## **SIEMENS**

# FDE SIMATIC FDE Gateway

**Operating Instructions** 

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#### Legal information

#### Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

#### DANGER

indicates that death or severe personal injury will result if proper precautions are not taken.

#### **A**WARNING

indicates that death or severe personal injury may result if proper precautions are not taken.

## **A**CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

#### NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

#### **Qualified Personnel**

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

#### **Proper use of Siemens products**

Note the following:

#### **A**WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

#### **Trademarks**

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#### **Disclaimer of Liability**

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

## **Preface**

#### Preface

The following operating instructions contain all the required information required for commissioning and operating a device from the SIMATIC family.

## Basic knowledge required

A prerequisite for understanding this manual is knowledge of how to use a PC. Basic knowledge of automation technology as well as IoT technologies is also recommended.

#### Scope of this document

These operating instructions apply to the SIMATIC FDE Gateway device.

MLFB 6ES7617-0AA00-0AB0

#### **FDE** conventions

The following generic terms are used in this documentation:

Generic term	Specific designation
Device	SIMATIC FDE Gateway
BFCG	Brownfield Connectivity Gateway

#### **Change directory**

The following versions of these operating instructions have been published:

Edition	Comment
10/2022	First edition
07/2023	Modified technical data

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Siemens Industry Online Support

You can find current information on the following topics quickly and easily here:

#### • Product support

All the information and extensive know-how on your product, technical specifications, FAQs, certificates, downloads, and manuals.

#### • Application examples

Tools and examples to solve your automation tasks – as well as function blocks, performance information and videos.

#### Services

Information about Industry Services, Field Services, Technical Support, spare parts and training offers.

#### • Forums

For answers and solutions concerning automation technology.

#### mySupport

Your personal working area in Industry Online Support for messages, support queries, and configurable documents.

This information is provided by the Siemens Industry Online Support in the Internet (https://support.industry.siemens.com).

Introduction

## 2.1 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit (https://www.siemens.com/industrialsecurity).

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customers' exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed visit (https://www.siemens.com/cert).

## 2.2 IT security on the northbound side

Ensure sufficient IT security on the northbound side. "Control activities" have a special risk.

We urgently recommend not making the web interface available at any location other than at the production network.

#### Note

#### Proper user administration required

Select one dedicated access token / login information per device.

Overview of the technical documentation

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The documents listed below are a selection to support you with the planning, installation, and commissioning, up to the analysis of your application. For more documents on other hardware or specific information, please visit SIEMENS SiePortal. (https://sieportal.siemens.com/)

## 3.1 Brownfield Connectivity Gateway

Brownfield Connectivity is a service designed to establish a connection between the production network and higher-level information systems. BFC is integrated into the structural framework of an existing software and architecture concept, the so-called brownfield. You can use the central BFC Gateway to connect SINUMERIK control systems, external control systems, and automation technology for which there is currently no Siemens standard solution to higher-level systems. The system offers extensive options for internal adaptation to custom-specific requirements.

For a detailed BFC Gateway Function Manual, see:

Brownfield Connectivity Gateway (https://support.industry.siemens.com/cs/ww/en/view/109801700/)

## 3.2 SIMATIC products

You can find an overview of the SIMATIC documentation available in Siemens Industry Online Support here:

Industry Online Support International (https://support.industry.siemens.com/cs/ww/en/view/109742705)

## 3.3 SINAMICS products

SIMATIC FDE Gateway enables connection to the following drives:

- SINAMICS V20
- SINAMICS G110M
- SINAMICS G120 series (except G120D)
- MICROMASTER 420/430/440

The connection is established via USS/RS232.

## SINAMICS G120C low voltage converter

#### **Getting Started**

The Getting Started is a condensed compilation of all the information required for the normal and safe operation of the converter.

#### **Operating instructions**

The operating instructions also contain information for special applications. Since sound prior knowledge of the configuration and parameter assignment of these applications can be assumed, the information is given in a concise form. This applies, for example, to operation with fieldbus systems.

#### List Manual

The List Manual contains a detailed description of all parameters and a series of function charts as well as error and alarm messages.

#### **MICROMASTER 440 frequency converter**

#### **Operating instructions**

The operating instructions provide information about characteristics of the MICROMASTER 440 as well as the installation, commissioning, control modes, system parameter structure, troubleshooting, technical specifications, and options.

#### Parameter list

The parameter list contains a detailed description of all parameters, ordered by function. It also contains a series of function charts as well as error and alarm messages.

#### **MICROMASTER 430 frequency converter**

#### Operating instructions

The operating instructions provide information about characteristics of the MICROMASTER 430 as well as the installation, commissioning, control modes, system parameter structure, troubleshooting, technical specifications, and options.

#### Parameter list

The parameter list contains a detailed description of all parameters, ordered by function. In addition, the parameter list contains function charts with graphical representations of the converter functions.

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#### 3.3 SINAMICS products

#### **MICROMASTER 420 frequency converter**

#### **Operating instructions**

The operating instructions provide information about characteristics of the MICROMASTER 420 as well as the installation, commissioning, control modes, system parameter structure, troubleshooting, technical specifications, and options.

#### Parameter list

The parameter list contains a detailed description of all parameters, ordered by function. In addition, the parameter list contains function charts with graphical representations of the converter functions.

#### SINAMICS V20 frequency converter

#### **Operating instructions**

The operating instructions contain information on the installation, commissioning, operation, and maintenance of the SINAMICS V20 frequency converter.

Installing and connecting a device

## 4.1 Scope of supply

#### **Supplied components**

The following components are included in the scope of supply of the SIMATIC FDE Gateway with article number 6ES7617-0AA00-0A:

- 1 x complete unit SIMATIC FDE Gateway
- 1 x 10-pin connecting terminal X4

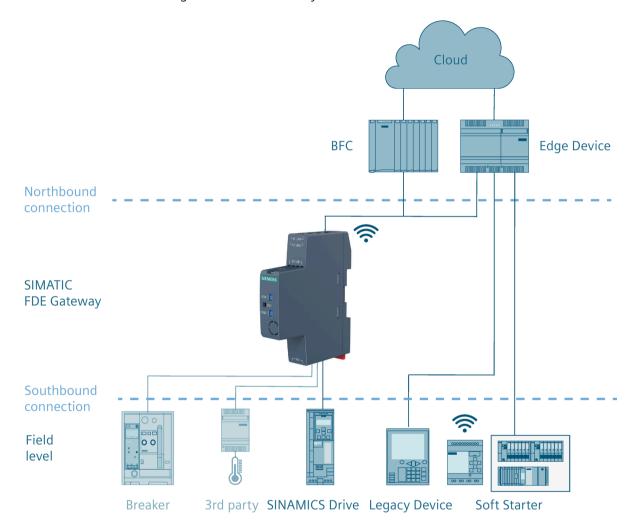
## 4.2 Information on the software license

#### Third-party software

SIMATIC FDE Gateway contains open-source software and/or other third-party software. Copyright © SIEMENS, 2023, and licensor. All rights reserved. Parts contain open-source software. For more information, see the web user interface for configuring the device.

