



Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
Components



Services



Solutions

Safety Instructions

# Micropilot M

## FMR230, FMR231, FMR240

PROFIBUS PA, FOUNDATION Fieldbus

Ex ia IIC T1...T6 Ga/Gb

Ex ia IIC T1...T6 Gb

NEPSI GYJ12.1379X



**en** - Document: XA00373F-C

Safety instructions for electrical apparatus for explosion-hazardous areas

→ 3

**zh** - 文档: XA00373F-C

爆炸环境中电气仪表的安全指南

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# Micropilot M

## FMR230, FMR231, FMR240

english

### PROFIBUS PA, FOUNDATION Fieldbus

#### Associated Documentation

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

- 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 ia IIC T1...T6 Ga/Gb  
Ex ia IIC T1...T6 Gb

#### Applied standards

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

**Safety instructions:  
Special conditions**

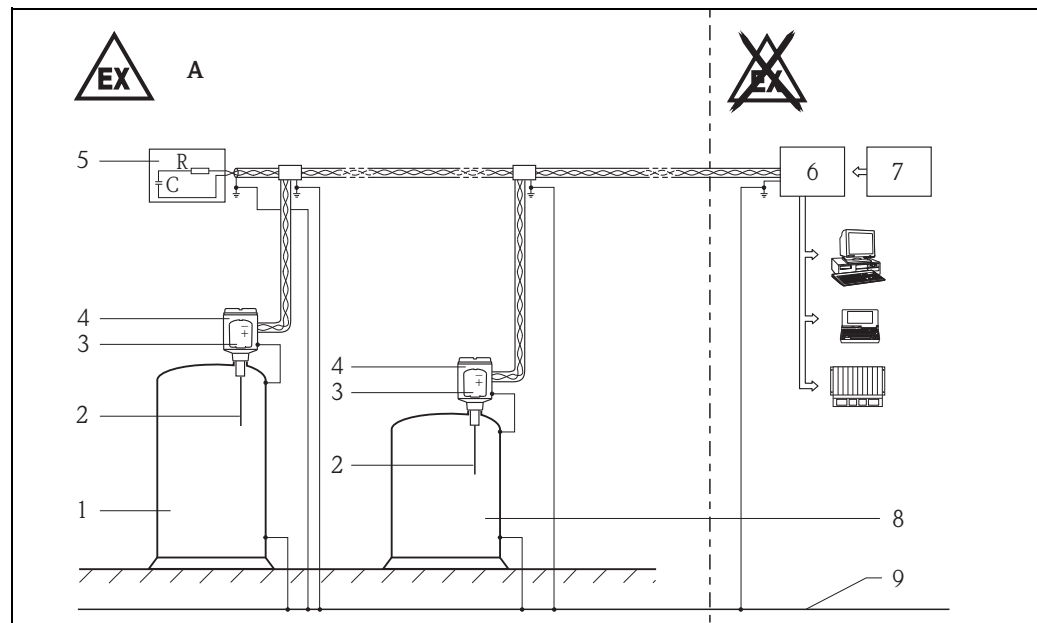
Permitted ambient temperature range at the electronics housing:  $-40\text{ °C} \leq T_a \leq +80\text{ °C}$ .  
Observe the information in the temperature tables.

