

Safety Instructions

Micropilot FMR20

4-20 mA HART, Modbus RS485

Ex ia IIC T4...T1 Ga

Ex ia IIC T4...T1 Ga/Gb



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About this document

This document has been translated into several languages. Legally determined is solely the English source text.

Associated documentation

This document is an integral part of the following Operating Instructions:

HART
BA01578F/00

Modbus
BA01931F/00

Supplementary documentation

Explosion-protection brochure: CP00021Z/11

The Explosion-protection brochure is available:

- In the download area of the Endress+Hauser website:
www.endress.com -> Downloads -> Brochures and Catalogs -> Text Search: CP00021Z
- On the CD for devices with CD-based documentation

Manufacturer's certificates**NEPSI Declaration of Conformity**

Certificate number:
GYJ21.3359X

Affixing the certificate number certifies conformity with the following standards (depending on the device version):

- GB 3836.1-2010
- GB 3836.4-2010
- GB 3836.20-2010

Manufacturer address

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

Address of the manufacturing plant: See nameplate.

Extended order code

The extended order code is indicated on the nameplate, which is affixed to the device in such a way that it is clearly visible. Additional information about the nameplate is provided in the associated Operating Instructions.

Structure of the extended order code

FMR20	–	*****	+	A*B*C*D*E*F*G*..
<i>(Device type)</i>		<i>(Basic specifications)</i>		<i>(Optional specifications)</i>

* = Placeholder

At this position, an option (number or letter) selected from the specification is displayed instead of the placeholders.

Basic specifications

The features that are absolutely essential for the device (mandatory features) are specified in the basic specifications. The number of positions depends on the number of features available.

The selected option of a feature can consist of several positions.

Optional specifications

The optional specifications describe additional features for the device (optional features). The number of positions depends on the number of features available. The features have a 2-digit structure to aid identification (e.g. JA). The first digit (ID) stands for the feature group and consists of a number or a letter (e.g. J = Test, Certificate). The second digit constitutes the value that stands for the feature within the group (e.g. A = 3.1 material (wetted parts), inspection certificate).

More detailed information about the device is provided in the following tables. These tables describe the individual positions and IDs in the extended order code which are relevant to hazardous locations.

Extended order code: Micropilot



The following specifications reproduce an extract from the product structure and are used to assign:

- This documentation to the device (using the extended order code on the nameplate).
- The device options cited in the document.

Device type

FMR20

Basic specifications

Position 1, 2 (Approval)		
Selected option		Description
FMR20	NA	NEPSI Ex ia IIC T4...T1 Ga
	NB	NEPSI Ex ia IIC T4...T1 Ga/Gb

Position 3 (Power supply, Output, Operation)		
Selected option		Description
FMR20	A	2-wire, 4-20 mA HART; HART configuration
	P	2-wire; 4-20mA HART; HART/Bluetooth (App) configuration
	R	4-wire; Modbus RS485

Optional specifications

No options specific to hazardous locations are available.

Safety instructions:

General

- Staff must meet the following conditions for mounting, electrical installation, commissioning and maintenance of the device:
 - Be suitably qualified for their role and the tasks they perform
 - Be trained in explosion protection
 - Be familiar with national regulations
- For installation, use and maintenance of the device, users must also observe the requirements stated in the Operating Instructions and the standards:
 - GB 50257-2014: "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering".
 - GB 3836.13-2013: "Explosive atmospheres, Part 13: Equipment repair, overhaul and reclamation".
 - GB/T 3836.15-2017: "Explosive atmospheres, Part 15: Electrical installations design, selection and erection".
 - GB/T 3836.16-2017: "Explosive atmospheres, Part 16: Electrical installations inspection and maintenance".
 - GB/T 3836.18-2017: "Explosive atmospheres, Part 18: Intrinsically safe electrical systems".
- Install the device according to the manufacturer's instructions and national regulations.
- Do not operate the device outside the specified electrical, thermal and mechanical parameters.

- Only use the device in media to which the wetted materials have sufficient durability.
- Avoid electrostatic charging:
 - Of plastic surfaces (e.g. enclosure, sensor element, special varnishing, attached additional plates, ..)
 - Of isolated capacities (e.g. isolated metallic plates)
- Modifications to the device can affect the explosion protection and must be carried out by staff authorized to perform such work by Endress+Hauser.

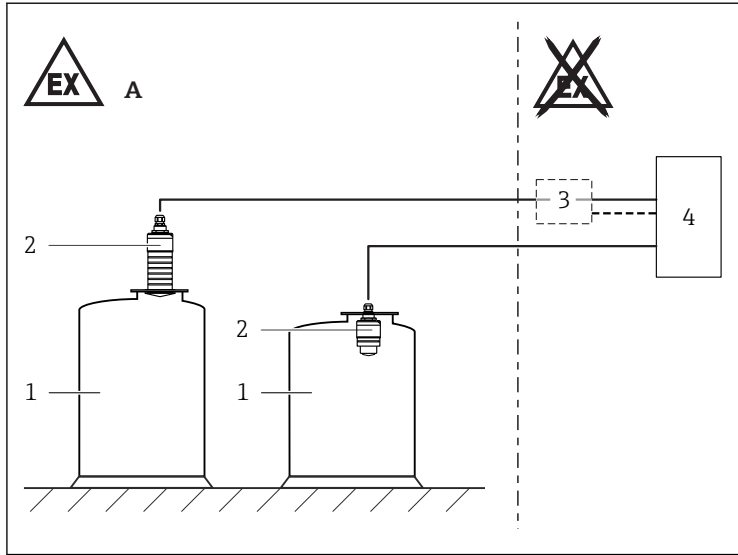
Safety
instructions:
Special conditions

Permitted ambient temperature range at the electronics enclosure:
For temperature classes T4..T1: $-40\text{ °C} \leq T_a \leq +80\text{ °C}$

