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Honeywell

THE POWER OF **CONNECTED**

Flow Computer
Device Series enCore FC
FC1, MC1

Manual
Operating Instructions

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Dortmund, June 2018

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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 and the arrangement of software components are variable. 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 consist of application-related functionalities, which come with different **A**pplication **F**unction **B**locks (abbreviated as: AFB). Owing to this modular design principle, each device can be optimally adapted to individual requirements.

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**
>
> Please note that the changes that you make in parameterization of enSuite become active in the device only when you activate the action **Transfer parameterization to device** and after the enCore device restarts (automatically).
>
> ⇨ volume "Configuration fo Device Software" of enCore FC manual

1.2   Scope of Delivery

The enCore FC's scope of delivery includes:

	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	✓	✓
manuals:		
„Instructions for Use in Legal Metrology" (*FC1 only*)	✓	✖
„Operating Instructions"	✓	✓
enSuite installation CD	✓	✓
USB cable Type A/B	✓	✓
accessories (plugs incl. housing)	✓	✓

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[1] Only for devices used in legal metrology.

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

[3] optional

1.2.1   Honeywell (Elster GmbH) Contact Information

You can contact our sales and service department at:

Elster GmbH (manufacturer)
Steinern Straße 19-21
55252 Mainz-Kastel/Germany

Phone: +49 6134 605-0
Email: **info@elster.com**
Website: **www.elster-instromet.com**

You can reach our Technical Assistance Center (TAC) at:

Phone: +49 231 937110-88
Email: **ElsterSupport@Honeywell.com**
Website: **www.elster-instromet.com**

2   About these Instructions

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 make it possible 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.

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 knowledge 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.

- 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.

- qualified electrician
  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 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.

2.2   The enCore FC Manual at a Glance

The manual for the enCore FC device series is modular:

For all device types that can be used in legal metrology, there is a volume
that specifically describes the legally relevant functions and characteristics.
All other volumes of the manual apply to all devices of the enCore FC series,
i.e. they are independent of the device type.

The manual consists of the following volumes:

- "Instructions for Use in Legal Metrology", enCore FC1 only
  This volume focuses on the legally relevant properties and
  functions of the FC1 flow computer.

- "Operating Instructions"
  This volume describes the assembly, installation, commissioning
  and maintenance of all enCore FC devices.

- "Configuration of Device Software"
  This volume describes parameterizing devices of the enCore series
  with the software system enSuite, the software download and
  further services.

- "Basic System with SFBs"
  This volume describes the basic system, which provides all basic
  functions of the device software. The basic system e.g. manages
  the system resources, the I/O boards or the connection to other
  devices via digital protocols.

- Functionality of individual **A**pplication **F**unction **B**locks
  Each volume describes the parameterization, function and
  operation of each AFB. These volumes always describe the full
  range of functions of the respective AFBs.

ℹ️ **Delivery form of the individual volumes**

The instructions for "Use in legal metrology" and the "Operating Instructions" are part of the product and are 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.

All further volumes of the enCore FC manual can be downloaded in PDF format from our Docuthek (**www.docuthek.com**). In addition, the "Operating Instructions" and the "Operating Instructions" are also available in digital form.

The documents in the Docuthek are regularly updated.

ℹ️ **Manuals as product components**

The volume "Use in Legal Metrology" and this "Operating Instructions" are product components and delivered in printed form with the device. Therefore, these must always be kept in the immediate vicinity of the enCore FC and easily accessible to the installation, operational, maintenance and cleaning personnel.

All other volumes of the enCore FC manual can be downloaded from our Docuthek (**www.docuthek.com**) in PDF format. In addition, the instructions for "Use in Legal Metrology" as well as the "Operating instructions" are available in digital form.

The documents in the Docuthek are regularly updated.

2.3   Text Labelling

Texts containing different contents are labelled differently. With the help of following characteristics, you can identify which content of the text is provided to you:

2.3.1   Presentation of Safety and Risk Instructions

Hazard Warnings

Hazard warnings indicate hazardous situations which may result in material damage and bodily harm or even death if disregarded.

Hazard warnings are described below:

> ⚠ **DANGER WORD!**
>
> **Type of danger**
>
> **Consequences in case of non-compliance**
>
> Avoiding danger

The danger word signals the hazard level:

- DANGER!
  … indicates an imminently hazardous situation that leads to death or severe injuries.
- WARNING!
  … indicates a possibly hazardous situation that may lead to death or severe injury.
- CAUTION!
  … indicates a possibly hazardous situation that may lead to slight or minor injuries.
- ATTENTION!
  … indicates a possibly hazardous situation that may lead to material damage.

Safety Instructions

Safety instructions include notes and information which if disregarded may lead to functions not working correctly or not working at all.

Safety instructions are described below:

> ⓘ **Safety instruction (optional)**
>
> Safety instruction text

Tips and recommendations

Tips include notes and information that make it easier for the user to operate the enCore FC.

Tips are described below:

> 📖 **Heading (optional)**
>
> Hint text

2.3.2 Paragraph Formats

► This triangle prompts you for an action.

✓ This character will show you the immediate result of your action.

▨ For the enCore FC symbol, the result of your operation is shown in running operation of the device after you have transferred an enSuite parameterization to the device and the device is restarted with this parameterization.

Example

Multi-row examples are marked by two continuous blue lines and the keyword "Example".

2.3.3   Character Formats

Example	Use
Time Service	Names of the individual SFB and AFB software elements of the enCore FC.
⇨ chapter 2.3.3 Character Formats (p. 17)	References to additional information are marked with an arrow. If the arrow refers to information within document, these references are formated as hyperlinks in blue font. You directly go to corresponding text passage by clicking the blue text.
Tab **Parameters**	Marking of graphic screen elements or messages which you find again on the screen. These include, for example, menu items, marking of tabs and parameters.
[OK] **[F1]**	Marking of buttons and keys are additionally framed with square brackets.
<Modbus AFB >	Place holders are specified in angle-brackets and represent the corresponding, current value of your system – as in the example the name of the Modbus AFB.
[Group 1.]Modbus	Optional information is specified in square brackets. In the example, **Group 1** is shown only when a group has been created in your device.
admin1	Texts which you enter in enSuite in the corresponding field.
www.docuthek.com	links (Hyperlink)

Example	Use
Date & time	You can navigate through different displays of enCore FC via hyperlinks. In the example, you change to the **Date & time** display.
Update date and time	Actions are also marked in the enCore FC display as hyperlinks. You carry out a specific functionality when you activate an action. In the example, the system time of the device is updated.
`readme.txt`	All the alphabetical strings which depict sheer ASCII character strings such as identifier for physical quantities, directory or file names.

Table 2-1: Character formats

2.3.4   Character Formats in Flow Charts

The individual elements are highlighted in the flow charts as shown in the following. That way, they can be distinguished properly even on a black-and-white printout:

Example	Use
[V Input]	enSuite parameters are presented with square brackets and font color [green].
generated counters	Export values, e.g. generated `Flow Conversion AFB` counters, have a proportional font and blue font color.
"Event messages"	Event-messages which are activated or reset by an AFB are marked in quotation marks and orange font.

Table 2-2: Character formats in flow charts

2.4   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.

2.5 Applicable Standards and Guidelines

The construction, production and operation of the enCore FC is based on the following standards and guidelines:[4]

- EN 12405-1 [5]
  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

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[4] Further applicable standards and guidelines result from the specific fields of application of the individual device.

[5] Only applies to converters of the enCore FC series.

3   Security considerations for your network

enCore FC 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.
>
> ⇨ FAQs 11.1 How to report a security vulnerability to Honeywell? (p. 122)

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 of the 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.

> **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.

Preventing unauthorized external access using a firewall

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 of the gas measuring plant.

Furthermore, we recommend to allow protocols and ports only that are actually used for data exchange with the external network, e.g. by adding these to the white list of the firewall (⇨ 10.5.1 Data protocols and its TCP default port (Ethernet), p. 118).

For example:
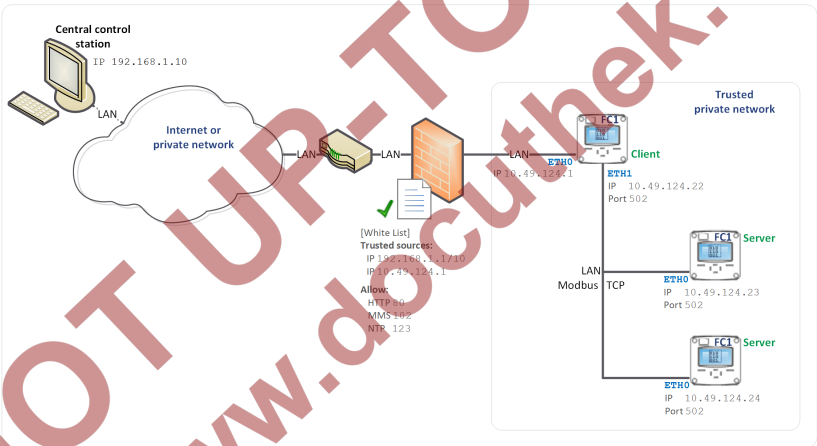
Fig. 3-1: Router and firewall between measurement plant and control station plus data exchange via Modbus TCP in a trusted network – example

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, e.g. 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 e.g. 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.

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.
- In order 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. EC 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 e.g. of EU type examination certificate (MID).

📖 **Important information**

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 ⇨ refer to chapter 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 a 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, e.g. 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
(⇨ chapter 4.2 Intended Use, p. 25):

- 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, e.g. 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 gas meters via a manufacturer-specific digital protocol - interface for gas meters with an encoder index
pressure transmitter	4 … 20 mA analog input - HART protocol interface
temperature transmitter	- resistance input for Pt100 with 4-wire technology - HART protocol interface

Device Type	Connection Option
gas quality measurement devices	• serial interface • LAN interface

Table 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 software configuration.

5.1.2 International Standards

Flow Computers of the enCore FC device series support the following international standards for the calculation of the gas characteristics which are used for flow conversion. Which standards are supported in detail varies according to device type:

Value	Selectable Calculation Standard
compressibility	• AGA8-92 DC (ISO 12213-2) • SGERG-88 (ISO 12213-3) • AGA-NX19 mod • AGA-NX19 mod BR.KOR.3H • AGA-NX19 GOST • GOST 30319.2-2015 • GOST 30319.3-2015
gas density, relative density	• AGA8-92 DC (ISO 12213-2) • ISO 6976 • GOST 30319.3-2015
heating value, Wobbe index	• ISO 6976

Table 2: International standards

Depending on the field of application, the enCore FC supports other European or international standards as well.

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).[6] The 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, e.g. gas quality measuring devices.

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 four process boards can be installed in a device with 1/3 overall width, while a maximum of seven 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.

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

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[6] ⇨ chapter 9.6 Housing dimensions (p. 93)

For a detailed description of the process boards and possible limitations for the board equipment ⇨ refer to chapter 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
⑤   power-LED
⑥   status-LED
⑦   USB connection 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.

①	up
②	down
③	left
④	right
⑤	enter

Fig. 5-2: Navigation keys

The navigation keys (up, down, left, right, 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

Elster calibrates the touch screen before delivery. In case a re-calibration should be necessary, select in the home display 🏠 of the device ℹ️ **Info – Display calibration** and follow the in-structions 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** fest. 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 checkmark ✅ 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 func-
tionality, 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 distin-
guished: 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. (⇨ chapter 5.3.1 Device Keys, S. 32)

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.

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 and the status LED.

Power-LED

LED Status	Explanation
off	power supply off; no USB connection
red	power supply off; USB connection detected
green	power supply on; no USB connection
orange	power supply on; USB connection active

Table 3: Power-LED

Status-LED

LED Status	Explanation
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.

Table 4: Status-LED (part 1)

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	Explanation
red, flashing	The error list includes at least one pending and not accepted alarm.
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:[7] • 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:[7] • The warning has already ended, but is not yet accepted. • The warning is still pending, but has already been accepted.

