Honeywell

enCore Device Series

FC1, MC1

Manual
Operating Instructions

FC1-OI-EN q 2022-12-21 Published with Basic System 03-41-A

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Contents

1 General information

1.1 The enCore/enSuite concept

enCore is the name of an Elster product platform for advanced measurement devices. All enCore devices are based on the same hardware components and software concepts. Both the hardware and software of enCore devices have a modular design; the configuration of the process board equipment is variable, just like the arrangement of software components. On one hand, the software components consist of basic functionalities which are provided by the Basic System with its **S**ystem **F**unction **B**locks (abbreviated as: SFBs) and on the other hand it consists of application-related functionalities which provide the various **A**pplication **F**unction **B**locks (abbreviated as: AFBs). Owing to this modular design principle, each device can be optimally adapted to individual requirements.

The enCore FC1 belongs to the enCore Flow Computer device series (in short: enCore FC). This series comprises several different device types that are used as industrial process computers for special tasks for measuring gas and liquids. It depends on the individual device type which functions a device supports in detail.

enSuite is the name of the PC software supporting all enCore devices along with a number of other Elster devices. The enSuite software provides tools for configuration, parameterization, diagnosis, software downloads and other services.

Parameterization in enSuite, transfer to the device

Changes that you have made in enSuite to the parameterization only become active in the device when you execute the action **Transfer parameterization to device** and after the enCore FC device has been automatically restarted.

➪ enCore manual “Configuring the Device with enSuite”

1.2 Scope of delivery

	enCore FC1	enCore MC1
enCore device:		
Electronic Flow Computer enCore FC1	✓	–
Electronic Flow Computer enCore MC1	–	✓
confirmation of conformity	✓ [1]	–
factory test protocol	✓ [2]	(✓)[3]
dispatch list/delivery note	✓	✓
printed manuals:		
"Instructions for Use in Legal Metrology" (*FC1 only*)	✓	–
"Operating Instructions"	✓	✓
USB cable Type A/B	✓	✓
accessories (plugs incl. housing)	✓	✓

Keep printed manual(s) in immediate vicinity of device

The "Operating Instructions" and - for use in legal metrology additionally - the applicable manual for "Instructions for Use in Legal Metrology" are an integral part of the product and supplied with the device in printed form.

Keep these documents in the immediate vicinity of the enCore FC for use by qualified personnel of the Notified Bodies as well as by installation, operating, maintenance and cleaning personnel at all times.

1 Only for devices used in legal metrology.

2 Only for devices that are not used in legal metrology.

3 optional

1.3 Check for new product releases on Honeywell website

The Honeywell website provides the most up-to-date product releases for Elster Gas device series. You can download the latest enCore and enSuite versions in the download section.

process.honeywell.com/us/en/site/elster-instromet/support#software-downloads

The change history informs about new functions, improvements, bug fixes and fixed security issues. The software history is available as a PDF file for product releases since 2020 in the download area of the respective device type.

The change history also lists the related manuals of a product release.

Which manuals are relevant for previous device firmware versions?

Only the latest manuals are available in the Docuthek. If you are using an older firmware version, you can look up the manuals for each version in the change history since 2020 on the Honeywell website.

process.honeywell.com/us/en/site/elster-instromet/support#software-downloads

2 About this manual

The present documentation are the "Operating Instructions" of the overall documentation, and describe the assembly, installation, commissioning and maintenance of the flow computer enCore FC series (called enCore FC below).

These instructions enable you to work with the enCore FC in a safe and efficient manner.

Compliance with all the safety and handling instructions specified in these "Operating Instructions" is a prerequisite to working with the enCore FC in a safe manner and using it properly, and for obtaining accurate measurement and calculation results.

In addition, compliance is also necessary with the guidelines, standards, local accident prevention regulations and general safety regulations that apply for the enCore FC's area of application.

For an overview of the relevant enCore manuals, refer to ➪ 12.9 enCore FC manuals at a glance (p. 146).

The illustrations in this manual serve to depict the facts that are being explained, and therefore may differ from the actual design of the enCore FC depending on the configuration of the device and enSuite.

The data and material properties that are presented below are guidelines. They must be reviewed for each individual case and corrected if required.

2.1 Target group definition

The present documentation is directed to qualified electricians in the fields of switch cabinet construction and maintenance, as well as qualified personnel with specialized knowledge in device assembly and commissioning.

The qualifications for different areas of activity are listed below:

- trained individual
  A person, who has been instructed by the plant operator in an informational session on the tasks assigned to him or her, and on possible hazards in case of improper behavior.
- specialist personnel
  A person who has the ability, because of his or her technical training, knowledge and experience, as well as his or her knowledge of the relevant regulations, to carry out the work assigned to him or her at the enCore FC, and to recognize and avoid possible hazards independently.
- gas specialist
  A person who has the ability, because of his or her technical training, knowledge and experience, as well as his or her know-ledge of the relevant standards and regulations, to carry out work in gas systems, and to recognize possible hazards independently. A gas specialist receives training for the specific location in which he or she works, and is acquainted with the relevant standards and regulations.
- qualified electrician
  A person who has the ability, because of his or her technical training, knowledge and experience, as well as his or her know-ledge of the relevant standards and regulations, to carry out work in electrical systems, and to recognize and avoid possible hazards independently. A qualified electrician receives training for the specific location in which he or she works, and is acquainted with the relevant standards and regulations.

Additionally for devices in legal metrology:

- authorized metrology expert
  A person who has the ability and is authorized, because of his or her technical training, knowledge and experience, to carry out legally relevant tasks in gas systems within the scope of legal metrology. An authorized metrology expert is acquainted with the relevant standards and legal regulations that apply in specific countries.
  In the European Union, the legally relevant tasks are executed by designated notified bodies.

2.2 Limitation of liability

All specifications and instructions in these Operating Instructions were compiled after taking into consideration the applicable standards and regulations, the current state of the art and the knowledge and experience we gained over the years.

The manufacturer assumes no liability for loss due to:

- non-compliance with these Operating Instructions
- unintended use
- use of the device by non-instructed personnel
- unauthorized device modifications
- technical changes
- use of non-authorized replacement parts

The actual scope of delivery may differ from the explanations and descriptions included here in case of special device designs, the use of additional order options or because of the latest technical changes.

The obligations arranged in the delivery contract apply, as do the General Terms and Conditions, manufacturer delivery conditions and current legal regulations that apply at the time the contract was concluded.

Read through these Operating Instructions carefully before beginning any work to and with the enCore FC, especially before commissioning the device!

The manufacturer assumes no liability for loss and malfunctions that result from non-compliance with these instructions.

We reserve the right to make technical changes within the scope of improving performance characteristics and continuous development of the device.

2.3 Applicable standards and guidelines

The construction, production and operation of the enCore FC is based on the following standards and guidelines: [1]

- EN 12405-1 [2]
  Gas meter – Conversion devices – Part 1: Volume conversion
- EN 61000-6-2
  Electromagnetic compatibility – Immunity for industrial environments
- EN 61000-6-3
  Electromagnetic compatibility – Emission standard for residential, commercial and light-industrial environments
- EN 60079-0
  Explosive atmospheres – Equipment – General requirements
- EN 60079-11
  Explosive atmospheres – Equipment protection by intrinsic safety "i"
- EN 60079-17
  Explosive atmospheres – Electrical installations inspection and maintenance
- EN 60079-25
  Explosive atmospheres – Intrinsically safe systems

1 Further applicable standards and guidelines result from the specific fields of application of the individual device.

2 Only applies to converters of the enCore FC series.

3 Security considerations for your network

enCore devices are used in modern accounting infrastructures and network control technology with the task of transmitting process information such as counters, measurements, and messages to an accounting center or control station. Such a connection represents a significant security risk and therefore careful consideration must be given to the design.

Reporting a security issue to Honeywell

As soon as you encounter a possible security gap of a Honeywell product, please report it directly to Honeywell.

⇨ 12.6 How to report a security vulnerability (p. 144)

3.1 Enforce a strong password policy

There are different attacks on passwords today, so you should follow the best practices for managing your passwords. Here are some best practices:

- Always change default passwords.
- Choose strong passwords
  Use a combination of uppercase and lowercase letters, numbers, and special characters when assigning a password. In addition, protection increases with the password length. A strong password consists of at least 8 characters.
- Change passwords on a regular basis.
- Change passwords immediately in case someone has tried to attack the system.

Document deviations of the best practices

If the system does not allow one of the best practices to be followed this should be documented. For example: maybe you do not allow the special character "=" in the password.

Assign passwords

enCore devices are delivered with standard users without password. We recommend to assign passwords for administrator and all main users during commissioning.

3.2 Preventing unauthorized external access

To reduce the risk to your network, we highly recommend to include a firewall or some other mechanism to limit the network traffic between the (external) central accounting center resp. control station and the (internal) network for example of the gas measuring plant in a target manner. In addition, enCore devices should only be installed where access control is guaranteed, i.e., where protective measures are taken to prevent unauthorized persons from gaining physical access to the device.

Furthermore, we recommend to allow protocols and ports only that are actually used for data exchange with the external network, for example, by adding these to the white list of the firewall and allow data exchange with trusted participants only (⇨ 10.4.1 Supported data protocols, p. 133).

To avoid a (temporary) shutdown of the LAN interface due to an unintended packet overload, limit the packet rate to a value you expect during normal operation.

For example:

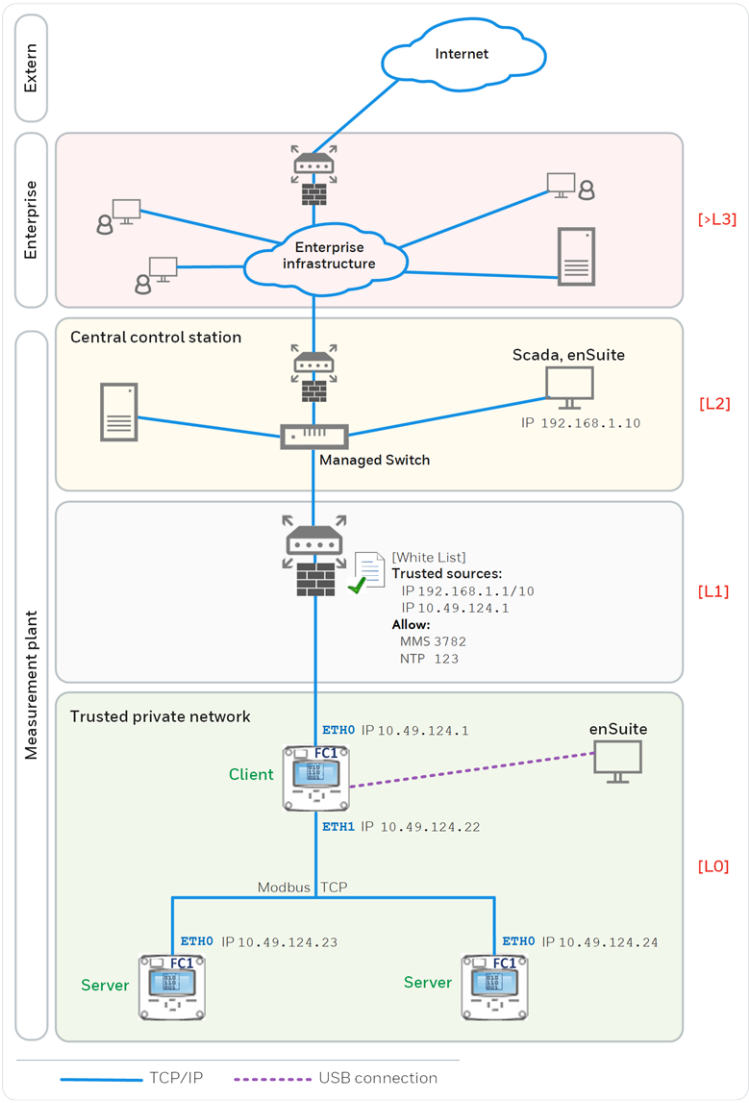


Fig. 3-1: Preventing unauthorized external access to enCore device – example with indication of security zones L0..L3 and higher according to IEC 62443

We recommend opening safety zone L0 only for zone L1 and not for zones L2, L3 and L4.

3.3 Security for data at rest and data in transit

3.3.1 Security for data at rest

enCore devices store all temporary or permanent data on the SD card. The data on the SD card is also called data at rest.

To prevent unauthorized access to sensitive data, enCore devices have been storing this data in encrypted form on the SD card since Basic System V 03-39. Since this version, access to sensitive data (e.g., reading out the parameterization) is only possible after authentication with user name and password.

➪ 1.0.1 Edit parameterization: sensitive data (p. 1)

Up to Basic System V 03-38, sensitive data was stored on the SD card without encryption. Here it is even more important to protect the SD card against unauthorized removal and the device against unauthorized access!

When discarding the device, you can easily and safely remove the stored data by removing the SD card.

➪ 3.2 Preventing unauthorized external access (p. 17)

3.3.2 Security for data in transit

Data in transit is the data that is transferred between an enCore device and, for example, a control station in a public or trusted network or between enCore device and enSuite, for example, when transferring data during parameterization of the device.

The communication between enCore device and enSuite is carried out via MMS protocol, which is secured via TLS since Basic System V 03-39. Other protocols – e.g., Modbus – transmit data partly in plain text. If possible, use the secure variant of a protocol. (⇨ 10.4.1 Supported data protocols, p. 133)

⇨ 3.2 Preventing unauthorized external access (p. 17)

Use encrypted VPN connection

We recommend using a VPN connection whenever you need a secure data connection but no secure protocol is supported for data transmission.

In a VPN, data is transferred between two or more participants in encrypted form. For this reason, a VPN connection is recommended, for example, for mobile access to an enCore device, access to the private network or for data communication via different systems.

Remote operation panel over insecure HTTP is no longer supported

Since Basic System V 03-39 the unsecure HTTP is no longer supported. Therefore, the remote operation panel can no longer be opened in the browser of a service computer.

Instead, you access the remote operation panel of an enCore device in enSuite using the action of the same name. In this case, the connection is established via MMS and secured via TLS.

TLS certificate for MMS communication with enSuite

To prevent data from being read by other network users during MMS communication between the enCore device and enSuite, the data is transmitted in encrypted form only since Basic System V 03-39. The encryption is carried out using the TLS (Transport Layer Security) transmission protocol. The enCore device uses a self-signed certificate to authenticate itself to enSuite each time an MMS connection is established. Normally, the certificate is created once when the enCore device is put into operation and announced to enSuite during the first MMS connection. However, it can be newly generated later.

4 Safety

4.1 General safety instructions

WARNING!

Risk of explosion

A risk of explosion exists if the enCore FC device (FC1 or MC1) is improperly assembled and connected!

- The enCore FC device must be installed outside of Ex zones 0, 1 and 2.
- Assemblies which are authorized as associated category ib electrical equipment with intrinsically safe electrical circuits in accordance with EN 60079-11 can be installed in the enCore FC device, for example, input boards with the label ExMFE5. The enCore FC device is therefore suitable for connecting to transmitters, pulse and signal sensors that are located in the potentially explosive area, for example, in zone 1. A mixed connection of intrinsically safe and non-intrinsically safe circuits is not permitted for these assemblies.
- Only measurement transmitters and pulse sensors that follow at least the requirements of the intrinsically safe protection class [Ex ib Gb] II C may be connected to the ExMFE5 assembly terminals provided for that purpose.
- When using input boards of ExMFE5 type, it is not permitted (according to the EU type examination certificate ATEX) to include more than one ExMFE5 board (i.e., more than one associated apparatus) into the same intrinsically safe circuit.
- All signals from the potentially explosive area (zone 0, zone 1, zone 2) must be regulated using suitable Ex isolators if they are connected to some other assembly group that is not the input board ExMFE5.

- The regulations in the relevant standards, especially EN 60079-0, EN 60079-11, EN 60079-17 and EN 60079-25, must be obeyed unconditionally.

Safety and warning instructions

The following safety and warning instructions must be observed unconditionally:

- Any individual appointed to perform work on or with the enCore FC device must read and understand these Operating Instructions before beginning work. This also applies if the individual concerned has already worked with such a device or a similar one, or was instructed by the manufacturer.
- To avoid risks and to ensure that the enCore FC device performs in an optimal manner, no changes or modifications that were not expressly authorized by the manufacturer may be performed on the device.
- The enCore FC device must not be exposed to temperatures below –25°C or above +60°C during storage.
- A temperature that is between –10°C and +55°C must be ensured while the enCore FC device is being operated.
- The power supply in enCore FC device is over a 24 V DC, and this supply must be protected externally using a 1A time-delay fuse.
- The grounding system is connected to the power supply socket PE for potential equalization.
- The threshold values listed in the certificates of conformity (e.g., EU type examination certificate ATEX) for the boards to be connected to the device must be observed.

The threshold values that are listed in the certificate of conformity for the applicable authorization must be observed while using the device within the scope of legal metrology, for example, of EU type examination certificate (MID).

Important note on mounting

To protect the device from unauthorized manual access, make sure that only authorized persons have direct access to the device after installation.

For a description of the process boards ➪ 5.5 Available process boards (p. 40).

4.2 Intended use

The enCore FC device is designed and constructed exclusively for its intended use as described here.

All enCore FC devices are process computer which process information on the externally connected measurement devices and signal sensors.

The specific intended use varies according to device type:

- enCore FC1
  The FC1 is mainly used for (fiscal) gas measurement. In this case, the main task of the device is to convert the gas volume measured at the measurement conditions to base conditions (volume conversion). Moreover, the corresponding thermal energy and mass can be calculated. The measured and/or calculated data can be recorded and monitored.

  The FC1 can also carry out other functions and calculations depending on the scope of application (e.g., volume or mass flow conversion for liquids).

  Moreover, the FC1 can also be used to measure, record and monitor other process signals.
- enCore MC1
  The MC1 is a process computer, which processes the information from the connected external measurement devices and signal sensors. This device type is mainly used in industrial

gas measurement. The main tasks of the device are monitoring and controlling processes. The measured and/or calculated data can be recorded and archived.

Compliance with all the specifications in these "Operating Instructions" also falls under the device's intended use.

Any use of the enCore FC that goes beyond or deviates from its intended use is considered a misuse of the device, and may lead to hazardous situations.

Claims of any kind due to loss resulting from non-intended use of the device are excluded.

Adhering to age and profession-specific regulations

When selecting personnel, make sure to comply with the specific regulations of the overall gas system that concern age and occupation.

4.3 Unacceptable use while impaired

Individuals whose ability to react is impaired, for example, because of drugs, alcohol, or medication, are not permitted to operate, assemble and configure the device. The operator is responsible for the careful selection of the personnel.

4.4 Operator liability

The enCore FC is used in industrial applications. The operator of the device is therefore subject to legal obligations of occupational health and safety.

In addition to the safety instructions in these Operating Instructions, current regulations of safety, accident prevention and environmental protection must be observed for the enCore FC area of application.

The following items especially apply:

- The operator must ensure compliance with the current regulations of safety, accident prevention and environmental protection that apply for the overall system in which the enCore FC is integrated.
- The operator must keep himself or herself informed of the applicable occupational health and safety regulations, and determine, over the course of a risk assessment, the additional risks that arise from the specific working conditions when the enCore FC is being used. The operator must include these items in the form of Operating Instructions for the enCore FC.
- The operator must review, over the entire operational life of the enCore FC, whether the Operating Instructions prepared by him or her correspond to the current status of the bodies of regulations, and adapt the instructions if necessary.
- The operator must definitively regulate and establish the responsibilities for enCore FC assembly, connection, commissioning, operation and maintenance.
- The operator must ensure that all employees who work with the enCore FC have read and understood these Operating Instructions. In addition, the operator must train these personnel at regular intervals and inform them of the risks involved with the device.
- The operator of the overall system in which the enCore FC is integrated must provide the personnel with the required protective equipment.

In addition, the operator is responsible for ensuring the enCore FC is always in a technically perfect state. The following therefore apply:

- The operator must ensure that the installation and maintenance work described in these Operating Instructions are performed properly.
- The operator must have all safety installations checked regularly to ensure they function correctly and are complete.

5 Design and function

5.1 Functional description of enCore FC devices

The specific function of an enCore device depends on its device type, ⇨ 4.2 Intended use (p. 24):

- enCore FC1
  The FC1 is a process computer, which is mainly used as a flow computer for natural gas, thus to measure and calculate the gas flow.
- enCore MC1
  The MC1 is a monitoring and controlling unit, mainly for use in industrial gas measurement.

For these special tasks, various measuring devices are connected to the device (depending on the application, for example, gas meter, pressure transmitter, temperature transmitter and gas quality measurement device).

The enCore FC provides various interface options for the various types of measurement device types:

Device type	Connection option
gas meter	– pulse interface for turbine, rotary piston or other pulse-generating gas meters – serial interface for ultrasonic flow meters via a manufacturer-specific digital protocol – interface for gas meters with an encoder index – LAN interface for ultrasonic flow meters
pressure transmitter	– 4 ... 20 mA analog input – HART protocol interface

Device type	Connection option
temperature transmitter	– resistance input for Pt100 with 4 wire technology – HART protocol interface
gas quality measurement devices	– serial interface – LAN interface

Table 5-1: Interface options

5.1.1 Number of streams and their flow directions

The number of streams and their flow directions are variable since device hardware and software can be extended. This number depends upon the number of board slots available, individual hardware settings and the soft-ware configuration.

5.1.2 Supported calculation standards

Depending on the field of application, the enCore FC device series supports European or international standards for the calculation of the respective characteristics. Which standards are supported in detail varies according to device type:

Standards for gas volume calculations

Value	Calculation standards
Compressibility	– SGERG-88 (ISO 12213-3) – SGERG-mod-H2 (DVGW G685-6 (A)) – AGA8-92 DC (ISO 12213-2) – AGA8 (2017) – AGA-NX19 mod – AGA-NX19 mod BR.KOR.3H – AGA-NX19 GOST

Value	Calculation standards
	– parameterized compressibility factor table (Table Z) – GOST 30319.2-2015 – GOST 30319.3-2015
Heating value, density, Wobbe index	– ISO 6976 – GPA 2172
Velocity of sound	– AGA10
VOS comparison	– between AGA10 and ultrasonic flow meter
Volume comparison	– EN 12405-3

Standards for gas mass calculations

Value	Calculation standards
Compressibility	– SGERG-88 (ISO 12213-3) – SGERG-mod-H2 (DVGW G685-6 (A)) – AGA8-92 DC (ISO 12213-2) – AGA8 (2017) – AGA-NX19 mod – AGA-NX19 mod BR.KOR.3H – AGA-NX19 GOST – parameterized compressibility factor table (Table Z) – GOST 30319.2-2015 – GOST 30319.3-2015
Heating value, density, Wobbe index	– ISO 6976 – GPA 2172

Standards for orifice calculations

Value	Calculation standards
Mass flow	– AGA3 – ISO 5167
Dynamic viscosity	– Sutherland
Joule-Thomson co-efficient	– Reader Harris
Compressibility	– SGERG-88 (ISO 12213-3) – SGERG-mod-H2 (DVGW G685-6 (A)) – AGA8-92 DC (ISO 12213-2) – AGA8 (2017) – AGA-NX19 mod – AGA-NX19 mod BR.KOR.3H – AGA-NX19 GOST – parameterized compressibility factor table (Table Z) – GOST 30319.2-2015 – GOST 30319.3-2015
Heating value, density, Wobbe index	– ISO 6976 – GPA 2172

Standards for liquid calculations

Value	Calculation standards
Liquid hydrocarbons	– ASTM-IP200 1952
Crude oil, refined products, lubricating oils, NGL, LPG	– API 11.1 1980 – API 11.1 2004
NGL, LNG	– GPA-TP27 2007
Water	– temperature correction table for water

5.2 Device description

The enCore FC is housed in a 19“ housing with 1/3 overall width (max. 4 process boards) or 1/2 overall width (max. 7 process boards). [1] he touch screen as well as the 2 function keys and 5 navigation keys for operation are located on the front panel. In addition, the USB connection, security switch and 2 status LEDs are located on the front panel.

At the rear side of the device, the CPU board provides a LAN interface and two RS232/RS422/RS485 serial interfaces. Devices with protocol interfaces can be connected to these interfaces, for example, gas quality measuring devices

NOTICE!

Printer AFB: Communication with a serial printer is not secure.