## 4.3 Description

The SIMATIC FDE Gateway is a flexible HW module for brownfield connectivity. The device allows the transfer of data from the field level to an edge device or to the cloud (northbound connection). It connects an RS232/USS device and digital and analog inputs/outputs via MQTT with edge devices and cloud systems.



SINAMICS Drive:

SINAMICS V20, SINAMICS G110M, SINAMICS G120 series (except G120D), MICROMASTER 420/430/440

The device offers the following functionality:

- Browser-based user interface for configuration and for viewing the device configuration
- MQTT northbound

#### Note

The SIMATIC FDE Gateway cannot check the data integrity of southbound interfaces.

#### **Properties**

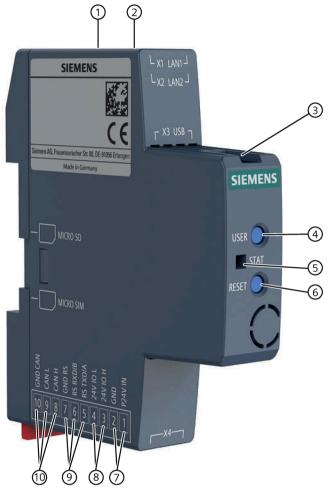
- 2 x Industrial Ethernet interface 100 Mbps
- 1 x combined digital input/analog input 1–10 V or 0–20 mA or 1 x digital output
- 1 x RS232 interface: Can be connected to the following SINAMICS devices via USS and the RS232 hardware interface:
  - SINAMICS V20
  - SINAMICS G110M
  - SINAMICS G120 series (except G120D)
  - MICROMASTER 420/430/440
- Wi-Fi: Northbound connection or for configuration via a local access point

#### Main characteristics

- Comprehensive interface set
- CE conformity
- Low-limitation, local processing power
- Simple installation plug & play
- Open, encrypted Cloud/IoT interface (MQTT 3.1.1)

## 4.4 Device design

The following figure shows the design of the SIMATIC FDE Gateway, with interfaces:



- ① Ethernet interface LAN1: TCP/IP interface
- ② Ethernet interface LAN2: TCP/IP interface
- 3 USB Micro-A
- 4 USER button
- ⑤ LED display

- 6 RESET button
- Connection for power supply (24 V DC power supply unit)
- (a) IO H, IO L for 24 V, for configurable DI/DO/AI (isolated)
- RS TXD/A, RS RXD/B, GND RS (isolated)
- (10) CAN H, CAN L, GND CAN (not used in current version)

## 4.5 Analog or digital input/output

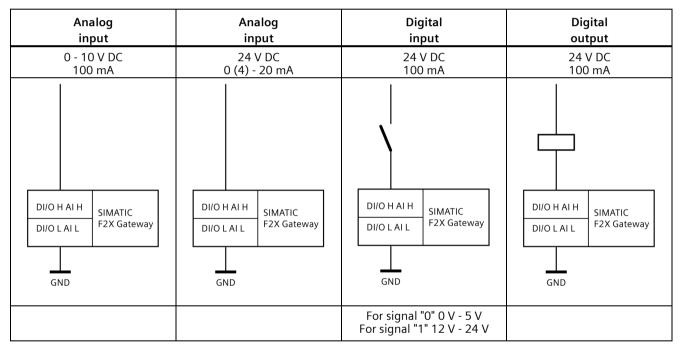
The device supports the following I/O functions:

- One configurable analog input/digital input/digital output (pins 3-4 of the X4 connector)
  - Analog input 0 10 V DC
  - Analog input 0 20 mA (4 20 mA)
  - Digital input 0 24 V DC (Type III input)
  - Digit output 24 V DC, 100 mA

The functionality depends on the configuration. The I/O is set by default to the digital input.

## Correct wiring of inputs/outputs

The variable I/O connection must be connected with circuitry that is intended for the configured behavior.



For connection to I/O, see section "Connecting interfaces to connecting terminal X4 (Page 21)".

## 4.6 Overview of operating modes

The LED display signals the following operating modes:

Operating mode	Color	
RUN	Illuminated green	
CONFIGURATION	Flashing yellow	

## 4.7 Changing the operating mode

Use the USER and RESET buttons to switch between operating modes:

Target operating mode	Action
RUN	Press the RESET button briefly or use the web user interface
CONFIGURATION	Keep the USER button pressed until the yellow LED flashes

#### Note

By pressing the RESET button, an unsaved configuration may be lost (24 V Off/On)

## 4.8 Preparing for the installation

- 1. When accepting a delivery, check the packaging for visible transport damage.

  If there is any transport damage at the time of delivery, make a complaint to the responsible forwarding company.
- 2. Unpack the device at its installation location.
- 3. Keep the original packaging in case you need to transport the device again.

#### Note

#### Damage to the device during transport and storage.

If a device is transported or stored without packaging, then shocks, vibrations, pressure, and moisture may affect the unprotected device. Damaged packaging is an indication that ambient conditions have already had a significant impact on the device.

The device may be damaged.

Do not dispose of the original packaging. Be sure to pack the device during transport and storage.

- 4. Check the contents of the packaging and the accessories for completeness and damage.
  - Device
  - DC connecting terminal, already plugged into the device.

5. If the package contents are incomplete or damaged, or do not correspond to your order, please immediately inform the responsible delivery company.



#### Risk of electric shock and fire due to device damage

A damaged device can carry dangerous voltage and trigger a fire in the machine or plant. A damaged device has unpredictable properties and states.

Death or serious injury can be the result.

Ensure that the damaged device is not installed and commissioned unintentionally. Label the damaged device correspondingly and keep it locked up. Send in the device so that it can be repaired as soon as possible.

#### NOTICE

#### Damage caused by condensation

If the device is exposed to low temperatures or extreme fluctuations in temperature (such as during cold weather) during transport, this may cause moisture to build up on or in the device (condensation).

Moisture may cause a short-circuit and damage the device.

Proceed as follows to prevent damage to the device:

Store the device at a dry location.

Let the device warm up to room temperature before commissioning.

Do not expose the device to direct heat radiation from a heater.

If condensation occurs, wait about 12 hours or until the device is completely dry before switching it on.

6. Make a note of the device's identification data.

## 4.9 Installing the device

#### 4.9.1 Mounting instructions

- The device is only approved for operation indoors.
- When installing in a control cabinet, observe the SIMATIC installation guidelines
   (<a href="https://support.industry.siemens.com/cs/ww/en/view/1064706">https://support.industry.siemens.com/cs/ww/en/view/1064706</a>) as well as the relevant DIN/VDE regulations or the respective country-specific regulations.

#### Secure mounting

The device is mounted horizontally on a DIN rail with a standard 35 mm profile.

