



Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
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## Safety Instructions

# Micropilot M

## FMR230, FMR231, FMR244, FMR245

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: XA00374F-D

Safety instructions for electrical apparatus for explosion-hazardous areas

→ 3

**zh** - 文档: XA00374F-D

爆炸环境中电气仪表的安全指南

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# Micropilot M

## FMR230, FMR231, FMR244, FMR245

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), BA00248F/00 (FMR244), BA00251F/00 (FMR245)
- PROFIBUS PA  
BA00225F/00 (FMR230), BA00226F/00 (FMR231), BA00249F/00 (FMR244), BA00252F/00 (FMR245)
- FOUNDATION Fieldbus  
BA00228F/00 (FMR230), BA00229F/00 (FMR231), BA00250F/00 (FMR244), BA00253F/00 (FMR245)

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.

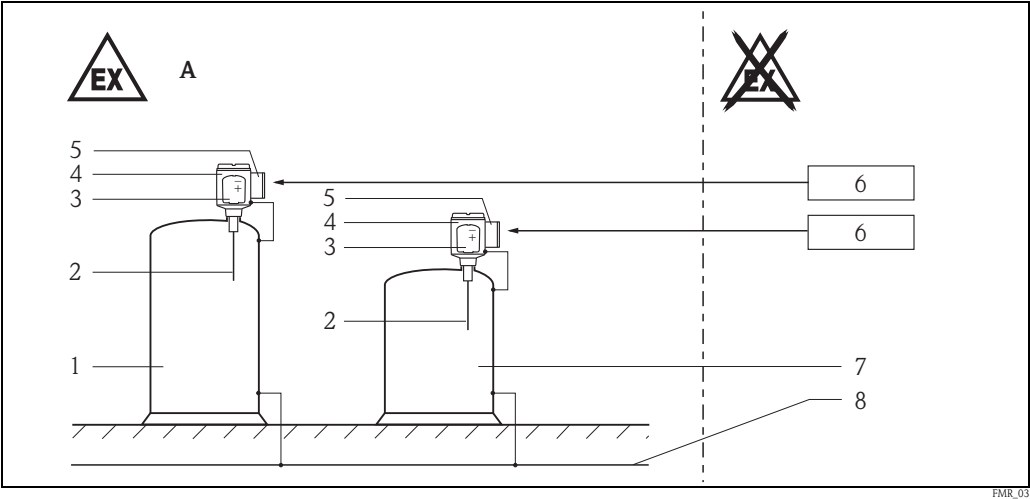
- The antenna contain surfaces, which can become electrostatically charged. For this reason, these antenna must not be arranged such that they can become dangerously charged from a flowing medium (e.g. filling curtain).  
Avoid electrostatic charging of the antenna (e.g. do not rub dry).

Antenna versions

|                           |                                                                                                                                                               |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FMR230-..H.....           | ■ Horn antenna (enamelled), up to 200 °C                                                                                                                      |
| FMR231-..E or F.....      | ■ PTFE rod antenna, up to 150 °C<br>■ Rod antenna (PTFE) with sanitary connection, up to 150 °C<br>■ Rod antenna (PTFE) threaded connection PVDF, up to 80 °C |
| FMR244-.....              | ■ Antenna with high chem. resistance, up to 130 °C                                                                                                            |
| FMR244-..A....            | ■ Antenna (PP), plated, up to 80 °C                                                                                                                           |
| FMR245-.....              | ■ Antenna with high chem. resistance, easy to clean, up to 150 °C                                                                                             |
| FMR245-..B or C or F or G | ■ Antenna with high chem. resistance, easy to clean, up to 200 °C                                                                                             |

Safety instructions:  
Installation

T12



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- 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.

