



Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
Components



Services



Solutions

## Safety Instructions

# Micropilot M

## FMR230, FMR231, FMR240

4-20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus

Ex d ia [ia Ga] IIC T1...T6 Ga/Gb

Ex d ia [ia Ga] IIC T1...T6 Gb

NEPSI GYJ12.1380X



**en** - Document: XA00371F-C

Safety instructions for electrical apparatus for explosion-hazardous areas

→ 3

**zh** - 文档: XA00371F-C

爆炸环境中电气仪表的安全指南

→ 9



# Micropilot M

## FMR230, FMR231, FMR240

english

**4-20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus**

### Associated Documentation

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

- HART  
BA00218F/00 (FMR230), BA00219F/00 (FMR231), BA00220F/00 (FMR240)
- PROFIBUS PA  
BA00225F/00 (FMR230), BA00226F/00 (FMR231), BA00227F/00 (FMR240)
- FOUNDATION Fieldbus  
BA00228F/00 (FMR230), BA00229F/00 (FMR231), BA00230F/00 (FMR240)

The Operating Instructions which are supplied and correspond to the device type apply.

### Designation

Explanation of the labelling and type of protection can be found in the explosion protection brochure.

#### Designation of explosion protection/ level of protection

Ex d ia [ia Ga] IIC T1...T6 Ga/Gb  
Ex d ia [ia Ga] IIC T1...T6 Gb

### Applied standards

GB 3836.1-2010  
GB 3836.2-2010  
GB 3836.4-2010  
GB 3836.20-2010

**Safety instructions:  
Special conditions**

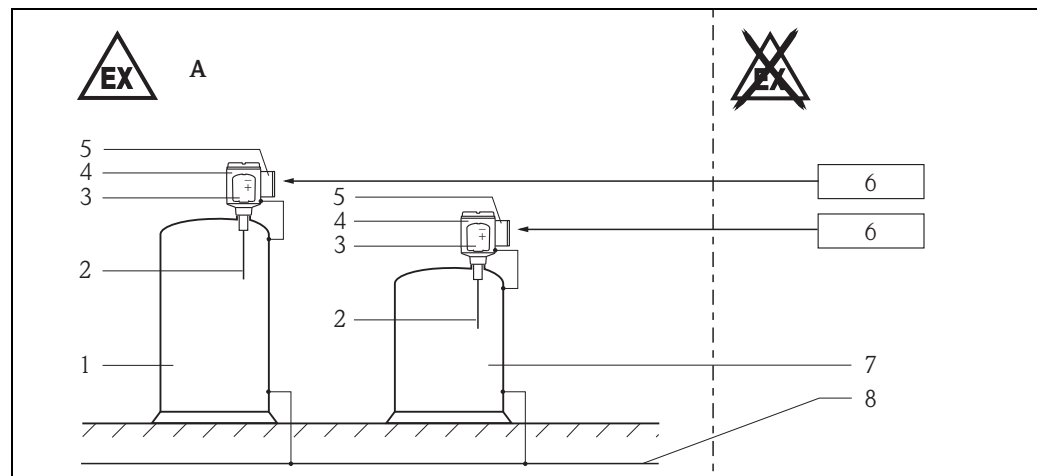
Permitted ambient temperature range at the electronics housing:  $-40\text{ °C} \leq T_a \leq +70\text{ °C}$ .  
Observe the information in the temperature tables.

Antenna versions

FMR230-..E.....	■ Horn antenna, up to 150 °C
FMR230-..V or K.....	■ Horn antenna, up to 200 °C
FMR230-..D.....	■ Horn antenna, up to 250 °C
FMR230-..F.....	■ Horn antenna, up to 350 °C
FMR230-..G.....	■ Horn antenna, up to 400 °C
FMR230-..L.....	■ Horn antenna, up to 280 °C
FMR230-..M.....	■ Horn antenna, up to 400 °C
FMR231-..A or B.....	■ PPS rod antenna, up to 120 °C
FMR231-..H or J.....	■ Antistatic PTFE rod antenna, up to 150 °C
FMR240-.....	■ Horn antenna, up to 150 °C
FMR240-.....	■ Wave guide antenna, up to 200 °C

**Safety instructions:  
Installation**

T12



1

**A Zone 1**

- 1 Tank, hazardous area Zone 0
- 2 Antenna version (→ 4, "Special conditions")
- 3 Electronic insert;  
Electronics compartment (Ex ia)
- 4 Housing :  
– T12 (Aluminium)  
optionally with or without VU331 display and operating module
- 5 Connection compartment (Ex d);  
Note: Do not open the connection compartment cover under voltage in explosive atmospheres.
- 6 Power supply
- 7 Tank, hazardous area Zone 1
- 8 Local potential equalization