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**

F12, F23

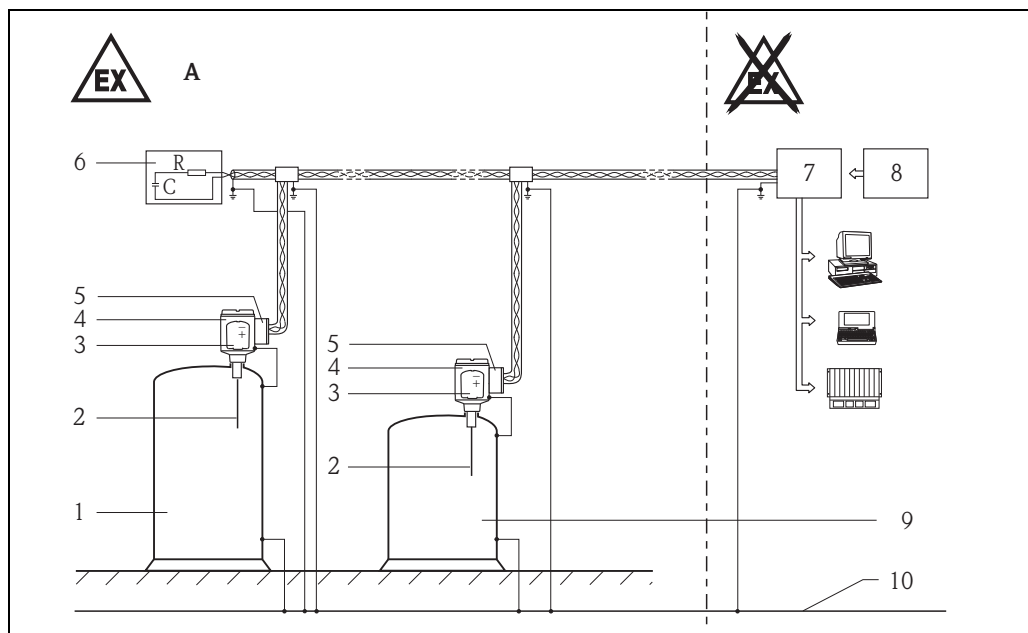


1

**A Zone 1**

- 1 Tank, hazardous area Zone 0
- 2 Antenna version (→ 4, "Special conditions")
- 3 Electronic insert
- 4 Housing:
  - F12 (Aluminium)
  - F23 (316L)
 optionally with remote display, e.g. FHX40;  
 optionally with or without VU331 display and operating module
- 5 Permitted terminating resistor Ex ia IIC
- 6 Certified associated apparatus (FISCO model)
- 7 Power supply
- 8 Tank, hazardous area Zone 1
- 9 Potential equalization

T12-OVP



2

**A** Zone 1

- 1 Tank, hazardous area Zone 0
- 2 Antenna version (→ 4, "Special conditions")
- 3 Electronic insert
- 4 Housing:  
– T12-OVP (Aluminium)  
optionally with or without VU331 display and operating module
- 5 Terminal module with integrated overvoltage protector
- 6 Permitted terminating resistor Ex ia IIC
- 7 Certified associated apparatus (FISCO model)
- 8 Power supply
- 9 Tank, hazardous area Zone 1
- 10 Potential equalization

- Install the device according to the manufacturer's instructions and any other valid standards and regulations.
- 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 (→ 7, "Temperature tables").
- After aligning (rotating) the housing, retighten the fixing screw (Allen screw on the threaded neck).
- Continuous duty temperature of the cable  $\geq T_a + 5$  K.
- If antenna extensions over 3 m-long are used, they should be fixed mechanically (using guy ropes).
- The housing of transmitter is equipped with a ground terminal; users must ensure that it is reliably connected to ground during installation and use.
- 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.