## 4.9.2 DIN-rail mounting

#### **Distances**

Ensure that the following clearances to other components or enclosure walls are complied with:

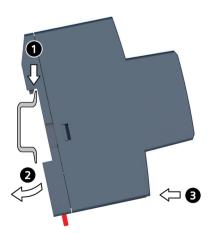
• Below the device: ≥ 50 mm

• Above the device: ≥ 50 mm

#### Mounting

#### Requirement

One 35 mm standard profile DIN rail is mounted at the installation location.



- 1. Place the device with the rail clamp on the marked position on the upper edge of the DIN rail and push the device downwards.
- 2. Swivel the rail clamp of the device from below over the DIN rail.
- 3. Press the device towards the DIN rail. The device snaps into place.

#### Removal

- 1. Press down on the red rail clamp with a screwdriver until the rail clamp releases the device.
- 2. Swivel the device away from the DIN rail.
- 3. Move the device upward and remove it.

## 4.10 Connecting the device

#### 4.10.1 Notes for connecting



## Danger caused by lightning

Lightning can enter power and data transmission cables and jump over to a person.

Lightning can cause death, serious physical injury, and burns.

Take the following precautionary measures:

- If a thunderstorm is approaching, disconnect the device from the electricity supply network in good time.
- Do not touch power or transmission cables during a storm.
- Maintain sufficient distance from electrical cables, distributors, systems, etc.

#### 4.10 Connecting the device

#### **NOTICE**

#### Malfunctions caused by I/O devices

The connection of I/O devices can lead to devices malfunctioning.

Injury to persons and damage to the machine or plant may result.

Take the following into account when connecting I/O devices:

- Read the documentation related to the I/O devices. Follow all instructions given in the documentation.
- Only connect I/O devices which are suitable for use in industrial environments according to EN 61000-6-2 and IEC 61000-6-2.
- Non-hot-pluggable I/O devices may only be connected when the device power supply is switched off.

#### NOTICE

#### Damage caused by feedback

Regenerative feedback of voltage to ground by a connected or installed component can damage the device.

Connected or installed I/O devices, for example, USB drives, must not feed any voltage into the device. Regenerative feedback is generally not permitted.

#### NOTICE

#### Ferrites required on USB cables

The immunity of the device in accordance with the specifications in the technical specifications is only ensured if the cables at the USB and micro-USB interfaces are equipped with a ferrite. Only use USB cables which have a ferrite attached.

#### Connecting the power supply

#### Note

The device may only be connected to a 24 V DC power supply that meets the requirements for safety extra-low voltage (SELV) according to IEC/EN/DIN EN/UL 61010-1.

The power supply must meet the requirements of NEC Class 2 or LPS according to IEC/EN/DIN EN/UL 60950-1.

#### Note

The power supply must be adjusted to match the connected loads of the device, see "Technical specifications (Page 48)".

In case of voltage peaks on the power supply lines, protective devices in the form of a varistor (MOV) UMOV = U-nom.  $\times$  1.2 (BLITZDUCTOR BVT AVD 24 (918 422) or equivalent) must to be used.

#### 4.10.2 Connecting interfaces to connecting terminal X4

#### **Connection capacity**

Connecting terminal X4 connects different interface types. The following aspects must be taken into account:

Conductor type	Minimum cross-section	Maximum cross-section
Solid conductor	0.25 mm <sup>2</sup>	1.5 mm <sup>2</sup>
Flexible conductor without end sleeve	0.25 mm <sup>2</sup>	1.5 mm <sup>2</sup>
Flexible conductor with ferrules, without plastic sleeve	0.25 mm <sup>2</sup>	1.5 mm <sup>2</sup>
Flexible conductor with ferrules, with plastic sleeve	0.25 mm <sup>2</sup>	0.75 mm <sup>2</sup>

The maximum length of cables to be connected to X4 is 3 m.

#### Note

#### Shielded cables

If cables with a shield are used, the shields must be connected to a ground connection in the system in which the device is used. This is in order to ensure EMC and EMI compatibility.

#### Pin overview of connecting terminal X4

The pin designations are also printed on the device.

Pin	Short description	Meaning	
1	SUPPLY 24V DC	24 V DC power supply	
2	SUPPLY GND	Ground for 24 V DC power supply	
3	DIO H/AI H	High/VCC for 24 V configurable digital DI/DO/AI (isolated)	
4	DIO L/AI L	Low for 24 V configurable digital DI/DO/AI (isolated)	
5	RS TXD/A	TxD pin for RS232	
6	RS RXD/B	RxD pin for RS232	

#### 4.10 Connecting the device

Pin	Short description	Meaning	
7	GND RS	Ground for RS232 communication	
8	CAN H	CAN is not used in the current version	
9	CAN L CAN is not used in the current version		
10	GND CAN	CAN is not used in the current version	

#### Connecting an interface

#### Requirement

- Use the supplied terminal
- Use cables which have the supported connection capacity
- Use slotted screwdrivers with a 3 mm blade

#### **Process**

- 1. Shut down the power supply
- 2. Identify the interface connections you want to connect
- 3. Connect all cables to the correct terminal sockets
- 4. Connect the terminal with the connection
- 5. Switch on the power supply unit

## 4.10.3 Connecting the power supply

The SITOP device 24 V/0.6 A (6EP3330-6SB00-0AY0) is intended for the power supply. The power supply is connected to the 10-pin spring contact on the underside of the device.

#### Note

The device may only be connected to a 24 V DC power supply that meets the requirements for safety extra-low voltage (SELV) according to IEC/EN/DIN EN/UL 61010-1.

The power supply must meet the requirements of NEC Class 2 or LPS according to IEC/EN/DIN EN/UL 60950-1.

#### Note

The power supply must be adjusted to match the connected loads of the device, see "Technical specifications".

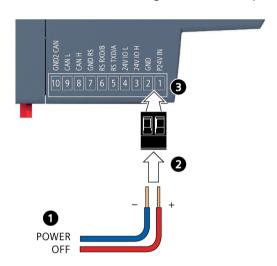
In case of voltage peaks on the power supply lines, protective devices in the form of a varistor (MOV) UMOV = U-nom.  $\times$  1.2 (BLITZDUCTOR BVT AVD 24 (918 422) or equivalent) must to be used.

#### Requirement

- The connecting terminal included in the scope of supply is used.
- A two-wire cable with a cross-section of 0.75 mm<sup>2</sup> to 2.5 mm<sup>2</sup>.
- Flat-head screwdriver with 3 mm blade.

#### **Procedure**

- 1. Turn off the power supply.
- 2. Connect the wires as shown to pins 1 and 2 of the 10-pin spring contact.
- 3. Connect the connecting terminal to the power supply connection.



## 4.10.4 Securing cables

To ensure strain relief, use cable ties or cable clamps to secure the connected cables to suitable fixing elements.

Make sure that the cables are not pinched by the cable ties or cable clamps.

#### 4.10.5 Connecting the converter

Connect the converter to pins 5–7 of the spring-loaded terminal.

You can connect a SIMATIC FDE Gateway to one of the following converters via the RS232 interface on the converter-specific module or control device:

- SINAMICS V20
- SINAMICS G110M
- SINAMICS G120 series (except G120D)
- MICROMASTER 420/430/440

#### 4.10 Connecting the device

Data transmission takes place via the "RS232 TXD" and "RS232 RXD" signals. The third "GND" insulated conductor is used as a shared ground potential.