Table 5: Status-LED (part 2)

---

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

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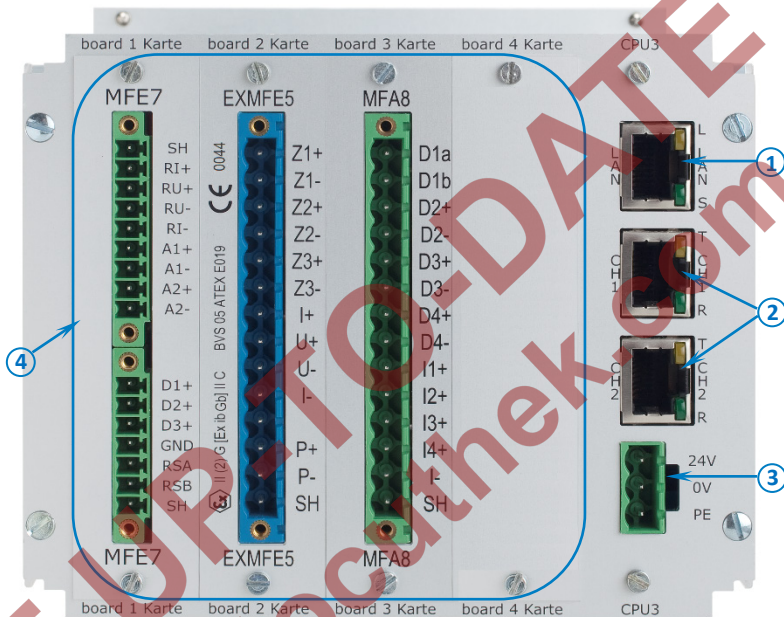
Fig. 5-3: Rear of device (example 1/3 overall width)

① LAN interface (Ethernet network)

② serial interfaces

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 chapters (descriptions individual boards):

⇨ 6.3 Installation and Conversion of Process Boards (p. 49)
   This chapter describes the ways you can change the I/O board equipment.

⇨ 6.4 Connection Diagrams (p. 55)
   This chapter 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, e.g. 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 e.g. 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. 23)
>
> ⇨ 6.1 Line Connection (p. 46)

The process board ExMFE5 is an "associated electrical equipment" according to EN50020, 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.
  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 × analog current input 4 … 20mA (P+/P-), alternatively usable as a HART interface.
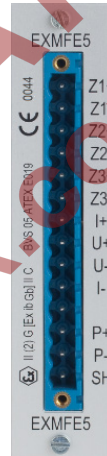
Fig. 5-4

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, alter-
  natively usable as a HART interface.

- 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).
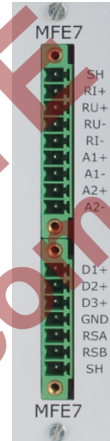
Fig. 5-5

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-)
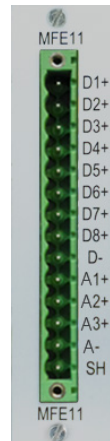
Fig. 5-6

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.

Fig. 5-7

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.
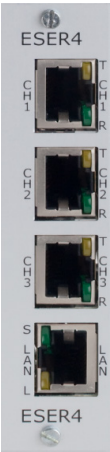
Fig. 5-8

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.

Fig. 5-9

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.

> 📖 It is recommended that the enCore FC be installed 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 in order to fulfill the requirements of an applicable approval.

6.2   Power Supply and Grounding
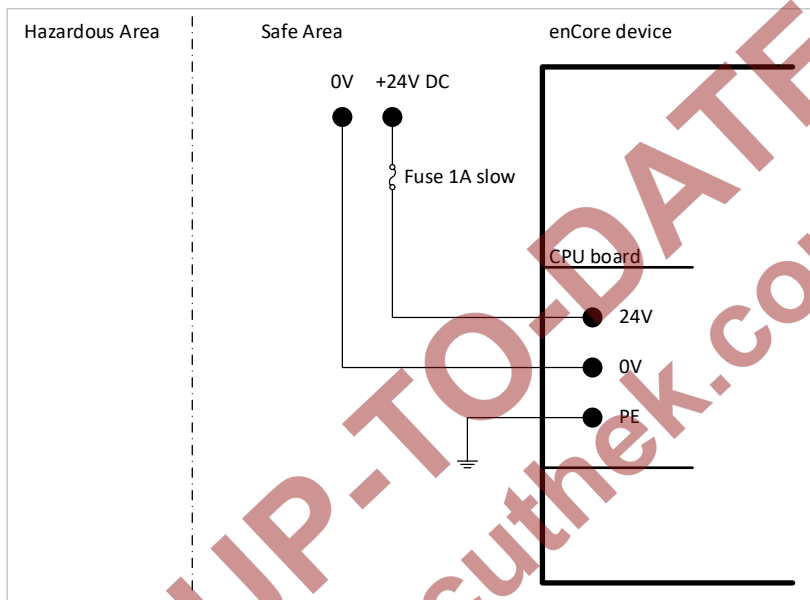
Fig. 6-1: Power supply

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.

It is recommended to operate the process computer in conjunction with an uninterruptible power supply. Its design must comply with EN 60654-2 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 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.

If required, please contact our support staff directly.

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(s)
- suitable labelling plate(s)
- jumper(s)

► If necessary, install or update to the next enSuite on the work computer (⇨ enSuite installation guide[8]).

► Read out the enCore FC device's parameterization 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 A).
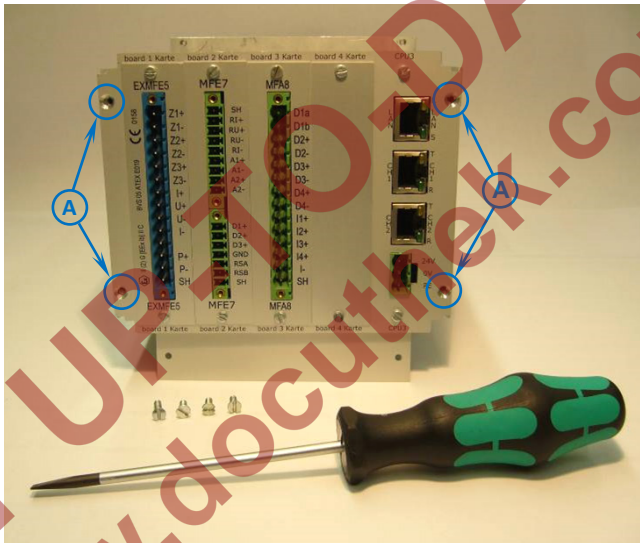
Fig. 6-2: Rear side of the device (example),
mounting screws are removed

---

[8] The installation guide is located on the enSuite installation CD. Alternatively, you can download the PDF from the Elster website in the software downloads section: **www.elster-instromet.com/en/software-downloads**.

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

Fig. 6-3: Remove the board frame

Fig. 6-4: Removed board frame

► 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 in order to
define the number on the board (⇨ Fig. 6-5 and 6-6).

= jumper	board position (slot no.)	1	2	3	4	5	6	7
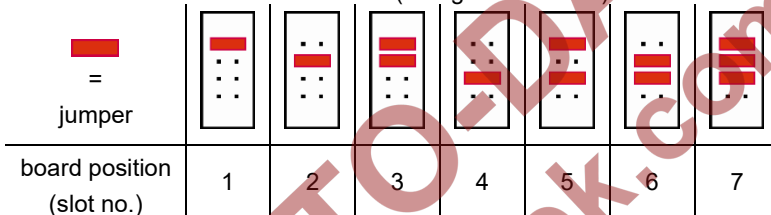
Fig. 6-5: Pin connector with jumper positions

► 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).

► 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 (⇨ Fig. 6-6, Position B). The pin connector must face upwards for defining the board number (⇨ Fig. 6-6, Position C).
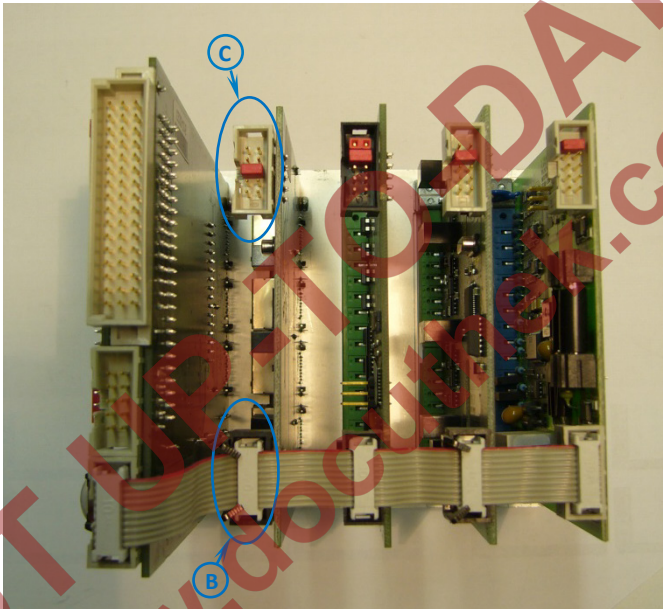
Fig. 6-6: Interior view of the board cage

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

Ⓒ   pin connector for defining the board number
(in Fig. 6-6: 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 in order to re-establish a connection between CPU and the display board.

► Close the device with the help of the 4 mounting screws (Positions A in Fig. 6-2).

► 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**, section **Board <x>**) 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 volume "Configuration of Device Software" of the enCore FC manual.

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 details on parameterization refer to the ⇨ 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; refer to 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
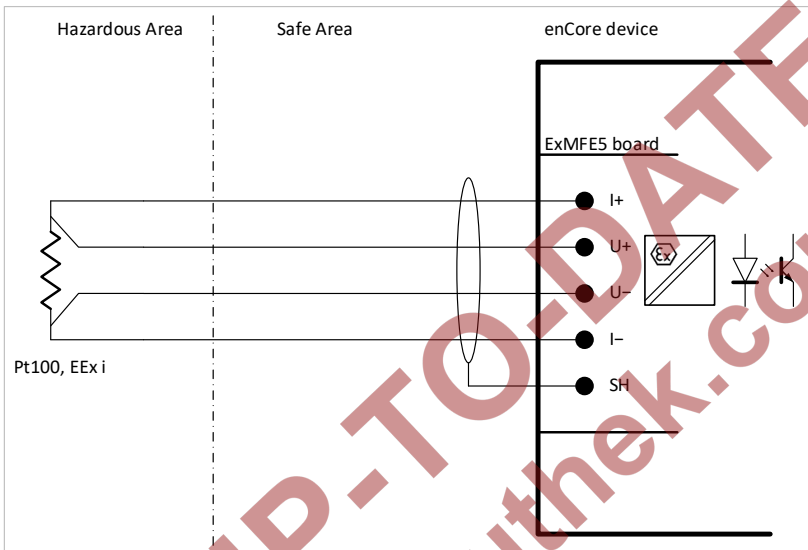
Fig. 6-7: Pt100 (EEx i) via ExMFE5

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
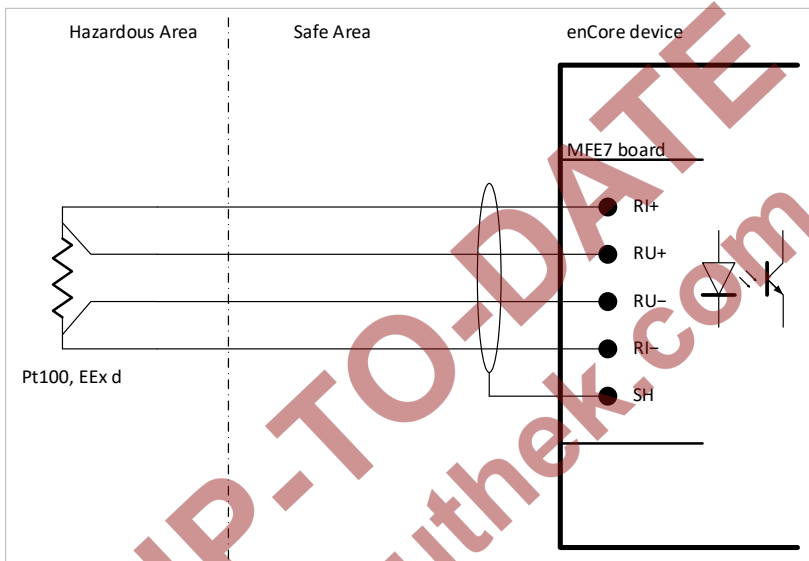
Fig. 6-8: Pt100 (EEx d) via MFE7

Characteristics MFE7:

- a galvanically isolated input safe circuit for 4-wire-PT100 temperature sensor

- 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. cable length: 500 m

6.4.4   Analog Measurement Transmitter (EEx i) via ExMFE5 Board

Fig. 6-9: 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 ... 20mA interface

- active signal converter integrated of the category "associated electrical equipment" according to EN50020 in input:

    − open-curcuit voltage: approx. 18 V

    − voltage at 20mA: approx. 10.6 V

    − max. load: 300 Ω

- max. measurement error: ±0.05% of the measurement (in the measuring range 4 to 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. 6-10: 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. 6-11: 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 20mA: 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. 6-12: 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)

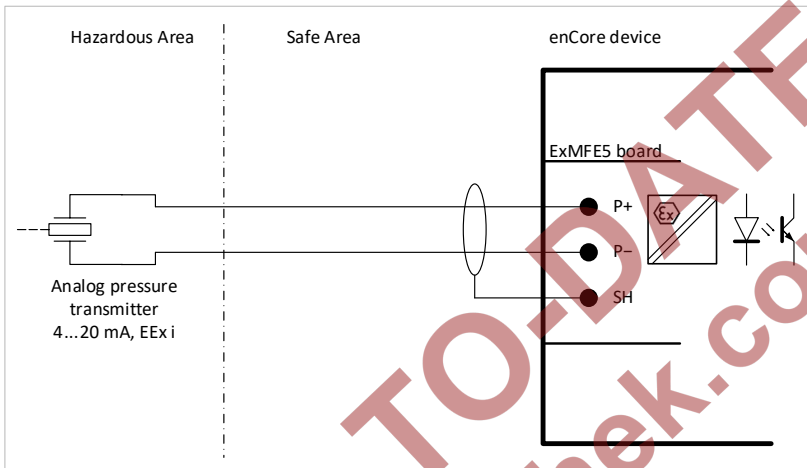### 6.4.8 HART Measurement Transmitter (EEx i) via ExMFE5 Board

Fig. 6-13: 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
- max. 4 transmitters:
  thereof max. 1 transmitter in burst mode[9, 10]
- max. cable length: 250 m

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.