F12, F23

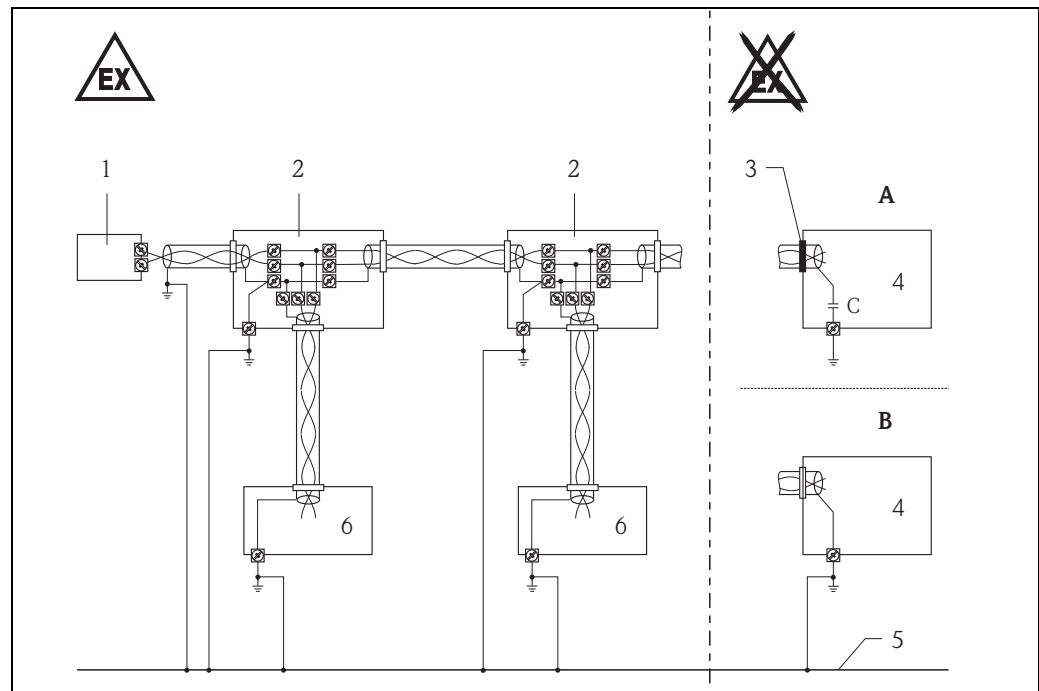
- The intrinsically safe input power circuit of the device is isolated from ground potential and has a dielectric strength of at least  $500 V_{rms}$  with respect to it.

T12-OVP

- The intrinsically safe input power circuit of the device is isolated from ground potential and has a dielectric strength of at least  $290 V_{rms}$  with respect to it.

### Potential equalization

- For earthing the screen →  3.



FM1U4x\_05

 3

#### A Version 1

Use small capacitors (e.g. 1 nF, 1500 V, dielectric strength, ceramic).  
Total capacitance connected to the screen may not exceed 10 nF.

#### B Version 2

- 1 Terminating resistor
- 2 Distributor/T box
- 3 Screen insulated
- 4 Supply unit/Segment coupler
- 5 Potential equalization (secured in high degree)
- 6 Field device

### Overvoltage protection


F12, F23

- On installations requiring overvoltage protection to comply with national regulations or standards, this device shall be installed using an overvoltage protector.

T12-OVP

- The integrated overvoltage protector meets the requirements as per IEC/EN 60079-14, Section 12.3.

### Safety instructions: Zone 0

- Only operate devices in potentially explosive vapour/air mixtures under atmospheric conditions (→ , "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.
- Associated apparatus with galvanic isolation between the intrinsically safe and non-intrinsically safe circuits are preferred.

- 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)".

**Safety instructions:  
Zone 1**

- When the device is connected to an intrinsically safe circuit Ex ib, the level of protection changes to Ex ib. Do not operate intrinsically safe circuits Ex ib in zone 0.

**Temperature tables**

Note: Observe the permitted antenna temperature range.