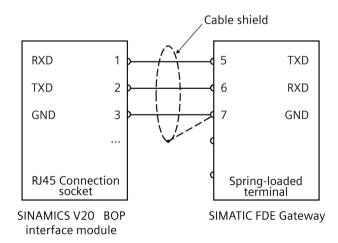
#### Interface assignment (converter side)

Converter	RS232 interface	Pin number	Signal name	Description
BOP interface module for		1	RXD	Receive data
SINAMICS V20		2	TXD	Transmit data
	8 1	3	GND	Signal ground
Power unit for	Optical I/O port interface 1)	2	RXD	Receive data
SINAMICS G110M	<b>5</b> 0	3	TXD	Transmit data
RS	RS232 interface of the fiber-optic cable 1)	5	GND	Signal ground
	<b>©</b> ::•••			
Control device for SINAMICS	<b>O</b> (: :)	2	RXD	Receive data
G120 series (except G120D)		3	TXD	Transmit data
		5	GND	Signal ground
PC converter connection mod-	<b>O</b> ()	2	RXD	Receive data
ule for MICROMASTER 420/430/440		3	TXD	Transmit data
420/430/440		5	GND	Signal ground

<sup>1)</sup> Connect the optical cable (article number: 3RK1922-2BP00) with the optical I/O port interface on the power unit for the RS232 communication.

#### Wiring example

The following SINAMICS V20 example shows the wiring between the converter and the SIMATIC FDE Gateway.



4.10 Connecting the device

#### Cable shield grounding:

The serial RS232 cable should be shielded. The shield should be connected to functional grounding at one end of the cable at least.

#### **GND** cable grounding:

Many masters do not have a shared connection. If this is the case, the RS232 mass should reference the same functional grounding as the master (at a single point). If the master has a shared connection, then the shared connection is connected with it and not connected to the functional grounding.

#### Note

When connecting the converter consider the following in order to achieve better EMC behavior:

- Use a shielded cable for RS232 communication between the converter and the device.
- Route the signal cable and the electric power cable separately in different cable ducts.

Software and commissioning

## 5.1 Establishing a connection to the device

The device starts automatically as soon as power is supplied.

The device is configured via the device web interface.

Connect via Wi-Fi to the access point fde gateway xxxxxx and go to https://192.168.4.1.

The SSID and KEY are specified on the nameplate of the device:

## **SIEMENS**

SIMATIC FDE Gateway 1P 6ES 7617-0AA0-0AB0

S T-P9000000

Supply: 24V, 150mA

Input: DI 24V DC or

AI 0-10V or AI 0-20mA Output: DO 24V DC, 0.1A

Ta: +0°C...+55°C

X1: 10:df:fc:10:c8:e0

X2: 10:df:fc:10:c8:e1

WiFi: 10:df:fc:10:c8:e2

SSID: fde\_gateway\_000000

Key: V2pcxyPT IP: 192.168.4.1

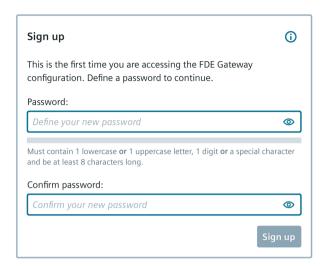
Siemens AG

Frauenauracher Str. 80, DE-91056 Erlangen

Made in Germany

The serial number (S), X1, X2, WiFi, SSID and key are device-specific.

The first time you log in, a registration window is displayed, prompting you to specify a password:



Choose a password and enter it twice in the form. Keep your password safe.

Click "Sign up". After successful registration you can connect to the device using your password. If the password is lost, the device has to be reset and reconfigured.

## 5.2 Device configuration

Log on to the device by entering your password:

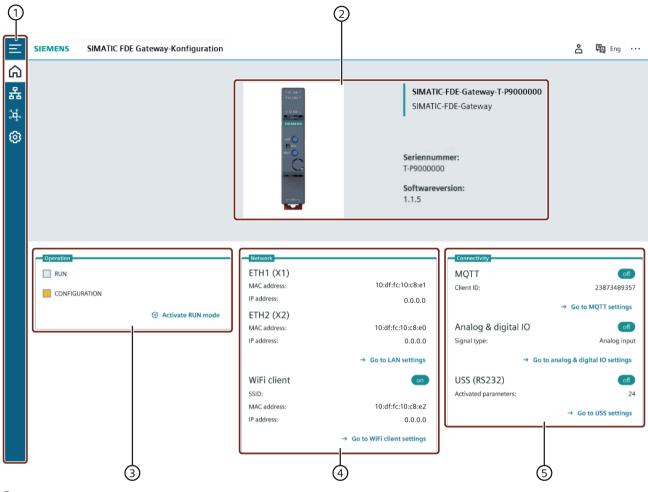


The start page appears.

#### 5.2 Device configuration

#### Start page

The start page provides information on the device and its current settings.



- 1 Menu
- 2 Information about the device
- ③ Operating mode settings
- 4 Network settings
- ⑤ Connectivity settings

## 5.3 Network settings

#### LAN settings

The data from the brownfield level is acquired via digital or analog input, or USS (RS232). This data is then transferred via LAN or Wi-Fi.

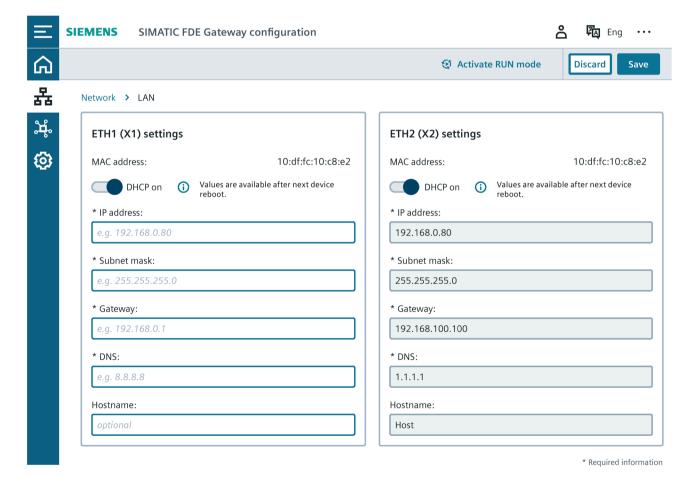
Under Network settings, set the parameters for the two Industrial Ethernet ports and for the Wi-Fi connection.

There are two ways to provide the IP address:

Automatically - DHCP on: An address is assigned to the Gateway via DHCP (Dynamic Host Configuration Protocol).

Manually: The parameters for both LAN ports are entered manually and, if necessary, specified together with the network administrator. The lines with asterisks must be completed.

The settings are only applied after a restart.