If you are using the basic system version 03-24 and earlier, refer to FAQ 11.2 Limitations for multidrop and burst mode up to basic system version ≤ 03-24 (p. 122).

---

[9] Up to and including basic system version 03-24, you could use either up to 4 × transmitters in multidrop mode or 1 × transmitters in burst mode.

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

6.4.9   Analog Measurement Transmitter (EEx d) via MFE11 Board (without barrier)
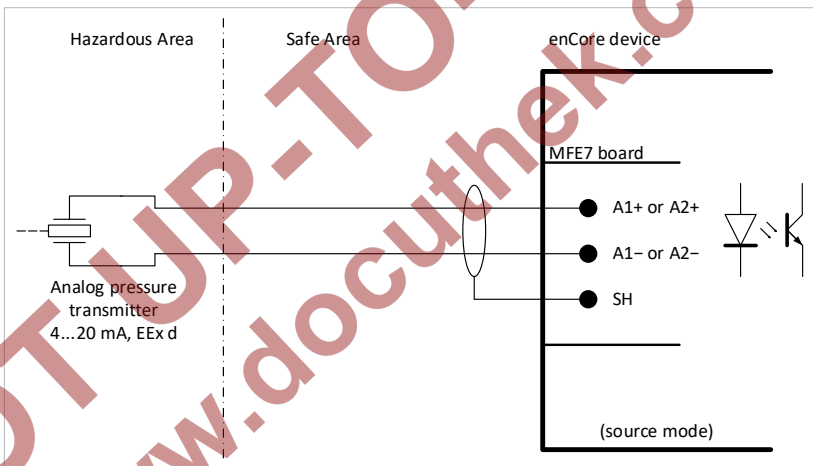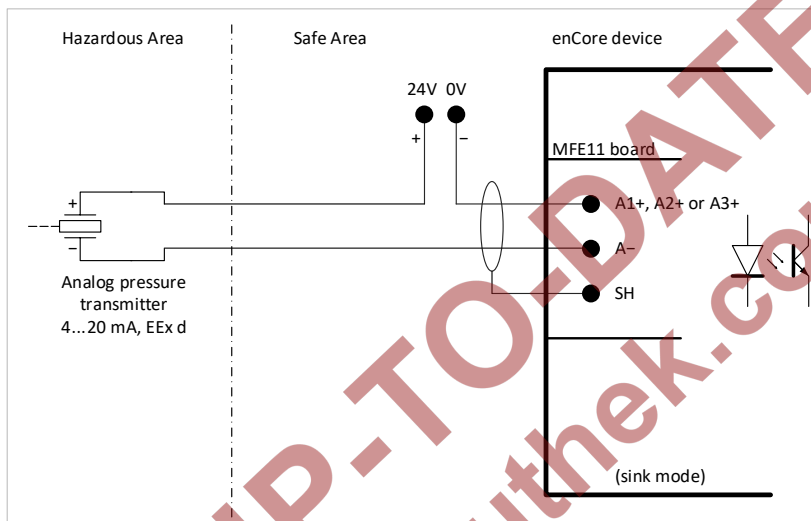

Fig. 6-14: Analog pressure transmitter (EEx d) via MFE11 – example

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 values:

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

6.4.10 Analog Measurement Transmitter (EEx i) via MFE11 Board (barrier in source mode)
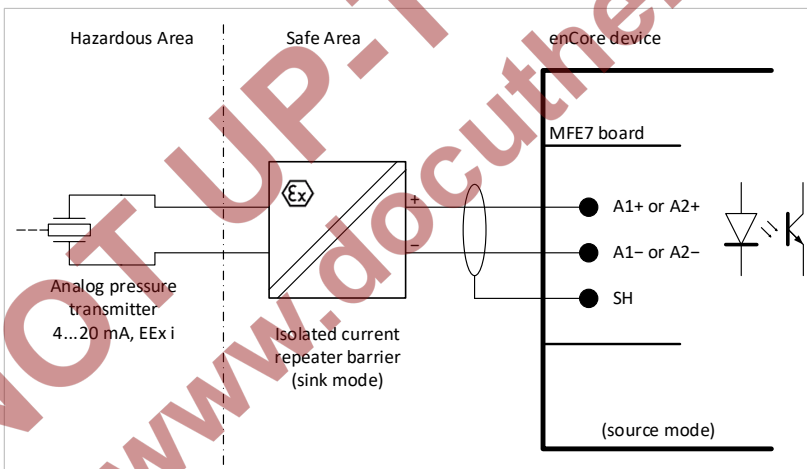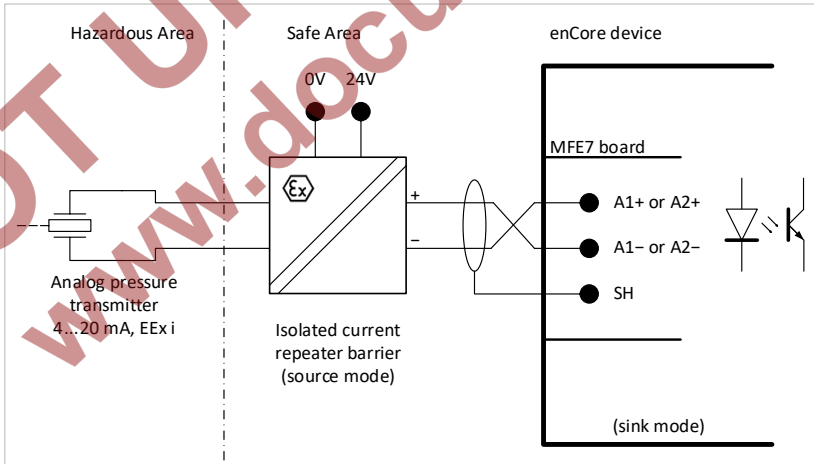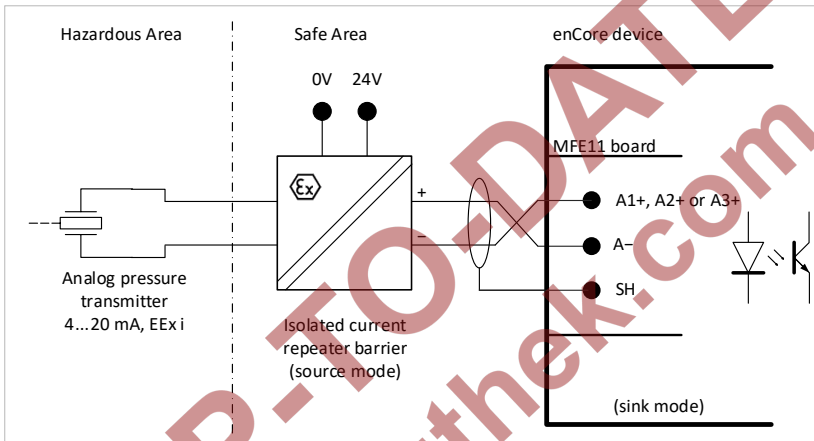

Fig. 6-15: Analog pressure transmitter (EEx i) via MFE11 – example

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 values:

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

6.4.11 Contacts or pulses (safe area) via MFE11 board
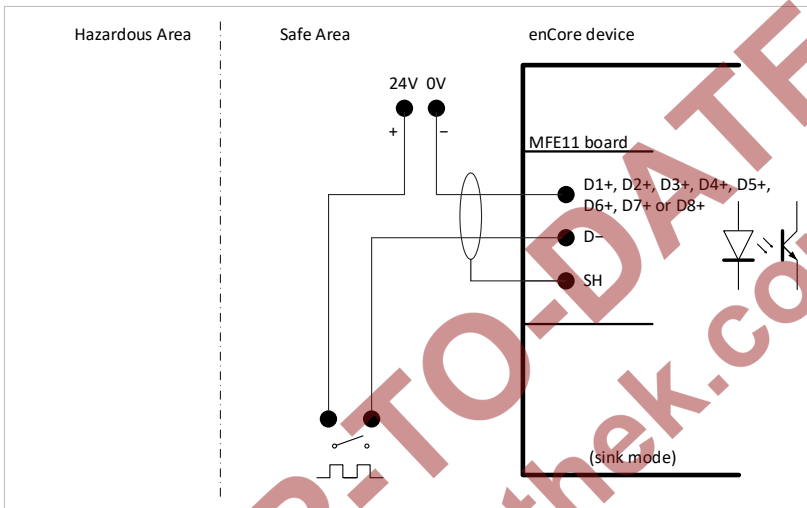
Fig. 6-16: Contacts or pulses (safe area) via MFE11 – example

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

6.4.12 Contacts or pulses (hazardous area) via MFE11 board
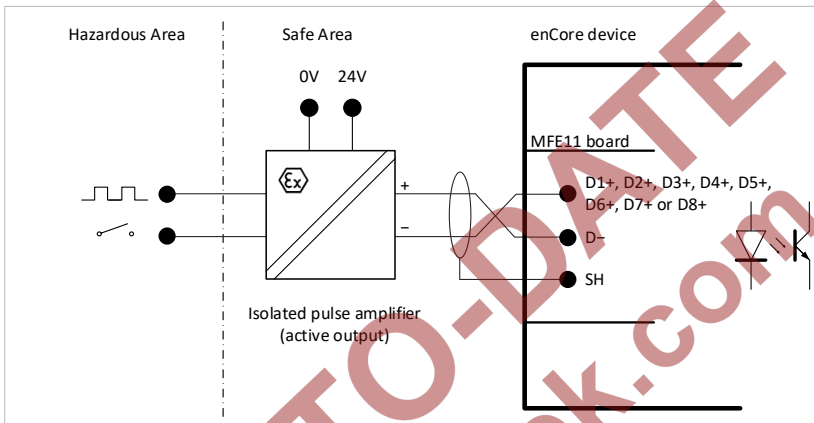
Fig. 6-17: Contacts or pulses (hazardous area) via MFE11 – example

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

6.4.13 HART Measurement Transmitter (EEx d) via MFE7 Board (without barrier, internal Power Supply)

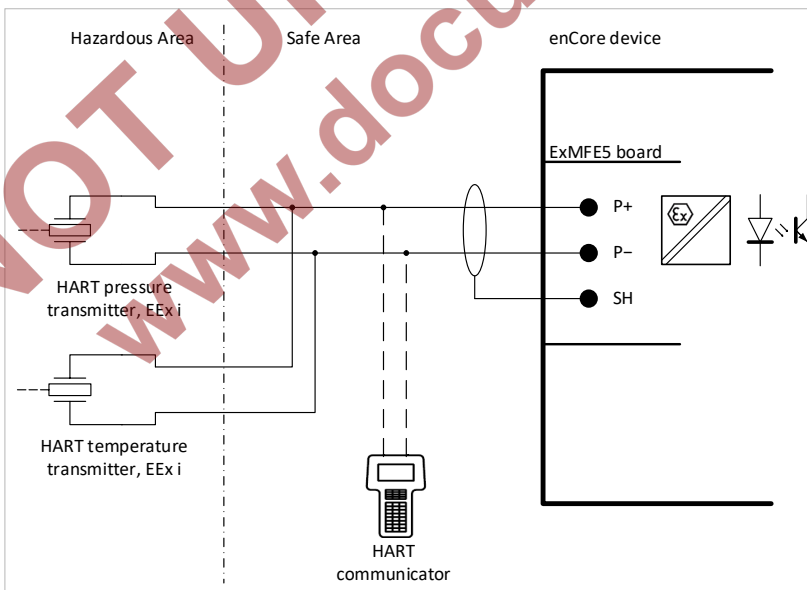

Fig. 6-18: HART pressure and temperature transmitter (EEx d) via MFE7 – example

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

    − voltage at 20 mA: approx. 12.6 V

    − max. load: 600 Ω

    − max. 4 transmitters:
      thereof max. 1 transmitter in burst mode[11, 12]

---

[11] Up to and including basic system version 03-24, you could use either up to 4 × transmitters in multidrop mode or 1 × transmitters in burst mode.