Permitted process temperature range:
For temperature classes T4..T1: $-40\text{ °C} \leq T_p \leq +80\text{ °C}$

- Avoid electrostatic charging of the enclosure (e.g. friction, cleaning, maintenance, strong medium flow).
- In the case of process connections made of polymeric material or with polymeric coatings, avoid electrostatic charging of the plastic surfaces.
- In the event of additional or alternative special varnishing on the enclosure or other metal parts:
 - Observe the danger of electrostatic charging and discharge.
 - Do not rub surfaces with a dry cloth.

Safety instructions: Installation



A0032043

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- A Zone 0, Zone 1
- 1 Tank; Zone 0, Zone 1
- 2 Micropilot FMR20
- 3 Terminal box (optional)
- 4 Controlling unit

- After aligning (rotating) the enclosure, retighten the fixing screw (see Operating Instructions).
- Install the device to exclude any mechanical damage or friction during the application. Pay particular attention to flow conditions and tank fittings.
- Continuous service temperature of the connecting cable: -40 °C to $\geq +80\text{ °C}$.

Intrinsic safety

- The device is only suitable for connection to certified, intrinsically safe equipment with explosion protection Ex ia / Ex ib.
- The intrinsically safe input power circuit of the device is isolated from ground. If the device is only equipped with one input, the dielectric strength of the input is at least $500 V_{\text{rms}}$. If the device is equipped with more than one input, the dielectric strength of each individual input to ground is at least $500 V_{\text{rms}}$, and the dielectric strength of the inputs vis-à-vis one another is also at least $500 V_{\text{rms}}$.
- Observe the pertinent guidelines when interconnecting intrinsically safe circuits.
- When the device is connected to certified intrinsically safe circuits of Category Ex ib for Equipment Groups IIC and IIB, the type of protection changes to Ex ib IIC and Ex ib IIB. Do not operate the antenna in Zone 0 if connecting to an intrinsically safe circuit of Category Ex ib.
- When the intrinsically safe Ex ia circuits of the device are connected to certified intrinsically safe circuits of Category Ex ib for Equipment Groups IIC or IIB, the type of protection changes to Ex ib [ia] IIC or Ex ib [ia] IIB. Regardless of the power supply, all the internal circuits correspond to Ex ia IIC type of protection (e.g. service interface, external display, sensor).

Connection to Modbus RS485

- Comply with the installation and safety instructions in the Operating Instructions.
- The bus and the devices must be galvanically isolated from each other.

Safety instructions:
Zone 0

- In the event of potentially explosive vapor/air mixtures, only operate the device under atmospheric conditions.
 - Temperature: -40 to $+80$ °C
 - Pressure: 80 to 110 kPa (0.8 to 1.1 bar)
 - Air with normal oxygen content, usually 21 % (V/V)
- If no potentially explosive mixtures are present, or if additional protective measures have been taken, the device may also be operated under non-atmospheric conditions in accordance with the manufacturer's specifications.
- Associated devices with galvanic isolation between the intrinsically safe and non-intrinsically safe circuits are preferred.
- Only use the device in media to which the SilGel 612 EH potting compound of the electronic insert and the enclosure made of PVDF Kynar 720 have sufficient durability.
- If there is a risk of dangerous potential differences within Zone 0 (e.g. through the occurrence of atmospheric electricity), implement suitable measures for intrinsically safe circuits in Zone 0.

Connection data

When using the internal overvoltage protection: No changes to the connection values.

Ex ia

Power supply and signal circuit with protection type: intrinsic safety
Ex ia IIC, Ex ia IIB.

Basic specification, Position 3 = A, P

Cable blue (-), brown (+)

Power supply

$U_i = 30$ V

$I_i = 100$ mA

$P_i = 750$ mW

effective inner inductance $L_i = 35$ μ H

effective inner capacitance $C_i = 15$ nF

Basic specification, Position 3 = R

Cable blue (-), brown (+), white (D0), black (D1)	
Power supply	RS485
$U_i = 30 \text{ V}$	$U_i = U_o = 4.2 \text{ V}$
$I_i = 100 \text{ mA}$	$I_i = 4.8 \text{ A}$
$P_i = 650 \text{ mW}$	$I_o = 149 \text{ mA}$
effective inner inductance $L_i = 20 \text{ } \mu\text{H}$	effective inner inductance $L_i = \text{negligible}$
effective inner capacitance $C_i = 10 \text{ nF}$	effective inner capacitance $C_i = 97 \text{ } \mu\text{F}$
cable inductance $L_{\text{cable}} = 0.8 \text{ } \mu\text{H/m}$	cable inductance $L_{\text{cable}} = 0.8 \text{ } \mu\text{H/m}$
cable capacitance $C_{\text{cable}} = 45 \text{ pF/m}$	cable capacitance $C_{\text{cable}} = 45 \text{ pF/m}$



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