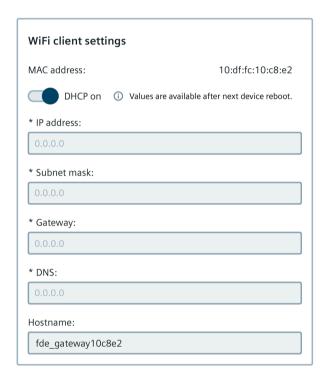
#### 5.3 Network settings

#### Wi-Fi settings

You can configure the northbound interface under Wi-Fi. The connection data for the configuration mode always corresponds with the data on the device nameplate. Switch on the Wi-Fi connection and fill out the parameters for the Wi-Fi connection in the Wi-Fi tab.



Complete the settings for the Wi-Fi client. Select a Wi-Fi network with good signal strength.



During operation, the connection to a cloud/Internet connection can be set.

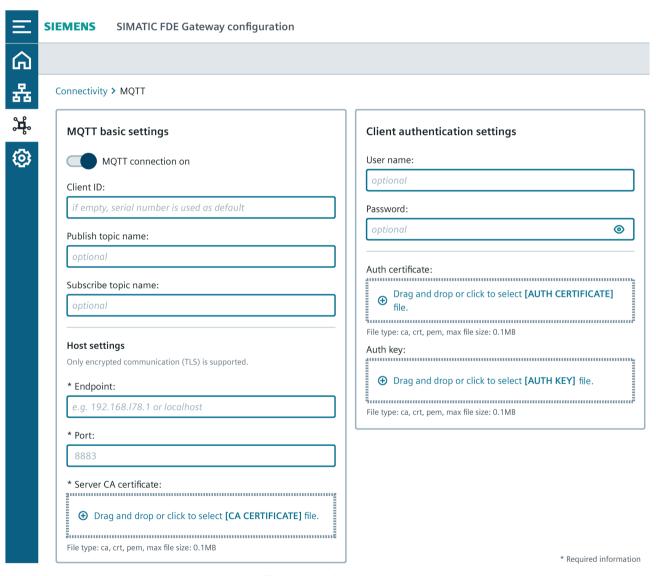
## 5.4 Connectivity settings

You can set the following parameters under Connectivity:

- · MQTT parameter
- · USS parameters
- · Analog or digital input or output

#### **MQTT** settings

Fill in the parameters for the MQTT basic setting in the MQTT tab.



Client ID: Uniquely identifies MQTT clients at the MQTT broker

Publish topic name: Each sent MQTT message is assigned to this topic

Subscribe topic name: MQTT messages to this Gateway are expected at this topic

#### 5.4 Connectivity settings

Endpoint: The address of the MQTT broker

Port: The port of the MQTT broker

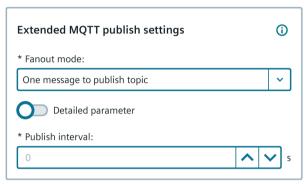
Server CA certificate: Public certificate from the Certificate Authority (ca.crt)

**User name:** User name that was specified in the broker **Password:** Password that was specified in the broker

For optional authentication of the client, you can use user name and password and/or certificates.

You can set the fanout mode and the Publish interval to suit your requirements.

Select one of the three options:



\* Required information

Fanout mode: Setting of the topic subdivision in the MQTT payload

- One message to publish topic
- One message per interface to subtopic
- One message per interface and parameter to subtopic

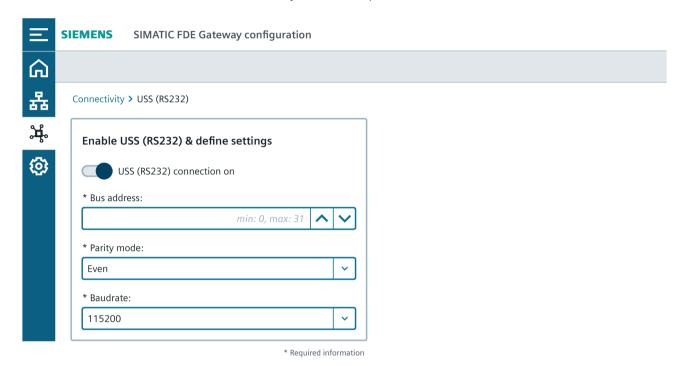
**Detailed parameter off**: Sets whether each parameter also displays the data type.

**Publish interval**: Sets the time period in which the MQTT payload is sent. At a value of 0 the interval is approximately 1 second. All other times can be set, for example: 5 s, 10 s, etc.

You can find examples of payloads with parameters in section MQTT payload examples (Page 38).

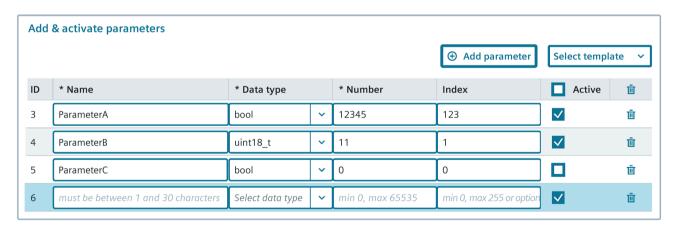
#### **USS** parameters

Enable the USS connectivity and set the parameters in the USS (RS232) tab.



Click "Add parameter". A parameter with name, data type, number, and index can then be inserted.

Added and activated parameters are read out via USS. Deactivate the check box in the corresponding line to disable the parameter.



You can find detailed information on the available parameters, data types, numbers, and indexes in the Product Information for your converter.

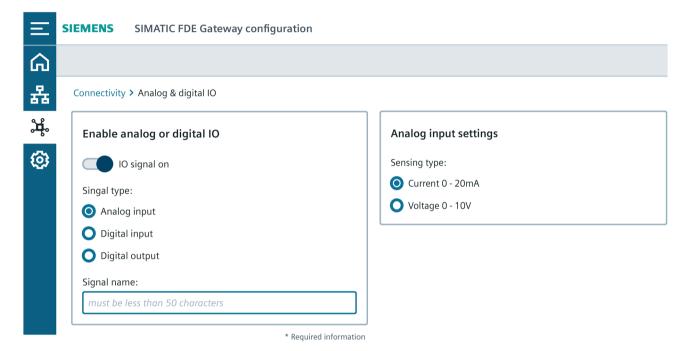
You can also select a template valid for G120 via "Select template".

#### 5.4 Connectivity settings

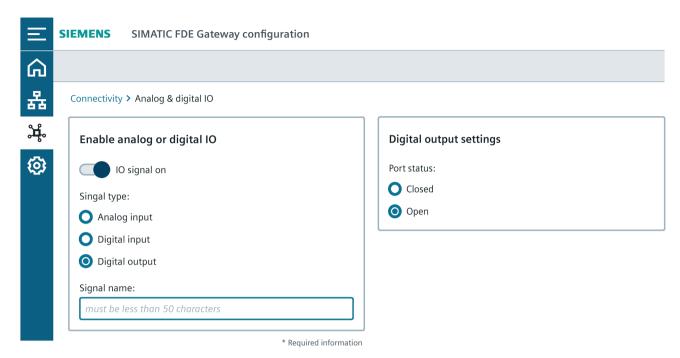
#### Enable analog or digital I/O

The configurable I/O (pins 3-4 of the X4 connecting terminal) are set to the digital input by default. You can set analog input and digital output parameters in the "Analog & digital I/O" tab.