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

- max. cable length: 250 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 **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.

If you are using the basic system version 03-24 and earlier, refer to FAQ 11.2 Limitations for multidrop and burst mode up to basic system version ≤ 03-24 (p. 122).

6.4.14 HART Measurement Transmitter (EEx d) via MFE7 Board (without barrier, external Power Supply)

Fig. 6-19: 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: approx. 300 Ω

- protocol converter integrated in input:
  max. 4 transmitters:
  thereof max. 1 transmitter in burst mode [13, 14]

- max. cable length: 250 m

---

[13] Up to and including basic system version 03-24, you could use either up to 4 × transmitters in multidrop mode or 1 × transmitters in burst mode.

[14] 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.

If you are using the basic system version `03-24` and earlier, refer to FAQ 11.2 Limitations for multidrop and burst mode up to basic system version ≤ 03-24 (p. 122).

6.4.15 HART Measurement Transmitter (EEx i) via MFE7 Board (barrier in sink mode)

Fig. 6-20: HART pressure and temperature transmitter (EEx i) via MFE7 – example

Characteristics MFE7:

- a galvanically isolated input safe circuit for a transmitter with HART interface

    − open-circuit voltage: approx. 21 V

    − voltage at 20 mA: approx. 12.6 V

    − max. load: 600 Ω

- protocol converter integrated in input:

    max. 4 transmitters:

    thereof max. 1 transmitter in burst mode [15, 16]

---

[15] Up to and including basic system version `03-24`, you could use either up to
4 × transmitters in multidrop mode or 1 × transmitters in burst mode.

- max. cable length: 250 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 **HART channel**
> - parameter **Power supply**: value **On** (source mode)
>
> With this, the operating mode of the channel is set correctly for
> connectingthe HART transmitters.
>
> If you are using the basic system version 03-24 and earlier, refer
> to FAQ 11.2 Limitations for multidrop and burst mode up to basic
> system version ≤ 03-24 (p. 122).

---

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

6.4.16 HART Measurement Transmitter (EEx i) via MFE7 Board (barrier in source mode)
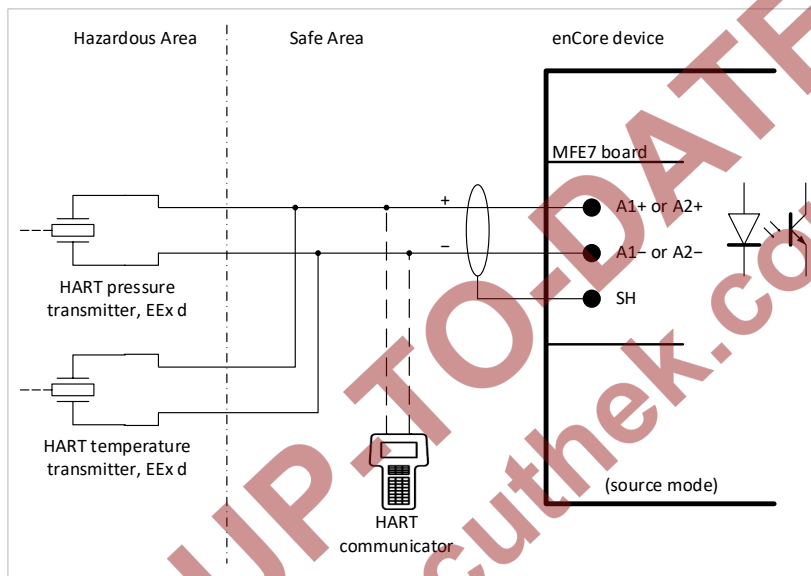

Fig. 6-21: HART pressure and temperature transmitter (EEx i) via MFE7 – example

Characteristics MFE7:

- a galvanically isolated input safe circuit for a transmitter with HART interface
  - load: approx. 50 Ω
- protocol converter integrated in input:
  max. 4 transmitters:
  thereof max. 1 transmitter in burst mode [17, 18]
- max. cable length: 250 m

---

[17] Up to and including basic system version 03-24, you could use either up to 4 × transmitters in multidrop mode or 1 × transmitters in burst mode.

[18] 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 connectingthe HART transmitters.

If you are using the basic system version `03-24` and earlier, refer to ⇨ FAQ 11.2 Limitations for multidrop and burst mode up to basic system version ≤ 03-24 (p. 122).

6.4.17 HART Measurement Transmitter (EEx d) via MFE7 Board (redundant, without barrier) – Burst Mode

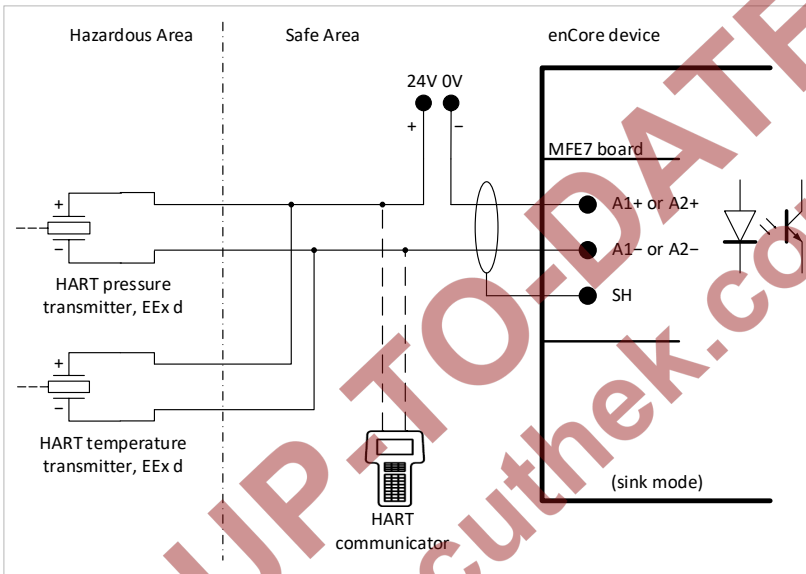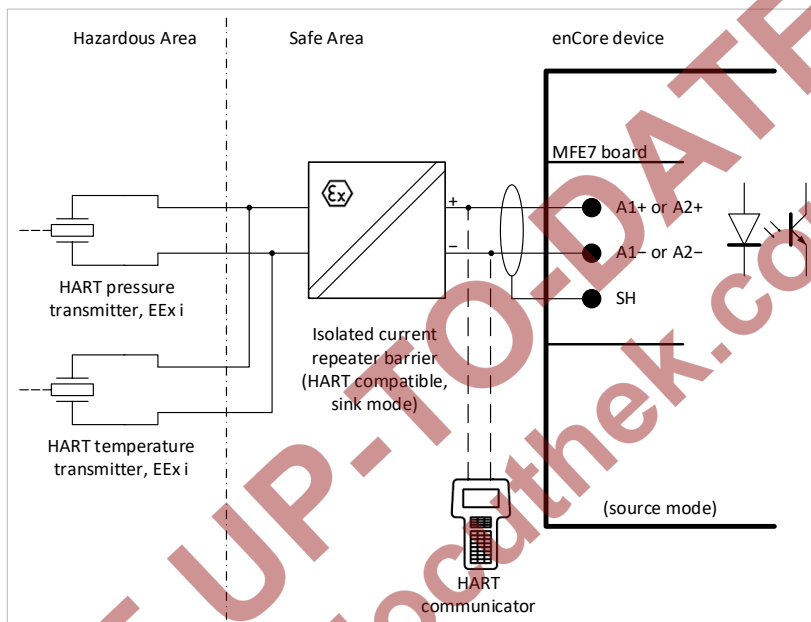Fig. 6-22: HART transmitter (EEx d) via MFE7 (redundant) – example

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:

        rated voltage: approx. 21 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[19].

- max. cable length: 250 m (total)

Hints on parameterization

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

Set the following values:

- channel **A1+ A1−** and **A2+ A2−**: type **HART channel**

- each channel with 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.

---

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

6.4.18 HART Measurement Transmitter (EEx i) via MFE7 Board (redundant, barrier in source mode) – Burst Mode
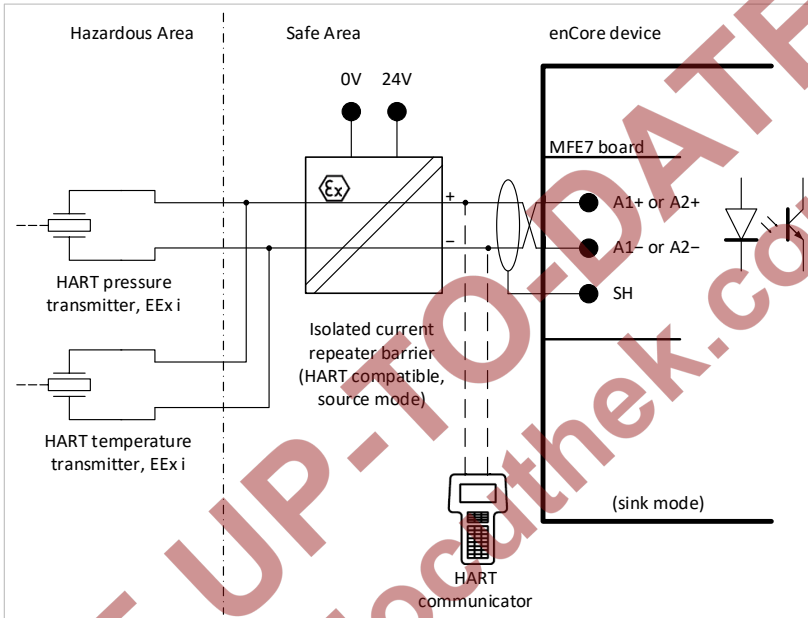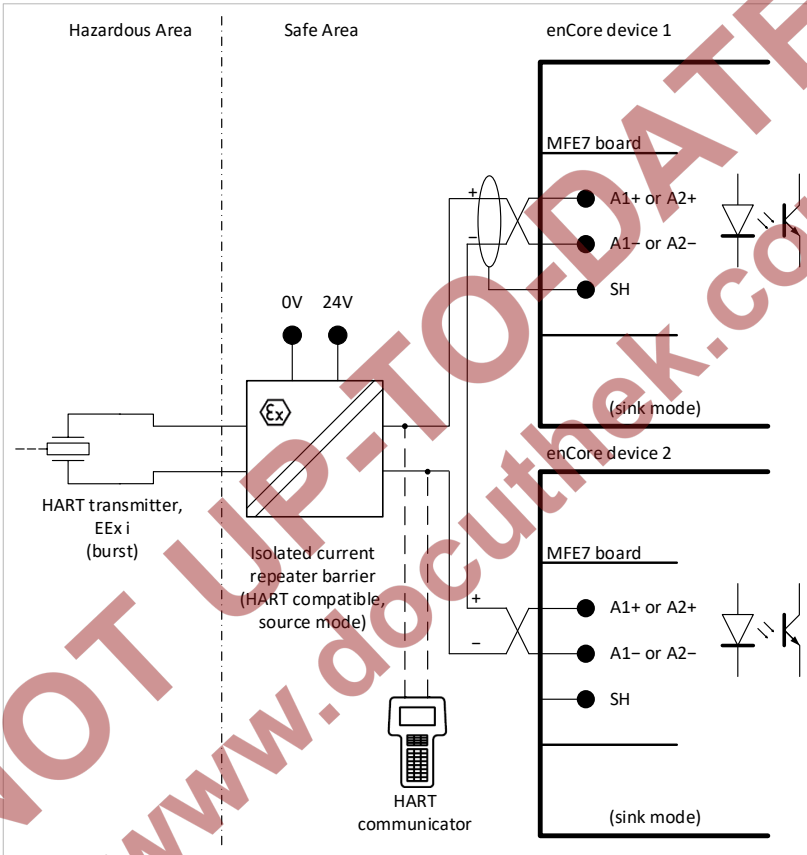

Fig. 6-23: HART transmitter (EEx i) via MFE7 (redundant) – example

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[20].