If you are using a Printer AFB that communicates with a serial printer via the RS232/RS485 interface of an enCore device, attackers may be able to gain access to this serial connection. In this scenario, attackers could monitor the connection, simulate a printer and redirect or tamper print data undetected.

Secure the connection to a serial printer to minimize the security risk.

Various other I/O boards can be mounted from the rear side of the device. The maximum number of boards depends upon the housing design. A maximum of 4 process boards can be installed in a device with 1/3 overall width, while a maximum of 7 can be installed in a device with 1/2 overall width.

The configuration of the I/O board equipment is variable. In principle, any I/O board can be inserted into any slot. There might be individual limitations depending on the type of the board.

1 ➪ 10.5 Housing dimensions (p. 136)

The following board types are currently available:

- ExMFE5 Ex input board
- MFE7 input board
- MFE11 input board
- MFA8 output board
- digital communication boards MSER4
- digital communication boards ESER4

For a detailed description of the process boards and possible limitations for the board equipment ➪ 5.5 Available process boards (p. 40).

5.3 Operation panel

Fig. 5-1: enCore FC operation panel – example enCore FC1

1. navigation keys
2. function keys
3. touch screen
4. security switch (sealable)
5. power LED
6. status LED
7. USB port for PC connection

5.3.1 Device keys

Two function keys are arranged below the touch screen. Pressing one of these keys activates the display button positioned directly over it.

Fig. 5-2: Navigation keys

The navigation keys (1 up, 2 down, 3 left, 4 tight, 5 enter) are provided for navigation purposes in device menus and displays. They provide an alternative option to the touch screen for operating the display. An acoustic signal is given out when a key is pressed.

5.3.2 Touch screen

All the key functions can be executed from the touch screen. An acoustic signal indicates that a function was activated.

Re-calibration of the touch screen

Honeywell calibrates the touch screen before delivery. In case a re-calibration should be necessary, select in the home display of the device **Info – Display calibration** and follow the instructions on the device. You can cancel he calibration at any time with the back key and then restart the calibration

In case of erroneous calibration, you can always use the function and navigation keys of the device

5.3.3 Operation and navigation within the display

Display test

Using the display test, you can check whether the device display of the enCore FC is working correctly.

To run the display test, ...

- ... switch to the home display if necessary.
- Double-click the symbol to open the **Info** display.
- Start the test with the action **Display test**.

During test mode, all pixels of the login area are alternately black and white.

- End the test with or .

Different types of device displays

Main display is the name of the first display of an AFB or a functionality of the basic system; it shows the most important results of this functionality. Depending on the AFB or functionality, further information is displayed in subordinate device displays.

The **basic display** is displayed immediately after the device is started. If no operation is performed during a preset time, the device switches back to the **basic display** automatically. For some device types, it is parameterizable which display is used as basic display.

Changing the "basic display"

For most device types (e.g., devices that are intended for the use in legal metrology), the basic display is fixed. In case that the basic display is not fixed, you can parameterize it in enSuite for a device parameterization in node **Displays** on tab **Basic display editor**:

To define a display as basic display, select ...

- ... from the 1st dropdown list **Basic display** the desired SFB or AFB...
- ... and from the 2nd dropdown list **Basic display** the display of this SFB or AFB.
- If necessary, adjust the time (in seconds) without any operation before ...

- ... the device switches back to the basic display in parameter **Go to basic display after <x> sec**.
- ... the brightness of the screen is reduced in parameter **Duration bright display <x> sec**.
- ... the screen is turned off in parameter **Duration dimmed display <x> sec**.

Home is a special display and shows the software structure of the device. In enSuite you add further entries to the home display in the parameter branch **Displays** on tab **Menu-editor – Home**.

Single software modules (like e.g., AFBs) and further selected functionalities, which shall be easily accessible (e.g., time or language setting), are represented with small symbols in this display. The symbols are labelled with the name of the corresponding functionality. AFBs are labelled with their user-defined names, if parameterized – otherwise the default name is displayed.

During parameterization, you can group AFBs in user-defined structures. Each group of AFBs is displayed in a folder **<Group name>** in the home display .

Navigating via touch-screen

In general

Two buttons are displayed at the bottom of the touch screen. Depending on the context, you can use the symbols and *or* and .

The function of the buttons is as follows...

- You switch directly to the home display.
- You switch directly to the basic display.
- You switch back to the calling display, i.e., the display that was previously opened.

The basic display can always be reached with a maximum of two steps – either by pressing and successively, or by pressing , if this button is displayed directly.

If the buttons are marked with the check mark or the X symbol , a user action has been performed previously (e.g., setting the system time) and the device is waiting for a confirmation by the user. User actions can be accepted with or discarded with .

Navigation options in the "Home" display

You open a folder by touching its symbol in the display; the AFBs grouped in that folder are shown subsequently.

After having touched the symbol of an AFB or any other selected functionality, the corresponding **main display** is shown.

Navigation options in other displays

Most device displays show measurement results, status information or settings.

When operating an enCore FC device, hyperlinks and actions are distinguished: Use hyperlinks to navigate through the device's displays and use actions to perform a specific functionality. Both hyperlinks and actions are presented in the display with a **blue** font color and underlined.

If a display contains more lines than can be presented at once, an **orange** scroll bar appears at the right edge of the screen.

You can scroll the contents of the display up or down by moving your finger vertically across the display area (vertical "wiping").

Navigation via keys

The buttons at the lower edge of the touch screen can alternatively be activated by pressing the associated (hardware) keys located directly underneath.

You can activate the controls located at the top of the touch screen by using the **[Up]**, **[Down]**, **[Left]** and **[Right]** keys, and activate them by pressing **[Enter]**. Use the **[Up]** and **[Down]** keys to scroll through the contents of a display. (⇨ 5.3.1 Device keys, p. 33).

5.3.4 Security switch

The security switch is a sealable rotary switch. The security switch is closed by turning it clockwise until it stops (⇨ Fig. 5-1: enCore FC operation panel – example enCore FC1, p. 32).

The security switch is part of the enCore concept for limiting user rights. A closed security switch can prevent certain actions of the user (e.g., changing certain parameters or software downloads of legally relevant (fiscal) or operative (non-fiscal) firmware module).

5.3.5 LEDs

Two multi-colored LEDs are placed on the operation panel: The power LED on the left and the status LED on the right.

Power LED

LED status	Description
off	power supply off; no USB connection
red	power supply off; USB connection detected
green	power supply on; no USB connection power
orange	power supply off; USB connection active

Status LED

LED status	Description
off	power supply off
green, flashing	start-up phase after a power failure
green, continuous light	The device works in an error-free manner, i.e., there are no pending or not accepted alarms or warnings in the error list.

A red or yellow status LED indicates that there is a pending or not accepted error of alarm or warning type.

The parameterized acceptance procedure (branch **Basic System – System**, section **Error List**, parameter **Acceptance procedure**) defines the conditions under which errors can be accepted:

- **Only ack inactive events**
  Errors cannot be accepted if they are still pending. This setting is generally prescribed for devices, which are used in the scope of application of the legal metrology activities (e.g., according to an EU type examination certificate).
- **Always ack events**
  Errors can be accepted as soon as they have occurred.

The status LED signals the error state as below (in order of priority):

LED status	Description
red, flashing	The error list includes at least one pending and not accepted alarm.

LED status	Description
yellow, flashing	The error list includes at least one pending and not accepted warning.
red, continuous light	The error list includes at least one alarm which fulfills one of the following conditions:[1] – The alarm has already ended, but is not yet accepted. – The alarm is still pending, but has already been accepted.
yellow, continuous light	The error list includes at least one warning fulfilling one of the following conditions:[1] – The warning has already ended, but is not yet accepted. – The warning is still pending, but has already been accepted.

[1] depending on the parameterized **Acceptance procedure**

5.4 Interfaces (rear side of device)

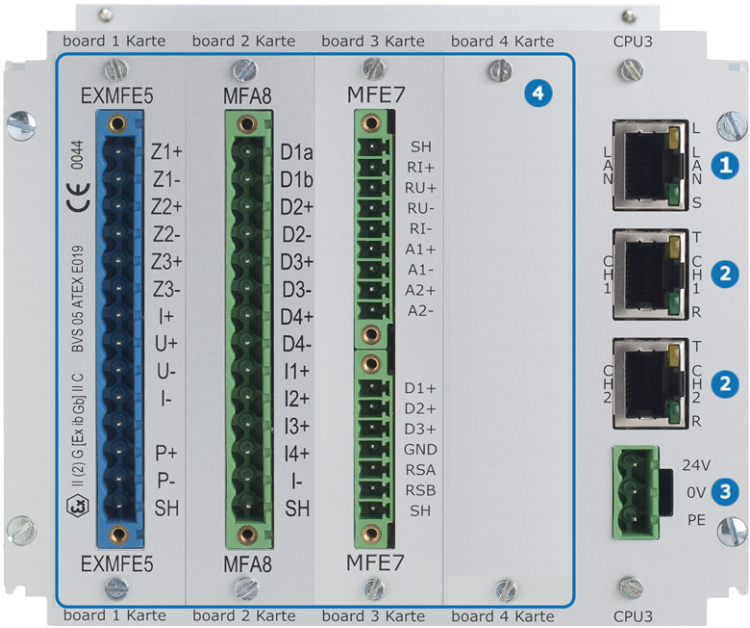


Fig. 5-3: Rear of device (example 1/3 overall width)

1. LAN interface (Ethernet network)
2. serial interface
3. 24 V DC power supply
4. optional process boards

5.5 Available process boards

The configuration of the I/O board assignment is variable. In principle, any I/O board can be inserted into any slot. If there are any kind of technical limitations – depending on the board type, they are listed in the following sections (descriptions individual boards):

⇨ 6.3 Installation and conversion of process boards (p. 51)
This section describes the ways you can change the I/O board equipment.

⇨ 6.4 Connection diagrams (p. 61)
This section includes connection diagrams for typical applications.

5.5.1 ExMFE5 process board

WARNING!

Risk of explosion

A risk of explosion exists if lines are connected to the ExMFE5 board while the device is connected to the power supply!

The transmitter-, pulse- and signal lines are connected only to the ExMFE5 board if the enCore FC is connected in a voltage-free manner.

WARNING!

Risk of explosion

A risk of explosion exists if the enCore FC (FC1 or MC1) is improperly assembled and connected!

- The enCore FC must be installed outside of Ex zones 0, 1 and 2.
- Assemblies which are authorized as associated category ib electrical equipment with intrinsically safe electrical circuits in accordance with EN 60079-11 can be installed in the enCore FC, for example, input boards with the label ExMFE5. The enCore FC is therefore suitable for connecting to transmitters, pulse and signal sensors that are located in the potentially explosive area, for example, in zone 1. A mixed connection of intrinsically safe and non-intrinsically safe circuits is not permitted for these assemblies.
- Only measurement transmitters and pulse sensors that follow at least the requirements of the intrinsically safe protection class [Ex ib Gb] II C may be connected to the ExMFE5 assembly terminals provided for that purpose.
- When using input boards of ExMFE5 type, it is not permitted (according to the EC type examination certificate ATEX) to include more than one ExMFE5 board (i.e., more than one associated apparatus) into the same intrinsically safe circuit.
- All signals from the potentially explosive area (zone 0, zone 1, zone 2) must be regulated using suitable Ex isolators, if they are connected to some other assembly group that is not the input board ExMFE5.
- The regulations in the relevant standards, especially EN 60079-0, EN 60079-11, EN 60079-17 and EN 60079-25, must be obeyed unconditionally

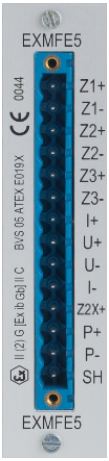
Comply with the safety- and risk instructions of the ExMFE5 input boards!

⇨ 4.1 General safety instructions (p. 22)

⇨ 6.1 Line connection (p. 48)

The process board ExMFE5 is an *associated electrical equipment* according to EN 50020, which provides five intrinsically safe input circuits of the category [Ex ib Gb] II C:

- 3 × NAMUR inputs (`Z1+/Z1–`, `Z2+/Z2–`, `Z3+/Z3–`) for signals, LF pulses and HF pulses [1] . As an alternative, the first channel is suitable for connecting an encoder index
- 1 × resistance input in 4-wire technology (`I+/U+/U–/I–`)
- 1 × `SH` for the cable shield
- 1 × analog current input 4 ... 20 mA (`P1+/P1–`), alternatively usable as a HART interface (up to 4 transmitters depending on type and manufacturer)



1 All pulse input channels work with Namur pulse generators as well as with pulse generators that have an open collector output.
From ExMFE5 firmware version 3.0.0 and higher, the additional contact `Z2X+` is available (cf. ExMFE5 cover plate). In special cases, the `Z2X+` input contact can be connected instead of `Z2+` for pulse generators with open collector output at channel 2.
Consult our technical support before using this option.
⇨ 12.4 Technical support Flow Computers and Gas analyzers (p. 144)

Simultaneous connection of an open-collector contact and a HART loop is not supported!

Note that the digital inputs of the ExMFE5 officially only support the connection of read and Namur contacts.

When connecting open collector contacts and simultaneously operating a HART loop, protocol timeouts may occur during HART communication!

HART transmitter with high inrush current

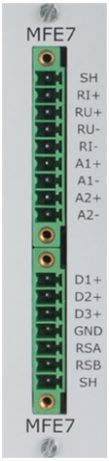
Please note that depending on the type and manufacturer of a HART transmitter, it may not be possible to operate more than one transmitter in a HART loop. This is the case with transmitters that require a high inrush current and therefore exceed the input current limit of 20 mA.

If you want to connect more than one transmitter, contact your Honeywell representative.

5.5.2 MFE7 process board

The process board MFE7 provides seven input circuits:

- 1 × resistance input in 4-wire technology (`RI+/RU+/RU-/RI-`).
- 2 × analog current inputs (`A1+/A1-`, `A2+/A2-`) in operational modes 0 … 20 mA or 4 … 20 mA, alternatively usable as a HART interface (up to 4 transmitters each depending on type and manufacturer)
- 3 × pulse inputs or signal inputs (`D1`, `D2`, `D3/GND`) for signals, LF pulses or HF pulses. As an alternative, the third channel (`D3/GND`) is suitable for connecting an encoder index. As an alternative, channels 2 and 3 (`D2`, `D3/GND`) can be used as a frequency input.
- 1 × RS485 serial interface (`RSA/RSB/GND`) with `RSA` being data – and `RSB` data+.



HART transmitter with high inrush current

Please note that depending on the type and manufacturer of a HART transmitter, it may not be possible to operate more than one transmitter in a HART loop. This is the case with transmitters that require a high inrush current and therefore exceed the input current limit of 20 mA.

- 2 × SH for the cable shield, where 1 SH is for the resistance input (RI+/RU+/RU–/RI–) and 1 SH for the digital channels (D1/GND, D2/GND, D3/GND).

ATTENTION

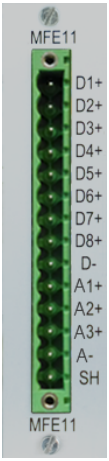
Do not bridge GND and SH in any cases!

This leads to disturbances of the digital inputs and the RS485 interface.

5.5.3 MFE11 process board

The process board MFE11 provides eleven input circuits:

- 8 × message or LF pulse inputs (D1 .. D8 with the common ground D–) for low-frequency pulses and messages; as pulse input with a maximum input frequency of 20 Hz or as messaging input with 0/24 V DC.
- 3 × analog current inputs 0...20 mA (A1+, A2+, A3+ with the common ground A–)
- 1 × SH for the cable shield



5.5.4 MSER4 process board

The process board MSER4 provides for 4 serial interfaces, each for one protocol channel (CH1, CH2, CH3, CH4). Every protocol channel alternatively supports RS485, RS422 or RS232.

> For a device in 1/3 overall width, a maximum of one MSER4 board can be installed in slot 4 only. For a device in 1/2 overall width, up to two MSER4 boards can be installed in slots 6 and 7 only.

5.5.5 ESER4 process board

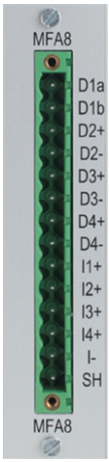
The process board ESER4 provides for 3 serial interfaces, each for one protocol channel (CH1, CH2, CH3). Every protocol channel alternatively supports RS485, RS422 or RS232. Moreover, one LAN interface (Ethernet network) is available.

> For a device in 1/3 overall width, a maximum of one ESER4 board can be installed in slot 4 only. For a device in 1/2 overall width, up to two ESER4 boards can be installed in slots 6 and 7 only.

5.5.6 MFA8 process board

The process board MFA8 provides eight output circuits:

- 1 × digital message output (D1a/D1b)
- 3 × digital outputs (D2+/D2–, D3+/D3–, D4+/D4–) for messages, trigger outputs or LF pulses
- 4 × analog outputs (I1, I2, I3, I4/I–) 0 … 20 mA or 4 … 20 mA for measurements
- 1 × SH for the cable shield



6 Assembly instructions

The enCore FC is provided for assembly within a 19" cabinet, and is available in either a 1/3 overall width or 1/2 overall width model. Compliance with the device's installation depth of 170 mm (with plugs approx. 220 mm) is necessary so the connection terminals located on the rear of the device remain accessible.

The enCore FC must be installed in an Ex free plant room (electrical room) outside of Ex zones 0, 1 and 2, in accordance with protection class IP 20.

We recommended to install the enCore FC in a swivel frame.

6.1 Line connection

WARNING!

Risk of explosion

A risk of explosion exists if lines are connected to the ExMFE5 board while the device is connected to the power supply!

Only connect transmitter, pulse and signal lines to the ExMFE5 board when power supply of the enCore FC is disconnected completely.

ATTENTION!

Risk of short circuit

The enCore FC device can be damaged if lines are connected while the device is connected to the power supply.

Always make sure the enCore FC is free of voltage before making any changes to device wiring or before connecting sensor, supply, signal, or data lines.

The transmitter, pulse, signal and data lines are connected to the enCore FC by using plug-in screw terminals that are located in a cable housing. Fixed screw terminals are used for the power supply connection.

Special attention must be paid to the intrinsically safe electrical circuits. Before switching on the power supply, the operator must ensure that the plug connections for the gas meter, pressure, and temperature inputs of the ExMFE5 input board are inserted, since this is the only way the minimum distance of 50 mm required in the relevant guidelines can be maintained.

The relevant installation guidelines must be observed when arranging the wiring.

The device lines must be free of tensile stress and must be provided with a kink protection if the enCore FC is being installed in a swivel frame.

Enough length must be allocated to cables so no tensile stress occurs in cables when the swivel frame is opened up.

It is recommended that the lines be placed on transfer terminals in a switch cabinet, and then be connected with the enCore FC from that point. However, these terminals must sometimes fulfill Ex regulations, and must also be sealable if applicable, for example to fulfill the requirements of an applicable approval.

6.2 Power supply and grounding

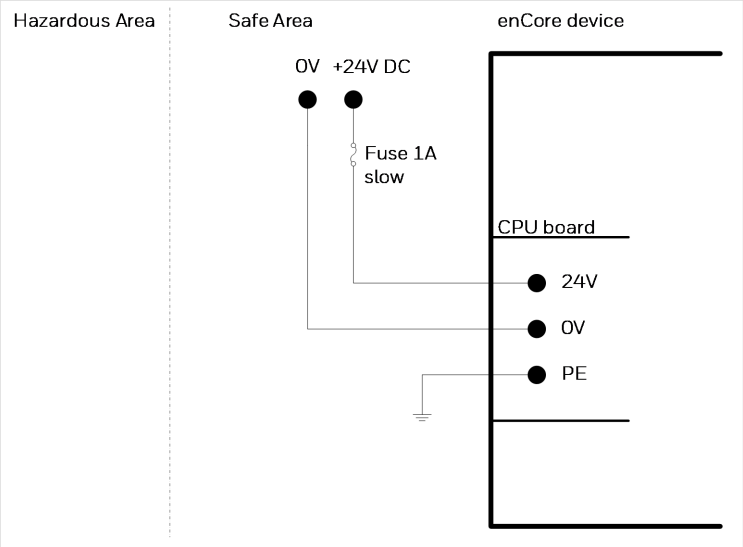


Fig. 6-1: Power supply

The enCore FC must be operated with a rated voltage of 24 V DC (max. permissible range: 20.4 V to 28.8 V).

The 24 V power supply is connected via the (+) and (–) terminals at the rear of the device, and must be protected externally using a 1A time-delay fuse.

We recommend to operate the process computer in conjunction with a suitable uninterruptible power supply. Its design must comply for direct current; nominal voltage 24 V DC, permitted range 20.4 V DC to 28.8 V DC, switching time not exceeding 10 ms. The external power supply must provide at least 12 W power. With a mains voltage of 100 V up to 230 V for the uninterruptible power supply, the switching time must not be greater than a mains period (50 or 60 Hz), based on the nominal value of the mains frequency.

The device is protected internally by means of a self-resetting over-current protection component.

The device is protected internally by means of a self-resetting over-current protection component.

The grounding system is connected to the power supply socket PE for potential equalization.

6.3 Installation and conversion of process boards

The process board configuration of the device is in correspondence with the order at the time of delivery. Owing to the modular hardware concept it is now possible to insert additional process boards in free board slots even later or to change the compilation of the process boards.

For safety reasons, any modifications of the process board configuration should be carried out only by the manufacturer's service department or by an appropriately trained specialist working for the plant operator.

The housing of the device must be opened in order to add or change process boards. The presence of a metrology expert may be required for this purpose when the device is being used within the scope of legal metrology.

ATTENTION!

Risk of short circuit

The device may damage if it is opened in case of connected power supply.

Always make sure the enCore FC is free of voltage before opening the device.

ATTENTION!

The integrated circuits of the process boards may be damaged due to electrostatic discharges.

According to EN 61340-5-1, an ESD-protected workplace (ESD pad and ESD wrist strap) must be used while working on a device when changing the I/O board configuration.

ATTENTION!

Incorrect replacement parts and accessories are a safety risk!

- Incorrect or defective replacement parts and accessories may detract from safety and lead to damage, malfunction, or total device failure.
- Use only original replacement parts and accessories from the manufacturer.

Please contact our technical support if you need assistance. (⇨ 12.4 Technical support Flow Computers and Gas analyzers, p. 144)

6.3.1 Insert a process board in a free board slot

The method used for changing or removing process boards is similar.

- Ensure that all the required accessories are available: process board, suitable labelling plate and jumper
- If necessary, install or update to the next enSuite on the work computer.[1]).

[1] The latest installation instructions are available on the Honeywell website in the **Software Downloads** section.
process.honeywell.com/us/en/site/elster-instromet/support#software-downloads

- Readout the enCore FC device's parameterization and archives with enSuite.
- Disconnect the power supply.
- Remove all the external cable connections from the device.
- Remove the 4 mounting screws present on the rear of the device. (Positions 1)

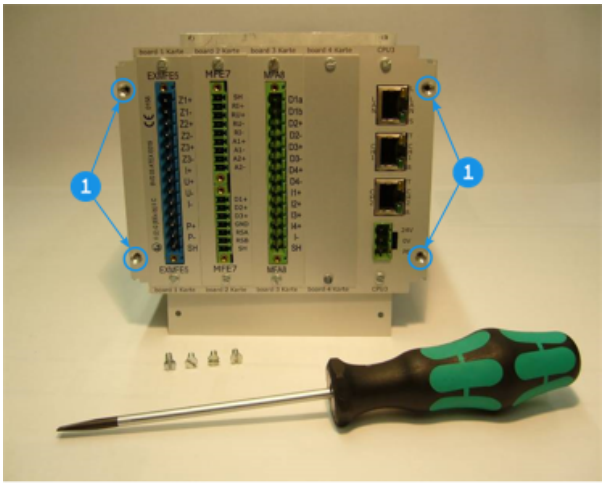


Fig. 6-2: Rear side of the device (example), mounting screws are removed

- Pull the board frame carefully and straight out of the housing.