To set the analog input, select the signal type "Analog input" and the desired sensing type (current 0 - 20 mA or voltage 1 - 10 V).



To set the digital output, select the signal type "Digital output" and the desired port status (Closed or Open).

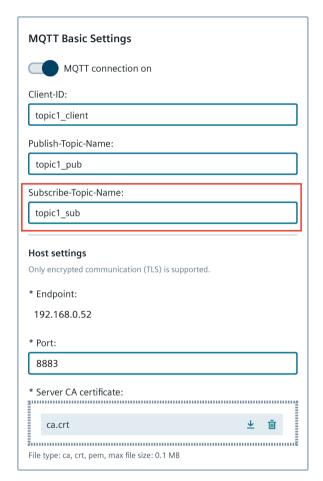


Correct wiring of inputs and the output are described in the chapter "Digital or analog input, digital output (Page 15)".

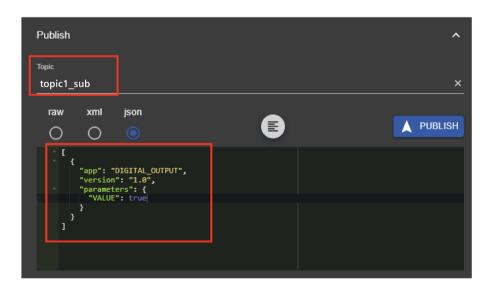
#### 5.4 Connectivity settings

#### Settings of the Digital\_Output application via MQTT protocol

A Subscribe topic name is assigned under Connectivity/MQTT. Under this topic you can change the values of the DIGITAL\_OUTPUT application, e.g.:



Publish desired change to the application DIGITAL OUTPUT:



The publish topic name must match the previously set subscribe topic name in the SIMATIC FDE Gateway.

The following payload in the JSON format shows how the settings can be changed:

```
[
    "app": "DIGITAL_OUTPUT",
    "version": "1.0",
    "parameters": {
        "VALUE": true
    }
}
```

The VALUE value can be changed.

# 5.5 MQTT payload examples

This section contains MQTT payload examples. Here you can see parameters which were specified in the connectivity configuration and published via MQTT.

## Fanout mode: One message to publish topic

**Example: Setting detailed parameter: ON** 

```
[
  {
    "app": "USS",
    "parameters": {
      "Parameter1": {
        "value": 315.854,
        "type": "float"
      },
. . .
      "STATUS": {
        "value": 0,
        "type": "int32 t"
      "STATUS INFO": {
        "value": "{}",
        "type": "string"
      },
      "TIMESTAMP MS": {
        "value": "1663312002231",
        "type": "string"
      },
      "READOUT MS": {
        "value": 35,
        "type": "uint32 t"
      }
    }
  }
]
```

```
Example setting detailed parameter: OFF
[
          "app": "USS",
          "parameters": {
                "Parameter1": 315.254,
...

"STATUS": 0,
          "STATUS_INFO": "{}",
          "TIMESTAMP_MS": "1663313457709",
          "READOUT_MS": 35
          }
     }
}
```

# **Example setting: Digital input only**

```
[
    "app": "DIGITAL_INPUT",
    "parameters": {
        "SIGNAL_NAME": {
            "value": "digital_input_signal",
            "type": "string"
        },
        "VALUE": {
            "value": 1,
            "type": "int8_t"
        }
    },
}
```

## Explanation

The value under "VALUE" corresponds to the state of the digital input:

- Value: 1: Input voltage.
- Value: 0: No input voltage.

5.5 MQTT payload examples

## **Example setting: Digital output only**

If only the digital output is activated, the state corresponds to the published value of the DIGITAL\_OUTPUT application.

### Example only analog input current (0-20mA): active

```
{
  "app": "ANALOG INPUT",
  "parameters": {
    "SIGNAL NAME": {
      "value": "analog input voltage",
      "type": "string"
    },
    "RAW VALUE": {
      "value": 4057,
      "type": "uint32 t"
    } ,
    "MA VALUE": {
      "value": 20,
      "type": "float"
    },
    "MV VALUE": {
      "value": 0,
      "type": "float"
    }
  }
}
```

#### **Explanation**

The value under "MA\_VALUE" is output directly in mA.

Operating Instructions, 02/2023, A5E52308942-AB

# Analog input voltage active

```
{
  "app": "ANALOG INPUT",
  "parameters": {
    "SIGNAL NAME": {
      "value": "analog input voltage",
      "type": "string"
    },
    "RAW VALUE": {
      "value": 451,
      "type": "uint32 t"
    },
    "MA VALUE": {
      "value": 0,
      "type": "float"
    },
    "MV VALUE": {
      "value": 8185.19,
      "type": "float"
    }
  }
},
  "app": "USS",
  "parameters": {
```

### **Explanation**

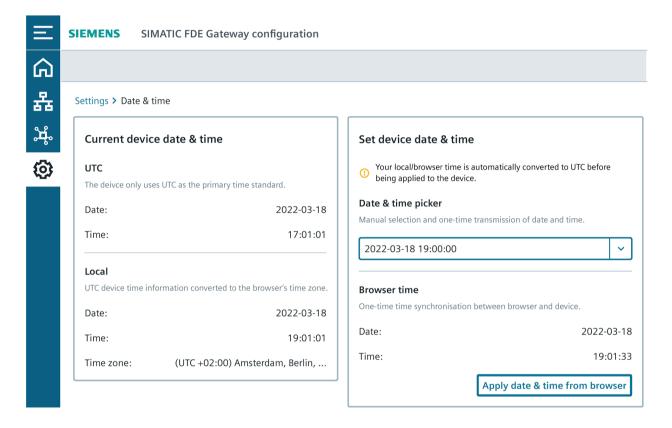
The value under "MV\_VALUE" is entered directly in mV

5.6 Date and time setting

# 5.6 Date and time setting

#### Date & time

The time configured in the device always corresponds to UTC as the primary format. This time can be selected manually or applied from the web browser:

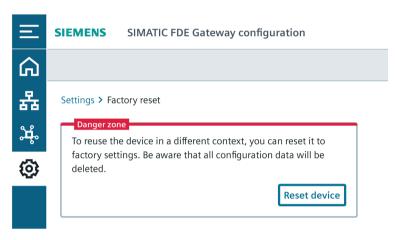


# 5.7 Factory settings, system upgrade

#### Resetting the device to the factory settings

It is possible to reset the device to the factory settings. Note that all configuration data is deleted in the process. Press and release the user button (X11) 5 times within 10 seconds to reset the Gateway to the factory settings.