**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.

\*<sup>1</sup> = Functional

limited by maximum permitted antenna temperature

**Zone 1 - Application**

|                                            | Temperature class | Max. permitted medium temperature<br>(Antenna in Zone 1) | Maximum permitted ambient temperature at the electronics housing<br>(in Zone 1) dependent on the medium temperature |                  |                  |                  |
|--------------------------------------------|-------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|------------------|------------------|------------------|
|                                            |                   |                                                          | FMR230                                                                                                              | FMR231           | FMR244           | FMR245           |
| HART, PROFIBUS PA                          | T6                | + 70 °C<br>+ 60 °C                                       | +55 °C<br>+60 °C                                                                                                    | +55 °C<br>+60 °C | +55 °C<br>+60 °C | +55 °C<br>+60 °C |
| FOUNDATION Fieldbus                        |                   |                                                          | +50 °C<br>+55 °C                                                                                                    | +50 °C<br>+55 °C | +50 °C<br>+55 °C | +50 °C<br>+55 °C |
| HART, PROFIBUS PA                          | T5                | + 95 °C<br>+ 70 °C                                       | +65 °C<br>+70 °C                                                                                                    | +65 °C<br>+70 °C | +65 °C<br>+70 °C | +65 °C<br>+70 °C |
| FOUNDATION Fieldbus                        |                   |                                                          | +60 °C<br>+70 °C                                                                                                    | +60 °C<br>+70 °C | +60 °C<br>+70 °C | +60 °C<br>+70 °C |
| HART, PROFIBUS PA +<br>FOUNDATION Fieldbus | T4                | +130 °C<br>+ 70 °C                                       | +60 °C<br>+70 °C                                                                                                    | +55 °C<br>+70 °C | +60 °C<br>+70 °C | +60 °C<br>+70 °C |
| HART, PROFIBUS PA +<br>FOUNDATION Fieldbus | T3 * <sup>1</sup> | +150 °C<br>+ 70 °C                                       | +60 °C<br>+70 °C                                                                                                    | +55 °C<br>+70 °C | not permitted    | +60 °C<br>+70 °C |
| HART, PROFIBUS PA +<br>FOUNDATION Fieldbus | T3                | +195 °C<br>+ 70 °C                                       | +55 °C<br>+70 °C                                                                                                    | not permitted    | not permitted    | +55 °C<br>+70 °C |
| HART, PROFIBUS PA +<br>FOUNDATION Fieldbus | T2 * <sup>1</sup> | +250 °C<br>+ 70 °C                                       | +50 °C<br>+70 °C                                                                                                    | not permitted    | not permitted    | not permitted    |

**Zone 0 - Application**

|                   | Temperature class | Max. permitted medium temperature<br>(Antenna in Zone 0) | Maximum permitted ambient temperature at the electronics housing<br>(in Zone 1) dependent on the medium temperature |        |        |        |
|-------------------|-------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|--------|--------|--------|
|                   |                   |                                                          | FMR230                                                                                                              | FMR231 | FMR244 | FMR245 |
| HART, PROFIBUS PA | T6                | +60 °C                                                   | +60 °C                                                                                                              | +60 °C | +60 °C | +60 °C |
|                   | T5...T1           | +60 °C                                                   | +70 °C                                                                                                              | +70 °C | +70 °C | +70 °C |

|                     | Temperature class | Max. permitted medium temperature<br>(Antenna in Zone 0) | Maximum permitted ambient temperature at the electronics housing<br>(in Zone 1) dependent on the medium temperature |        |        |        |
|---------------------|-------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|--------|--------|--------|
|                     |                   |                                                          | FMR230                                                                                                              | FMR231 | FMR244 | FMR245 |
| FOUNDATION Fieldbus | T6                | +60 °C                                                   | +55 °C                                                                                                              | +55 °C | +55 °C | +55 °C |
|                     | T5...T1           | +60 °C                                                   | +70 °C                                                                                                              | +70 °C | +70 °C | +70 °C |

**Connection data****Connection compartment Ex d**

| Power supply:                                      |
|----------------------------------------------------|
| U <sub>e</sub> ≤ 30 V<br>U <sub>m</sub> ≤ 250 V AC |

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



# Micropilot M

## FMR230, FMR231, FMR244, FMR245

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), BA00248F/00 (FMR244), BA00251F/00 (FMR245)
- PROFIBUS PA  
BA00225F/00 (FMR230), BA00226F/00 (FMR231), BA00249F/00 (FMR244), BA00252F/00 (FMR245)
- FOUNDATION Fieldbus (基金会现场总线)  
BA00228F/00 (FMR230), BA00229F/00 (FMR231), BA00250F/00 (FMR244), BA00253F/00 (FMR245)

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。

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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： $-40\text{ }^{\circ}\text{C} \leq T_a \leq +70\text{ }^{\circ}\text{C}$ 。  
遵守温度表中的信息。

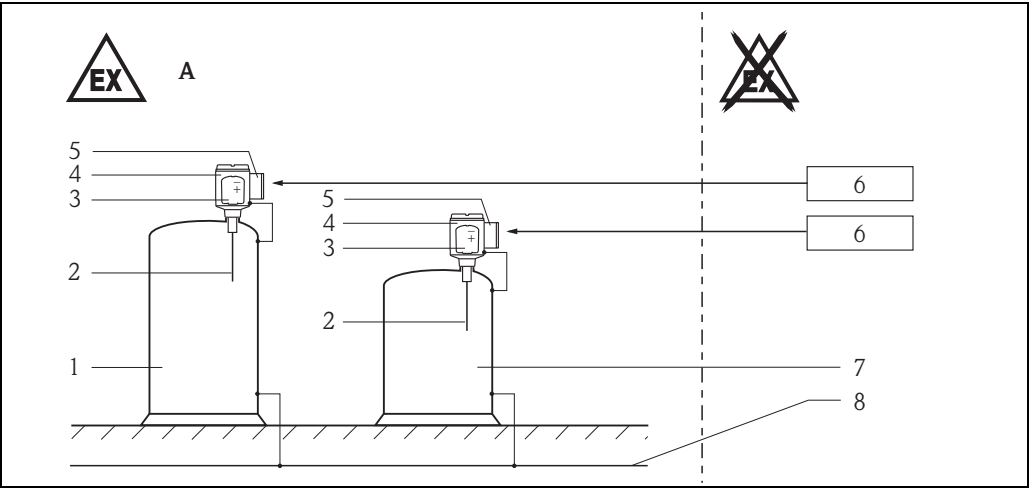
■ 天线的某些表面可能会有静电积聚。因此，布置天线时应避免天线因流体介质 (例如填料板) 而积聚电荷，这会带来危险。  
请避免天线积聚静电 (如不要干擦)。