\*1 = Functional limited by maximum permitted antenna temperature

**Zone 1 - Application**

F12

	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 D.....	FMR230- ..L.....	FMR230- ..M.....	FMR230- ..F or G.....	FMR231- .....	FMR240- .....	FMR240- Wave guide antenna	
PROFIBUS PA	T6	+ 80 °C + 60 °C	+55 °C	+60 °C	+60 °C	+60 °C	+55 °C	+60 °C	+60 °C	
FOUNDATION Fieldbus			+60 °C	+60 °C	+60 °C	+60 °C	+60 °C	+60 °C	+60 °C	
PROFIBUS PA	T5	+ 95 °C + 75 °C	+50 °C	+55 °C	+55 °C	+55 °C	+50 °C	+55 °C	+55 °C	
FOUNDATION Fieldbus			+55 °C	+55 °C	+55 °C	+55 °C	+55 °C	+55 °C	+55 °C	
PROFIBUS PA	T5	+ 95 °C + 75 °C	+70 °C	+75 °C	+75 °C	+75 °C	+70 °C	+75 °C	+75 °C	
FOUNDATION Fieldbus			+75 °C	+75 °C	+75 °C	+75 °C	+75 °C	+75 °C	+75 °C	
PROFIBUS PA + FOUNDATION Fieldbus	T4	+130 °C + 80 °C	+70 °C	+75 °C	+75 °C	+75 °C	+65 °C	+70 °C	+75 °C	
PROFIBUS PA + FOUNDATION Fieldbus	T3 *1	+150 °C + 80 °C	+70 °C	+70 °C	+75 °C	+70 °C	+55 °C	+65 °C	+75 °C	
PROFIBUS PA + FOUNDATION Fieldbus	T3	+195 °C + 80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	
PROFIBUS PA + FOUNDATION Fieldbus	T3	+195 °C + 80 °C	+60 °C	+70 °C	+75 °C	+70 °C	+80 °C	not permitted	not permitted	+75 °C +80 °C
PROFIBUS PA + FOUNDATION Fieldbus	T2 *1	+250 °C + 80 °C	+55 °C	+70 °C	+70 °C	+65 °C	+80 °C	not permitted	not permitted	not permitted
PROFIBUS PA + FOUNDATION Fieldbus	T2 *1	+280 °C + 80 °C	not permitted	+65 °C	+70 °C	+65 °C	+80 °C	not permitted	not permitted	not permitted
PROFIBUS PA + FOUNDATION Fieldbus	T2	+290 °C + 80 °C	not permitted	not permitted	+70 °C	+65 °C	+80 °C	not permitted	not permitted	not permitted
PROFIBUS PA + FOUNDATION Fieldbus	T1 *1	+350 °C + 80 °C	not permitted	not permitted	+70 °C	+60 °C	+80 °C	not permitted	not permitted	not permitted
PROFIBUS PA + FOUNDATION Fieldbus	T1 *1	+400 °C + 80 °C	not permitted	not permitted	+65 °C	+55 °C	+80 °C	not permitted	not permitted	not permitted

## F23

	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
PROFIBUS PA	T6	+ 80 °C + 60 °C	+50 °C +60 °C	+55 °C +60 °C	+55 °C +60 °C	+55 °C +60 °C	+50 °C +60 °C	+55 °C +60 °C	+60 °C +60 °C
FOUNDATION Fieldbus			+45 °C +55 °C	+50 °C +55 °C	+50 °C +55 °C	+50 °C +55 °C	+45 °C +55 °C	+50 °C +55 °C	+55 °C +55 °C
PROFIBUS PA	T5	+ 95 °C + 75 °C	+65 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C	+65 °C +75 °C	+70 °C +75 °C	+75 °C +75 °C
FOUNDATION Fieldbus			+60 °C +70 °C	+65 °C +70 °C	+65 °C +70 °C	+65 °C +70 °C	+60 °C +70 °C	+65 °C +70 °C	+70 °C +70 °C
PROFIBUS PA + FOUNDATION Fieldbus	T4	+130 °C + 80 °C	+65 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+70 °C +80 °C	+55 °C +80 °C	+60 °C +80 °C	+70 °C +80 °C
PROFIBUS PA + FOUNDATION Fieldbus	T3 *1	+150 °C + 80 °C	+60 °C +80 °C	+65 °C +80 °C	+70 °C +80 °C	+65 °C +80 °C	+45 °C +80 °C	+55 °C +80 °C	+65 °C +80 °C
PROFIBUS PA + FOUNDATION Fieldbus	T3	+195 °C + 80 °C	+45 °C +80 °C	+65 °C +80 °C	+70 °C +80 °C	+65 °C +80 °C	not permitted	not permitted	+65 °C +80 °C
PROFIBUS PA + FOUNDATION Fieldbus	T2 *1	+250 °C + 80 °C	+30 °C +80 °C	+60 °C +80 °C	+65 °C +80 °C	+55 °C +80 °C	not permitted	not permitted	not permitted
PROFIBUS PA + FOUNDATION Fieldbus	T2 *1	+280 °C + 80 °C	not permitted	+60 °C +80 °C	+65 °C +80 °C	+55 °C +80 °C	not permitted	not permitted	not permitted
PROFIBUS PA + FOUNDATION Fieldbus	T2	+290 °C + 80 °C	not permitted	not permitted	+65 °C +80 °C	+55 °C +80 °C	not permitted	not permitted	not permitted
PROFIBUS PA + FOUNDATION Fieldbus	T1 *1	+350 °C + 80 °C	not permitted	not permitted	+60 °C +80 °C	+45 °C +80 °C	not permitted	not permitted	not permitted
PROFIBUS PA + FOUNDATION Fieldbus	T1 *1	+400 °C + 80 °C	not permitted	not permitted	+60 °C +80 °C	+45 °C +80 °C	not permitted	not permitted	not permitted