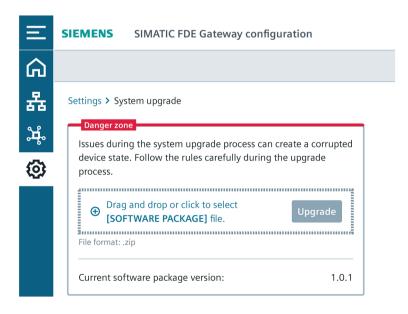
Factory settings can also be set via the web user interface:



If the password has been forgotten, it can be reset through a reset to the factory settings.

### System upgrade

Any updated software versions are available in the Sie-Portal (<a href="https://sieportal.siemens.com/">https://sieportal.siemens.com/</a>). You can update the software via the configuration interface:



# 5.7 Factory settings, system upgrade

Observe the notes which appear during the process.

#### Note

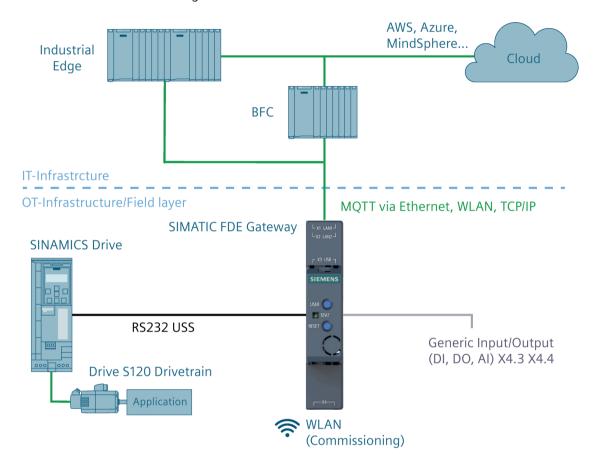
To avoid damage during the system upgrade, follow these rules:

- Ensure that the device is connected to a stable 24 V power supply.
- Do not close or refresh the website.
- Ensure that your client is always connected to the SIMATIC FDE Gateway hotspot. Do not leave the area.

# 5.8 Settings for operation on the BFC Gateway

The Brownfield Connectivity Gateway enables the installation of applications such as BFC Analytics. This app offers a solution for visualizing data and machine tool-related KPIs which provide information about the production and machines states.

The following figure shows a use case for connecting an FDE Gateway to a BFC Gateway when using G120/RS232.



### **Settings**

The device is in the "Connect via UI" commissioning mode. Make all necessary configurations for the MQTT connection to the BFC on both sides:

- MQTT settings must be made on the FDE side.
- Insert the certificate and/or user name and password.
- The USS communication must be configured according to the converter and parameters must be specified manually or via a template (only valid for G120).
- The BFC Gateway settings and installation are described in the BFCG Function Manual (https://support.industry.siemens.com/cs/ww/en/view/109801700/).
- Middleware script must be inserted (internal mapping of the parameter values).

5.9 Settings for operation on the Industrial Edge device

#### Overview of system limits

By default, a BFC Gateway supports up to 60 connected clients (BFC devices).

Up to 50 data points are supported per BFC device, divided into "datasets".

The shortest interval for reading datasets is 200 ms.

#### Open BFC Gateway ports for incoming communication

Port	Туре	Protocol	Use	Encrypted	Description
22	TCP	SSH	Commissioning/ Updates	Yes	SSH access for commissioning and system updates
1883	TCP	MQTT	Commissioning	No	Standard MQTT port for commissioning BFC clients
4840	TCP	OPC UA	Data forwarding	Yes	Standard OPC UA server port. Used to present collected data.
8883	TCP	MQTT	Data acquisition	Yes	Standard MQTTS port for data acquisition from BFC clients
9876	TCP	HTTP	Commissioning	No	HTTP WebUI for commissioning the BFC Gateway
9877	TCP	HTTPS	Configuration & HTTP REST Client	Yes	HTTPS WebUI for configuring the BFC Gateway

Further setting options are described in the BFCG Function Manual (https://support.industry.siemens.com/cs/ww/en/view/109801700/).

# 5.9 Settings for operation on the Industrial Edge device

The Industrial Edge device enables you to install applications including IE Databus, IE Flow Creator, and IE MQTT Connector.

These apps offer solutions for visualizing data and machine tool-related KPIs which provide information about the production and machines states.

The Siemens Industrial Edge Hub (<a href="https://iehub.eu1.edge.siemens.cloud/">https://iehub.eu1.edge.siemens.cloud/</a>) platform also offers many pre-built apps. For example, the apps "Analyze MyDrives /Edge (<a href="https://support.industry.siemens.com/cs/ww/en/view/109800585">https://support.industry.siemens.com/cs/ww/en/view/109800585</a>)" or "Predictive Service Analyzer - Converter" were developed for monitoring the drive train.

#### Settings

Make all necessary configurations for the MQTT connection to Industrial Edge on both sides:

- MQTT settings must be made on the FDE side.
- Insert the certificate and/or user name and password.
- The USS communication must be configured according to the converter and parameters must be specified manually or via a template (only valid for G120).

The settings and the installation of the Edge applications are described in the Industrial Edge Management Operating Manual

(https://support.industry.siemens.com/cs/de/en/view/109780393)

Perform the following steps:

- Install the required apps (IE Databus, IE Flow Creator, IE MQTT Connector).
- Define the required network settings on the Edge device side.
- Generate the keys for the safe MQTT connection.

# 5.10 Settings for operation in MindSphere

The Siemens IoT-as-a-service solution MindSphere saves operating data and makes them accessible through digital applications so that you can make decisions on the basis of valuable factual information. One of these apps is the Predictive Service Assistance app which offers access via your tenant to all relevant service and asset data of the drive systems, such as pumps and fans.

## **Settings**

Make all necessary configurations for the MQTT connection to BFC and MindSphere on both sides:

- MQTT settings must be made on the FDE side.
- Insert the certificate and/or user name and password.
- Select a USS example template to obtain valid data.
- BFC Gateway and MindSphere settings and installation are described in the BFCG Function Manual (https://support.industry.siemens.com/cs/ww/en/view/109801700/).

**Technical specifications** 

6

# 6.1 Certificates and approvals

# 6.1.1 CE marking



The device complies with the guidelines listed in the following sections.

### **EU Declaration of Conformity**

The associated Declaration of Conformity is available on the Internet: Cert (https://support.industry.siemens.com/cs/ww/en/ps/16739/cert).

# 6.1.2 ISO 9001 - Certificate and SW license agreements

#### ISO 9001 certificate

The quality assurance system of our complete product creation process (development, production, and sales) fulfils ISO 9001 requirements,

as confirmed by TÜV (German Technical Inspectorate) Rheinland

### Software license agreements

If the device is supplied with installed software, you must observe the corresponding license agreements.

## 6.1.3 WEEE guideline

#### WEEE mark (European Union)



Disposal instructions; observe local regulations.

# 6.2 Directives and declarations

# 6.2.1 Electromagnetic Compatibility industrial area +A1:2011

# **Electromagnetic compatibility**

This product meets the requirements of the EU Electromagnetic Compatibility Directive 2014/30/EU.