- max. cable length: 250 m (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**
- each channel with 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.

---

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

6.4.19 HART Measurement Transmitter (EEx d) via MFE7 Board (Multi-Master, without barrier) – Multidrop Mode (*from Basic System 03-25*)
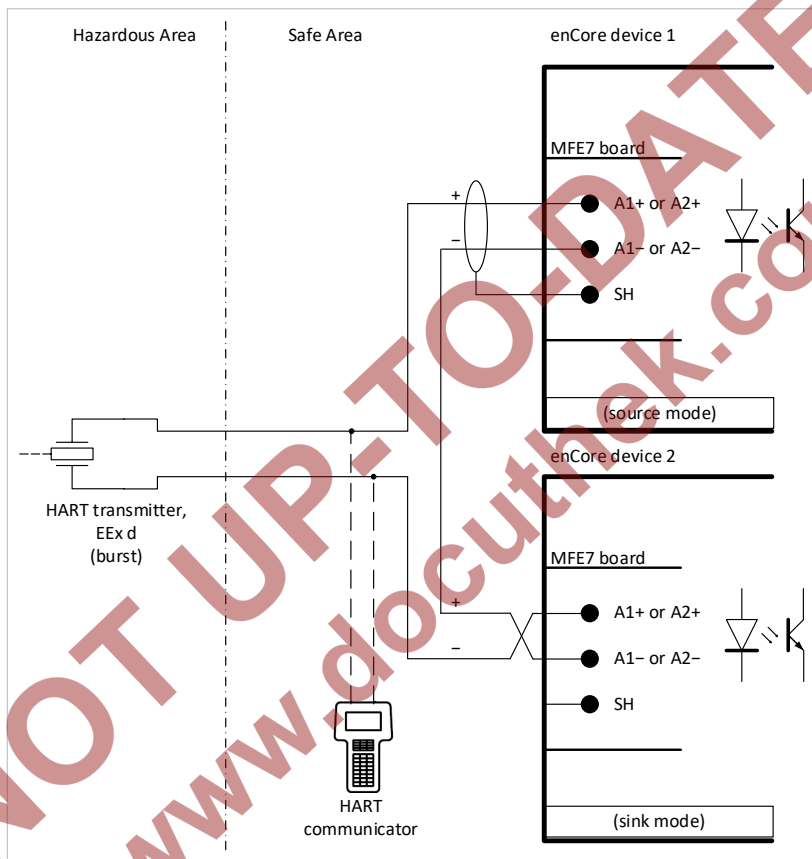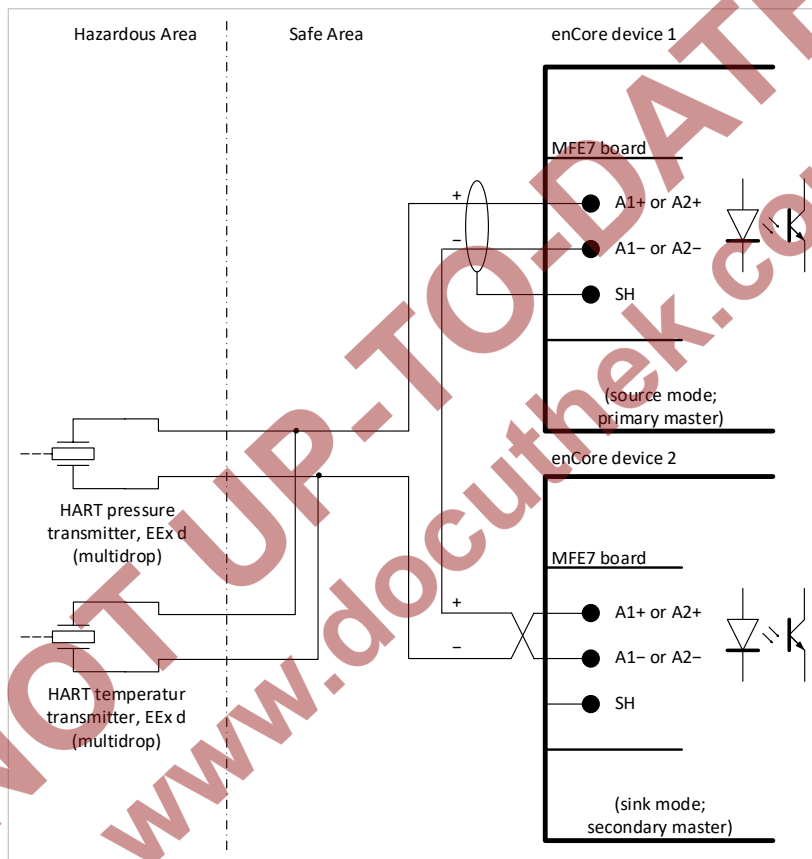

Abb. 6-24: HART pressure and temperature transmitter (EEx d)
via MFE7 (primary and secondary master) – example

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:

rated voltage: approx. 21 V

max. load: 300 Ω

- 2nd device in sink mode:

load: approx. 50 Ω

- max. cable length: 250 m (total)

📘 **A HART communicator cannot be used in this operating mode!**

Note that for technical reasons it is not possible to use HART communicator in a HART loop for diagnostic purposes in this operating mode.

📘 **Hints on parameterization**

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

Set the following values:

- channel **A1+ A1−** and **A2+ A2−**: type **HART channel**
- each channel with parameter **Power supply**:
    - for device 1: value **On** (source mode)
    - for device 2: value **Off** (sink mode)

In folder **<channel>: HART loop <x>**:

- parameter **Master address**:
    - for device 1: value **Primary**
    - for device 2: value **Secondary**
- For each transmitter, set the parameter **device <x>** to **used** and parameterize all other settings for the individual transmitters.

6.4.20 HART Measurement Transmitter (EEx i) via MFE7 Board (Multi-Master, barrier in source mode) – Multidrop Mode (*from Basic System 03-25*)
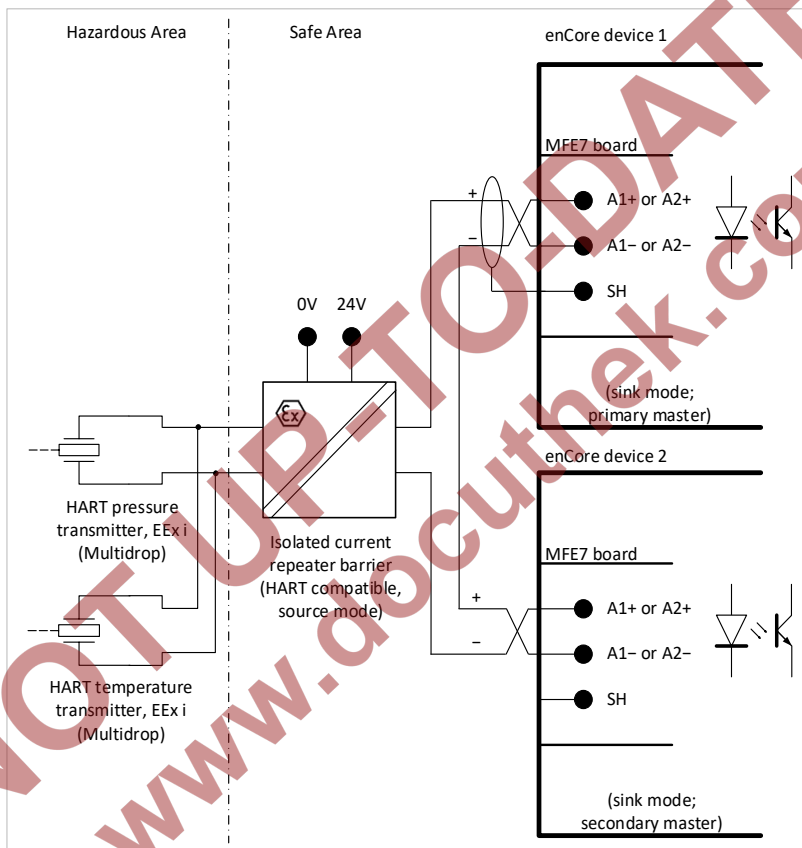
Abb. 6-25: HART pressure and temperature transmitter (EEx i)
via MFE7 (primary and sekundary master)

- a galvanically isolated input safe circuit for a transmitter with HART interface for every device

- both devices in sink mode:
  load: approx. 50 Ω

- max. cable length: 250 m (total)

A HART communicator cannot be used in this operating mode!

Note that for technical reasons it is not possible to use HART communicator in a HART loop for diagnostic purposes in this operating mode.

Hints on parameterization

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

Set the following values:

- channel **A1+ A1−** and **A2+ A2−**: type **HART channel**
- each channel with parameter **Power supply**:
  - for device 1: value **Off** (sink mode)
  - for device 2: value **Off** (sink mode)

In folder **<channel>: HART loop <x>**:

- parameter **Master address**:
  - for device 1: value **Primary**
  - for device 2: value **Secondary**
- For each transmitter, set the parameter **device <x>** to **used** and parameterize all other settings for the individual transmitters.

6.4.21   Gas Meter (Turbine): Encoder Index, 2 LF/HF Sensors (EEx i) via ExMFE5 Boards
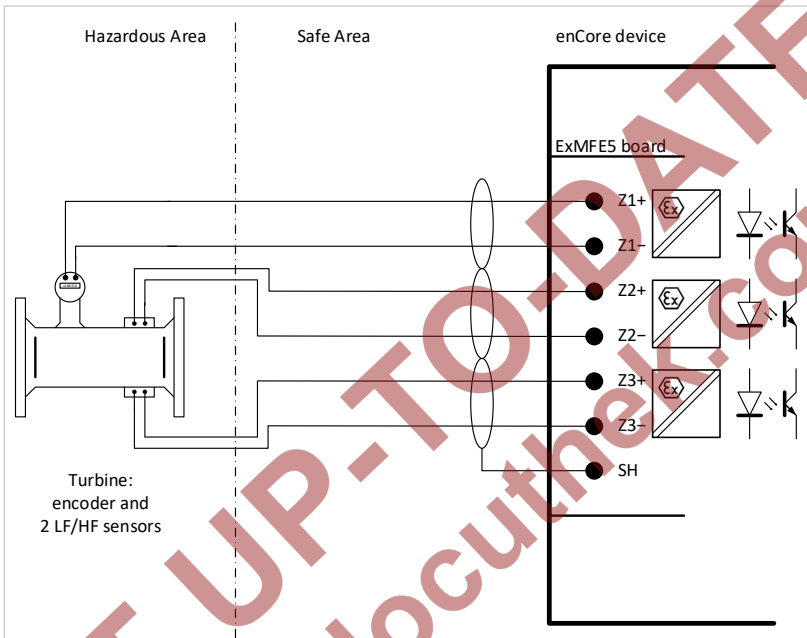
Fig. 6-26: Interface for turbine meter
encoder index, 2 LF/HF sensors (EEx i) via ExMFE5

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

6.4.22 Gas Meter (Turbine): Encoder Index, 2 LF/HF Sensors (EEx i) via MFE7 Board
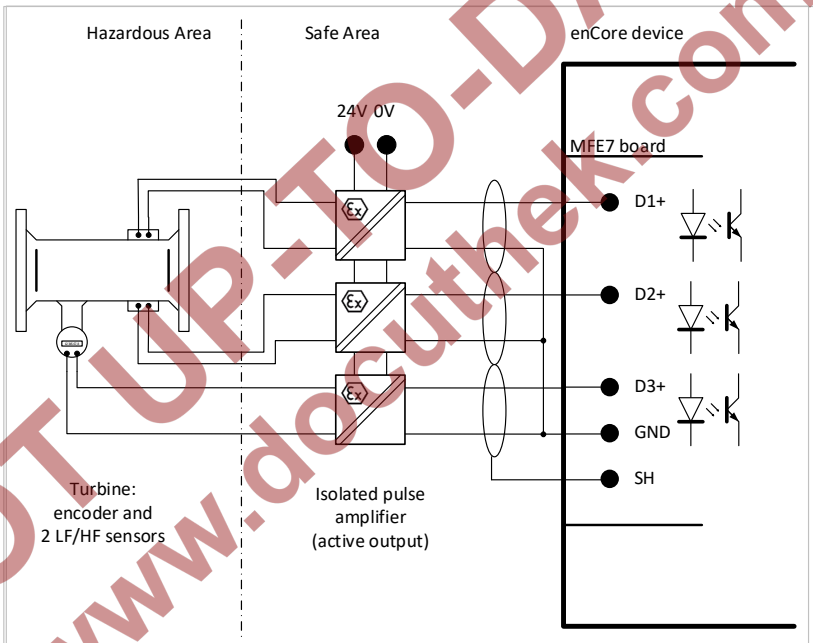
Fig. 6-27: Interface for turbine meter
encoder index, 2 LF/HF sensors (EEx i) via MFE7