- Install the device according to the manufacturer's instructions and any other valid standards and regulations.
- The electrical apparatus must be integrated into the local potential equalisation line. The input circuit is galvanically connected to the housing.
- The external earth connection facility should be connected reliably.
- The relationship between the permitted ambient temperature for the electronics housing, dependent on the range of application and the temperature classes is shown in the tables (→ 6, "Temperature tables").
- After aligning (rotating) the housing, retighten the fixing screw (Allen screw on the threaded neck).
- Connection compartment cover: "Do not open under voltage in explosive atmospheres".
- For operating the transmitter housing at an ambient temperature under  $-20\text{ °C}$ , appropriate cables and cable entries permitted for this application must be used.
- Continuous duty temperature of the cable  $\geq T_a + 5\text{ K}$ .
- Connect the device using suitable cable and wire entries or using piping systems of protection type "Pressure-tight Enclosure d".  
(Complying with the stipulations of the Ex d IIC class of the standards GB3836.1/2-2010.)
- When connecting the transmitter housing via piping entries permitted for this purpose, the associated seal mechanisms must be arranged directly at the housing.
- Close unused entry glands with approved (Ex d) sealing plugs.
- If antenna extensions over 3 m-long are used, they should be fixed mechanically (using guy ropes).
- In case of additional or alternative special varnishing of the enclosure or other metallic parts the danger of an electrostatic charging must be observed. Do not rub surfaces with dry cloth.

FMR240 or FMR230 with shut-off mechanism

- The entire arrangement must at least meet the national requirements.  
If the device needs to be disassembled for e.g. service purposes, we recommend securing the shut-off mechanism against opening or closing it with an additional blind flange. The operator is entirely responsible for ensuring that the complete arrangement is permissible for the respective application.

**Safety instructions:**  
**Zone 0**

- Only operate devices in potentially explosive vapour/air mixtures under atmospheric conditions (→ 6, "Zone 0 - Application"):  
 $-20\text{ °C} \leq T \leq +60\text{ °C}$   
 $0.8\text{ bar} \leq p \leq 1.1\text{ bar}$
- If no potentially explosive mixtures are present, the transmitters may be operated under other atmospheric conditions in accordance with the manufacturer's specifications.
- Only install the devices in media for which the wetted materials have sufficient durability.
- For installation, use and maintenance of the device, users must also observe the requirements stated in the Operating Instructions and the standards:
  - GB50257-1996: "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering".
  - GB3836.13-1997: "Electrical apparatus for explosive gas atmospheres, Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres".
  - GB3836.15-2000: "Electrical apparatus for explosive gas atmospheres, Part 15: Electrical installations in hazardous area (other than mines)".
  - GB3836.16-2006: "Electrical apparatus for explosive gas atmospheres, Part 16: Inspection and maintenance of electrical installation (other than mines)".

**Temperature tables**

Note: Observe the permitted antenna temperature range.