Fig. 6-3: Removing the board frame

Fig. 6-4: Removed board frame

- If you are installing an ESER4, make sure that the JP4 jumper is set correctly on the board:

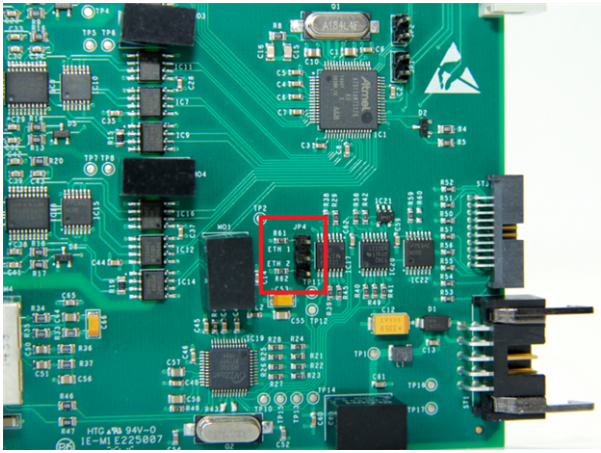


Fig. 6-5: ESER4 – position of JP4
in the example neither ETH1 nor ETH2 are set

The jumper setting varies with the number of ESER4 boards used and the board slot used, set the jumpers accordingly:

- for 1/3 width:
  board slot: board 4
  jumper position ETH 1 (upper 2 pins)

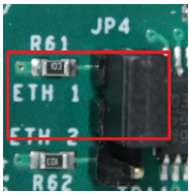


Fig. 6-6: JP4 – ETH 1 is set

- for 1/2 width with 1 ESER4
  board slot: board 7
  jumper position ETH 1 (upper 2 pins)
- for 1/2 width with 2 ESER4

– 1. ESER4:
  board slot `board 7`
  jumper position `ETH 2` (lower 2 Pins)

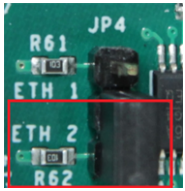


Fig. 6-7: `JP4` – `ETH2` is set

– 2. ESER4:
  board slot: `board 6`
  jumper position `ETH 1` (upper 2 pins)

Subsequent installation of a 2nd ESER4 board (1/2 width only)

When you subsequently install a second ESER4 board, you need to adjust the jumper position for `JP4` on both ESER4 boards. In this case set the jumper of the first board (slot `board 7`) the jumper position to `ETH2`.

Background:

For 1/2 width and 2 ESER4 boards, the lower jumper position (`ETH1`) must be set for the board with the lower board slot (`board 6`) and the higher jumper position (`ETH2`) for the board with the higher board slot (`board 7`).

▶ Check the position for the additional board (number of board slot).

Set up the board number on the board

Note that the number of the board slot as well as the board number on the board must be set; this is essential for further functioning of the internal I/O bus communication.

- Insert the relevant jumpers in the suitable pin connector to define the number on the board. For the ESER4 board this is `JP3`, for all other boards `JP1`.

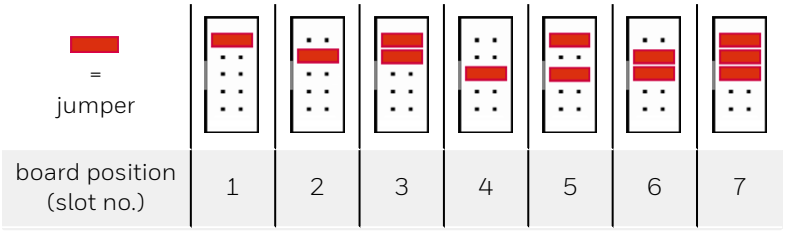


Fig. 6-8: Pin connector with jumper positions

- Remove the cover plate of the respective slot (2 screws).
- Insert the board with the side meant for the process connection in the slot on the rear panel (blue plug for Ex boards, otherwise green plug.
  ➪ Fig. 6-2: Rear side of the device (example), mounting screws are removed (p. 53).
- Make sure that the orientation of the board (top/bottom) is correct: On the opposite side the pin connector for the I/O bus connection (with safety clamp) must face downwards to the bottom of the device tray.
  ➪ 6.4 Connection diagrams (p. 61), position 2

  The pin connector must face upwards for defining the board

- number (⇨ position 3).

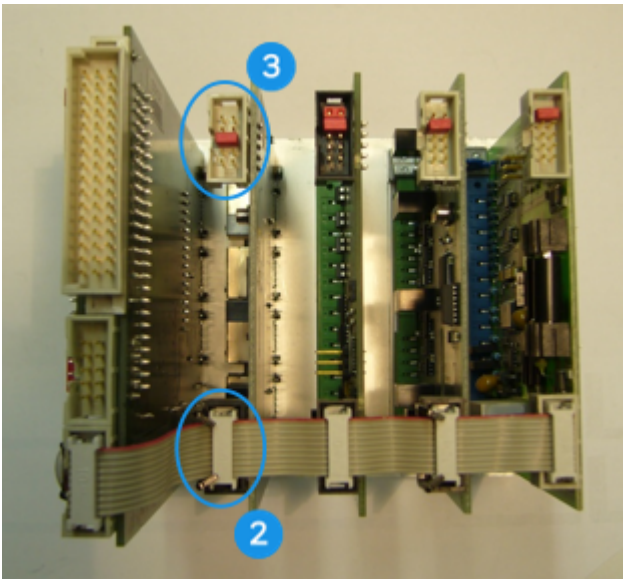


Fig. 6-9: Interior view of the board cage

2 pin connector for I/O bus connection (with safety clamp)

3 connector for defining the board number – in the example: 4 boards

- Position the labelling plate of the board on the rear side of the device and screw the board firmly on to the labelling plate.
- Insert the plug for the internal I/O bus on the other side of the board. The safety clamp closes automatically. Check whether all the other bus plugs are still plugged in properly.
- Re-insert the board frame carefully inside the device. Press gently on the board frame to re-establish a connection between CPU and the display board.

Only when installing an ESER4:

The supplied bus cable `ESER4-CPU3Core` is used to connect the LAN interface(s) of the ESER4 board(s) to the LAN bus of the enCore device. In case ...

- ... an ESER4 is already installed in the device, use the existing bus cable to connect a second ESER4 to the LAN bus. The bus cable supplied is then not required.
- ... you only install one ESER4, connect the plugs at the end of the bus cable, the middle plug remains unused in this case.

To first connect the bus cable to the CPU, ...

- ... place the plug of one end of the bus cable on the corresponding socket of the CPU, so that the nose of the plug fits into the recess.
- Press the plug firmly into the socket of the CPU.

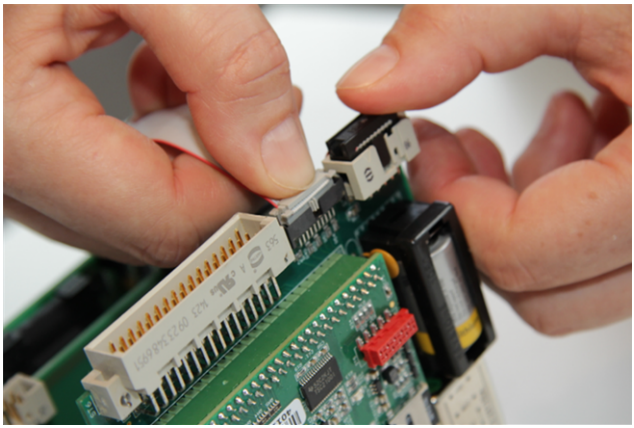


Fig. 6-10: Connect bus cable with CPU3Core

To connect a second ESER4 to the CPU, ...

- ... place the middle plug of the bus cable to the interface of the ESER4.
- Press the plug firmly into the socket of the ESER4.

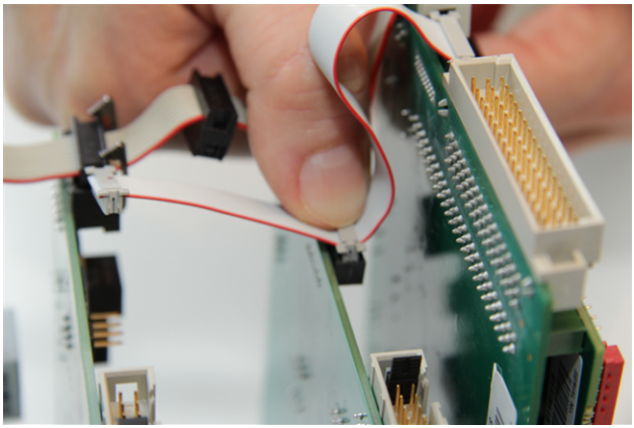


Fig. 6-11: Connect bus cable to second ESER4 (middle plug)

To connect the first or only ESER4 to the CPU, ...

- ... connect the free plug at the other end of the bus cable to the interface of ESER4 in the same way.
- Press the plug firmly into the socket of the ESER4.
- The LAN interface(s) are connected to the LAN-BUS.
- Close the device with the help of the 4 mounting screws.
  ➪ Fig. 6-2: Rear side of the device (example), mounting screws are removed (p. 53)
- Restore all external cable connections with enCore FC.
- Connect the power supply.
- Use the enSuite to edit the imported parameterization by taking into consideration the new board configuration. Add the new board to the parameterization (parameter branch **Basic System – I/O boards**) and adjust all settings for its process connection.
- Transfer the edited parameterization to the device.

Details on parameterization

For details on the parameterization procedure refer to manual ➪ "Configuring the Device with enSuite".

6.4 Connection diagrams

This section shows connection diagrams for those measurement devices that are typically connected to an enCore FC flow computer (e.g., temperature and pressure transmitter, gas meter and gas quality measurement devices). Moreover, typical connection diagrams for processing devices such as station control or remote transfer device are illustrated here.

When using equipment from other manufacturers

If you use equipment from other manufacturers, please refer to the connection information in the manufacturer's documentation.

Minimum requirements

If a special setting is required for connecting a specific board or a specific board channel with a measuring device, you get only the minimum required settings below the respective connection diagram.

For detailed information on parameterization refer to enSuite ⇨ Online help.

6.4.1 General recommendations for signal and data cable

Signal connection

The following standard minimum requirements for the used type of cable are recommended for the signal connection with external transmitters and sensors as well as for the signal connection of external devices:

- signal cable with a line-to-line capacity smaller than 120 pF/m and an inductance smaller than 0.7 µH/m
- Wire diameter greater or equal to 0,5 mm^2, number of wires according to the application, stranded cable, shielded together; screen at just one place (preferably on enCore FC) connected with PE
- The maximum cable length is dependent on the type of the signal; ⇨ the following section for exact specifications.

Data communication connection

The following standard minimum requirements for the used type of cable are recommended for the data communication connection with external sensors as well as for the data communication connection of external devices according to RS232, RS422 or RS485:

- signal cable with a line-to-line capacity smaller than 120 pF/m and an inductance smaller than 0,7 µH/m.
- Wire diameter greater or equal to 0.25 mm^2, number of wires according to the application, stranded cable, shielded together. Screen at just one place (preferably on enCore FC) connected with PE.
- The maximum cable length is 30 m for RS232, and 500 m for RS422 and RS485.

RS485

According to RS485, resistors are required for resting potential generation at any places in case of data communication connections, for every 470 Ω between R/TA and +U and also between R/TB and SGND. Other bus resistors at every 120 Ω between R/TA and R/TB on both the physical ends of the cable are recommended for cable length from 200 m onwards.

Ethernet

A standard type of cable is recommended for data communication connection via Ethernet according to Category 5 (Cat 5), the maximum cable length is 100 m.

6.4.2 Pt100 (EEx i) via ExMFE5 board

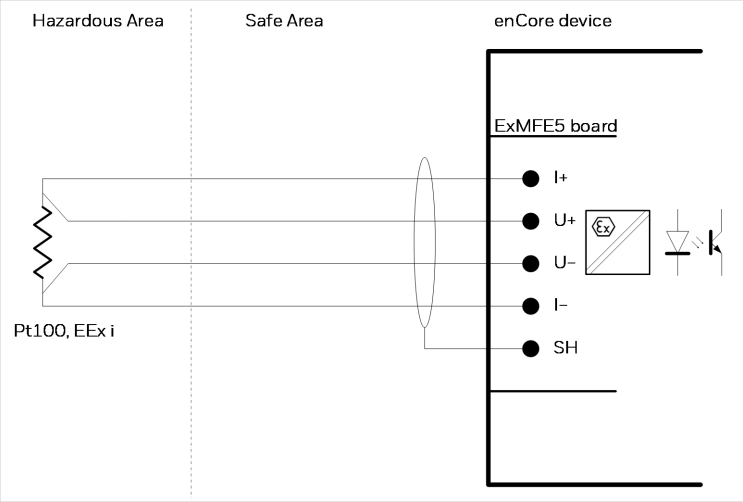


Fig. 6-12: Pt100 (EEx i) via ExMFE5

Characteristics ExMFE5:

- intrinsically safe, galvanically isolated input safe circuits of the category [Ex ib Gb] II C for 4-wire-Pt100 temperature sensor; active signal converter integrated in input as "associated electrical equipment" according to EN50020
- max. measurement error: ±0.05 % of the measurement
  (in the measuring range –10 to +60 °C and between 0 to +40 °C ambient temperature)
- max. cable length: 500 m

6.4.3 Pt100 (EEx d) via MFE7 board

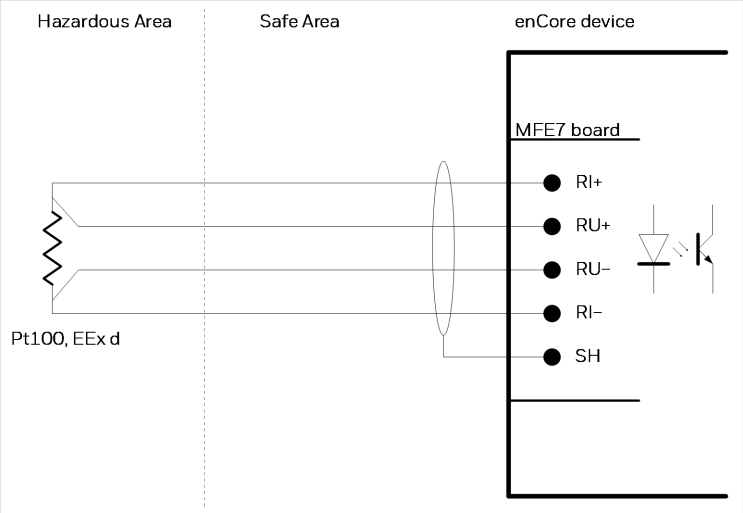


Fig. 6-13: Pt100 (EEx d) via MFE7

Characteristics MFE7:

- a galvanically isolated input safe circuit for 4-wire-Pt100 temperature sensor; active signal converter integrated
- max. measurement error: ±0.05 % of the measurement
  (in the measuring range –40 to +120 °C and between -10 to +55 °C ambient temperature)
- max. measurement error: ±0.05 % of the measurement
  max. cable length: 500 m

6.4.4 Analog measurement transmitter (EEx i) via ExMFE5 board

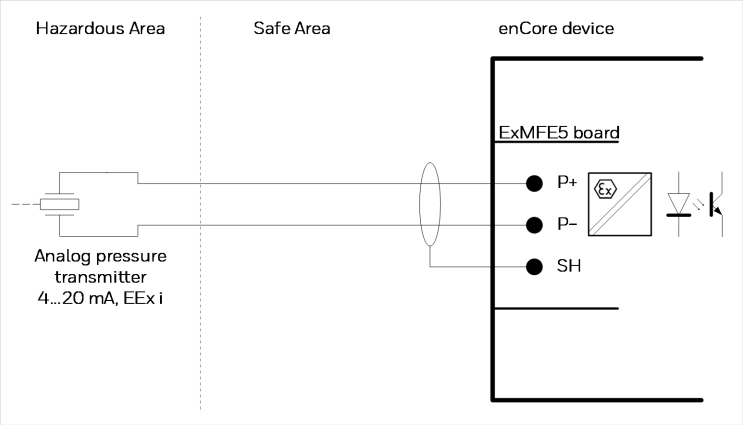


Fig. 6-14: analog pressure transmitter (EEx i) via ExMFE5 – example

Characteristics ExMFE5:

- intrinsically safe, galvanically isolated input safe circuits of the category [Ex ib Gb] II C for transmitter with 4 ... 20 mA interface
- active signal converter integrated of the category "associated electrical equipment" according to EN50020 in input:
  - open-circuit voltage: approx. 18 V
  - voltage at 20 mA: approx. 10.6 V
  - max. load: 300 Ω
- max. measurement error: ±0.05 % of the measurement (in the measuring range 4 ... 20 mA and between 0 to +40 °C ambient temperature)
- max. cable length: 500 m

Hints on parameterization

Branch **<device>** – **Basic System** – **I/O boards** – **Board <x>: ExMFE5**

Set the following value:

- channel **P1+ P1–** type **Current input**

6.4.5 Analog measurement transmitter (EEx d) via MFE7 board (without barrier)

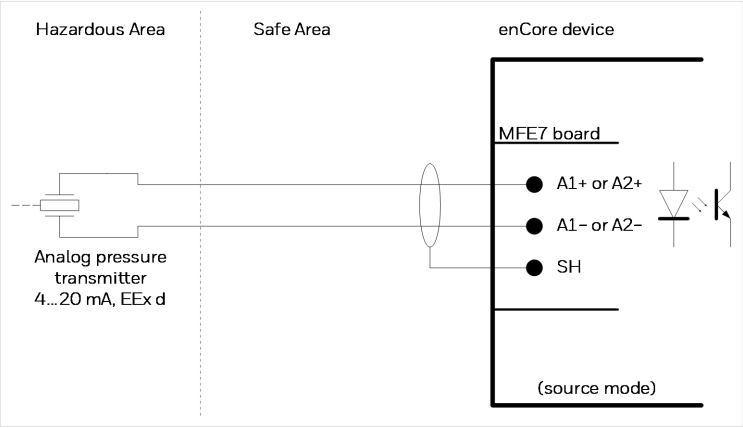


Fig. 6-15: Analog pressure transmitter (EEx d) via MFE7 – example

Characteristics MFE7:

- a galvanically isolated input safe circuit with 4 ... 20 mA interface:
  - open-circuit voltage: approx. 21 V
  - voltage at 20 mA: approx. 12.6 V
  - max. load: 600 Ω

- max. measurement error: ±0,05 % of the measurement (in the measuring range 4 ... 20 mA and between –10 to +55 °C ambient temperature)
- max. cable length: 500 m

Hints on parameterization

Branch **<device>** – **Basic System** – **I/O boards** – **Board <x>: MFE7**

Set the following values:

- channel **A1+ A1–** or **A2+ A2–** type **Current input**
- parameter **Power supply** value **On** (source mode)

6.4.6 Analog measurement transmitter (EEx i) via MFE7 board (barrier in sink mode)

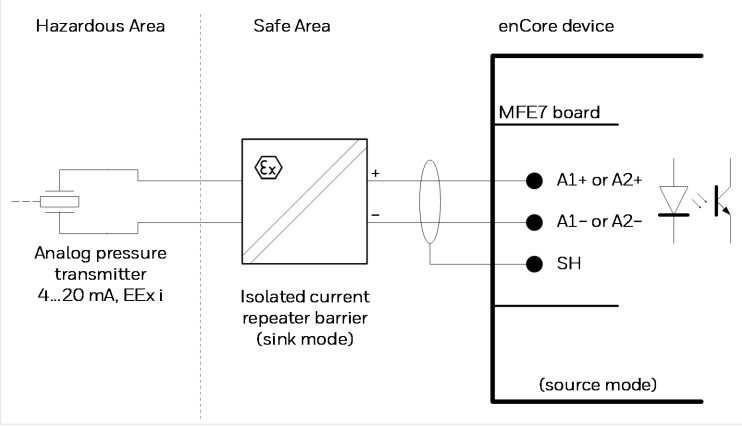


Fig. 6-16: Analog pressure transmitter (EEx i) via MFE7 – example

Characteristics MFE7:

- a galvanically isolated input safe circuit with 4 ... 20 mA interface:
  - open-circuit voltage: approx. 21 V
  - voltage at 20 mA: approx. 12.6 V
  - max. load: 600 Ω
- max. measurement error: ±0,05 % of the measurement (in the measuring range 4 ... 20 mA and between –10 to +55 °C ambient temperature)
- max. cable length: 500 m

Hints on parameterization

Branch **<device>** – **Basic System** – **I/O boards** – **Board <x>: MFE7**

Set the following values:

- channel **A1+ A1–** or **A2+ A2–** type **Current input**
- parameter **Power supply** value **On** (source mode)

6.4.7 Analog measurement transmitter (EEx i) via MFE7 board (barrier in source mode)

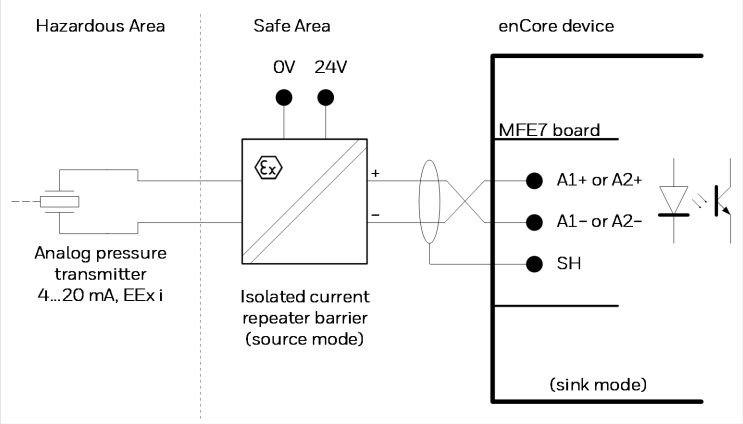


Fig. 6-17: Analog pressure transmitter (EEx i) via MFE7 – example

Characteristics MFE7:

- A galvanically isolated input safe circuit with 4 ... 20 mA interface:
  load: approx. 50 Ω
- max. measurement error: ±0,05 % of the measurement
  (in the measuring range 4 ... 20 mA and between –10 to +55 °C ambient temperature)
- max. cable length: 500 m

Hints on parameterization

Branch **<device>** – **Basic System** – **I/O boards** – **Board <x>: MFE7**

Set the following values:

- channel **A1+ A1–** or **A2+ A2–** type **Current input**
- parameter **Power supply** value **Off** (sink mode)

6.4.8 Analog measurement transmitter (EEx d) via MFE11 board (without barrier)

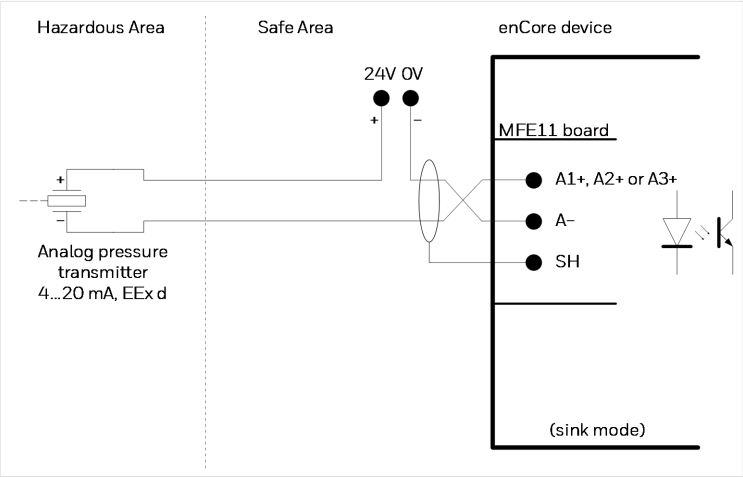


Fig. 6-18: Analog pressure transmitter (EEx d) via MFE11 – example

Characteristics MFE11:

- a galvanically isolated input safe circuit with 4 ... 20 mA interface:
  - load: approx. 90 Ω
- max. measurement error: ±0,06 % of the measurement (in the measuring range 4 ... 20 mA and between 0 bis +40 °C ambient temperature)
- max. cable length: 500 m

Hints on parameterization

Branch **<device>** – **Basic System** – **I/O boards** – **Board <x>: MFE11**

Set the following value:

– channel **A1+ A–**, **A2+ A–** or **A3+ A–** type **Current input**

6.4.9 Analog measurement transmitter (EEx i) via MFE11 board (barrier in source mode)

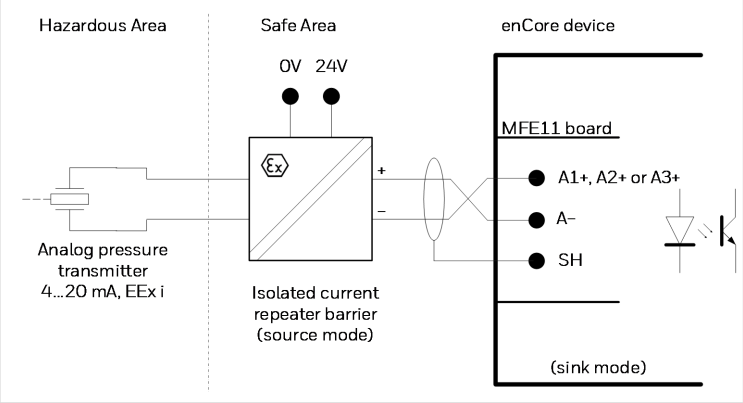


Fig. 6-19: Analog pressure transmitter (EEx i) via MFE11 – example

Characteristics MFE11:

- a galvanically isolated input safe circuit with 4 ... 20 mA interface:
  load: approx. 90 Ω
- max. measurement error: ±0,06 % of the measurement
  (in the measuring range 4 ... 20 mA and between 0 bis +40 °C ambient temperature)
- max. cable length: 500 m

Hints on parameterization

Branch **<device>** – **Basic System** – **I/O boards** – **Board <x>: MFE11**

Set the following value:

- channel **A1+ A–**, **A2+ A–** or **A3+ A–** type **Current input**

6.4.10 Contacts or pulses (safe area) via MFE11 board

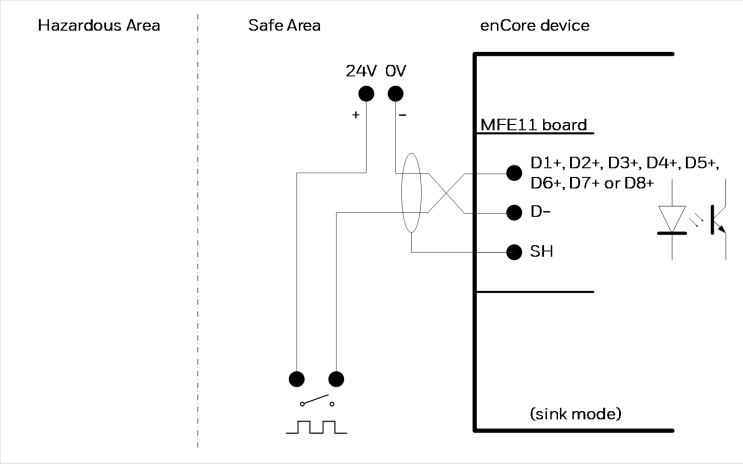


Fig. 6-20: Contacts or pulses (safe area) via MFE11 – example

Characteristics MFE11:

- eight galvanically isolated input circuits for messages and low-frequency pulses
- passive isolated pulse amplifier integrated in the inputs
- max. load: 24 V DC; 2.4 mA
- switching point:
  ≥ 18 V DC: (1)
  ≤ 10 V DC: (0)

- max. input frequency: 20 Hz,
  min. pulse length: 50 ms
- max. cable length: 500 m

6.4.11 Contacts or pulses (hazardous area) via MFE11 board

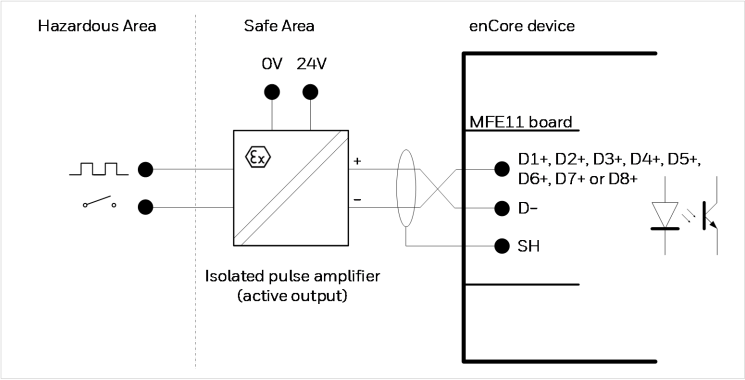


Fig. 6-21: Contacts or pulses (hazardous area) via MFE11 – example

Characteristics MFE11:

- eight galvanically isolated input circuits for messages and low-frequency pulses
- passive isolated pulse amplifier integrated in the inputs
- max. load: 24 V DC; 2.4 mA
- switching point:
  ≥ 18 V DC: (1)
  ≤ 10 V DC: (0)
- max. input frequency: 20 Hz,
  min. pulse length: 50 ms
- max. cable length: 500 m

6.4.12 HART measurement transmitter (EEx i) via ExMFE5 board

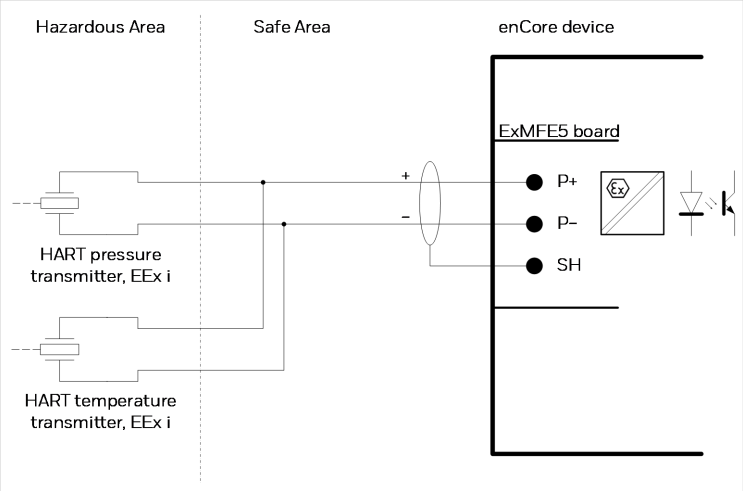


Fig. 6-22: HART pressure and temperature transmitter (EEx i) via ExMFE5 – example

Characteristics ExMFE5:

- an intrinsically safe, galvanically isolated input safe circuits of the category [Ex ib Gb] II C for transmitter with HART interface
- an active signal and protocol converter integrated in input as "associated electrical equipment" according to EN50020:
  - open-circuit voltage: approx. 18 V
  - voltage at 20 mA: approx. 10.6 V
  - max. load: 300 Ω
- Multidrop mode: up to 4 transmitter (max. 388 mW)
  Burst mode: 1 transmitter [1]
- max. cable length: 250 m

[1] Burst mode is not supported by all transmitters.

Hints on parameterization

Branch **<device>** – **Basic System** – **I/O boards** – **Board <x>: ExMFE5**

Set the following value:

- channel **P1+ P1–** type **HART channel**

With this, the operating mode of the channel is set correctly for connecting the HART transmitters. In folder **P1+ P1–: HART loop <x>** all further settings for the individual transmitter or transmitters are set.

The following HART modes are possible:

- Multidrop mode (max. 4 transmitters)
  Note that the HART device cannot be operated using **HART address** zero (**0**).
- Burst mode (max. 1 transmitter)
  Set the burst mode by parameterizing **HART address** zero (**0**) for the HART device.

6.4.13 HART measurement transmitter (EEx d) via MFE7 board (without barrier, internal power supply)

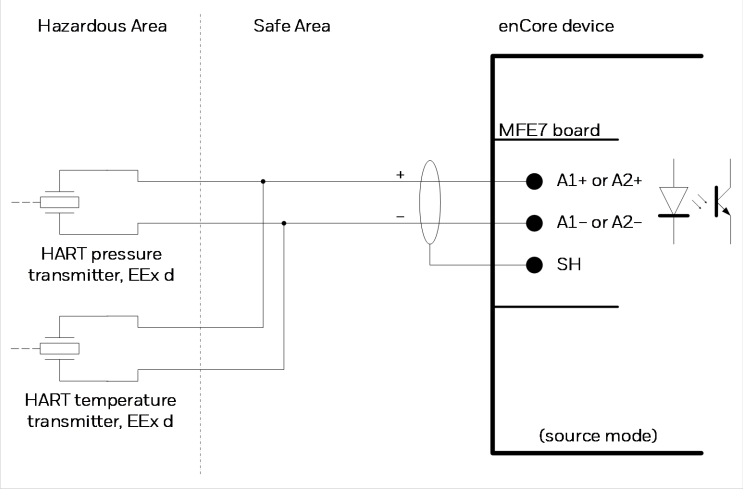


Fig. 6-23: HART pressure and temperature transmitter (EEx d) via MFE7 – example

Characteristics MFE7:

- a galvanically isolated input safe circuit for a transmitter with HART interface
- an active signal and protocol converter integrated in input:
  - open-circuit voltage: approx. 21 V
  - load: 300 Ω
  - Multidrop mode: up to 4 transmitters (max. 388 mW)
    Burst mode: 1 transmitter [1]
  - max. cable length: 250 m

[1] Burst mode is not supported by all transmitters.

Hints on parameterization

Branch **<device> – Basic System – I/O boards – Board <x>: MFE7**

Set the following values:

- channel **A1+ A1–** or **A2+ A2–** type **HART channel**
- parameter **Power supply** value **On** (source mode)

With this, the operating mode of the channel is set correctly for connecting the HART transmitters.

The following HART modes are possible:

- Multidrop mode (max. 4 transmitters)
  Note that the HART device cannot be operated using **HART address** zero (**0**).
- Burst mode (max. 1 transmitter)
  Set the burst mode by parameterizing **HART address** zero (**0**) for the HART device.

6.4.14 HART measurement transmitter (EEx d) via MFE7 board (without barrier, external power supply)

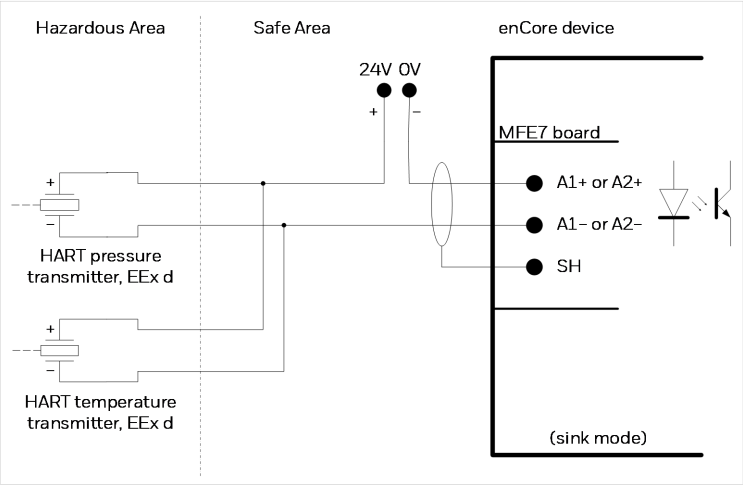


Fig. 6-24: HART pressure and temperature transmitter (EEx d) via MFE7 – example

Characteristics MFE7:

- a galvanically isolated input safe circuit for a transmitter with HART interface:
  - load: 300 Ω
- protocol converter integrated in input:
  Multidrop mode: up to 4 transmitters
  Burst mode: 1 transmitter [1]
- max. cable length: 250 m

[1] Burst mode is not supported by all transmitters.

Hints on parameterization

Branch **<device>** – **Basic System** – **I/O boards** – **Board <x>: MFE7**

Set the following values:

- channel **A1+ A1–** or **A2+ A2–** type **HART channel**
- parameter **Power supply** value **Off** (sink mode)

With this, the operating mode of the channel is set correctly for connecting the HART transmitter.

The following HART modes are possible:

- Multidrop-Modus (max. 4 transmitters)
  Note that the HART device cannot be operated using **HART address** zero (**0**).
- Burst-Modus (max. 1 Transmitter)
  Set the burst mode by parameterizing **HART address** zero (**0**) for the HART device.

6.4.15 HART measurement transmitter (EEx i) via MFE7 board (barrier in sink mode)

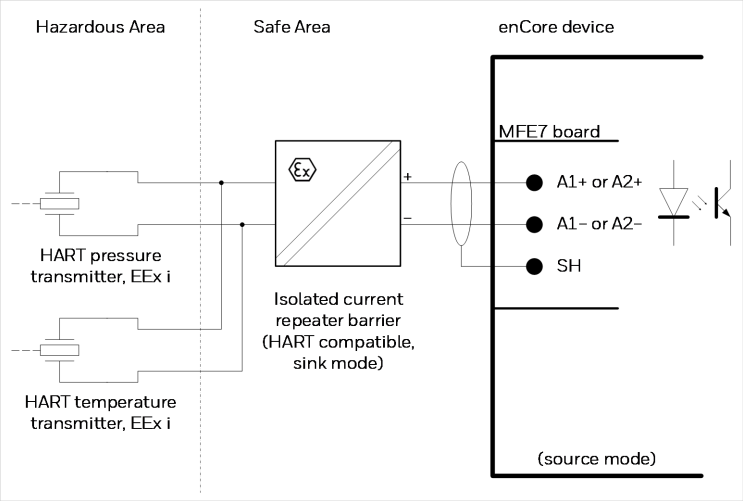


Fig. 6-25: HART pressure and temperature transmitter (EEx i) via MFE7 – example

Characteristics MFE7:

- a galvanically isolated input safe circuit for a transmitter with HART interface
- In source mode the board offers a guaranteed voltage of 12.6 V at a transmitter load of max. 600 Ω for 20 mA:
  - open-circuit voltage: approx. 21 V
  - load: 300 Ω
- protocol converter integrated in input:
  Multidrop mode: up to 4 transmitters
  Burst mode: 1 transmitter [1]
- max. cable length: 250 m

[1] Burst mode is not supported by all transmitters.

Hints on parameterization

Branch **<device>** – **Basic System** – **I/O boards** – **Board <x>: MFE7**

Set following values:

- channel **A1+ A1–** or **A2+ A2–** type **HART channel**
- parameter **Power supply** value **On** (source mode)

With this, the operating mode of the channel is set correctly for connecting the HART transmitters. In node **<Channel>: HART loop <x>**all further settings for the individual transmitters are set.

The following HART modes are possible:

- Multidrop mode (max. 4 transmitters)
  Note that the HART device cannot be operated using **HART address** zero (**0**).
- Burst mode (max. 1 transmitter)
  Set the burst mode by parameterizing **HART address** zero (**0**) for the HART device.

6.4.16 HART measurement transmitter (EEx i) via MFE7 board (barrier in source mode)

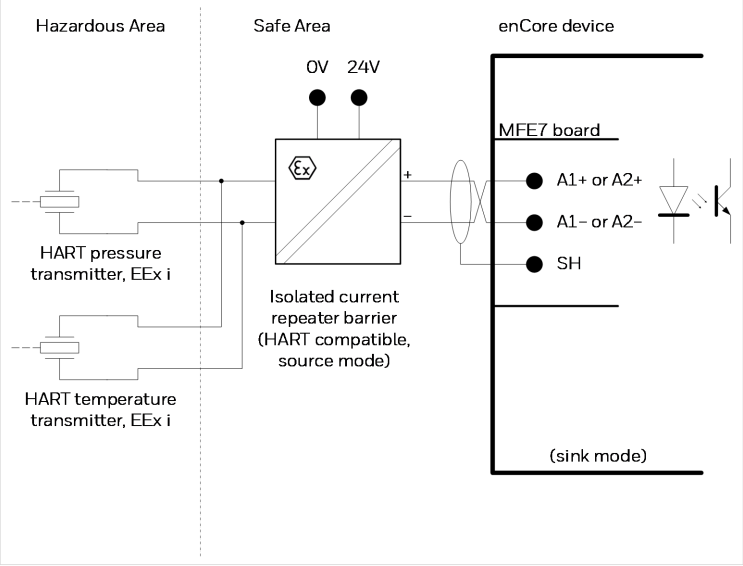


Fig. 6-26: HART pressure and temperature transmitter (EEx i) via MFE7 – example

Characteristics MFE7:

- a galvanically isolated input safe circuit for a transmitter with HART interface
  - load: 300 Ω
- protocol converter integrated in input:
  Multidrop mode: up to 4 transmitters
  Burst mode: 1 transmitter [1]
- max. cable length: 250 m

[1] Burst mode is not supported by all transmitters.

Hints on parameterization

Branch **<device>** – **Basic System** – **I/O boards** – **Board <x>: MFE7**

Set following values:

- channel **A1+ A1–** or **A2+ A2–** type **HART channel**
- parameter **Power supply** value **Off** (sink mode)

With this, the operating mode of the channel is set correctly for connecting the HART transmitters. In node **<Channel>: HART loop <x>**all further settings for the individual transmitters are set.

The following HART modes are possible:

- Multidrop mode (max. 4 transmitters)
  Note that the HART device cannot be operated using **HART address** zero (**0**).
- Burst-Modus (max. 1 transmitter)
  Set the burst mode by parameterizing **HART address** zero (**0**) for the HART device.

6.4.17 HART measurement transmitter (EEx d) via MFE7 board (redundant, without barrier) – burst mode

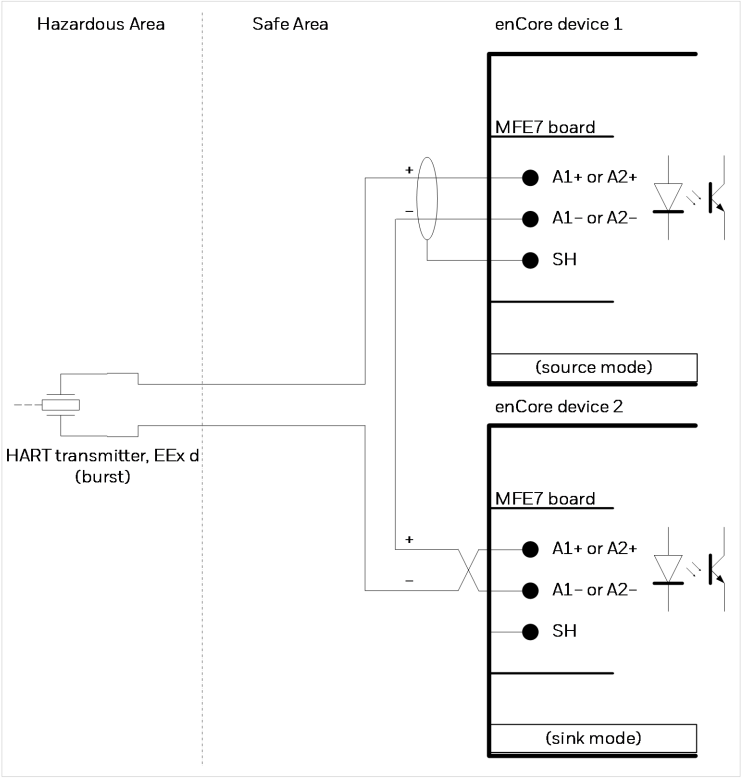


Fig. 6-27: HART-Transmitter (EEx d) via MFE7 (redundant)

Honeywell Elster special feature

This operating mode is tailored to the special features of the MFE7 input board. It is not part of the official HART standard IEC 61784-1.

We have developed this mode for cases where a transmitter is to communicate with two enCore devices.

Characteristics MFE7:

- a galvanically isolated input safe circuit for a transmitter with HART interface for every device;
  protocol converter integrated in input:
  - 1st device in source mode:
    open-circuit voltage: approx. 24 V
    max. load: 300 Ω
  - 2nd device in sink mode
    load: approx. 50 Ω
- This operating mode can only be used with one transmitter in burst mode. [1]
- max. cable length: 250 m (in total)

[1] Burst mode is not supported by all transmitters.

Hints on parameterization

Branch **<device>** – **Basic System** – **I/O boards** – **Board <x>: MFE7**

Set following values:

- channel **A1+ A1–** and **A2+ A2–** type **HART channel**
- per channel the parameter **Power supply**:

- for device 1 value **On** (source mode)
- for device 2 value **Off** (sink mode)

With this, the operating mode of the channel is set correctly for the redundant connection of both the HART transmitters with the ignition protection category EEx d. In node **<Channel>: HART loop <x>** all further settings for the individual transmitters are set.

6.4.18 HART measurement transmitter (EEx i) via MFE7 board (redundant) – burst mode

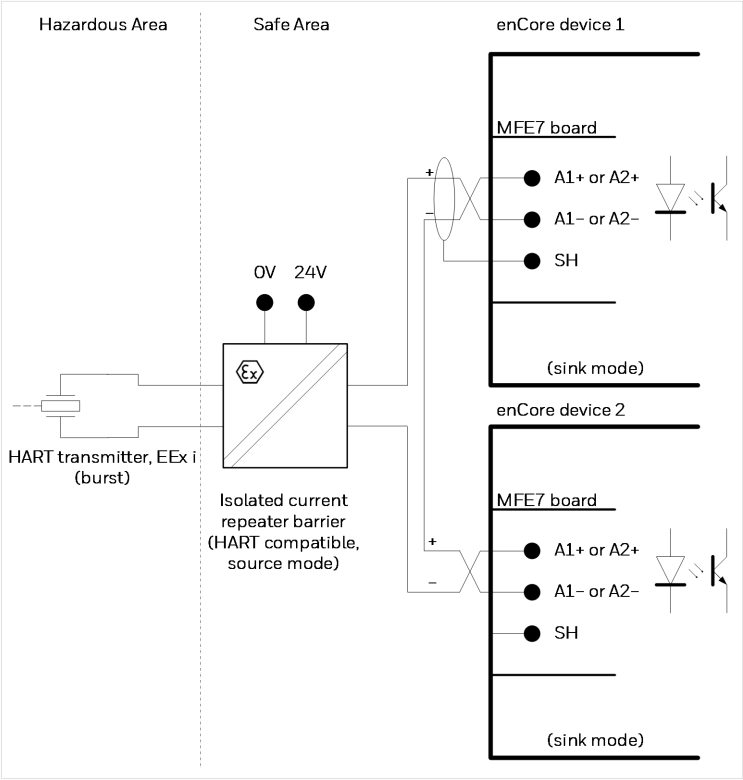


Fig. 6-28: HART transmitter (EEx i) via MFE7 (redundant) – example

Honeywell Elster special feature

This operating mode is tailored to the special features of the MFE7 input board. It is not part of the official HART standard IEC 61784-1.

We have developed this mode for cases where a transmitter is to communicate with two enCore devices.

Characteristics MFE7:

- a galvanically isolated input safe circuit for a transmitter with HART interface for every device
- both devices in sink mode:
  - load: approx. 50 Ω
    this operating mode can only be used with just one transmitter in burst mode [1]
- max. cable length: 250 m (in total)

Hints on parameterization

Branch **<device>** – **Basic System** – **I/O boards** – **Board <x>: MFE7**

Set following values:

- channel **A1+ A1–** and **A2+ A2–** type **HART channel**
- per channel the parameter **Power supply**:

- for device 1 value **Off** (sink mode)
- for device 2 value **Off** (sink mode)

With this, the operating mode of the channel is set correctly for the redundant connection of both the HART transmitters with the ignition protection category EEx i. In node **<Channel>: HART loop <x>**all further settings for the individual transmitters are set.

1 Burst mode is not supported by all transmitters.

6.4.19 Gas meter (turbine): encoder index, 2 LF/HF sensors (EEx i) via ExMFE5 boards

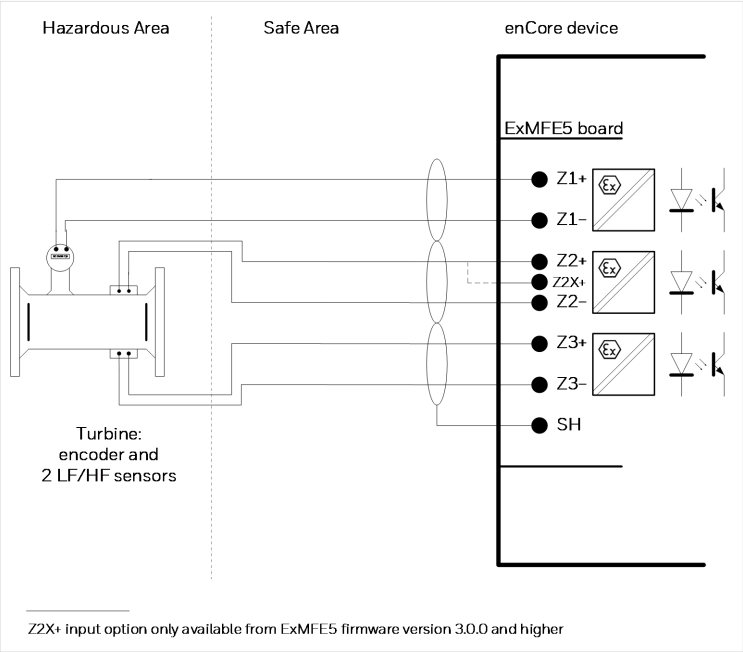


Fig. 6-29: Interface for turbine meter:
encoder index, 2 LF/HF sensors (EEx i) via ExMFE5 – example

Characteristics ExMFE5:

- three intrinsically safe, galvanically isolated input safe circuits of the category [Ex ib Gb] II C for HF- or LF pulse sensor according to NAMUR; active isolated pulse amplifier integrated in the inputs as "associated electrical equipment" according to EN50020
- Alternatively, one encoder index can be connected with NAMUR interface on channel 1.
- max. input frequency depending on the operating mode:

  - LF: 2 Hz, min. pulse length: 200 ms
  - HF: 5 kHz

- max. cable length depending on the operating mode:
  - message, LF or encoder: 500 m
  - HF (up to 2 kHz): 250 m
  - HF (up to 5 kHz): 100 m

Channel option Z2X+/Z2– from ExMFE5 firmware version 3.0.0 and higher

All pulse input channels work with Namur pulse generators as well as with pulse generators that have an open collector output.