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:
    − LF: 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

6.4.23   Gas Meter (Turbine) SMRI Bi-directional: 2 HF Sensors, Flow Direction Detection (EEx i) via MFE7 Board
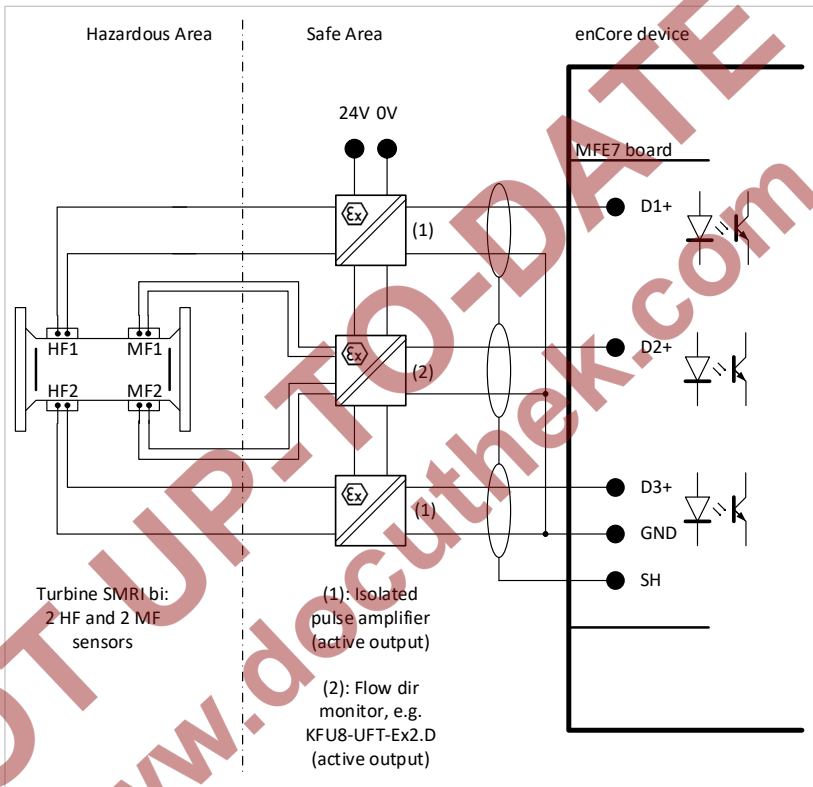
Fig. 6-28: Interface for turbine meter type SMRI bi:
2 HF and 2 MF sensors (EEx i), flow direction detection external via MFE7

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. 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

6.4.24 Gas Meter (Turbine) SMRI Bi-directional: Flow Direction Detection Internal (EEx i) via MFE7 Board
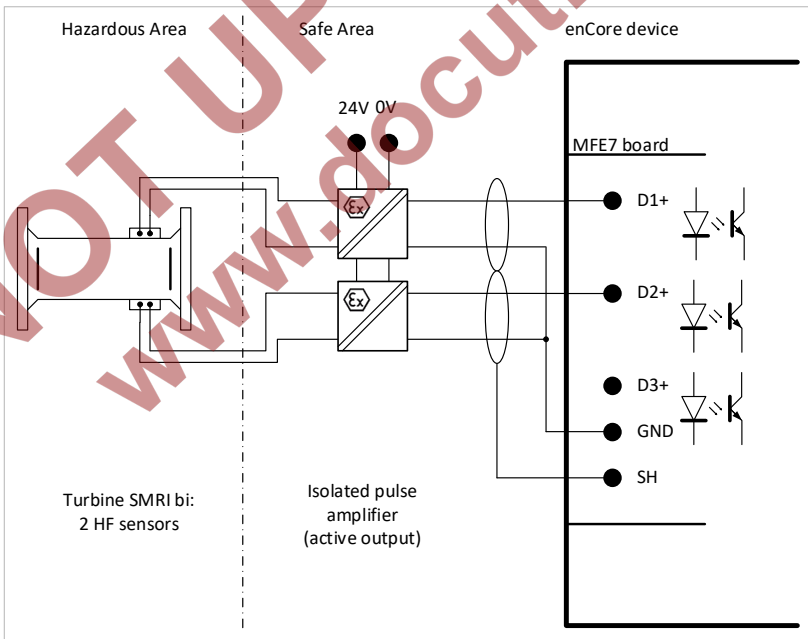
Fig. 6-29: Interface for turbine meter type SMRI bi:
2 HF sensors (EEx i), flow direction detection internal via MFE7

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**

6.4.25 Q.Sonic Ultrasound Gas Meter: Serial RS485 (EEx d) via MFE7 Board
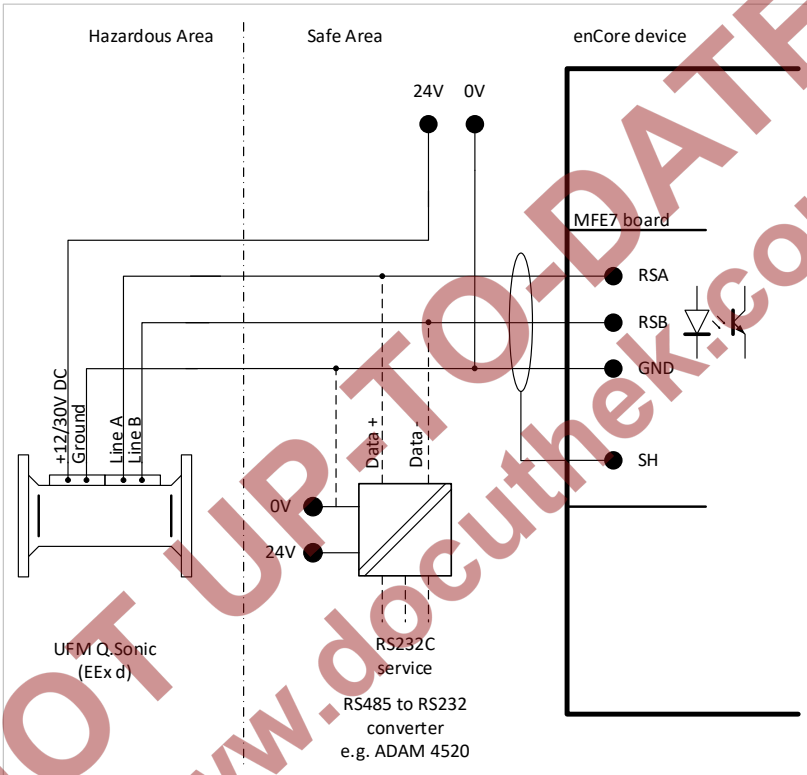
Fig. 6-30: Interface for ultra sound gas meter (Q.Sonic):
serial RS485 (EEx d) via MFE7

Consider the recommendations made with regards to cable length
and connection resistors in ⇨ refer to chapter 6.4.1 General
Recommendations for Signal and Data Cable (p. 56).

6.4.26 Q.Sonic6 Ultrasound Gas Meter: Serial RS485 (EEx d) via MFE7 Board
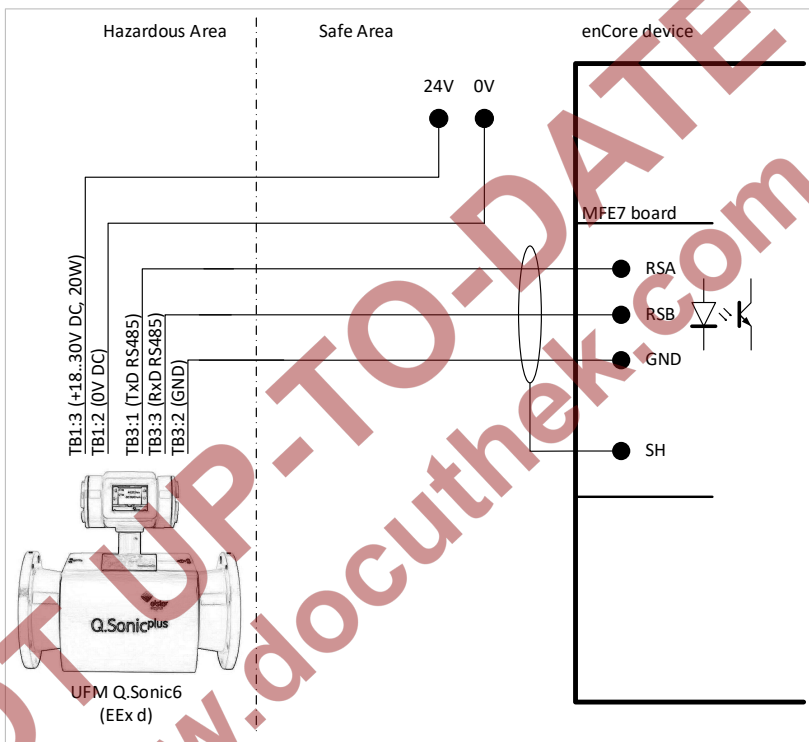
Fig. 6-31: Interface for ultra sound gas meter (Q.Sonic6):
serial RS485 (EEx d) via MFE7

Consider the recommendations made with regards to cable length and connection resistors in ⇨ chapter 6.4.1 General Recommendations for Signal and Data Cable (p. 56).

6.4.27   FLOWSIC600 Ultrasound Gas Meter: Serial RS485 (EEx d) via MFE7 Board
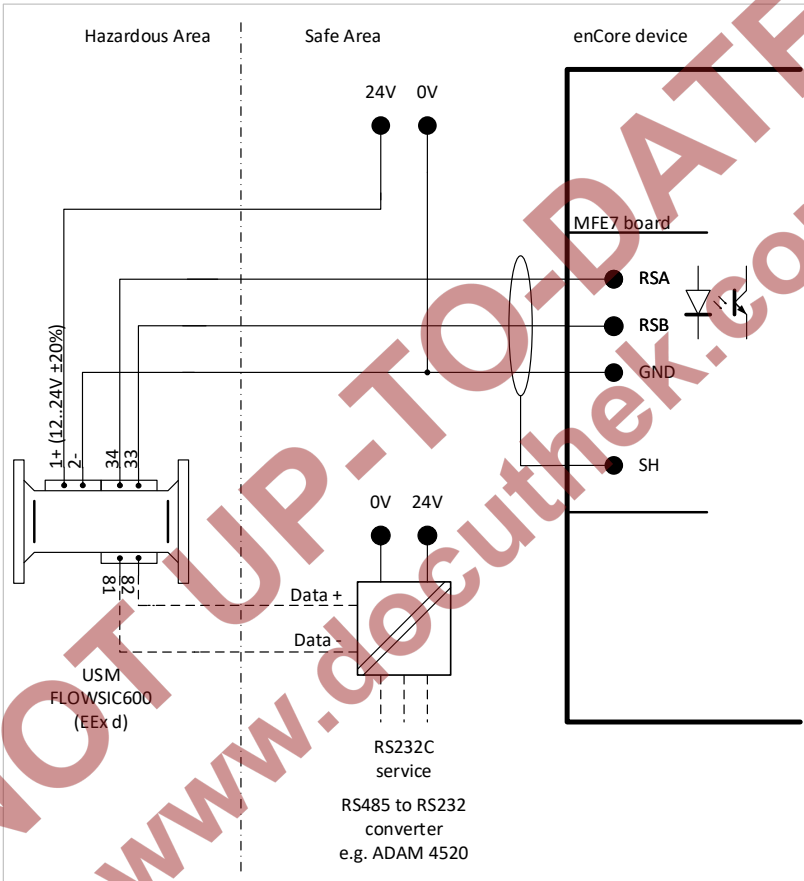
Fig. 6-32: Interface for ultra sound gas meter (FLOWSIC600):
serial RS485 (EEx d) via MFE7

> Consider the recommendations made with regards to cable length
> and connection resistors in ⇨ refer to chapter 6.4.1 General
> Recommendations for Signal and Data Cable (p. 56).