\*1 = Functional

limited by maximum permitted antenna temperature

**Zone 1 - Application**

	Temperature class	Max. permitted medium temperature (Antenna in Zone 1)	Maximum permitted ambient temperature at the electronics housing (in Zone 1) dependent on the medium temperature						
			FMR230- ..E or V or K or D.....	FMR230- ..L.....	FMR230- ..M.....	FMR230- ..F or G.....	FMR231- .....	FMR240- .....	FMR240- Wave guide antenna
HART, PROFIBUS PA	T6	+ 70 °C + 60 °C	+55 °C	+60 °C	+60 °C	+60 °C	+55 °C	+55 °C	+60 °C
FOUNDATION Fieldbus			+60 °C	+60 °C	+60 °C	+60 °C	+60 °C	+60 °C	+60 °C
HART, PROFIBUS PA	T5	+ 95 °C + 70 °C	+50 °C	+55 °C	+55 °C	+55 °C	+50 °C	+50 °C	+55 °C
FOUNDATION Fieldbus			+55 °C	+55 °C	+55 °C	+55 °C	+55 °C	+55 °C	+55 °C
HART, PROFIBUS PA	T4	+130 °C + 70 °C	+65 °C	+65 °C	+65 °C	+65 °C	+65 °C	+65 °C	+65 °C
FOUNDATION Fieldbus			+70 °C	+70 °C	+70 °C	+70 °C	+70 °C	+70 °C	+70 °C
HART, PROFIBUS PA + FOUNDATION Fieldbus	T3 *1	+150 °C + 70 °C	+60 °C	+65 °C	+65 °C	+60 °C	+55 °C	+60 °C	+65 °C
HART, PROFIBUS PA + FOUNDATION Fieldbus	T3	+195 °C + 70 °C	+70 °C	+70 °C	+70 °C	+70 °C	not permitted	not permitted	+65 °C +70 °C
HART, PROFIBUS PA + FOUNDATION Fieldbus	T2 *1	+250 °C + 70 °C	+50 °C	+60 °C	+65 °C	+55 °C	not permitted	not permitted	not permitted
HART, PROFIBUS PA + FOUNDATION Fieldbus	T2 *1	+280 °C + 70 °C	not permitted	+60 °C	+65 °C	+55 °C	not permitted	not permitted	not permitted
HART, PROFIBUS PA + FOUNDATION Fieldbus	T2	+290 °C + 70 °C	not permitted	not permitted	+65 °C	+55 °C	not permitted	not permitted	not permitted
HART, PROFIBUS PA + FOUNDATION Fieldbus	T1 *1	+350 °C + 70 °C	not permitted	not permitted	+60 °C	+50 °C	not permitted	not permitted	not permitted
HART, PROFIBUS PA + FOUNDATION Fieldbus	T1 *1	+400 °C + 70 °C	not permitted	not permitted	+60 °C	+45 °C	not permitted	not permitted	not permitted

**Zone 0 - Application**

	Temperature class	Max. permitted medium temperature (Antenna in Zone 0)	Maximum permitted ambient temperature at the electronics housing (in Zone 1) dependent on the medium temperature		
			FMR230	FMR231	FMR240
HART, PROFIBUS PA	T6	+60 °C	+60 °C	+60 °C	+60 °C
	T5...T1	+60 °C	+70 °C	+70 °C	+70 °C

	Temperature class	Max. permitted medium temperature (Antenna in Zone 0)	Maximum permitted ambient temperature at the electronics housing (in Zone 1) dependent on the medium temperature		
			FMR230	FMR231	FMR240
FOUNDATION Fieldbus	T6	+60 °C	+55 °C	+55 °C	+55 °C
	T5...T1	+60 °C	+70 °C	+70 °C	+70 °C

**Connection data****Connection compartment Ex d****Power supply:** $U_e \leq 30 \text{ V}$  $U_m \leq 250 \text{ V AC}$ 

Note: Do not open the connection compartment cover under voltage in explosive atmospheres.





# Micropilot M

## FMR230, FMR231, FMR240

4-20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus  
(基金会现场总线)

### 相关资料

本文档是下列操作手册的组成部分：

- HART  
BA00218F/00 (FMR230), BA00219F/00 (FMR231), BA00220F/00 (FMR240)
- PROFIBUS PA  
BA00225F/00 (FMR230), BA00226F/00 (FMR231), BA00227F/00 (FMR240)
- FOUNDATION Fieldbus (基金会现场总线)  
BA00228F/00 (FMR230), BA00229F/00 (FMR231), BA00230F/00 (FMR240)

根据用户订购仪表的具体型号所提供的相应操作手册。

### 名称

防爆标志和防护类型说明请查询防爆手册。

防爆代号 / 防护级别

Ex d ia [ia Ga] IIC T1...T6 Ga/Gb  
Ex d ia [ia Ga] IIC T1...T6 Gb

### 适用标准

GB 3836.1-2010  
GB 3836.2-2010  
GB 3836.4-2010  
GB 3836.20-2010

## 安全指南：特殊条件

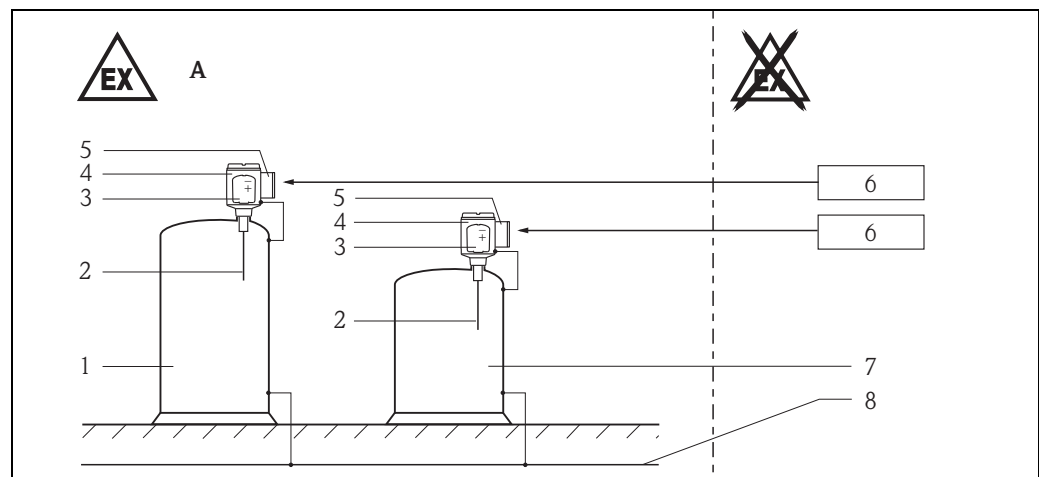
电子部件外壳处的允许环境温度范围： $-40\text{ °C} \leq T_a \leq +70\text{ °C}$ 。  
遵守温度表中的信息。