From ExMFE5 firmware version 3.0.0 and higher, the additional contact Z2X+ is available. In special cases, the Z2X+ input contact can be connected instead of Z2+ for pulse generators with open collector output at channel 2.

Consult our technical support before using this option.
⇨ 12.4 Technical support Flow Computers and Gas analyzers (p. 144)

6.4.20 Gas meter (turbine): encoder index, 2 LF/HF sensors (EEx i) via MFE7 board

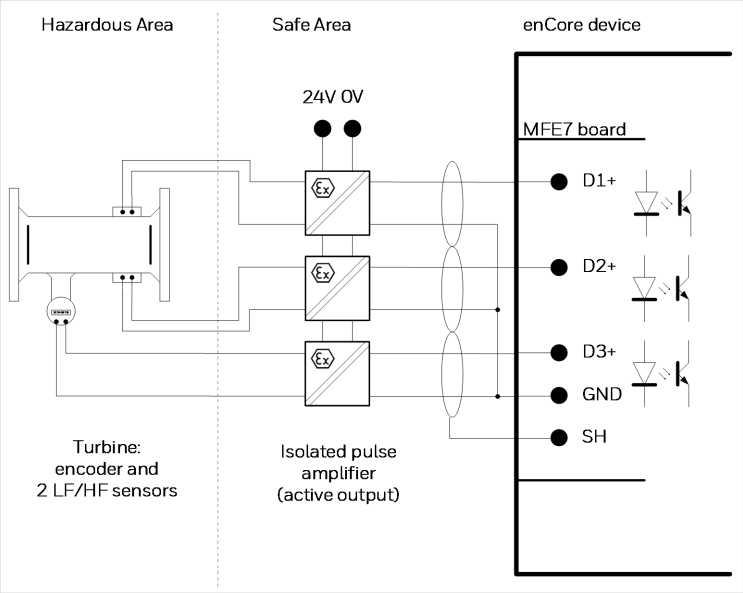


Fig. 6-30: Interface for turbine meter:
encoder index, 2 LF/HF sensors (EEx i) via MFE7 – example

Characteristics MFE7:

- three galvanically isolated input safe circuits for HF or LF pulse sensor;
  passive isolated pulse amplifier integrated in the inputs
- Alternatively, one encoder index or a transmitter can be connected with frequency interface on channel 3.
- max. load: 24 V DC; 6 mA
- switching point:
  > 15 V DC: (1)
  < 6.5 V DC: (0)
- max. input frequency depending on the operating mode:

  - NF: 8 Hz,
    min. pulse length: 50 ms
  - HF: 5 kHz
  - frequency (only channel 3): 5 kHz
    (accuracy better than 1 ppm)

- max. cable length depending on the operating mode:
  - message, LF or encoder: 500 m
  - HF up to 2 kHz: 250 m
  - HF up to 5 kHz: 100 m
  - frequency: 100 m

6.4.21 Gas meter (turbine) SMRI bi-directional: 2 HF sensors, flow direction detection (EEx i) via MFE7 board

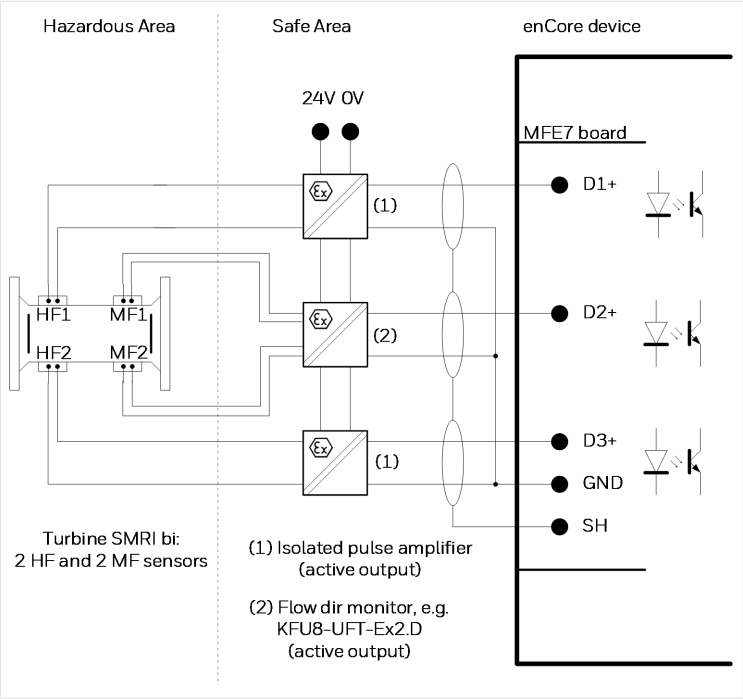


Fig. 6-31: Interface for turbine meter type SMRI bi:
2 HF and 2 MF sensors (EEx i), flow direction detection external via MFE7 – example

Characteristics MFE7:

- two galvanically isolated input safe circuits for HF pulse sensor; passive isolated pulse amplifier integrated in the inputs
- a galvanically isolated input safe circuit for the direction signal; a passive isolated pulse amplifier integrated in the inputs
- max. load: 24 V DC; 6 mA

- switching point:
  > 15 V DC: (1)
  < 6.5 V DC: (0)
- max. input frequency in operating mode:
  - HF: 5 kHz
- max. cable length depending on the operating mode:
  - message: 500 m
  - HF (up to 2 kHz): 250 m
  - HF (up to 5 kHz): 100 m

6.4.22 Gas meter (turbine) SMRI bi-directional: flow direction detection internal (EEx i) via MFE7 board

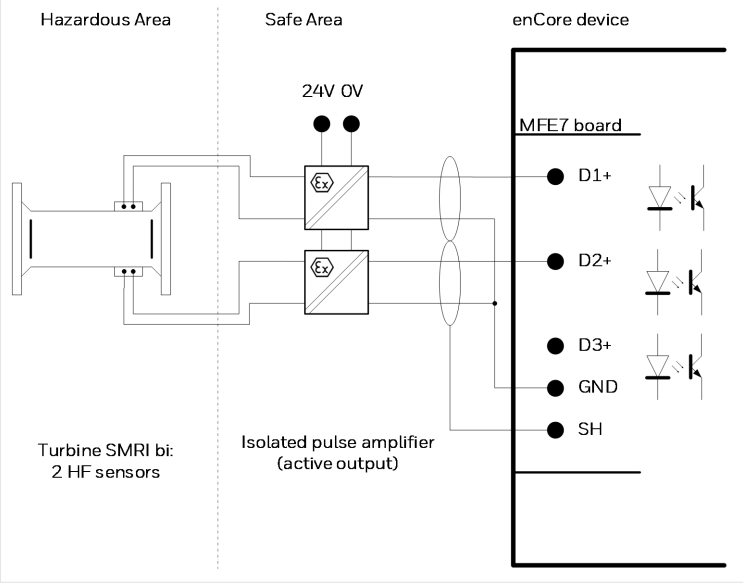


Fig. 6-32: Interface for turbine meter type SMRI bi:
2 HF sensors (EEx i), flow direction detection internal via MFE7 – example

Characteristics MFE7:

- two galvanically isolated input safe circuits for HF- or LF pulse sensor;
  passive isolated pulse amplifier integrated in the inputs
- a galvanically isolated input safe circuit for the direction signal;
  a passive isolated pulse amplifier integrated in the inputs
- max. input signal: 24 V DC; 6 mA
- switching point:
  > 15 V DC: (1)
  < 6,5 V DC: (0)
- max. input frequency: 5 kHz
- max. cable length depending on the operating mode:
  - message: 500 m
  - HF (up to 2 kHz): 250 m
  - HF (up to 5 kHz): 100 m

Hints on parameterization

Branch **<device>** – **Basic System** – **I/O boards** – **Board <x>: MFE7**

Set following values:

- channel **D1+ GND** type **HF pulse input channel A**
- parameter **Flow direction detection** value **On**
- channel **D2+ GND** type **HF pulse input channel B**

6.4.23 Q.Sonic ultrasonic flow meter: serial RS485 (EEx d) via MFE7 board

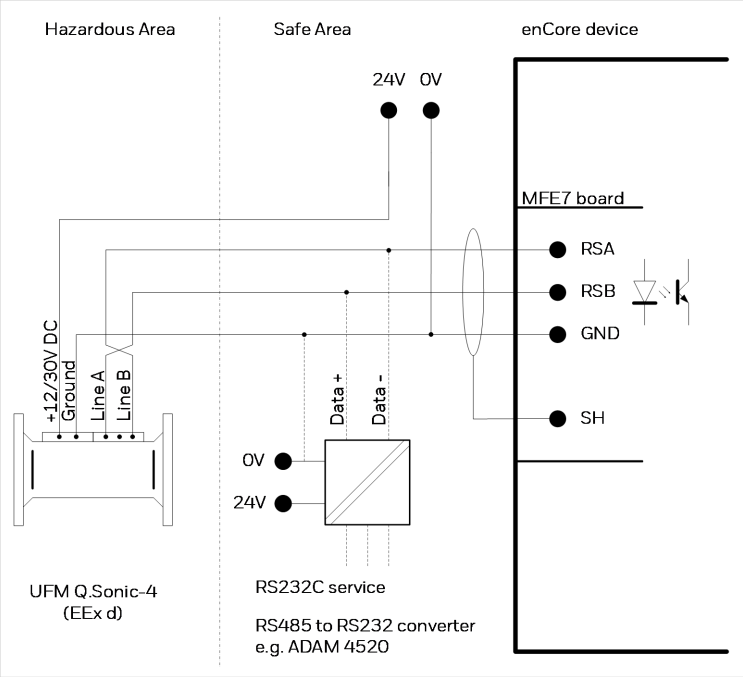


Fig. 6-33: Interface for ultrasonic flow meter (Q.Sonic): serial RS485 (EEx d) via MFE7

Consider the recommendations made with regards to cable length and connection resistors.

⇨ 6.4.1 General recommendations for signal and data cable (p. 61)

6.4.24 Q.Sonic6 ultrasonic flow meter: serial RS485 (EEx d) via MFE7 board

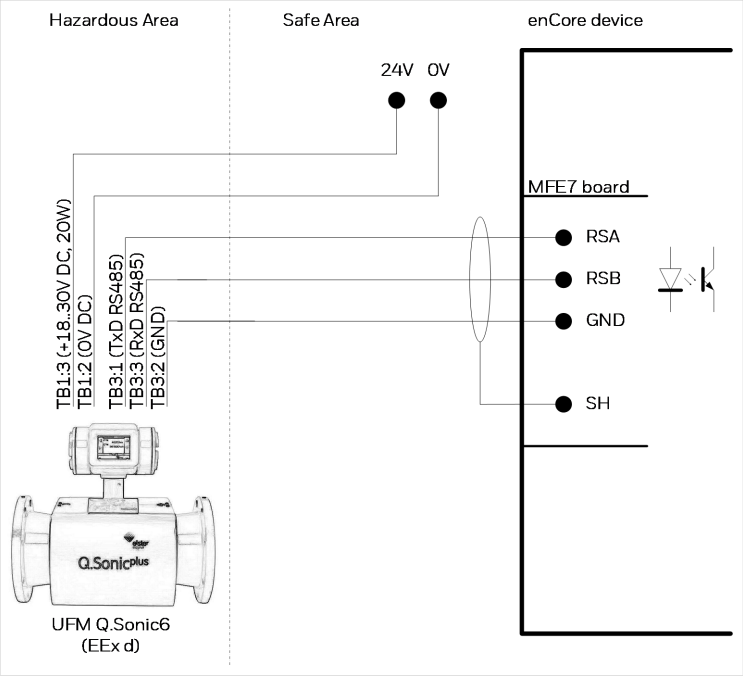


Fig. 6-34: Interface for ultrasonic flow meter (Q.Sonic6): serial RS485 (EEx d) via MFE7

Consider the recommendations made with regards to cable length and connection resistors.

⇨ 6.4.1 General recommendations for signal and data cable (p. 61)

6.4.25 FLOWSIC600 ultrasonic flow meter: serial RS485 (EEx d) via MFE7 board

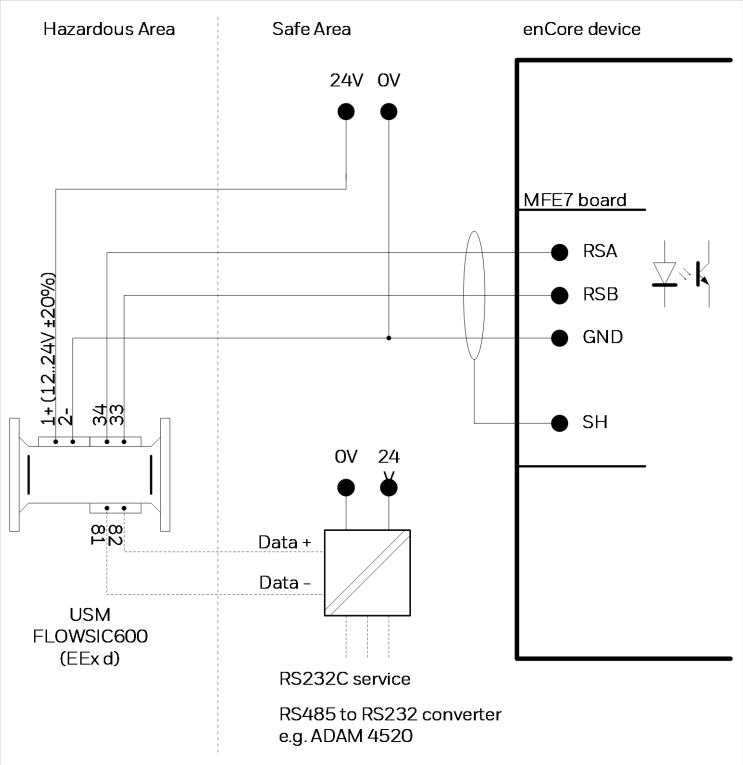


Fig. 6-35: Interface for ultrasonic flow meter (FLOWSIC600): serial RS485 (EEx d) via MFE7

Consider the recommendations made with regards to cable length and connection resistors.

⇨ 6.4.1 General recommendations for signal and data cable (p. 61)

6.4.26 Serial interface through COM port (CPU or MSER4 board)

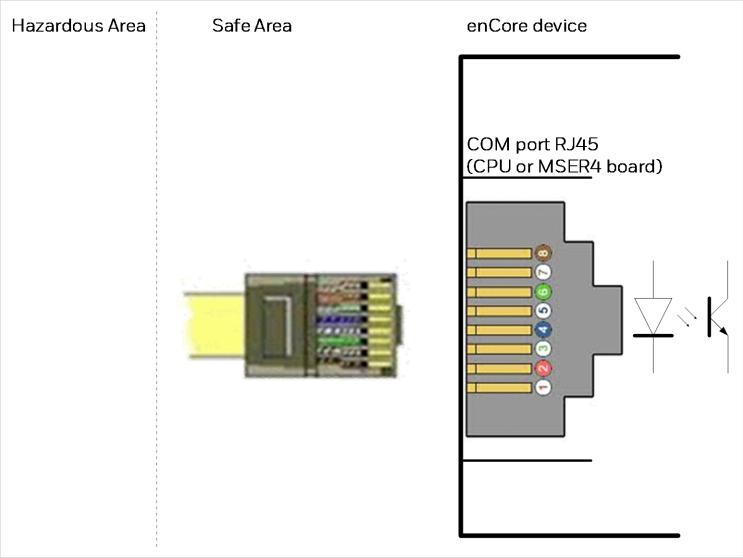


Fig. 6-36: Serial interface through COM port (via CPU or MSER4)

Cable length and the connection resistors

Consider the recommendations made with regards to cable length and connection resistors.

⇨ 6.4.1 General recommendations for signal and data cable (p. 61)

Hints on parameterization

Branch **<device>** – **Basic System** – **I/O boards** – **CH1/CH2** for protocol channels of the CPU (in the sub-folder **MSER4** for protocol channels of an MSER4 board)

Select the appropriate driver mode here (RS485, RS422 or RS232).

The following table indicates signal assignment depending on the Driver mode:

RJ45 Pin no.	Pair no./color	RS485	RS422	RS232
1	3/white-orange	data A	data A	TXD
2	3/orange	data B	data B	RTS
3	2/white-green	-	data A'	RXD
4	1/blue	VAUX	VAUX	VAUX
5	1/white-blue	SGND	SGND	SGND
6	2/green	-	data B'	CTS
7	4/white-brown	VAUX	VAUX	VAUX
8	4/brown	SGND	SGND	SGND

Table 6-1: Pin assignment and color coding acc. to standard EIA/TIA 568B[1]

[1] Note that other color coding standards are also usual and commonly used.

6.4.27 Analog output over MFA8 board (0/4 ... 20 mA)

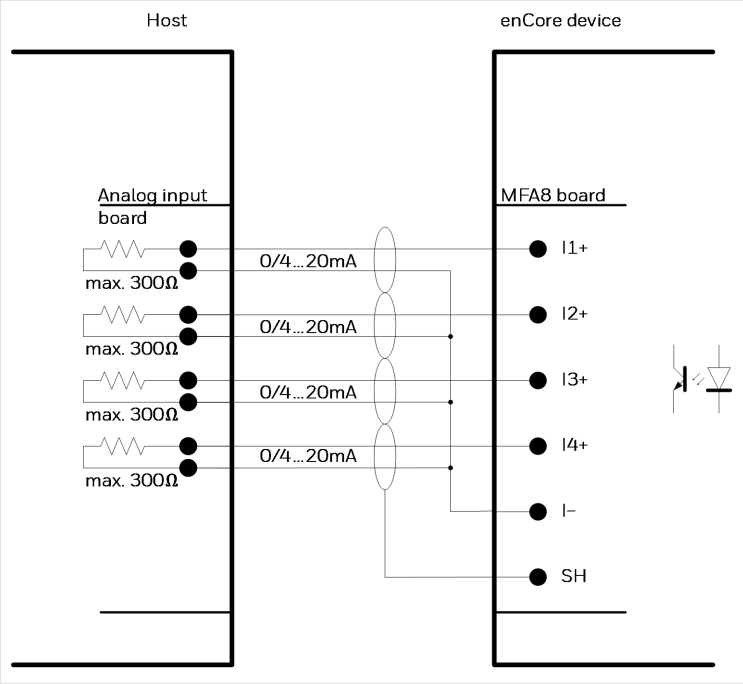


Fig. 6-37: Analog output via MFA8

Characteristics MFA8:

- four common galvanically isolated active output safe circuits ("common ground") with 0 ... 20 mA- or 4 ... 20 mA interface:
  - max. rated voltage: approx. 9 V
  - max. permissible load: 300 Ω (in the trough)
- max. measurement error: ±0.1 % of the measurement (in the measuring range 4 ... 20 mA and 0 up to 40 °C ambient temperature)
- max. cable length: 500 m

Hints on parameterization

Branch: **<device>** – **Basic System** – **I/O boards** – **Board <x>: MFA8**

Set the following values:

- for the relevant channel **I1+ I–**, **I2+ I–**, **I3+ I–** or **I4+ I–** type **Current output**
- parameter **Current range** current output range: **0 to 20 mA** or **4 bis 20 mA**

6.4.28 Message output over MFA8 board

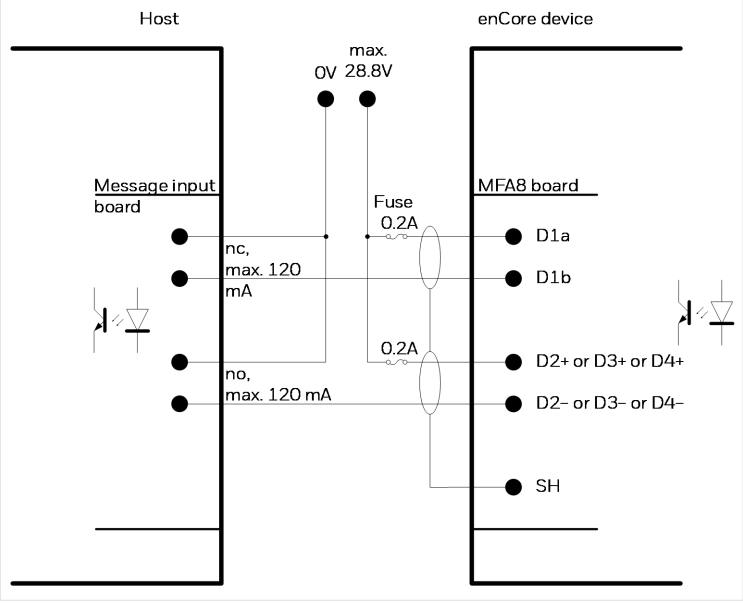


Fig. 6-38: Message output via MFA8

Characteristics MFA8:

- four galvanically isolated passive output safe circuits for displaying messages:

  - channel **D1** interpreted as opener (`nc`, "normally closed")
  - channel **D2**, **D3** and **D4** interpreted as closer (`no`, "normally open")

- max. load per channel: 28.8 V DC; 120 mA
- max. cable length: 250 m

Hints on parameterization

Branch **<device>** – **Basic System** – **I/O boards** – **Board <x>: MFA8**

Set the following values:

- channel **D2+ D2–**, **D3+ D3–** and **D4+ D4–** type **Message output**

6.4.29 Pulse output over MFA8 board

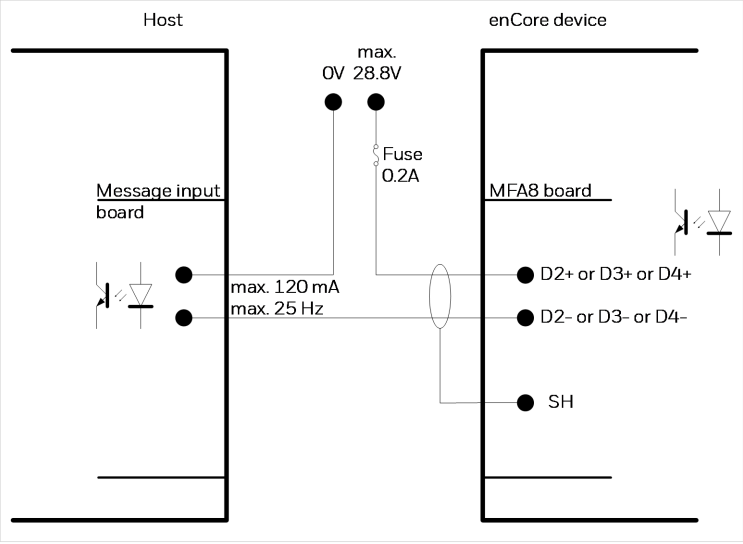


Fig. 6-39: Pulse output via MFA8

Characteristics MFA8:

- three galvanically isolated passive output safe circuits for displaying pulses
- max. load per channel: 28,8 V DC; 120 mA
- max. pulse rate: 25 Hz
- max. cable length: 250 m

Hints on parameterization

Branch **<device>** – **Basic System** – **I/O boards** – **Board <x>: MFA8**

Set the following values:

– channels **D2+ D2–**, **D3+ D3–** and **D4+ D4–** type **Pulse output**

7 Device configuration and commissioning

All newly delivered devices are factory-configured so as to support all available interfaces.