天线型号

|                       |                                                                                                 |
|-----------------------|-------------------------------------------------------------------------------------------------|
| FMR230-..H.....       | ■ 喇叭形天线 (搪瓷)，最高达 200 °C                                                                         |
| FMR231-.E 或 F.....    | ■ PTFE 杆型天线，最高达 150 °C<br>■ 带清洁连接的杆型天线 (PTFE)，最高达 150 °C<br>■ 带螺纹连接 PVDF 的杆型天线 (PTFE)，最高达 80 °C |
| FMR244-.....          | ■ 具有高度抗化性的天线，最高达 130 °C                                                                         |
| FMR244-.4....         | ■ PP 电镀天线，最高达 80 °C                                                                             |
| FMR245-.....          | ■ 具有高度抗化性的天线，易于清洁，最高达 150 °C                                                                    |
| FMR245-.B 或 C 或 F 或 G | ■ 具有高度抗化性的天线，易于清洁，最高达 200 °C                                                                    |

安全指南：安装

T12



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- A**    区域 1
- 1    液罐，危险区，区域 0
- 2    天线型号 (→ 8, “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 10, “ 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 ”。
- 要使变送器外壳在低于 -20 °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送器外壳时, 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。

#### 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 10, “ 区域 0 - 应用 ” ):
  - 20 °C  $\leq T \leq$  +60 °C
  - 0.8 bar  $\leq p \leq$  1.1 bar
- 如果不存在可能爆炸的混合物, 则变送器可在符合制造商技术规范的有关大气条件下运行。
- 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修 ( 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<br>( 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                          | FMR231           | FMR244           | FMR245           |
| HART, PROFIBUS PA                                         | T6    | + 70 °C<br>+ 60 °C         | +55 °C<br>+60 °C                | +55 °C<br>+60 °C | +55 °C<br>+60 °C | +55 °C<br>+60 °C |
| FOUNDATION Fieldbus<br>( 基金会现场总线 )                        |       |                            | +50 °C<br>+55 °C                | +50 °C<br>+55 °C | +50 °C<br>+55 °C | +50 °C<br>+55 °C |
| HART, PROFIBUS PA                                         | T5    | + 95 °C<br>+ 70 °C         | +65 °C<br>+70 °C                | +65 °C<br>+70 °C | +65 °C<br>+70 °C | +65 °C<br>+70 °C |
| FOUNDATION Fieldbus<br>( 基金会现场总线 )                        |       |                            | +60 °C<br>+70 °C                | +60 °C<br>+70 °C | +60 °C<br>+70 °C | +60 °C<br>+70 °C |
| HART, PROFIBUS PA +<br>FOUNDATION Fieldbus<br>( 基金会现场总线 ) | T4    | +130 °C<br>+ 70 °C         | +60 °C<br>+70 °C                | +55 °C<br>+70 °C | +60 °C<br>+70 °C | +60 °C<br>+70 °C |
| HART, PROFIBUS PA +<br>FOUNDATION Fieldbus<br>( 基金会现场总线 ) | T3 *1 | +150 °C<br>+ 70 °C         | +60 °C<br>+70 °C                | +55 °C<br>+70 °C | 不允许              | +60 °C<br>+70 °C |
| HART, PROFIBUS PA +<br>FOUNDATION Fieldbus<br>( 基金会现场总线 ) | T3    | +195 °C<br>+ 70 °C         | +55 °C<br>+70 °C                | 不允许              | 不允许              | +55 °C<br>+70 °C |
| HART, PROFIBUS PA +<br>FOUNDATION Fieldbus<br>( 基金会现场总线 ) | T2 *1 | +250 °C<br>+ 70 °C         | +50 °C<br>+70 °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<br>( 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 | FMR244 | FMR245 |
| HART, PROFIBUS PA | T6      | +60 °C                     | +60 °C                          | +60 °C | +60 °C | +60 °C |
|                   | T5...T1 | +60 °C                     | +70 °C                          | +70 °C | +70 °C | +70 °C |

|                                    | 温度组别    | 最大允许的介质温度<br>( 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 | FMR244 | FMR245 |
| FOUNDATION Fieldbus<br>( 基金会现场总线 ) | T6      | +60 °C                     | +55 °C                          | +55 °C | +55 °C | +55 °C |
|                                    | T5...T1 | +60 °C                     | +70 °C                          | +70 °C | +70 °C | +70 °C |

连接数据

接线柜 Ex d

|                            |
|----------------------------|
| 电源：                        |
| Ue ≤ 30 V<br>Um ≤ 250 V AC |

注意：请勿在爆炸性空气环境中带电压开启接线柜。



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