6.4.28   Serial Interface through COM Port (CPU or MSER4-Board)
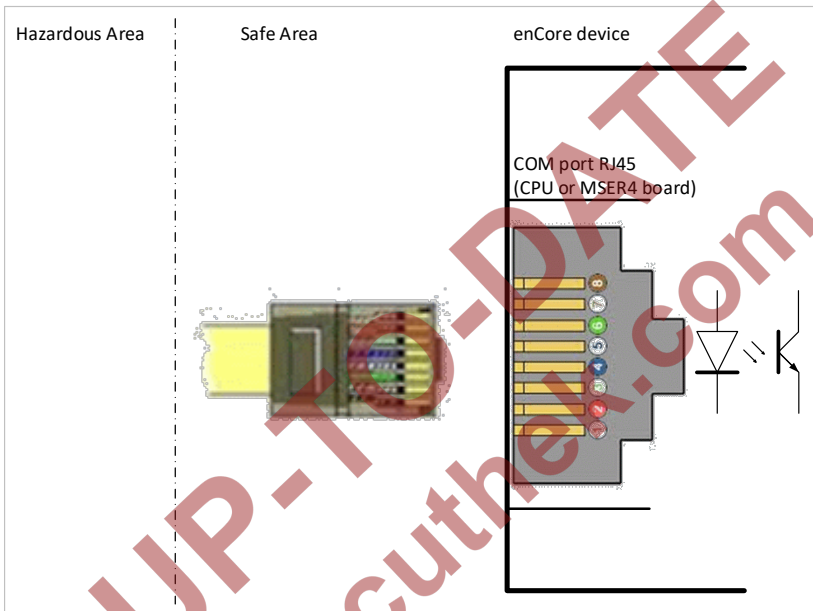
Fig. 6-33: Serial interface through COM port (via CPU or MSER4)

ℹ️ **Cable length and the connection resistors**

Consider the recommendations made with regards to cable length and connection resistors in ⇨ refer to chapter 6.4.1 General Recommendations for Signal and Data Cable (p. 56).

📖 **Hints on parameterization**

Branch **<device> – Basic System – I/O boards – Board <x>: MSER4**

Select the following values:

- channels **CH1/CH2** of the CPU: appropriate **Driver mode**: **RS232**, **RS422** or **RS485**

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: Pin assignment and color coding acc. to standard EIA/TIA 568B[21]

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

6.4.29   Analog Output over MFA8 Board (0/4 ... 20 mA)
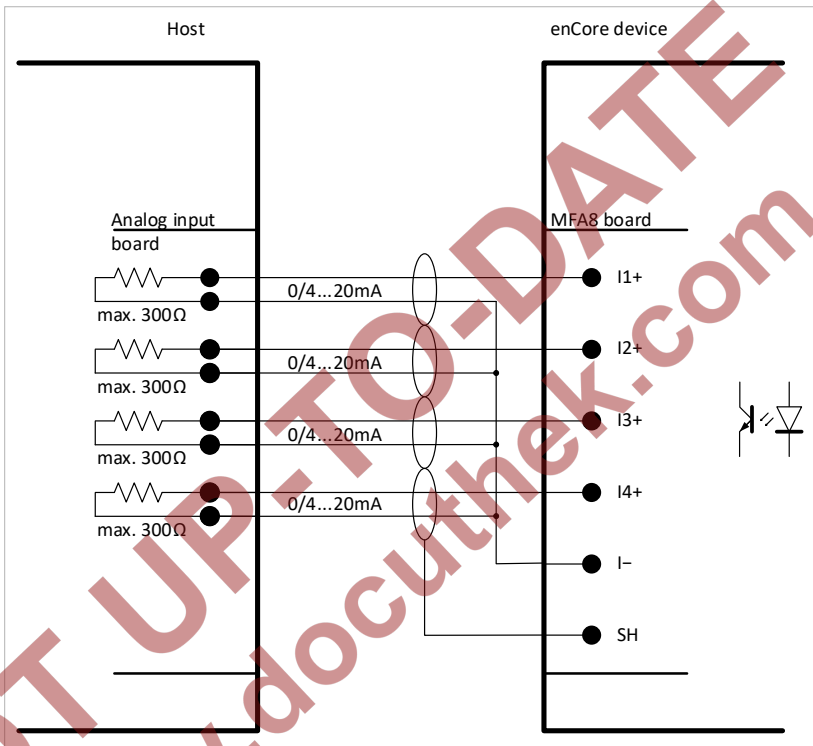
Fig. 6-34: Analog output via MFA8

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−**, **I 2+ I−**, **I3+ I−** or **I4+ I−**: type
  Current output
  - parameter **Current range**: current output range:
    0 to 20 mA or **4 to 20 mA**

6.4.30 Message Output over MFA8 Board
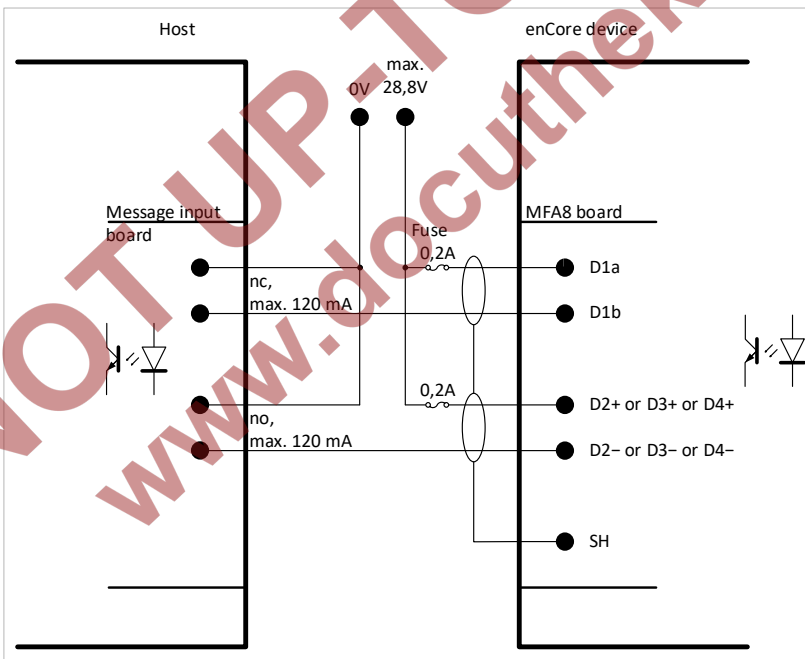
Fig. 6-35: Message output via MFA8

Characteristics MFA8:

- four galvanically isolated passive output safe circuits for displaying messages:
    - channel **D1** interpreted as opener (nc, "**n**ormally **c**losed")
    - channel **D2**, **D3** and **D4** interpreted as closer (no, "**n**ormally **o**pen")
- 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**

6.4.31 Pulse Output over MFA8 Board
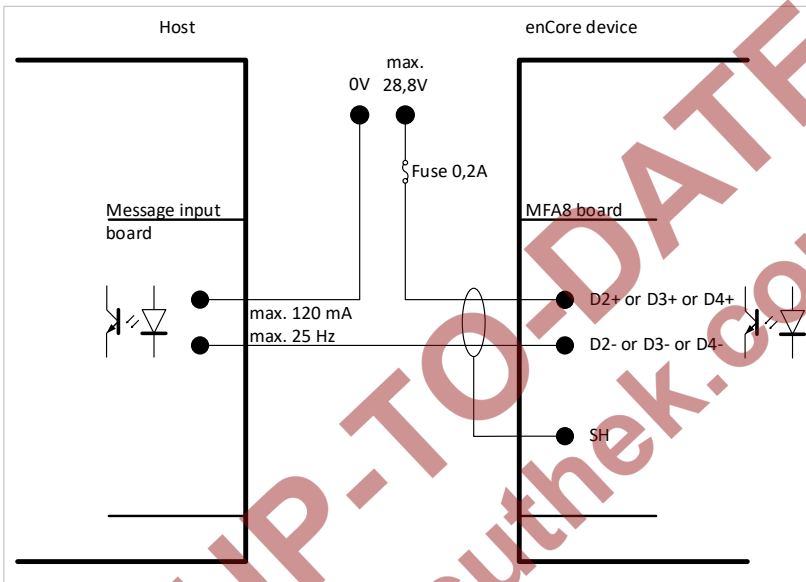
Fig. 6-36: Pulse output via MFA8

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:

- channel **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. The currently valid version of the file is always located on the enSuite installation CD. Alternatively you can download the PDF from the Elster Instromet website from the section **Software downloads**: **www.elster-instromet.com/en/software-downloads**

A gas specialist must be consulted for this procedure. The presence of a metrology expert is also required when the device is being used within the scope of legal metrology.

> The ⇨ online help function in enSuite software contains instructions for operating enSuite as well as a detailed description of its parameters.

7.1   Device Configuration

This section gives brief instructions on how to create a complete confi-
guration for enCore devices and how to transfer the configuration into the
device on-site via USB. For details ⇨ refer to volume "Configuration of
Device Software" of the enCore FC manual.

> **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.
✓ As soon as the transfer of the parameterization begins, a login dialog
   appears on the computer screen.
► Login as an administrator.

> **Standard login**
>
> A standard login as an administrator (user name **admin1** and an
> empty password) typically works here if you have not changed the
> start-up settings for user administration. Otherwise follow the
> individual user configuration of the device.

✓ After a successful login the data transfer begins.

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

Fig. 7-1: Emergency mode

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 us if you require further assistance for diagnosing the error.

7.2   Commissioning the Measurement System

The presence of a metrology expert is required for final commissioning of the device when it is used within the scope of legal metrology. In this case, the conditions of the applicable authorization must be observed as well.

7.2.1 Checking Device Settings

The legally relevant parameters can be checked in special device displays (⇨ volume "Use in Legal Metrology" of the enCore FC manual). The enSuite software will allow you to carry out a complete check of the current device parametrization when the software has an online connection to the device.

7.2.2 Checking Measurement Input Values

Input measurements, in particular input values for flow conversion (measurement data from gas meters, pressure transmitters, temperature transmitters and, if applicable, gas composition measurement devices) can be checked on the device display (⇨ volume "Use in Legal Metrology" of the enCore FC manual).

7.2.3 Checking Output Signals

Parameterized output signals can be measured using appropriate measure-ment devices and checked in that way.

7.2.4 Checking Digital Communication (Modbus, etc.)

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

7.2.5 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 regu-lations must be observed.

7.2.6 End of Commissioning (*from Basic System 03-24*)

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**

7.2.7   Sealing (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.

This section contains instructions for replacing the battery and cleaning the device, as well as contact data for customer service and the service hotline.

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 be replaced by a new one when the power supply has been switched off 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

You need one of the below mentioned batteries: Lithium 3 V CR2 ½ AA

► For reasons of security, use enSuite to read out 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 (A) from the left side wall.
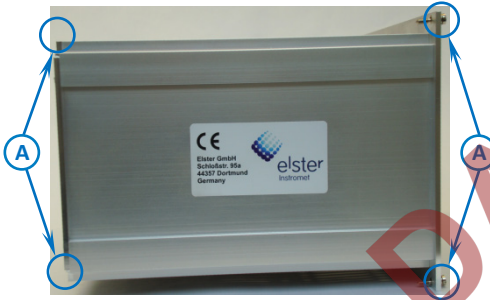
Fig. 8-1

► Remove the left side plate.

Fig. 8-2
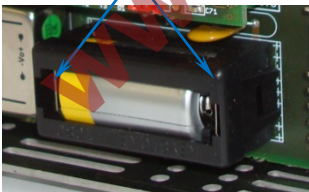
Fig. 8-3

Fig. 8-4

► Carefully loosen the battery cover tabs (B) 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
     (⇨ Fig. 8-3 to 8-4)! An incorrect polarity will make itself known
     through a loss of data, only after a power failure of greater than
     15 minutes.

►   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   Technical Assistance Center (TAC)

Our Technical Assistance Center is available for technical advice as well as repairs.

Furthermore, our employees are always interested in new information and experiences that are gained through use of the device and which may be valuable for improving our products.

You can contact our Technical Assistence Center at:

Tel.:   +49 231 937110-88

E-Mail: **ElsterSupport@Honeywell.com**

8.4   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.

If required, please contact our support staff directly.

You must contact the responsible customer service department for spare parts and accessories (⇨ chapter 8.3 Technical Assistance Center (TAC), p. 110).

8.5   Warranty Conditions

You will find our current warranty conditions in the General Terms and Conditions, e.g. on our website:

www.elster-instromet.com/en/general-terms-of-business

9 Decommissioning/Disposal

9.1 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.

> ℹ️ 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.

> ℹ️ 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 (⇨ chapter 8.1 Battery Replacement, p. 106).

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.

9.2   Disposal

Elster, being the manufacturer, will take care of proper disposal of the enCore FC once the operational life of the device expires.