Setting enCore device parameters, i.e., configuring device functions and adapting the device to the actual measuring point, is done on site using the enSuite software.

enSuite system requirements and installation

System requirements and details about how to install enSuite are available in a separate installation guide. You can download the PDF on the Elster Instromet website from the section **Software Downloads**: process.honeywell.com/us/en/site/elster-instromet/support#software-downloads

If work on a gas system is also required due to the scope of application of enCore FC, it is necessary to call in a gas specialist for this work step. If the device is used in the area of application of legal metrology, the presence of a metrology expert is additionally required.

Online help

Instructions for operating enSuite and a detailed description of the parameters can be found in the ⇨ enSuite online help.

7.1 Parameterization of the device

This section gives brief instructions on how to create a complete configuration for enCore devices and how to transfer the configuration into the device on-site via USB. Details ⇨ enCore manual “Configuring the Device with enSuite”.

Opening the security switch

As a general rule, there are parameters which cannot be changed, if the security switch is closed – especially if the device is used within the scope of legal metrology. If a new parameterization refers to such a parameter, then the security switch must be opened, such that the presence of a metrology expert may be required in some instances.

The following steps are required:

- ▶ Start enSuite on your computer.
- ▶ Establish the USB connection with your enCore device.
- ▶ Use enSuite to create a suitable device parameterization.
- ▶ Open the security switch if required.
- ▶ Transfer the parameterization to the device.
- ✓ A login dialog appears on the computer screen.
- ▶ Login as an administrator.

- ✓ After a successful login, the data transfer begins.
- ▬ After successful data transfer the device restarts automatically and displays its' main display.

Device starts with a prohibitive or a customs sign

In very rare cases, it may happen that the device starts in emergency mode or with in the so-called "improper configuration mode" after parameterization.

⇨ 11.1 What if a warning sign is displayed after system start? (p. 138)

7.2 Commissioning

7.2.1 Set date and time on device

Background

First set the current date and time as well as the timezone of the location. Activate daylight saving time if applicable.

Steps at the device

- Log on to the device under **System – Users** with the standard user **admin1**. In delivery state, the password is empty by default.
- Switch to the main display with – **System – Time Service**.
- Click the hyperlink **Date & Time**.
- Set the correct system time.

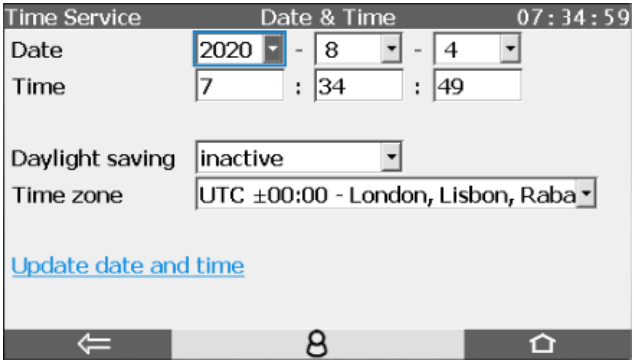


Fig. 7-1: Set system time - example

- Confirm your input with **Update date and time**.

The text **Date and time updated** is briefly displayed when the system time has been successfully updated.

7.2.2 Set password for admin1

Background

In the delivery state, user passwords for standard users are empty for all enCore devices, including **admin1**. Change the password for **admin1** during commissioning.

Further details ⇨ "9 User and rights management" in the FC manual Basic System with SFBs.

> **Assign password at first login to the enCore device!**
>
> In delivery state, user passwords are not set for standard users. Even if you create a new user in enSuite, enSuite creates these users without a password.
>
> We strongly recommend that each user changes his or her password at the first login to the device.

Change password on the device

Prerequisite(s)

- No user is currently logged in to the device.

▶ Log in to the device under **System – User** with your login data.

▶ Click the action: **Change password**

The edit fields for the new password are displayed.

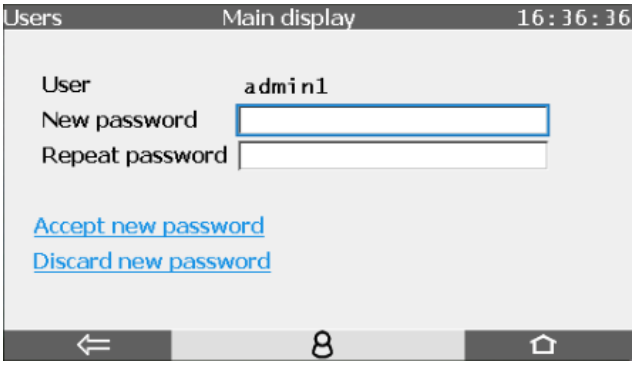


Fig. 7-2: Main display "Change password" – example

- You can make the keyboard appear by clicking the field **New password**.
- Enter the new password.

Permissible passwords

When choosing a new password, please note:

- A password can be made up of 3 to 10 permissible characters – empty passwords (0 characters) are also permitted.
- No distinction is made between upper case and lower case letters.
- All the letters from `a` through `z` (or `A` through `Z`) and the numbers `0` through `9` are permissible.
- Special characters such as empty space and `-.*[{|#,\` are *not* permissible.

- Enter the same password in the field **Repeat password**
- Save the password with **Accept new password**.

The passwords entered will be checked to make sure they are identical and for length and permissible characters. A short status message will be displayed briefly over the lower edge of the screen. Red font indicates that the password was not able to be saved.

7.2.3 Create TLS certificate and publish it to enSuite

Background

Since Basic System V 03-39, MMS connections between enCore device and enSuite are secured via TLS. The enCore device authenticates itself to enSuite with a self-signed certificate.

The devices are always delivered by Honeywell without a certificate. When you switch on the device for the first time, a new certificate is automatically created. This ensures that the certificate is not compromised.

In order to rule out the unlikely case that a third party (e.g., during transport) has already created and compromised a certificate, we recommend deleting the certificate and having it created again during commissioning of the device. It is important that summer or winter time (normal time) and the time zone of the enCore device are set.

Steps

- The enCore device is preferably connected to enSuite via USB, or alternatively via TCP/IP.
- User right **Change general system settings** is granted.

First make sure that daylight saving time (standard time) and the time zone are set correctly on the enCore device

- ▶ Connect enSuite to the device
- ✓ When connecting for the first time, enSuite displays the information of the current certificate of the device
- ▶ Accept the certificate only temporarily.
- ▶ Call the action **Online parameterization**.
- ▶ In the parameter tree open the node **<device type> – Basic System – Time Service**.
- ▶ In section **General** select the **Time zone**.
- ▶ In section **Daylight saving** parameterize daylight saving.
- ▶ Click on the icon **Transfer changes to device**.

Create a new TLS certificate:

- Authenticate yourself on the device in display **System – Users**
- Switch via basic display to device display:
  Info – <device serial no.>.
- Delete the existing certificate with **Delete certificate**.

The certificate will only be permanently deleted on shutdown.

- Restart the device with the action **Reboot and create certificate**.

On restart, the device generates a new certificate for MMS communication.

To validate the certificate information, ...

- ... open the certificate information on the device under:
  Info – <device serial no.>, **Certificate**

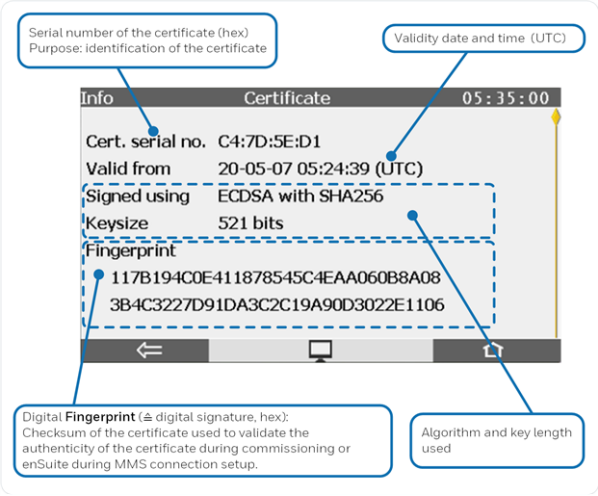


Fig. 7-3: Display **Certificate** with certificate information, top of page – example

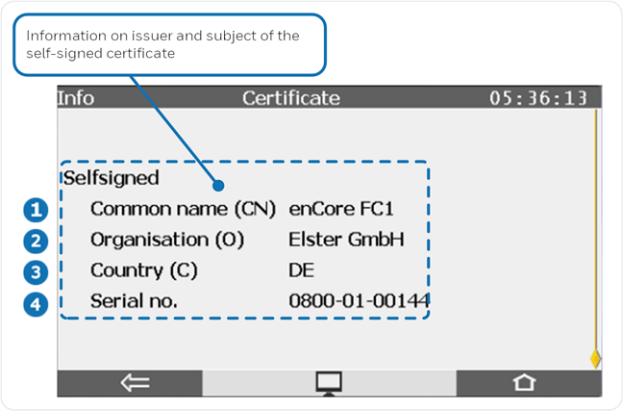


Fig. 7-4: Display **Certificate** with certificate information, end of page – example

Naming convention according to X.500 standard and values for TLS certificates for enCore devices:

1. CN = Common Name, *here*: enCore device type
2. C = Country; *here*: DE - Germany
3. O = Organization; *here*: Elster GmbH
4. Serial number of enCore device

▶ Connect enSuite to the device with the action **Connect**.

✓ enSuite displays the information of the new certificate:

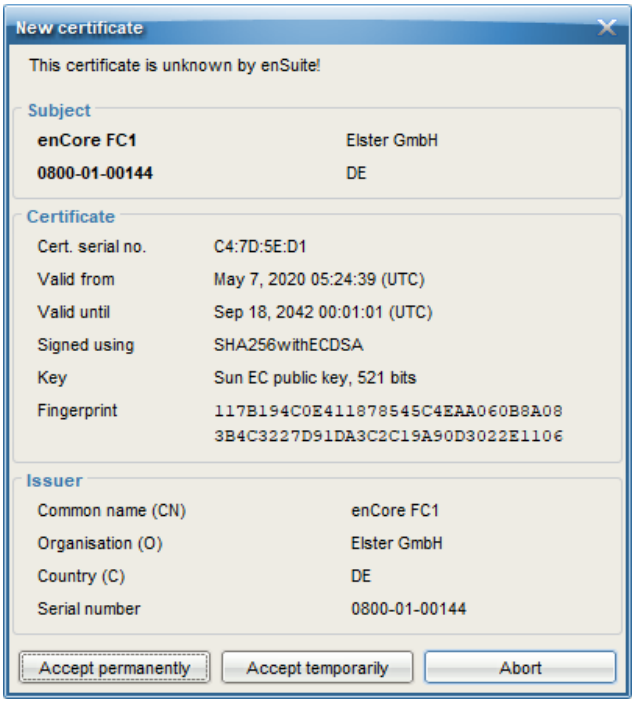


Fig. 7-5: Unknown certificate – example

- ▶ Compare the fingerprint and/or the information on the subject of enSuite and the device display with each other.
  (Note: In the device display, the item information is on the second page).
- ✓ Since you have newly created the certificate, the data should match.
- ▶ Confirm the certificate with **[Accept permanently]**.
- ✓ In this case, enSuite stores the certificate and checks the device's certificate with the stored information every time an MMS connection is established (unnoticed by the user). Only if the certificates do not match, enSuite will display the certificate information again for validation.

Accept certificate only temporarily

Alternatively, you can **[Accept temporarily]** the certificate. In this case, this MMS connection will be allowed. enSuite does not save the certificate and the next time a connection is established, enSuite will display the certificate information again for validation.

This option is useful, for example, if you are not on site and can only check the certificate at a later point in time.

7.2.4 Checking device settings

You can carry out a complete check of the current device parameterization using the enSuite software during online connection with the device.

7.2.5 Checking measurement input values

You can check the input measurement values (measured data, e.g., from meters, pressure transmitters, temperature transmitters and gas quality measuring devices) via the device display.

7.2.6 Checking output signals

Parameterized output signals can be measured using appropriate measurement devices and checked in that way.

7.2.7 Checking digital communication (Modbus, etc.)

Appropriate tools (e.g., a protocol analyzer) can be used to check digital communication.

7.2.8 Checking measurements and calculations

A final check of the accuracy of measurement results and calculations must be executed when the device is used within the scope of legal metrology. A metrology expert is required for this process, and the applicable legal regulations must be observed.

7.2.9 End of commissioning (from Basic System V 03-24 and higher)

enSuite provides a convenient function to prepare an enCore flow computer for operation at the end of commissioning. This function combines different actions (e.g., the action **Erase fiscal audit trail** or **Set counters**) per stream.

This function is available in normal mode during online parametrization only. Requirement is that the calibration switch is open. Depending on the action you want to execute, you need the user right **Erase fiscal audit trail/fiscal archives** and/or the rights for the individual counters on parameter level.

Call:

<Stream 1/stream 2>, tab **End of commissioning**

7.2.10 Seal (if necessary)

It may be necessary for the device as well as sensor and signal lines to be sealed by a metrology expert when it is used within the scope of legal metrology. The conditions of the applicable authorization must be observed in this case.

8 Maintenance

The enCore FC is practically maintenance-free. Only the battery, which is required for purposes of data retention when the power supply is switched off, must be replaced at certain intervals.
Please contact our technical support if you need assistance. (⇨ 12.4 Technical support Flow Computers and Gas analyzers, p. 144)

8.1 Battery replacement

The enCore FC battery mainly comes into use when the power supply to enCore FC is disconnected permanently, or it is being switched off and switched back on at frequent intervals. Consumption of the battery can be neglected if the power supply is connected. In addition, the battery loses energy as it ages.

The battery must be replaced with a new one at least every 10 years.

Special cases

- storage without power supply
  The battery loses approx. 3 % of its charge every month if the device is stored, but is not continuously connected with power supply. The battery is completely discharged after 3 years of storage. We therefore recommend that the battery be replaced by a new one when the enCore FC has been without supply voltage for longer than 1 year.
- frequent switching on and off of the device
  The battery also loses additional charge if the enCore FC power supply is switched on and off frequently during operation.
  It is thus recommended that the battery is replaced by a new one when the power supply has been switched off and then switched back on again more than 1,000 times.

The enCore FC automatically signals as soon as battery state of charge has dropped to 20 % of that of a new battery.

A dead battery may sometimes lead to a loss of the measurement data that was calculated and saved.

For safety reasons, the battery should be replaced only by the manufacturer's service department or by an appropriately trained specialist working for the plant operator.

The housing of the device must be opened in order to replace the battery. The presence of a metrology expert may be required for this purpose when the device is being used within the scope of legal metrology.

ATTENTION!

Risk of short circuit

The device may damage if it is opened in case of connected power supply.

Always make sure the enCore FC is free of voltage before changing the battery.

8.1.1 Changing batteries

Prerequisite(s)

- You need a battery of the type: Lithium 3V CR2 ½ AA by Varta

Use only battery types tested and approved by Honeywell

Only these batteries ensure that all data is saved on the SD card when the device is shut down, for example after a power failure. Otherwise, corrupt archives or a defective parameterization can be the result.

Steps in short

- For reasons of security, use enSuite to readout the parameterization of the enCore FC.
- Switch the device to free of voltage.
- Remove all cable connections to the enCore FC.
- Remove the enCore FC from the switch cabinet.
- Remove the 4 mounting screws (1) from the left side wall.

Fig. 8-1: Remove mounting screws

- Remove the left side plate.

Fig. 8-2: Remove left side plate

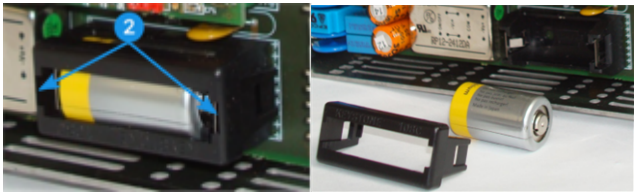


Fig. 8-3: Remove battery cover and Remove battery

- Carefully loosen the battery cover tabs (2) using a small screwdriver.
- Remove the battery cover tabs.
- Take out the old battery.

A capacitor ensures that device data will be retained for 15 minutes.

- Insert the new battery.

Make sure the polarity is correct when inserting the battery!

An incorrect polarity will make itself known through a loss of data, only after a power failure of greater than 15 minutes.

⇨ Fig. 8-3: Remove battery cover and Remove battery (p. 119)

- Put the battery cover back on and carefully press on it until it snaps into place with a soft click.
- Re-assemble the device.
- Establish the cable connections with device.
- Connect the power supply again.

✓ The battery changing process is now complete.

Dispose of the battery properly

Make sure that the used battery is disposed of properly according to the instructions of the battery manufacturer.

8.2 Cleaning

ATTENTION!

Water penetrating the device will damage it!

Water may seep into the device and damage it when it is cleaned with a cloth that is too wet.

Only use a damp cloth to clean the device.

Normally a dry, soft microfiber cloth is sufficient for cleaning the enCore FC. A mild dishwashing liquid solution or a mild glass cleaner can be used for stubborn stains.

Cleaners that are recommended for cleaning navigation devices and similar devices with a touch screen are also suitable for the screen. Alternatively, a mixture of 50 % isopropyl alcohol and distilled water can be used to clean the screen.

8.3 Replacement parts and accessories

ATTENTION!

Incorrect replacement parts and accessories are a safety risk!

Incorrect or defective replacement parts and accessories may detract from safety and lead to damage, malfunction, or total device failure.

- Use only original replacement parts and accessories from the manufacturer.

Please contact our technical support if you need assistance. (⇨ 12.4 Technical support Flow Computers and Gas analyzers, p. 144)

For spare parts and repairs please contact our service.

9 Decommissioning and disposal

9.1 Preparations

9.1.1 Readout parameterization (optional)

If you want to save the parameterization during temporary shutdown or use it as a template for parameterization of another device, readout the parameterization as follows.

Readout parameterization in enSuite

- A data connection to the device exists.

- Select your device in the navigation window.
- From the context menu select the action: **Readout parameterization**
- Save the data with a suitable name.

⇨ enCore manual “Configuring the Device with enSuite”

9.1.2 Readout archives (optional)

Background

To avoid data gaps in the archives as far as possible, read the archives from the enCore device immediately before taking it out of service.

Readout archives in enSuite

Prerequisite(s)

- A data connection to the device exists.

- Select your device in the navigation window.
- From the context menu select the action:**Readout archives**
- Save the archives with a suitable name.

➪ enCore manual “Configuring the Device with enSuite”

9.2 Decommissioning and disassembly

For safety reasons, the decommissioning of the enCore device may only be performed by the service or appropriately trained specialist personnel of the operator

WARNING!

Risk of explosion

A risk of explosion exists if lines are connected to the ExMFE5 board while the device is connected to the power supply!

The transmitter-, pulse-, and signal lines are connected only to the ExMFE5 board if the enCore FC is connected in a voltage-free manner.

ATTENTION!

Risk of short circuit

The enCore FC device can be damaged if lines are connected while the device is connected to the power supply.

Always make sure the enCore FC is free of voltage before making any changes to device wiring or before connecting sensor, supply, signal or data lines.

To take the enCore device out of operation, proceed as follows:

- Disconnect the device from the power supply.
- Remove all cable and data lines.
- Remove the enCore FC from the switch cabinet.

To prevent unauthorized third parties from gaining access to the device data, remove the SD card as follows:

- Remove the 4 mounting screws (1) on the front and rear of the left side panel.

Fig. 9-1: Remove mounting screws

- Remove the left side plate.
- You look directly at the CPU3 board with the SD card holder.
- Open the SD card holder by sliding the cover down:

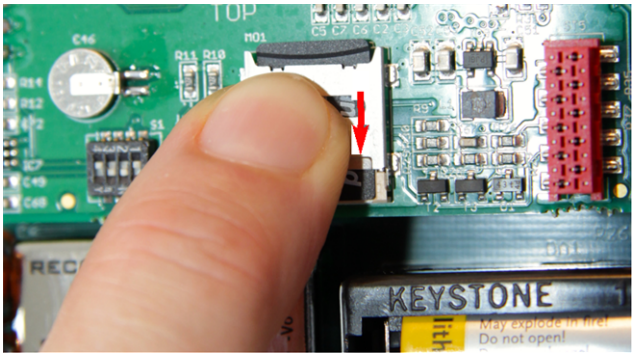


Fig. 9-2: Open SD card holder

- Remove the SD card.
- *For final decommissioning*: To prevent data from being restored even after deletion, we recommend destroying the SD card.

Next steps:

- For temporary decommissioning:
  ⇨ 9.3 Storage (p. 126)
- For final decommissioning remove the battery:
  ⇨ 8.1.1 Changing batteries (p. 117)

Proper disposal of the battery

Please note that batteries are subject to hazardous waste treatment. Drop them off at a collection point or have them disposed of by a specialist company.

- ⇨ 9.4 Disposal (p. 127)

9.3 Storage

ATTENTION!

Material damage from formation of condensation!

Storing the device can lead to the formation of condensation resulting from variations in temperature. This may result in the device malfunctioning at a later time.

- If stored or transported in cold weather or if subject to extreme variations in temperature, the device must be slowly brought to room temperature before it is commissioned.
- The device must undergo a waiting period of at least 12 hours before it is put into operation if condensation is formed during storage.

The device is not connected to power supply during storage. At this time, the battery caters for internal data retention.

The internal device's time may no longer be correct if it is stored for longer periods. The device's time must thus be controlled subsequently and set if required.

Data may be lost if the internal power supply is not guaranteed for the battery during storage (e.g., archived data, device time setting). For instance, this can be the case if the battery has been taken out or is empty. The maximum service life of the battery is 3 years (⇨ 8.1.1 Changing batteries, p. 117).

The following regulations apply for storage:

- Relative humidity may not exceed 93 %.
- Packaging must only be stored in closed areas.
- Storage temperature must be between –25°C and +60°C.
- Mechanical vibrations must be avoided during storage.

9.4 Disposal

enCore devices fall under the WEEE directive and are marked with the WEEE symbol. It is important to note that disused enCore devices must be sent to an individual or collective take-back and disposal system. As the EU member states have transposed the WEEE directive into national legislation in different ways, the regulations for the return of disused equipment vary.

Please ask your local Honeywell sales partner how the take-back of your equipment is regulated.

Environmentally friendly disposal according to WEEE directive

The WEEE directive 2012/19/EU was issued by the European Commission. WEEE stands for "Waste of Electrical and Electronic Equipment". It aims to create a legal framework for sustainable production and consumption of electrical and electronic equipment through reuse, recycling and other forms of recovery of used electrical and electronic equipment. The proportion of such devices in household waste should be reduced, raw materials should be collected and sent for recycling.

Remove the battery before shipping or disposing of the enCore device

Please note that batteries are subject to hazardous waste treatment. Remove them before shipping the enCore device and hand them in at a collection point or have them

10 Technical data

10.1 General

	Technical data
Dimensions/housing	– plug-in unit in 19" technology, 3 height units (HU), 1/3 or 1/2 housing width – depth without plugs approx. 170 mm, with plugs approx. 220 mm – process interfacing at the rear, operation panel at the front
Ambient conditions	– ambient temperature range –10 °C up to +55 °C – humidity < 90 %, non-condensing – installation outside Ex zones 0, 1 and 2 only
IP code	– IP20
Storage temperature	– –25 °C to +60 °C
Weight	(fully equipped) – 1/3 device width: approx. 1.3 kg – 1/2 device width: approx. 2.1 kg
Power supply	– 24 V DC with a tolerance of -15 % and +20 % (i.e., maximum permissible range 20.4 V DC to 28.8 V DC), power consumption up to 12 W (typically 5 W) – optional: 230 V AC via external power supply

	Technical data
	– We recommend to operate the process computer in conjunction with a suitable uninterruptible power supply. Its design must comply for direct current; nominal voltage 24 V DC, permitted range 20.4 V DC to 28.8 V DC, switching time not exceeding 10 ms. The external power supply must provide at least 12 W power. With a mains voltage of 100 V up to 230 V for the uninterruptible power supply, the switching time must not be greater than a mains period (50 or 60 Hz), based on the nominal value of the mains frequency.
Display/operation panel	– 4.3" TFT color display with touch screen, 480 × 272 pixels RGB, LED background lighting – 4 × navigation and 2 × function keys – 2 × multicolor LEDs for power and status indication – 1 × sealable security switch

Table 10-1: General technical data

10.2 Input channels

ExMFE5

- 3 × NAMUR inputs [Ex ib Gb] IIC for LF pulses (max. 2 Hz, min. pulse length 200 ms) or HF pulses (max. 5 kHz, min. pulse length 110 µs) or messages.
  One of these inputs can alternatively be used for connecting an encoder index.
- 1 × analog input for a transmitter with 4 ... 20 mA interface [Ex ib Gb] IIC, alternatively suitable for connecting transmitters with HART interface (1 × transmitter in burst mode[1] or up to 4 × transmitters in multidrop mode)
- 1 × resistance input for a Pt100 temperature transmitter (4-wire technology), [Ex ib Gb] IIC

All inputs are galvanically isolated from the system.