The device is designed in accordance with the CE marking for the following areas of application:

Area of application	Requirement for		
	Interference emission	Immunity to interference	
Industrial area	EN 61000-6-4:2007 +A1:2011	EN 61000-6-2:2005	

### 6.2.2 ESD guideline

#### What is ESD?

An electronic module is equipped with highly integrated components. Due to their design, electronic components are highly sensitive to overvoltage and thus to electrostatic discharging. Such electronic components or modules are marked as electrostatic sensitive devices.

The following abbreviations are commonly used for electrostatic sensitive devices:

- ESD Electrostatic-sensitive device
- ESD Electrostatic Sensitive Device is the common international designation

Electrostatic-sensitive devices can be labelled with the corresponding icon.



#### NOTICE

#### Damage of ESD through contact

Electrostatic-sensitive devices (ESDs) can be destroyed by voltages well below the threshold of human perception. If you don't discharge yourself electrostatically beforehand, just touching a component or electrical connector is sufficient to cause such voltages.

The damage that occurs to a component due to overvoltage is often not immediately detectable, but may only be noticed after a longer operating time. The consequences are unpredictable, and range from unforeseeable malfunctions to total failure of the machine or plant.

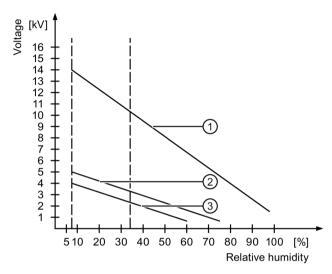
It is essential to avoid touching components directly. Make sure that personnel, workstations, and packaging are properly grounded.

#### 6.2 Directives and declarations

# Charging

Any person who is not conductively connected to the electrical potential of their surroundings can accumulate an electrostatic charge.

Of particular importance is the material with which the person comes into contact. The figure below shows the maximum values of the electrostatic voltages with which a person can be charged, depending on air humidity and material. These values correspond to the specifications of IEC 61000-4-2.



- Synthetic material
- ② Wool
- (3) Antistatic material such as wood or concrete

#### **NOTICE**

#### **Observe grounding**

If no grounding is available, then no equipotentiality can be achieved. Electrostatic charges are not discharged and damage to the ESD may occur.

Protect yourself against electrostatic discharging. When handling ESDs, make sure that personnel and workstations are properly grounded.

### Protection against electrostatic discharging

- Always disconnect the power supply before installing or removing modules which contain ESDs.
- Ensure sufficient grounding:
  - When handling electrostatic sensitive devices, make sure that personnel, workstations, devices, tools, and packaging are properly grounded. This prevents static charging.
- Avoid direct contact:
  - As a general rule, do not touch electrostatic sensitive devices, except in the case of unavoidable maintenance work.
  - Handle the assemblies at the edge so that you do not touch any connection pins or conductor paths. In this way, the discharge energy does not reach and damage any sensitive components.
  - Discharge your body electrostatically before taking module measurements by touching grounded metallic objects. Only use grounded measuring devices.

Technical specifications

# 7.1 General technical specifications

## General technical specifications

Article number	6ES7617-0AA00-0AB0
Weight without mounting bracket	50 g
Supply voltage <sup>1</sup>	24 V DC, no electrical isolation
Current consumption	Max. 5 W
Noise emission	<40 dB (A) according to DIN 45635-1
Degree of protection	IP20 according to IEC 60529
Quality assurance	According to ISO 9001

The device may only be connected to a power supply in accordance with the requirements of safety extra low voltage (SELV) as specified in IEC/EN/DIN EN/UL 60950-1. The power supply must meet NEC Class 2 or LPS requirements according to IEC/EN/DINEN/UL 60950-1.

#### **Interfaces**

LAN interface X1 P1, RJ45 <sup>1</sup>	10/100 Mbit
LAN interface X2 P2, RJ45 <sup>1</sup>	10/100 Mbit (supports Auto-MDIX)
RS232	
Wi-Fi	2.4 GHz for configuration
	2.4/5 GHz for northbound connection

<sup>&</sup>lt;sup>1</sup> For unambiguous labeling, the LAN interfaces are numbered on the enclosure. The operating system numbering may differ.

### **Electromagnetic compatibility**

Immunity with regard to conducted disturbance variables on the power supply cables	± 2 kV according to IEC 61000-4-4; burst ± 1 kV according to IEC 61000-4-5; surge asymmetric
Immunity on signal cables	± 1 kV according to IEC 61000-4-4; burst; length < 30 m ± 2 kV according to IEC 61000-4-4; burst; length > 30 m ± 2 kV according to IEC 61000-4-5; surge; length > 30 m
Immunity against static electric discharge	± 4 kV contact discharge according to IEC 61000-4-2 ± 8 kV air discharge according to IEC 61000-4-2
Immunity against radiofrequency radiation	10 V/m, 80 MHz 1 GHz, 80% AM according to IEC 61000-4-3 3 V/m, 1.4 2 GHz, 80% AM according to IEC 61000-4-3 1 V/m, 2 2.7 GHz, 80% AM according to IEC 61000-4-3 10 V, 150 kHz 80 MHz, 80% AM according to IEC 61000-4-6

If there are voltage peaks on the power supply lines, use a protective device in the form of a varistor (MOV)  $UMOV = Urated \times 1.2$  (BLITZDUCTOR BVT AVD 24 (918 422) or compatible).

<sup>&</sup>lt;sup>2</sup> Lower supply voltage reduces buffer times.

# 7.2 Ambient conditions

## **Climatic ambient conditions**

Temperature values have been tested according to IEC 60068-2-1, IEC 60068-2-2, and IEC 60068-2-14.

Ambient air temperature			
Operation	0 55 °C		
Transport/storage	-20 70 °C		
Gradient			
Operation	Max. 10 °C/h		
Storage	20 °C/h, no condensation		
Relative humidity, tested acco	ording to IEC 60068-2-78, IEC 60068-2-30		
Operation	5 85% at 30 °C, no condensation		
Transport/storage	5 85% for 25/55 °C, no condensation		
Barometric air pressure			
Operation	1080 795 hPa, corresponds to an altitude of –1,000 2,000 m		
Transport/storage	1080 660 hPa, corresponds to an altitude of –1,000 3,500 m		

## Mechanical environmental conditions

Vibration resistance, tested according to IEC 60068-2-6		
<ul> <li>Operation</li> </ul>	Operation Vibration load 1 g, 10 cycles per axis:	
	• 5 8.4 Hz, deflection 3.5 mm	
	• 8.4 200 Hz, acceleration 9.8 m/s <sup>2</sup>	
Transport/storage	• 5 8.4 Hz: Deflection 3.5 mm	
	• 8.4 500 Hz: Acceleration 9.8 m/s <sup>2</sup>	
Shock resistance, tested according to IEC 60068-2-27		
Operation	150 m/s², 11 ms	
Transport/storage	250 m/s <sup>2</sup> , 6 ms	

**Dimension drawings** 



# A.1 Dimension drawings

The following figures show the dimension drawings of the FDE Gateway device. All dimensions are in mm.