Send the enCore FC to the following address:

Elster GmbH
Steinern Straße 19–21
D - 55252 Mainz-Kastel
Germany

10 Technical Data

10.1 General Information

dimensions/ housing	• plug-in unit in 19" technology, 3 height units (3U), 1/3 or 1/2 housing width • depth without plug 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 protection class	• 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 • operation in conjunction with an uninterruptable power supply is recommended (⇨ chapter 6.2 Power Supply and Grounding, p. 48)
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
	• sealable security switch

Table 7: General technical data

10.2 Input channels

ExMFE5 input board	• 3 NAMUR inputs [Ex ib Gb] IIC for LF pulses (max. 2 Hz, min. pulse length 200 ms) or HF pulses (max. 5 kHz) or messages. One of these inputs can alternatively be used for connecting an encoder index.
	• 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[22] or up to 4 trans-mitters in multidrop mode)
	• input for Pt100 temperature transmitter in 4-wire technology, [Ex ib Gb] IIC
	• all inputs galvanically isolated amongst each other, and inputs and system

---

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

MFE7 input board	• 3 inputs (24 V DC) for LF pulses (max. 8 Hz, min. pulse length 50 ms) or HF pulses (max. 5 kHz) 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[23] or up to 4 transmitters in multidrop mode), active or passive power supply
	• input for a Pt100 temperature transmitter in 4-wire technology
	• all inputs galvanically isolated amongst each other, and inputs and system
MFE11 input board	• 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
	• passive power supply
	• All inputs are galvanically isolated from the system, and the analog inputs are galvanically isolated from the pulse and messaging inputs

Table 8: Input channels – technical specifications

---

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

10.3 Outputs

MFA8 output board	• 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 galvanically isolated amongst each other, and outputs and system • analog outputs galvanically isolated amongst each another, and analog outputs and system

Table 9: Output channels – technical specifications

10.4 Interfaces for Digital Communication

CPU	• LAN interface (Ethernet 10/100-Mb) • 2 serial interfaces, supported standards: RS485/RS422/RS232
MSER4	• 4 serial interfaces, galvanically isolated amongst each other, and interfaces and system supported standards: RS485/RS422/RS232
ESER4	• 3 serial interfaces, galvanically isolated amongst each other, and interfaces and system supported standards: RS485/RS422/RS232 • LAN interface (Ethernet 10/100-Mb)
MFE7	• 1 serial RS485 interface
USB port	• USB interface for connecting a PC or laptop for parameterization and service purposes

Table 10: Protocol interfaces – technical specifications

10.5 Data Protocols

Ethernet communication	• NTP, Modbus TCP, MMS, HTTP, DSfG (class B)
serial communication	• Modbus (ASCII, RTU), UNIFORM, DSfG (class A)

Table 11: Supported data protocols

10.5.1 Data protocols and its TCP default port (Ethernet)

Protocol	Default port	Description
HTTP	80	**H**yper**T**ext **T**ransfer **P**rotocol allows e.g. to access the enCore device via the remote operation panel.
MMS	102	**M**anufacturing **M**essaging **S**pecification (acc. to ISO standard 9506) allows communication between enSuite and enCore devices.
Modbus TCP	502	Protocol for the data exchange of user-defined registers between a central control station and enCore devices over a standard TCP/IP network.
NTP	123	**N**etwork **T**ime **P**rotocol for the highly accurate time synchronization of enCore devices with an NTP time server.

Protocol	Default port	Description
DSfG	8000	**D**igitale **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.

Tabelle 10-1: Default ports used by enCore devices

10.6 Housing dimensions

10.6.1 1/3 housing width
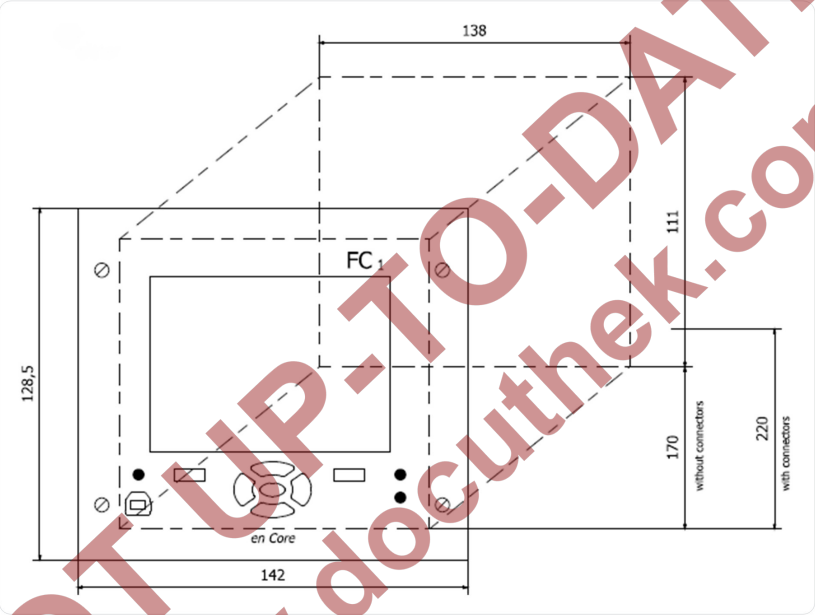
Fig. 10-1: Dimensions for plug-in module 19", 3 U, 28 HP
(all values in millimeters)

10.6.2   1/2 housing width
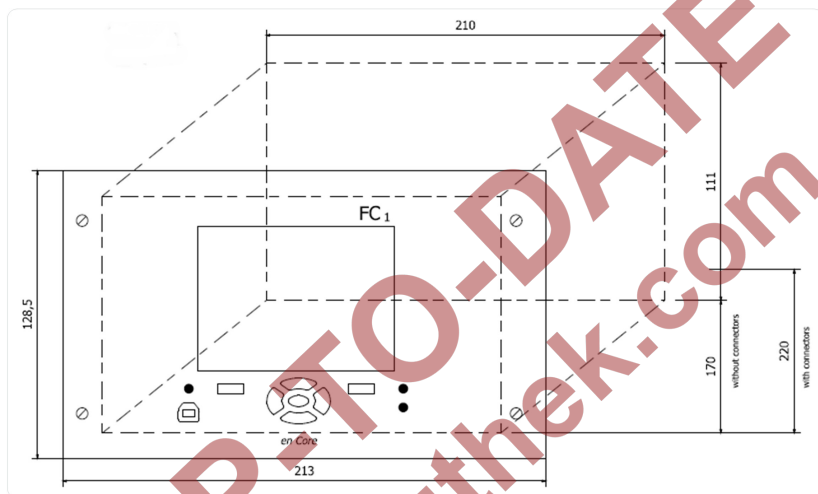
Fig. 10-2: Dimensions for plug-in module 19", 3 U, 42 HP
(all values in millimeters)

11 FAQs

11.1 How to report a security vulnerability to Honeywell?

For the purpose of submission, a security vulnerability is defined as a software defect or weakness that can be exploited to reduce the operational or security capabilities of the software.

Honeywell investigates all reports of security vulnerabilities affecting Honeywell products and services. To report a potential security vulnerability against any Honeywell product, please follow the instructions on our website at:

https://honeywell.com/pages/vulnerabilityreporting.aspx

Submit the requested information to Honeywell by using one of the following methods:

Send an email to **security@honeywell.com**.

or

Contact your Honeywell ⇨ Technical Assistance Center (TAC) (p. 110).

11.2 Limitations for multidrop and burst mode up to basic system version ≤ 03-24

If you were using previous versions of the basic system, you had to take some specialties into account when using HART communication. These restrictions have been removed with the basic system version 03-25. The differences are listed in the table:

	Basic System version up to 03-24	**Basic System version from 03-25**
Number of masters	• 1 master	• up to 2 masters (according to HART specification) Parameter **Master address**
Number of transmitters per HART loop	depending on communication mode: • up to 4 × transmitters in multidrop mode or • 1 × transmitter in burst mode	independent of communication mode: • up to 4 × transmitters, thereof max. 1 × transmitter in burst mode
allowed HART addresses	depending on communication mode: • multidrop: 1..15 • burst: 0	independent of communication mode:: • multidrop or burst: 0..15

Table 11-1: HART: Basic System up to 03-24 vs. 03-25 and higher

12 Index

13 Appendix

- EU Declaration of Conformity enCore FC1

- EU Declaration of Conformity enCore MC1

- ExMFE5 board: EC Type Examination Certificate (ATEX)

CE

EU Declaration of Conformity No. DEMZE1709
EU-Konformitätserklärung Nr.

Honeywell

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)**

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

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

CE M.... 0102 T10434	CE	CE 0044 (Ex) II (2) G [Ex ib Gb] IIC 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*
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, 09.03.2017**	Piet Platschorre,	Jörg Kern,
Signed for and on behalf of *Unterzeichnet für und im Namen von*	Place and date of issue *Ort und Datum der Ausstellung*	Managing Director, General Manager PMC Europe	Sr R&D Manager Gas Metering

CE **EU Declaration of Conformity No.** DEMZE1802
EU-Konformitätserklärung Nr.

Honeywell

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)**

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

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

Not applicable *Entfällt*	BVS 05 ATEX E 019
	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
	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*
	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, 30.04.2018**	Piet Platschorre,	Jörg Kern,
Signed for and on behalf of *Unterzeichnet für und im Namen von*	Place and date of issue *Ort und Datum der Ausstellung*	Managing Director, General Manager PMC Europe	Sr R&D Manager Gas Metering

EG-Baumusterprüfbescheinigung

(1)

(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

(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	U_o	DC	8,6	V
	Stromstärke	I_o		14,9	mA
	Leistung	P_o		32	mW
	linearere Ausgangskennlinie				
	max. äußere Induktivität	L_o		10	mH
	max. äußere Kapazität	C_o		0,5	µF
15.3.2.2	Kanal 4 (Anschl. I+ , I- , U+ , U-)				
	Spannung	U_o	DC	5,9	V
	Stromstärke	I_o		14,4	mA
	Leistung	P_o		21	mW
	linearere Ausgangskennlinie				
	max. äußere Induktivität	L_o		10	mH
	max. äußere Kapazität	C_o		0,5	µF
15.3.2.3	Kanal 5 (Anschl. P+ , P-)				
	Spannung	U_o	DC	21	V
	Stromstärke	I_o		73,9	mA
	Leistung	P_o		388	mW
	linearere Ausgangskennlinie				
	max. äußere Induktivität	L_o		5	mH
	max. äußere Kapazität	C_o		0,18	µF
15.3.3	Umgebungstemperaturbereich	T_a		-20 °C bis +70 °C	

Seite 2 von 3 zu BVS 05 ATEX E 019
Dieses Zertifikat darf nur unverändert weiterverbreitet werden.
Dinnendahlstraße 9   44809 Bochum   Telefon 0201/172-3947   Telefax 0201/172-3948

EXAM

BBG Prüf- und Zertifizier GmbH

(16)   Prüfprotokoll
       BVS PP 05.2005 EG, Stand 31.01.2005

(17)   Besondere Bedingungen für die sichere Anwendung
       Entfällt

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

Page 1 of 3 of BVS 05 ATEX E 019
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	U_o	DC		8.6	V
Current	I_o			14.9	mA
Power	P_o			32	mW
Linear output characteristic					
Max. external inductivity	L_o			10	mH
Max. external capacitance	C_o			0.5	µF

15.3.2.2 Channel 4 (terminals I+, I-, U+, U-)

Voltage	U_o	DC		5.9	V
Current	I_o			14.4	mA
Power	P_o			21	mW
Linear output characteristic					
Max. external inductivity	L_o			10	mH
Max. external capacitance	C_o			0.5	µF

15.3.2.3 Channel 5 (terminals P+, P-)

Voltage	U_o	DC		21	V
Current	I_o			73.9	mA
Power	P_o			388	mW
Linear output characteristic					
Max. external inductivity	L_o			5	mH
Max. external capacitance	C_o			0.18	µF

15.3.3   Ambient temperature range T_a -20°C to +70°C

Page 2 of 3 of BVS 05 ATEX E 019
This certificate may only be circulated without alteration.
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EXAM
BBG Prüf- und Zertifizier GmbH

(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

Seite 1 von 3 zu BVS 05 ATEX E 019 / N1
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) <u>15.1 Gegenstand und Typ</u>

Prozesskarte Typ EXMFE5

<u>15.2 Beschreibung</u>

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.

<u>15.3 Kenngrößen</u>

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	

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

(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

Page 1 of 3 of BVS 05 ATEX E 019/N1
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

Page 2 of 3 of BVS 05 ATEX E 019/N1
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