天线型号

FMR230-..E.....	■ 喇叭形天线，最高达 150 °C
FMR230-..V 或 K.....	■ 喇叭形天线，最高达 200 °C
FMR230-..D.....	■ 喇叭形天线，最高达 250 °C
FMR230-..F.....	■ 喇叭形天线，最高达 350 °C
FMR230-..G.....	■ 喇叭形天线，最高达 400 °C
FMR230-..L.....	■ 喇叭形天线，最高达 280 °C
FMR230-..M.....	■ 喇叭形天线，最高达 400 °C
FMR231-A 或 B.....	■ PPS 杆型天线，最高达 120 °C
FMR231-H 或 J.....	■ 防静电 PTFE 杆型天线，最高达 150 °C
FMR240-.....	■ 喇叭形天线，最高达 150 °C
FMR240-.....	■ 导波管天线，最高达 200 °C

## 安全指南：安装

T12



1

**A** 区域 1

- 1 液罐，危险区，区域 0
- 2 天线型号 (→ 10, “特殊条件”)
- 3 电子插件：  
电子接线柜 (Ex ia)
- 4 外壳：  
- T12 (铝)  
可选带有或不带有 VU331 显示屏和操作模块
- 5 接线柜 (Ex d)；  
注意：请勿在爆炸性空气环境中带电压开启接线柜。
- 6 电源
- 7 液罐，危险区，区域 1
- 8 本地电势均衡

- 按照制造商的说明及其它有效标准和规定来安装设备。
- 必须将电气仪器集成连接于本地等电势线上。输入电路与外壳进行电气连接。
- 外部接地连接部件应可靠连接。
- 电子部件外壳的允许环境温度 (取决于应用范围) 与温度等级之间的关系如表所示 (→ 图 12, “温度表”)。
- 在对齐 (旋转) 外壳后, 重新拧紧固定螺丝 (带螺纹螺栓颈上的内六角螺丝)。
- 接线柜盖: “请勿在爆炸性空气中带电压打开盖子”。
- 要使变频器外壳在低于  $-20^{\circ}\text{C}$  的环境温度下工作, 必须使用允许用于该应用条件的适当电缆和电缆引入装置。
- 电缆持续工作温度  $\geq T_a + 5\text{ K}$ 。
- 使用合适的电缆和电线引入装置, 或使用防护类型为“耐压密封外壳 d”的管路系统连接设备。(遵守 GB3836.1/2-2010 标准的 Ex d IIC 类的规定。)
- 当使用允许用于此用途的管路入口连接变频器外壳时, 则必须直接在外壳处配置相关的密封机械装置。
- 请用通过防爆认证 (Ex d) 的密封塞密封未使用的电缆引入接头。
- 如果使用超过 3 米长的天线延伸件, 则必须使用机械方式固定 (使用牵索)。
- 如果护罩或其它金属部件需要额外涂漆或其它特殊的涂漆, 则必须注意静电危险。请勿用干布擦拭表面。

带闭锁机械装置的 FMR240 或 FMR230

- 所有装置必须至少符合国家要求。  
如果设备需要拆卸, 如出于维护目的等, 则建议固定闭锁机械装置以避免打开, 或者用附加的盲板将其闭合。操作员应确保整个装置可用于各种应用, 并对此负全责。