MFE7

- 3 × inputs (24 V DC) for LF pulses (max. 8 Hz, min. pulse length 50 ms) or HF pulses (max. 5 kHz, min. pulse length 20 µs) or messages
  One of these inputs can be used alternatively for connecting an encoder index or as frequency input.
- 2 × analog inputs for transmitters with 4 ... 20 mA interface, alternatively suitable for connecting transmitters with HART interface (1 × transmitter in burst mode[2] or up to 4 × transmitters in multidrop mode), active or passive power supply
- 1 × resistance input for a Pt100 temperature transmitter (4-wire technology)

All inputs are galvanically isolated from the system.

1 Burst mode is not supported by all transmitters.

2 Burst mode is not supported by all transmitters.

MFE11

- 8 × inputs (24 V DC) for LF pulses (max. 20 Hz, min. pulse length 50 ms) or messages
- 3 × analog inputs for transmitters with 4 ... 20 mA interface
- 1 × passive power supply

All inputs are galvanically isolated from the system, and the analog inputs are galvanically isolated from the pulse and messaging inputs.

10.3 Output channels

MFA8

- 1 × PhotoMos output (NC, max. 28.8 V, 120 mA) for alarm/message signaling
- 3 × PhotoMos outputs (NO, max. 28.8 V DC, 120 mA) for alarm/message or pulse outputs of up to 25 Hz
- 4 × analog outputs 0/4 ... 20 mA for measurements

Alarm/message and pulse outputs are galvanically isolated from each other, from the analog outputs, and from the system. Analog outputs are galvanically isolated in common from the system and the digital outputs.

10.4 Interfaces for digital communication

CPU

- 1 × LAN interface (Ethernet 10/100 Mbit/s)
  The interface is galvanically isolated from all other interfaces and from the system.
- 2 × COM ports
  The first port can be used as DSfG protocol interface.
  The serial interfaces are galvanically isolated from each other and from the system.
  Supported standards: RS485, RS422, RS232

Not all enCore device types support all standards.

MSER4

- 4 × serial interfaces
  The serial interfaces are galvanically isolated from each other and from the system.
  Supported standards: RS485/RS422/RS232

ESER4

- 3 × serial interfaces
  The serial interfaces are galvanically isolated from each other and from the system.
  Supported standards: RS485/RS422/RS232
- 1 × LAN interface (Ethernet 10/100 Mbit/s)
  The interface is galvanically isolated from all other interfaces and from the system.

MFE7

- 1 × serial RS485 interface
  The interface is galvanically isolated from all other interfaces and from the system.

USB port

- 1 × USB interface for connecting a PC or laptop for parameterization and service purposes

10.4.1 Supported data protocols

Protocols at a glance

Not every data protocol is supported by every enCore FC device type.

Communication	Supported data protocols
Ethernet	– DSfG (class B) – HTTP (*only up to Basic System V 03-38*) – MMS (secured via TLS) – Modbus TCP – IEC 60870-5-104 – NTP – SMTP (unencrypted, SSL/TLS, STARTTLS)
serial (RS232, RS485)	– DSfG (class A) – Modbus (ASCII, RTU) – UNIFORM

Table 10-2: Support data protocols

Use secure version of a protocol!

Unencrypted protocols transmit data in plain text, such as Modbus. If possible, use the secure version of a protocol.

Protocols in detail

For unencrypted protocols, consider country-specific regulations!

Please note that with some protocols the data communication is unencrypted. This is the case, for example, with communication via Modbus und IEC 60870-5-104.

Unencrypted data communication does not prevent an attacker from intercepting or modifying the communication. Consider the country-specific regulations. These may require manual verification of the data.

DSfG

Default port: 8000

Digitale **S**chnittstelle **f**ür **G**asmessgeräte (digital interface for gas measuring devices) allows communication in a heterogeneous network of different DSfG-compatible devices. DSfG is a digital data protocol that is well-established in Germany. Requires a DSfG AFB.

HTTP

Default port: 80

Until Basic System 03-38, **H**yper**T**ext **T**ransfer **P**rotocol enabled e.g., access to an enCore device via the remote control panel. Please note that HTTP is considered insecure today and is no longer supported since Basic System 03-39!

IEC 60870-5-104

Default port: 2404

Telecontrol protocol for data exchange of user-defined IEC objects between control stations and enCore device (IEC60870 AFB) via a standard TCP/IP network. One IEC60870 AFB can be polled by up to 4 control stations and supports up to 8 station addresses.

MMS

Default port: 102
Note: Typically, port 3782 is used instead of port 102 for secure communication. For reasons of downward compatibility, enCore devices use the standard port 102.

Manufacturing **M**essaging **S**pecification (according to ISO standard 9506) enables communication between enSuite and enCore devices, e.g., allows access to an enCore device via the remote control panel.
For reasons of data security, enCore devices since Basic System 03-39 only support MMS connections that are secured via TLS (**T**ransport **L**ayer **S**ecurity), i.e., the data is transmitted encrypted and the authentication of the enCore devices is ensured via a certificate.

Modbus (ASCII, RTU)

Default port: –

Protocol for data exchange of user-defined registers between central control station and enCore device (Modbus AFB and "intelligent protocols" (GC, USM)) via a serial asynchronous point-to-point data connection via RS232C or a multipoint connection via RS422 or RS485.

Modbus TCP

Default port: 502

Protocol for data exchange of user-defined registers between central control station and enCore devices (Modbus AFB and "intelligent protocols" (GC, USM)) via a standard TCP/IP network

NTP

Default port: 123

Network **T**ime **P**rotocol for the time synchronization of enCore devices with an NTP time server.

SMTP

Default port: 25, 465 (SSL/TLS), 587 (STARTTLS)

By default, the Notification AFB uses unencrypted SMTP for the transmission of emails.
We recommend to use SSL/TLS or – if possible – the newer STARTTLS as encryption technique.

UNIFORM

Default port: –

UNIFORM is a manufacturer-specific protocol for the connection of Q.Sonic ultrasonic gas meters (USM), up to series IV.

10.5 Housing dimensions

10.5.1 1/3 housing width

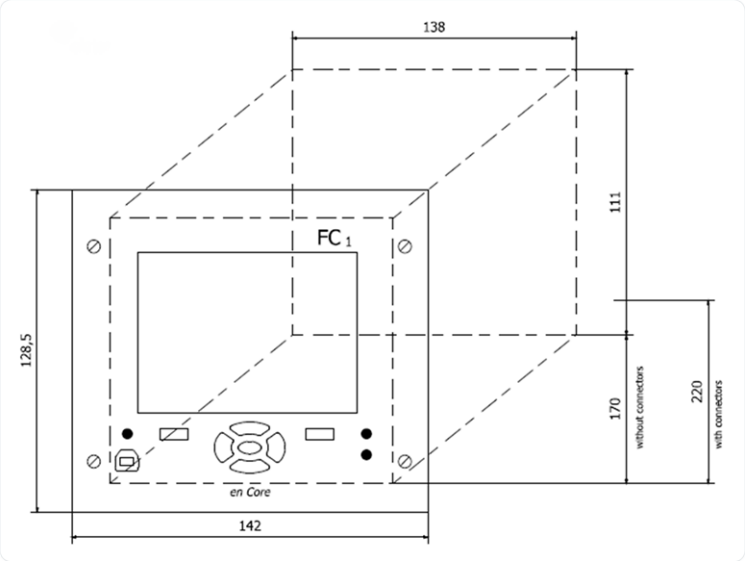


Fig. 10-1: Dimensions for plug-in module 19", 3 U, 28 HP
(all values in millimeters)

10.5.2 1/2 housing width

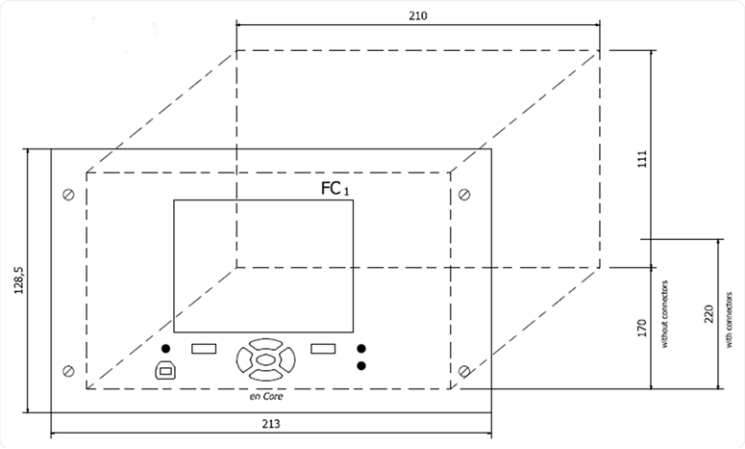


Fig. 10-2: Dimensions for plug-in module 19", 3 U, 42 HP
(all values in millimeters)

11 FAQ

11.1 What if a warning sign is displayed after system start?

11.1.1 Prohibitive sign

In very rare cases, it may happen that the device shows a prohibitive sign in the home display after parameterization and restart:

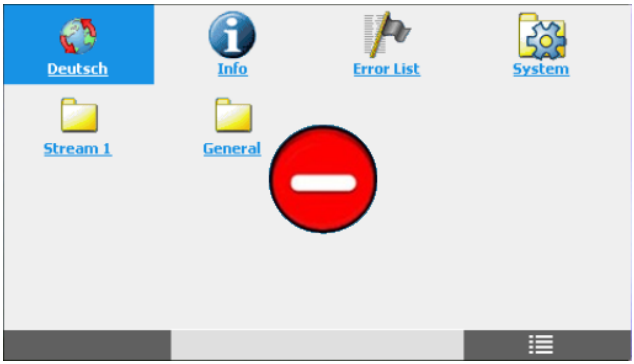


Fig. 11-1: Emergency mode – example

The prohibitive sign indicates that the device has started in emergency mode due to a system error that has been detected during re-start. In this case only basic functionalities for error handling are active; all the other functions are disabled.

Typically, this error is caused by an erroneous parameterization configuration and can be solved by transferring a correct parameterization to the device.

Please contact our technical support if you need assistance. (⇨ 12.4 Technical support Flow Computers and Gas analyzers, p. 144)

11.1.2 Customs sign

In case the device detects inconsistencies, it starts in the so-called "improper configuration mode" and signals this with the customs sign.

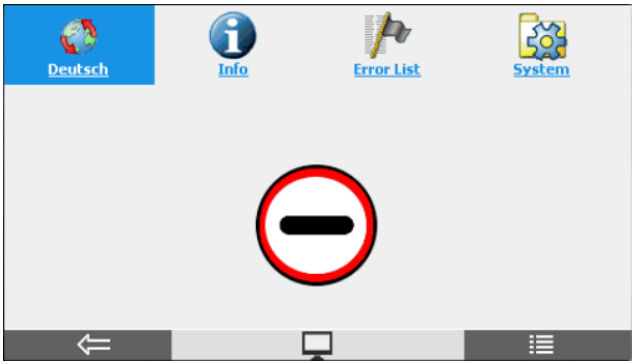


Fig. 11-2: "Improper configuration mode" with strongly limited range of functions

In this mode the device is in emergency operation:

- SFBs only run in the standard configuration.
- AFBs do not start.
- With enSuite, you can only create a new software parameterization or transfer another parameterization to the device.
- It is also possible to exchange the basic device settings via enSuite.

Viewing the causes at the device display

The device shows the detected inconsistencies in the display **Info - <serial number of the device>**. (⇨ enCore manual “Basic System with SFBs”)

▶ Switch directly to the device display with the button . The device display signals inconsistencies in red font:

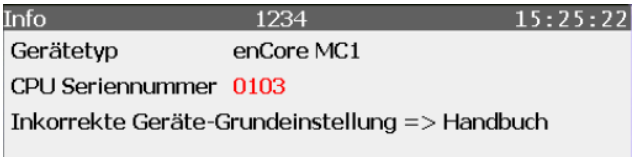


Fig. 11-3: In the example the CPU serial number does not match the basic device setting

Possible causes for inconsistencies are:

- The CPU serial number of the device does not match the CPU serial number of the basic device settings.
- There is no device basic settings file in the device.
  In this case the serial number of the CPU is displayed in the title as follows: **CPU3-<CPU serial number>**
- The device type (kernel of the firmware) does not match the device type of the basic device settings.
- The verification of the signature of the device basic settings has failed.
- The parameterization uses a chargeable AFB, which is not activated in the device.

Please contact our technical support if you need assistance. (⇨ 12.4 Technical support Flow Computers and Gas analyzers, p. 144)

11.1.3 Stop sign

The stop sign at the device display signals a runtime error of the enCore device. In this state, the integrity of the software is no longer guaranteed, therefore the enCore device has stopped all legally relevant calculations.

Fig. 11-4: The device signals a runtime error (stop sign).

This severe exceptional state should not occur during operation, but can be triggered in rare cases, for example by a defective hardware, by a faulty configuration of the connected ethernet subnet or by “Denial of Service attacks”.
You define in enSuite how the device should behave in case of a runtime error.

> **Basic System** –**System**, section **General**, parameter **Behavior on runtime error**

Steps at the device

- If a stop sign is displayed on the device, restart the enCore device. In some cases, the device can restore the integrity of the software when it is restarted, since the RAM is initialized here, for example.

Further error diagnostics:

- The stop sign is displayed again *a few minutes* after the restart. The runtime error is probably caused by a hardware error. Contact our technical support directly or send the device directly to your sales partner for further analysis.
  ➪ 12.4 Technical support Flow Computers and Gas analyzers (p. 144)
- The stop sign is displayed *again and again at longer intervals*. Also in this case, a defective hardware or an erroneous configuration of the connected network can be the cause. Before contacting the technical service because of a possible hardware error, first check your network, and your routers and switches.

12 Notices

12.1 Third-party trademarks

All used or mentioned brand names are the property of their respective owners. A possible mention of brands is done in good faith and without any intention to derive a claim.

12.2 Third-party licenses

This product may contain or be derived from materials, including software, of third parties. The third party materials may be subject to licenses, notices, restrictions and obligations imposed by the licensor.

The licenses, notices, restrictions and obligations, if any, may be found in the materials accompanying the product, in the documents or files accompanying such third party materials, in a file named `Third_Party_Licenses_enCore.pdf` at:

process.honeywell.com/us/en/site/elster-instromet/about-us

12.3 Warranty Conditions

You will find our current warranty conditions in the General Terms and Conditions, for example, on our website:

process.honeywell.com/us/en/site/elster-instromet/about-us

12.4 Technical support Flow Computers and Gas analyzers

Our support of Elster Gas is available for technical advice as well as repairs.

To find further information visit our support site of Elster Gas:

process.honeywell.com/us/en/site/elster-instromet/support

Use secure communication!

Use secure communication, such as email encryption, to send confidential data.

12.5 Spare parts and repairs

For spare parts and repairs please write an email to our service.

PMT-Reparatur@Honeywell.com

12.6 How to report a security vulnerability

A security vulnerability is defined as an error or weakness in the software that can be exploited to impair the operation or security of the parameterization or device software or to access sensitive data.

Honeywell investigates all reports of security vulnerabilities affecting Honeywell products and services. For details on Honeywell security policy, visit:

www.honeywell.com/us/en/product-security

To report a potential security vulnerability against any Honeywell product, please follow the instructions at:

www.honeywell.com/us/en/product-security#vulnerability-reporting

To view information on current malware threats please visit:

www.honeywell.com/us/en/news

OR

Contact your local Honeywell Process Solutions Customer Contact Center (CCC) or our technical support of Elster Gas.

12.7 How to give feedback to user documentation

We are always interested in your comments, corrections or suggestions for improvement regarding the Elster Gas Flow Computers and Gasanalyzers documentation. Please send your feedback to our technical support of Elster Gas.

ElsterSupport@Honeywell.com

Use this email address to provide feedback, or to report errors and omissions in the documentation.

12.8 Knowledge base articles on Honeywell Support Portal

Elster Gas provides problem-solving approaches and answers to frequently asked questions, as well as tips and tricks in short articles for various product series in our technical knowledge base.

process.honeywell.com/us/en/services-and-support/support-center/technical-support

The knowledge articles are constantly being expanded.

12.9 enCore FC manuals at a glance

The user documentation of enCore FC has a modular structure. All manuals are available for download in the docuthek. Manuals for which an order number is given in the following tables can be ordered as printed copies from Elster Gas. .

Please note that safety instructions are contained exclusively in the ➪ enCore manual “Operating Instructions”.

12.9.1 For use in legal metrology

The legally relevant functions and features are described for each device type in a separate manual. For use in legal metrology, a printed copy of the corresponding manual is included in the delivery. The order number is indicated in square brackets.

Manual	FC1	MC1
FC1 –Instructions for Use in Legal Metrology[1] [FC1-ULM-EN]	✓	–

12.9.2 Basic manuals

These manuals document assembly, installation, commissioning, configuration, maintenance, and basic functions.

Manual	FC1	MC1
Operating Instructions[2] (*included in delivery*) [FC1-OI-EN]	✓	✓

1 as per EU-type examination certificate as electronic gas-volume conversion device (EVCD)

2 assembly, installation, commissioning, and maintenance of an enCore FC device

Manual	FC1	MC1
Configuring the Device with enSuite[1]	✓	✓
Basic System with SFBs[2]	✓	✓
Update of the Device Software	✓	✓

12.9.3 Single AFBs

Parameterization, functionality, and operation are described for each AFB in a separate manual. These manuals always describe the maximum functional range of an AFB. Which AFBs are necessary for a device or which AFBs are optional depends on the individual device type.

Manual	FC1	MC1
Flow Conversion AFB	✓	–
Gas Quality AFB	✓	–
Station AFB	✓	✓
Notification AFB	✓	✓
Modbus AFB	✓	✓
IEC60870 AFB	✓	✓
IEC60870 AFB interoperability list	✓	✓

1 parameterization and analysis software enSuite, the download of the device software and further service measures

2 Basic System of the device software, which includes all basic functions of the device such as the user administration

12.9.4 Download latest manuals on Docuthek

Elster Gas provides the user documentation such as manuals, certificates, data sheets, technical information for different device types (in different languages) on the Docuthek. The documents are regularly updated.

www.docuthek.com
Use the device type as search term, for example,
enCore FC1

Check PDF after download

Use SHA-1 checksum information to verify the file integrity of a PDF after download with an appropriate tool.

The target value of the SHA-1 checksum for a PDF can be found on our Docuthek in the details in section **Remarks**, or – if you have downloaded the PDF from Honeywell website – in brackets next to the download link.

Which manuals are relevant for previous product releases?

Only the latest manuals are available on the Docuthek. If you are using an older software version, you can look up these manuals for each version in the software history on the Honeywell website. The software history is available as a PDF file for product releases since 2020 in the download area of the respective device type.
process.honeywell.com/us/en/site/elster-instromet/support#software-downloads

13 Index

14 Appendix

14.1 Declaration of conformity and certificates

- EU Declaration of Conformity enCore FC1
- EU Declaration of Conformity enCore MC1
- ExMFE5 board: EU Type Examination Certificate (ATEX) with 1st amendment and supplement 2

CE **EU Declaration of Conformity No.** **DEMZE2004** **Honeywell**
EU-Konformitätserklärung Nr.

Type, Model *Typ, Ausführung* **enCore FC1**

Manufacturer *Hersteller* **Elster GmbH, Steinern Straße 19-21, 55252 MAINZ-KASTEL, GERMANY**

Product *Produkt* **Flow computer, Electronic gas-volume conversion device (EVCD)**
Flow Computer, Elektronischer Zustandsmengenumwerter

This declaration of conformity is valid for the following Directives:
Diese Konformitätserklärung gilt für folgende Richtlinien:

2014/32/EU (MID)	2014/30/EU (EMC)	2014/34/EU (ATEX)	2011/65/EU (RoHS)

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:
Der oben beschriebene Gegenstand der Erklärung erfüllt die einschlägigen Harmonisierungsrechtsvorschriften der Union:

EN 12405-1:2005 + A2:2010	EN 61000-6-3 :2007-09 EN 61000-6-2 :2011-06	EN 60079-0:2012, EN 60079-11:2012	EN 50581:2012

This declaration of conformity is valid for products labelled accordingly:
Diese Konformitätserklärung gilt für entsprechend gekennzeichnete Produkte:

T10434 CE M.... 0102	CE	CE 0044 Ex II (2) G [Ex ib Gb] IIC	CE
		Input board ExMFE5 *Eingangskarte ExMFE5*	

The production is subject to the following surveillance procedures:
Die Herstellung unterliegt folgenden Überwachungsverfahren:

Directive Annex D *Richtlinie Anhang D*	Directive Annex II *Richtlinie Anhang II*	Directive Annex IV+VII *Richtlinie Anhang IV+VII*	Directive Article 7 *Richtlinie Artikel 7*
Notified Body 0102 Physikalisch Technische Bundesanstalt (PTB) D-38116 Braunschweig		Notified Body 0044 TÜV NORD CERT GmbH D-30519 Hannover	

The conformity according MID is only valid with an additional document of the manufacturer indicating all components of an individual measurement system verified according to Annex D.

Die Konformität nach MID ist nur gültig mit einer separaten Bescheinigung des Herstellers, in der alle Komponenten eines nach Anhang D geprüften einzelnen Messsystems ausgewiesen sind.

This declaration of conformity is issued under the sole responsibility of the manufacturer. If alterations are made to the product or it is modified, this declaration becomes void with immediate effect.

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller. Bei Umbau des Produkts oder Änderungen am Produkt verliert diese Erklärung mit sofortiger Wirkung ihre Gültigkeit.

Elster GmbH	**Mainz-Kastel, 08.09.2020**		
Signed for and on behalf of *Unterzeichnet für und im Namen von*	Place and date of issue *Ort und Datum der Ausstellung*	Piet Platschorre, Managing Director, General Manager PMC Europe	Christian Neugebauer, R&D Manager Gas Electronics

CE **EU Declaration of Conformity No.** **DEMZE1902** **Honeywell**
EU-Konformitätserklärung Nr.

Type, Model *Typ, Ausführung* **enCore MC1**

Manufacturer *Hersteller* **Elster GmbH, Steinern Straße 19-21, 55252 MAINZ-KASTEL, GERMANY**

Product *Produkt* **Monitoring Unit** *Melde- und Überwachungseinheit*

This declaration of conformity is valid for the following Directives:
Diese Konformitätserklärung gilt für folgende Richtlinien:

2014/30/EU (EMC)	2014/34/EU (ATEX)	2011/65/EU (RoHS)

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:
Der oben beschriebene Gegenstand der Erklärung erfüllt die einschlägigen Harmonisierungsrechtsvorschriften der Union:

DIN EN 55024:2016 / EN 55024:2010 + A1:2015, DIN EN 55022:2011 / EN 55022:2010, DIN EN 55022 Berichtigung 1 / EN 55022:2010/AC:2011	EN 60079-0:2012, EN 60079-11:2012	EN 50581:2012

Certificates and interventions by notified bodies:
Bescheinigungen und Maßnahmen durch notifizierte Stellen:

Not applicable *Entfällt*	BVS 05 ATEX E 019	Not applicable *Entfällt*
	EU-type examination *EU-Baumusterprüfung*	
	Notified Body 0158 DEKRA EXAM GmbH Dinnendahlstraße 9 D-44809 Bochum	

This declaration of conformity is valid for products labelled accordingly:
Diese Konformitätserklärung gilt für entsprechend gekennzeichnete Produkte:

CE	CE 0044 Ex II (2) G [Ex ib Gb] IIC	CE
	Input board ExMFE5 *Eingangskarte ExMFE5*	

The production is subject to the following surveillance procedures:
Die Herstellung unterliegt folgenden Überwachungsverfahren:

Directive Annex II *Richtlinie Anhang II*	Directive Annex IV+VII *Richtlinie Anhang IV+VII*	Directive Article 7 *Richtlinie Artikel 7*
	Notified Body 0044 TÜV NORD CERT GmbH D-30519 Hannover	

This declaration of conformity is issued under the sole responsibility of the manufacturer. If alterations are made to the product or it is modified, this declaration becomes void with immediate effect.
Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller. Bei Umbau des Produkts oder Änderungen am Produkt verliert diese Erklärung mit sofortiger Wirkung ihre Gültigkeit.

Elster GmbH	**Mainz-Kastel, 04.09.2019**		
Signed for and on behalf of *Unterzeichnet für und im Namen von*	Place and date of issue *Ort und Datum der Ausstellung*	Piet Platschorre, Managing Director, General Manager PMC Europe	Jörg Kern, Sr R&D Manager Gas Metering

EXAM
BBG Prüf- und Zertifizier GmbH

(1) # EG-Baumusterprüfbescheinigung

(2) **- Richtlinie 94/9/EG -**
Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen

(3) ## BVS 05 ATEX E 019

(4) **Gerät:** **Prozesskarte Typ EXMFE5**

(5) **Hersteller:** **FLOW COMP Systemtechnik GmbH**

(6) **Anschrift:** **D 44357 Dortmund**

(7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu dieser Baumusterprüfbescheinigung festgelegt.

(8) Die Zertifizierungsstelle der EXAM BBG Prüf- und Zertifizier GmbH, benannte Stelle Nr. 0158 gemäß Artikel 9 der Richtlinie 94/9/EG des Europäischen Parlaments und des Rates vom 23. März 1994, bescheinigt, dass das Gerät die grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie erfüllt.
Die Ergebnisse der Prüfung sind in dem Prüfprotokoll BVS PP 05.2005 EG niedergelegt.

(9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit

EN 50014:1997 + A1 – A2 Allgemeine Bestimmungen
EN 50020:2002 Eigensicherheit 'i'

(10) Falls das Zeichen „X" hinter der Bescheinigungsnummer steht, wird in der Anlage zu dieser Bescheinigung auf besondere Bedingungen für die sichere Anwendung des Gerätes hingewiesen.

(11) Diese EG-Baumusterprüfbescheinigung bezieht sich nur auf die Konzeption und die Baumusterprüfung des beschriebenen Gerätes in Übereinstimmung mit der Richtlinie 94/9/EG.
Für Herstellung und in Verkehr bringen des Gerätes sind weitere Anforderungen der Richtlinie zu erfüllen, die nicht durch diese Bescheinigung abgedeckt sind.

(12) Die Kennzeichnung des Gerätes muss die folgenden Angaben enthalten:

Ex **II (2)G [EEx ib] IIC**

EXAM BBG Prüf- und Zertifizier GmbH
Bochum, den 31. Januar 2005

Zertifizierungsstelle

Fachbereich

Dieses Zertifikat darf nur unverändert weiterverbreitet werden.
Dinnendahlstraße 9 44809 Bochum Telefon 0201/172-3947 Telefax 0201/172-3948

(13) Anlage zur

(14) # EG-Baumusterprüfbescheinigung

BVS 05 ATEX E 019

(15) 15.1 Gegenstand und Typ

Prozesskarte Typ EXMFE5

15.2 Beschreibung

Die Prozesskarte, die außerhalb des explosionsgefährdeten Bereiches errichtet wird, dient zur Energieversorgung und Verarbeitung der Signale von bis zu fünf Sensoren, die im explosionsgefährdeten Bereich installiert sind.

15.3 Kenngrößen

15.3.1	nicht-eigensichere Versorgungs- und Signalstromkreise (Stecker ST1)				
	Nennspannung		DC	24	V
	max. Spannung	Um	AC	250	V
15.3.2	eigensichere Ausgangsstromkreise (Anschl. Stiftleiste)				
15.3.2.1	Kanal 1 (Anschl. Z1+ , Z1-)				
	Kanal 2 (Anschl. Z2+ , Z2-)				
	Kanal 3 (Anschl. Z3+ , Z3-)				
	Werte je Kreis				
	Spannung	Uo	DC	8,6	V
	Stromstärke	Io		14,9	mA
	Leistung	Po		32	mW
	linearere Ausgangskennlinie				
	max. äußere Induktivität	Lo		10	mH
	max. äußere Kapazität	Co		0,5	µF
15.3.2.2	Kanal 4 (Anschl. I+ , I- , U+ , U-)				
	Spannung	Uo	DC	5,9	V
	Stromstärke	Io		14,4	mA
	Leistung	Po		21	mW
	linearere Ausgangskennlinie				
	max. äußere Induktivität	Lo		10	mH
	max. äußere Kapazität	Co		0,5	µF
15.3.2.3	Kanal 5 (Anschl. P+ , P-)				
	Spannung	Uo	DC	21	V
	Stromstärke	Io		73,9	mA
	Leistung	Po		388	mW
	linearere Ausgangskennlinie				
	max. äußere Induktivität	Lo		5	mH
	max. äußere Kapazität	Co		0,18	µF
15.3.3	Umgebungstemperaturbereich	Ta	-20 °C bis +70 °C		

Dieses Zertifikat darf nur unverändert weiterverbreitet werden.
Dinnendahlstraße 9 44809 Bochum Telefon 0201/172-3947 Telefax 0201/172-3948

(16) Prüfprotokoll
BVS PP 05.2005 EG, Stand 31.01.2005

(17) Besondere Bedingungen für die sichere Anwendung
Entfällt

Dieses Zertifikat darf nur unverändert weiterverbreitet werden.
Dinnendahlstraße 9 44809 Bochum Telefon 0201/172-3947 Telefax 0201/172-3948

- English translation of the German original certificate –

EX **EXAM**
BBG Prüf- und Zertifizier GmbH

(1) # EC Type Examination Certificate

(2) **- Council Directive 94/9/EC -**
Protective devices and systems intended for use in potentially explosive atmospheres

(3) ## BVS 05 ATEX E 019

(4) **Device:** **Process Board Type EXMFE5**

(5) **Manufacturer:** **FLOW COMP Systemtechnik GmbH**

(6) **Address:** **D – 44357 Dortmund**

(7) This device type and its various permissible versions are specified in the appendix to this Type Examination Certificate.

(8) The EXAM BBG Prüf- und Zertifizier GmbH certification body, notified body no. 0158 in accordance with Article 9 of the European Parliament and Council Directive 94/9/EC of 23 March 1994, certifies that this device has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of protective devices and systems intended for use in potentially explosive atmospheres according to Annex II to the Directive.
The test results are recorded in the test report BVS PP 05.2005 EC.

(9) The compliance of the device with the Essential Health and Safety Requirements has been assured by compliance with

EN 50014:1997 + A1 – A2	General Requirements
EN 50020:2002	Intrinsic Safety ‘i’

(10) If the character “X” is placed after the certificate number, it indicates that the device is subject to special requirements for safe use as referenced in the appendix to this certificate.

(11) This EC type examination certificate refers only to the design and construction of the specified device in accordance with Council Directive 94/9/EC.
Further requirements of this Directive, which are not covered by this certificate, apply to the manufacture and supply of this device.

(12) The marking of the device shall include the following details:

Ex II (2)G [EEx ib] IIC

EXAM BBG Prüf- und Zertifizier GmbH
Bochum, 31 January 2005

Certification Body Head of Unit

This certificate may only be circulated without alteration.
Dinnendahlstrasse 9 44809 Bochum Tel. +49 (201) 172 3947 Fax +49 (201) 172 3948

EXAM
BBG Prüf- und Zertifizier GmbH

(13) Appendix to

(14) # EC Type Examination Certificate

BVS 05 ATEX E 019

(15) 15.1 Object and Type

Process Board Type EXMFE5

15.2 Description

The process board that will be installed outside potentially explosive atmospheres serves as power supply and for processing the signals of up to five sensors being installed in potentially explosive atmospheres.

15.3 Characteristics

15.3.1	Non-intrinsically safe supply and signal circuits (connector ST1)				
	Nominal voltage		DC	24	V
	Maximum voltage	Um	AC	250	V
15.3.2	Intrinsically safe output circuits (terminal strip connections)				
15.3.2.1	Channel 1 (terminals Z1+, Z1-)				
	Channel 2 (terminals Z2+, Z2-)				
	Channel 3 (terminals Z3+, Z3-)				
	Values per circuit				
	Voltage	Uo	DC	8.6	V
	Current	Io		14.9	mA
	Power	Po		32	mW
	Linear output characteristic				
	Max. external inductivity	Lo		10	mH
	Max. external capacitance	Co		0.5	µF
15.3.2.2	Channel 4 (terminals I+, I-, U+, U-)				
	Voltage	Uo	DC	5.9	V
	Current	Io		14.4	mA
	Power	Po		21	mW
	Linear output characteristic				
	Max. external inductivity	Lo		10	mH
	Max. external capacitance	Co		0.5	µF
15.3.2.3	Channel 5 (terminals P+, P-)				
	Voltage	Uo	DC	21	V
	Current	Io		73.9	mA
	Power	Po		388	mW
	Linear output characteristic				
	Max. external inductivity	Lo		5	mH
	Max. external capacitance	Co		0.18	µF
15.3.3	Ambient temperature range	Ta	-20°C to +70°C		

This certificate may only be circulated without alteration.
Dinnendahlstrasse 9 44809 Bochum Tel. +49 (201) 172 3947 Fax +49 (201) 172 3948

(16) Test report
BVS PP 05.2005 EC, as of 31 January 2005

(17) Special conditions for safe use
None

Dinnendahlstrasse 9 44809 Bochum Tel. +49 (201) 172 3947 Fax +49 (201) 172 3948

(1) # 1. Nachtrag zur EG-Baumusterprüfbescheinigung

(2) Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen - Richtlinie 94/9/EG
Ergänzung gemäß Anhang III Ziffer 6

(3) Nr. der EG-Baumusterprüfbescheinigung: **BVS 05 ATEX E 019**

(4) Gerät: **Prozesskarte Typ EXMFE5**

(5) Hersteller: **ELSTER GmbH**
ehemals **FLOW COMP Systemtechnik GmbH**

(6) Anschrift: **Steinern Straße 19-21, 55252 Mainz-Kastel**

(7) Die Bauart dieser Geräte sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu diesem Nachtrag festgelegt.

(8) Die Zertifizierungsstelle der DEKRA EXAM GmbH, benannte Stelle Nr. 0158 gemäß Artikel 9 der Richtlinie 94/9/EG des Europäischen Parlaments und des Rates vom 23. März 1994, bescheinigt, dass diese Geräte die grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie erfüllen. Die Ergebnisse der Prüfung sind in dem Prüfprotokoll BVS PP 05.2005 EG niedergelegt.

(9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit

EN 60079-0:2012 Allgemeine Anforderungen
EN 60079-11:2012 Eigensicherheit „i"

(10) Falls das Zeichen "X" hinter der Bescheinigungsnummer steht, wird in der Anlage zu dieser Bescheinigung auf besondere Bedingungen für die sichere Anwendung des Gerätes hingewiesen.

(11) Dieser Nachtrag zur EG-Baumusterprüfbescheinigung bezieht sich nur auf die Konzeption und die Baumusterprüfung der beschriebenen Geräte in Übereinstimmung mit der Richtlinie 94/9/EG.
Für Herstellung und Inverkehrbringen der Geräte sind weitere Anforderungen der Richtlinie zu erfüllen, die nicht durch diese Bescheinigung abgedeckt sind.

(12) Die Kennzeichnung des Gerätes muss die folgenden Angaben enthalten:

Ex II (2) G [Ex ib Gb] IIC

DEKRA EXAM GmbH
Bochum, den 13. Dezember 2012

Zertifizierungsstelle

Fachbereich

Dieses Zertifikat darf nur vollständig und unverändert weiterverbreitet werden.
DEKRA EXAM GmbH Dinnendahlstraße 9, 44809 Bochum, Telefon +49.234.3696-105, Telefax +49.234.3696-110, zs-exam@dekra.com

(13) Anlage zum

(14) **1. Nachtrag zur EG-Baumusterprüfbescheinigung**
BVS 05 ATEX E 019

(15) 15.1 Gegenstand und Typ

Prozesskarte Typ EXMFE5

15.2 Beschreibung

Die Prozesskarte kann auch nach den im zugehörigen Prüfprotokoll aufgeführten Prüfungsunterlagen gefertigt werden.
Die Prozesskarte wurde nach den Normen EN 60079-0:2012 und EN 60079-11:2012 geprüft und wird jetzt von einem anderen Hersteller (ehemals FLOW COMP Systemtechnik GmbH, Dortmund) gefertigt.

15.3 Kenngrößen

15.3.1	nicht-eigensichere Versorgungs- und Signalstromkreise (Stecker ST1)				
	Nennspannung		DC	24	V
	max. Spannung	Um	AC	250	V
15.3.2	eigensichere Ausgangsstromkreise (Anschl. Stiftleiste)				
15.3.2.1	Kanal 1 (Anschl. Z1+ , Z1-)				
	Kanal 2 (Anschl. Z2+ , Z2-)				
	Kanal 3 (Anschl. Z3+ , Z3-)				
	Werte je Kreis				
	Spannung	Uo	DC	8,6	V
	Stromstärke	Io		14,9	mA
	Leistung	Po		32	mW
	linearere Ausgangskennlinie				
	max. äußere Induktivität	Lo		10	mH
	max. äußere Kapazität	Co		0,5	µF
15.3.2.2	Kanal 4 (Anschl. I+ , I- , U+ , U-)				
	Spannung	Uo	DC	5,9	V
	Stromstärke	Io		14,4	mA
	Leistung	Po		21	mW
	linearere Ausgangskennlinie				
	max. äußere Induktivität	Lo		10	mH
	max. äußere Kapazität	Co		0,5	µF
15.3.2.3	Kanal 5 (Anschl. P+ , P-)				
	Spannung	Uo	DC	21	V
	Stromstärke	Io		73,9	mA
	Leistung	Po		388	mW
	linearere Ausgangskennlinie				
	linearere Ausgangskennlinie				
	max. äußere Induktivität	Lo		5	mH
	max. äußere Kapazität	Co		0,18	µF
15.3.3	Umgebungstemperaturbereich	Ta	-20 °C bis +70 °C		

Dieses Zertifikat darf nur vollständig und unverändert weiterverbreitet werden.
DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Telefon +49.234.3696-105, Telefax +49.234.3696-110, zs-exam@dekra.com

(16) Prüfprotokoll

BVS PP 05.2005 EG, Stand 13.12.2012

(17) Besondere Bedingungen für die sichere Anwendung

Entfällt

Dieses Zertifikat darf nur vollständig und unverändert weiterverbreitet werden.
DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Telefon +49.234.3696-105, Telefax +49.234.3696-110, zs-exam@dekra.com

(1) # 1. Amendment to the EC Type Examination Certificate

(2) Protective devices and systems intended for use in potentially explosive atmospheres - Council directive 94/9/EG
Amendment as referred to in Annex III, point 6

(3) No. of the EC type examination certificate: **Process Board Type EXMFE5**

(4) Device: **Process Board Type EXMFE5**

(5) Manufacturer: **ELSTER GmbH**
formerly **FLOW COMP Systemtechnik GmbH**

(6) Address: **Steinern Straße 19-21, 55252 Mainz-Kastel**

(7) This device type and its various permissible versions are specified in the appendix to this amendment.

(8) The EXAM BBG Prüf- und Zertifizier GmbH certification body, notified body no. 0158 in accordance with Article 9 of the European Parliament and Council Directive 94/9/EC of 23 March 1994, certifies that these devices have been found to comply with the Essential Health and Safety Requirements relating to the design and construction of protective devices and systems intended for use in potentially explosive atmospheres according to Annex II to the Directive.
The test results are recorded in the test report BVS PP 05.2005 EC.

(9) The compliance of the device with the Essential Health and Safety Requirements has been assured by compliance with

EN 60079-0:2012	General Requirements
EN 60079-11:2012	Intrinsic Safety 'i'

(10) If the character "X" is placed after the certificate number, it indicates that the device is subject to special requirements for safe use as referenced in the appendix to this certificate.

(11) This EC type examination certificate refers only to the design and construction of the specified devices in accordance with Council Directive 94/9/EC.
Further requirements of this Directive, which are not covered by this certificate, apply to the manufacture and supply of this device.

(12) The marking of the device shall include the following details:

Ex II (2)G [EEx ib Gb] IIC

DEKRA EXAM GmbH
Bochum, 13 December 2012

Certification Body

Head of Unit

This certificate may only be circulated without alteration.
DEKRA EXAM GmbH Dinnendahlstrasse 9, 44809 Bochum, Tel. +49.234.3896-110, zs-exam@dekra.com

(13) Appendix to

(14) **1. Amendment of the EC Type Examination Certificate BVS 05 ATEX E 019**

(15) 15.1 Object and Type

Process Board Type EXMFE5

15.2 Description

The process board can also be manufactured in accordance with the test protocol listed in the corresponding examination documents.
The process board has been examined according to the standards EN 60079-0:2012 and EN 60079-11:2012 and is now manufactured by another manufacturer (formerly FLOW COMP Systemtechnik GmbH Dortmund).

15.3 Characteristics

15.3.1	Non-intrinsically safe supply and signal circuits (connector ST1)				
	Nominal voltage		DC	24	V
	Maximum voltage	Um	AC	250	V
15.3.2	Intrinsically safe output circuits (terminal strip connections)				
15.3.2.1	Channel 1 (terminals Z1+, Z1-)				
	Channel 2 (terminals Z2+, Z2-)				
	Channel 3 (terminals Z3+, Z3-)				
	Values per circuit				
	Voltage	Uo	DC	8.6	V
	Current	Io		14.9	mA
	Power	Po		32	mW
	Linear output characteristic				
	Max. external inductivity	Lo		10	mH
	Max. external capacitance	Co		0.5	µF
15.3.2.2	Channel 4 (terminals I+, I-, U+, U-)				
	Voltage	Uo	DC	5.9	V
	Current	Io		14.4	mA
	Power	Po		21	mW
	Linear output characteristic				
	Max. external inductivity	Lo		10	mH
	Max. external capacitance	Co		0.5	µF
15.3.2.3	Channel 5 (terminals P+, P-)				
	Voltage	Uo	DC	21	V
	Current	Io		73.9	mA
	Power	Po		388	mW
	Linear output characteristic				
	Max. external inductivity	Lo		5	mH
	Max. external capacitance	Co		0.18	µF
15.3.3	Ambient temperature range	Ta	-20°C to +70°C		

This certificate may only be circulated without alteration.
DEKRA EXAM GmbH Dinnendahlstrasse 9, 44809 Bochum, Tel. +49.234.3896-110, zs-exam@dekra.com

(16) Test report
BVS PP 05.2005 EG, as of 13.12.2012

(17) Special conditions for safe use
None

Translation

1 # EU-Type Examination Certificate Supplement 2

Change to Directive 2014/34/EU

2 **Equipment intended for use in potentially explosive atmospheres Directive 2014/34/EU**

3 EU-Type Examination Certificate Number: **BVS 05 ATEX E 019 X**

4 Product: **Process card type EXMFE5**

5 Manufacturer: **Elster GmbH**

6 Address: **Steinern Straße 19-21, 55252 Mainz, Germany**

7 This supplementary certificate extends EC-Type Examination Certificate No. BVS 05 ATEX E 019 to apply to products designed and constructed in accordance with the specification set out in the appendix of the said certificate but having any acceptable variations specified in the appendix to this certificate and the documents referred to therein.

8 DEKRA Testing and Certification GmbH, Notified Body number 0158, in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.
The examination and test results are recorded in the confidential Report No. BVS PP 05.2005 EU.

9 The Essential Health and Safety Requirements are assured in consideration of:

EN IEC 60079-0:2018	**General requirements**
EN 60079-11:2012	**Intrinsic Safety "i"**

10 If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Special Conditions for Use specified in the appendix to this certificate.

11 This EU-Type Examination Certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

12 The marking of the product shall include the following:

 **II (2)G [Ex ib Gb] IIC**

DEKRA Testing and Certification GmbH
Bochum, 2022-02-01

Signed: Jörg-Timm Kilisch
_____
Managing Director

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DEKRA Testing and Certification GmbH, Handwerkstr. 15, 70565 Stuttgart, Germany
Certification body: Dinnendahlstr. 9, 44809 Bochum, Germany
Phone +49.234.3696-400, Fax +49.234.3696-401, e-mail DTC-Certification-body@dekra.com

13 **Appendix**

14 **EU-Type Examination Certificate**

BVS 05 ATEX E 019
Supplement 2

15 **Product description**

15.1 **Subject and type**

Prozesskarte type EXMFE5

15.2 **Description**

With this supplement the certificate is changed to Directive 2014/34/EU.
(Annotation: In accordance with Article 41 of Directive 2014/34/EU, EC-Type Examination Certificates referring to 94/9/EC that were in existence prior to the date of application of 2014/34/EU (20 April 2016) may be referenced as if they were issued in accordance with Directive 2014/34/EU. Supplementary Certificates to such EC-Type Examination Certificates, and new issues of such certificates, may continue to bear the original certificate number issued prior to 20 April 2016.)

Reason for the supplement:

- Change to Directive 2014/34/EU
- Examination according to the current standard
- Modification of electrical parameters for channel 5
- Update of the Documents
- The device is marked with the symbol "X"

Listing of all components used referring to older standards

None

15.3 **Parameters**

15.3.1 Non-intrinsically safe supply and signal circuits
Connector ST1

Nominal voltage		DC	24	V
Nominal current			80	mA
Maximum input voltage	U_m	AC	250	V

15.3.2 Intrinsically safe output circuits
Connector ST2

15.3.2.1 Channel 1 Pins Z1+, Z1-;
Channel 2 Pins Z2+, Z2-;
Channel 3 Pins Z3+, Z3-

For each circuit:

Maximum output voltage	U_o	DC	8.6	V
Maximum output current	I_o		14.9	mA
Linear output characteristics				
Maximum output power	P_o		32	mW
Maximum external capacitance	C_o		0.5	µF
Maximum external inductance	L_o		10	mH

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DEKRA Testing and Certification GmbH, Handwerkstr. 15, 70565 Stuttgart, Germany
Certification body: Dinnendahlstr. 9, 44809 Bochum, Germany
Phone +49.234.3696-400, Fax +49.234.3696-401, e-mail DTC-Certification-body@dekra.com

15.3.2.2	Channel 4 Pins I+, I- , U+, U-				
	Maximum output voltage	U_o	DC	5.9	V
	Maximum output current	I_o		14.4	mA
	Linear output characteristics				
	Maximum output power	P_o		21	mW
	Maximum external capacitance	C_o		0.5	µF
	Maximum external inductance	L_o		10	mH
15.3.2.3	Channel 5 Pins P+, P-				
	Maximum output voltage	U_o	DC	21	V
	Maximum output current	I_o		85	mA
	Linear output characteristics				
	Maximum output power	P_o		447	mW
	Maximum external capacitance	C_o		0.18	µF
	Maximum external inductance	L_o		5	mH
15.3.3	Ambient temperature range	T_a		-20 °C … +70 °C	

16 **Report Number**

BVS PP 05.2005 EU, as of 2022-02-01

17 **Special Conditions for Use**

17.1 The Process card shall be installed inside an enclosure having at least the degree of protection IP20 in accordance with EN 60529.

17.2 The installation shall be done in such a way that the separation requirements of IEC 60079-11 are fulfilled with regards to external intrinsically safe or non-intrinsically safe circuits.

18 **Essential Health and Safety Requirements**

The Essential Health and Safety Requirements are covered by the standards listed under item 9.

19 **Drawings and Documents**

Drawings and documents are listed in the confidential report.

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA Testing and Certification GmbH
Bochum, 2022-02-01
BVS-Hil/Mu A20210793

Managing Director

This certificate may only be reproduced in its entirety and without any change.

DEKRA Testing and Certification GmbH, Handwerkstr. 15, 70565 Stuttgart, Germany
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Phone +49.234.3696-400, Fax +49.234.3696-401, e-mail DTC-Certification-body@dekra.com