#### 安全指南: 区域 0

- 只有在下列大气条件下才能在有爆炸可能的蒸汽 / 空气混合物中操作设备 (→ 图 12, “区域 0 - 应用”):  
 $-20^{\circ}\text{C} \leq T \leq +60^{\circ}\text{C}$   
 $0.8\text{ bar} \leq p \leq 1.1\text{ bar}$
- 如果不存在可能爆炸的混合物, 则变频器可在符合制造商技术规范的其他大气条件下运行。
- 只有当介质的防潮材料具备足够的耐用性时, 才可把设备安装于介质中。
- 在安装、使用和维护设备时, 用户必须遵守操作手册和下列标准中规定的要求:
  - GB50257-1996: “电气装置安装工程 爆炸和火灾危险环境电气装置施工及验收规范”。
  - GB3836.13-1997: “爆炸性气体环境用电气设备 第 13 部分: 爆炸性气体环境用电气设备的检修”。
  - GB3836.15-2000: “爆炸性气体环境用电气设备 第 15 部分: 危险场所电气安装 (煤矿除外)”。
  - GB3836.16-2006: “爆炸性气体环境用电气设备 第 16 部分: 电气装置的检查和维护 (煤矿除外)”。

## 温度表

注意：遵循允许的天线温度范围。

\*1 = 功能型

受限于允许的最大天线温度

## 区域 1 - 应用

	温度组别	最大允许的介质温度 (天线在区域 1 中)	电子部件外壳 (区域 1) 处的最大允许温度取决于输入温度						
			FMR230- ..E 或 V 或 K 或 D.....	FMR230- ..L.....	FMR230- ..M.....	FMR230- ..F 或 G.....	FMR231- .....	FMR240- .....	FMR240 导波管 天线
HART, PROFIBUS PA	T6	+ 70 °C + 60 °C	+55 °C	+60 °C	+60 °C	+60 °C	+55 °C	+55 °C	+60 °C
FOUNDATION Fieldbus (基金会现场总线)			+60 °C	+60 °C	+60 °C	+60 °C	+60 °C	+60 °C	+60 °C
HART, PROFIBUS PA	T5	+ 95 °C + 70 °C	+65 °C	+65 °C	+65 °C	+65 °C	+65 °C	+65 °C	+65 °C
FOUNDATION Fieldbus (基金会现场总线)			+70 °C	+70 °C	+70 °C	+70 °C	+70 °C	+70 °C	+70 °C
HART, PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T4	+130 °C + 70 °C	+60 °C	+65 °C	+65 °C	+65 °C	+55 °C	+60 °C	+65 °C
HART, PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T3 *1	+150 °C + 70 °C	+60 °C	+65 °C	+65 °C	+60 °C	+55 °C	+60 °C	+65 °C
HART, PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T3	+195 °C + 70 °C	+55 °C	+65 °C	+65 °C	+60 °C	不允许	不允许	+65 °C +70 °C
HART, PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T2 *1	+250 °C + 70 °C	+50 °C	+60 °C	+65 °C	+55 °C	不允许	不允许	不允许
HART, PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T2 *1	+280 °C + 70 °C	不允许	+60 °C	+65 °C	+55 °C	不允许	不允许	不允许
HART, PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T2	+290 °C + 70 °C	不允许	不允许	+65 °C	+55 °C	不允许	不允许	不允许
HART, PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T1 *1	+350 °C + 70 °C	不允许	不允许	+60 °C	+50 °C	不允许	不允许	不允许
HART, PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T1 *1	+400 °C + 70 °C	不允许	不允许	+60 °C	+45 °C	不允许	不允许	不允许

## 区域 0 - 应用

	温度组别	最大允许的介质温度 (天线在区域 0 中)	电子部件外壳 (区域 1) 处的最大允许温度取决于输入温度		
			FMR230	FMR231	FMR240
HART, PROFIBUS PA	T6	+60 °C	+60 °C	+60 °C	+60 °C
	T5...T1	+60 °C	+70 °C	+70 °C	+70 °C

	温度组别	最大允许的介质温度 (天线在区域 0 中)	电子部件外壳 (区域 1) 处的最大允许温度取决于输入温度		
			FMR230	FMR231	FMR240
FOUNDATION Fieldbus (基金会现场总线)	T6	+60 °C	+55 °C	+55 °C	+55 °C
	T5...T1	+60 °C	+70 °C	+70 °C	+70 °C

## 连接数据

## 接线柜 Ex d

## 电源：

 $U_e \leq 30 \text{ V}$  $U_m \leq 250 \text{ V AC}$ 

注意：请勿在爆炸性空气环境中带电压开启接线柜。





[www.endress.com/worldwide](http://www.endress.com/worldwide)

---

**Endress + Hauser**   
People for Process Automation

---

XA00371F-C/00/B2/13.12  
71197084  
CCS/FM 9.0