T12-OVP

	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
PROFIBUS PA	T6	+ 80 °C + 60 °C	+55 °C +60 °C	+60 °C +60 °C	+60 °C +60 °C	+55 °C +60 °C	+50 °C +60 °C	+55 °C +60 °C	+60 °C +60 °C
FOUNDATION Fieldbus			+50 °C +55 °C	+55 °C +55 °C	+55 °C +55 °C	+50 °C +55 °C	+45 °C +55 °C	+50 °C +55 °C	+55 °C +55 °C
PROFIBUS PA	T5	+ 95 °C + 75 °C	+70 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C	+65 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C
FOUNDATION Fieldbus			+65 °C +70 °C	+65 °C +70 °C	+65 °C +70 °C	+65 °C +70 °C	+60 °C +70 °C	+65 °C +70 °C	+65 °C +70 °C
PROFIBUS PA + FOUNDATION Fieldbus	T4	+130 °C + 80 °C	+70 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+65 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C
PROFIBUS PA + FOUNDATION Fieldbus	T3 *1	+150 °C + 80 °C	+70 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+70 °C +80 °C	+65 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C
PROFIBUS PA + FOUNDATION Fieldbus	T3	+195 °C + 80 °C	+65 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+70 °C +80 °C	not permitted	not permitted	+75 °C +80 °C
PROFIBUS PA + FOUNDATION Fieldbus	T2 *1	+250 °C + 80 °C	+60 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C	+65 °C +80 °C	not permitted	not permitted	not permitted
PROFIBUS PA + FOUNDATION Fieldbus	T2 *1	+280 °C + 80 °C	not permitted	+70 °C +80 °C	+75 °C +80 °C	+65 °C +80 °C	not permitted	not permitted	not permitted
PROFIBUS PA + FOUNDATION Fieldbus	T2	+290 °C + 80 °C	not permitted	not permitted	+75 °C +80 °C	+65 °C +80 °C	not permitted	not permitted	not permitted
PROFIBUS PA + FOUNDATION Fieldbus	T1 *1	+350 °C + 80 °C	not permitted	not permitted	+70 °C +80 °C	+55 °C +80 °C	not permitted	not permitted	not permitted
PROFIBUS PA + FOUNDATION Fieldbus	T1 *1	+400 °C + 80 °C	not permitted	not permitted	+70 °C +80 °C	+55 °C +80 °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
PROFIBUS PA	T6	+60 °C	+60 °C	+60 °C	+60 °C
	T5	+60 °C	+75 °C	+75 °C	+75 °C
	T4...T1	+60 °C	+80 °C	+80 °C	+80 °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	+60 °C	+70 °C	+70 °C	+70 °C
	T4... T1	+60 °C	+80 °C	+80 °C	+80 °C

**Connection data**

F12, F23

- Power supply and signal circuit in protection type: intrinsic safety Ex ia IIC or IIB (FISCO model or ENTITY concept (individual interconnection))

Power supply:	
$U_i = 17.5 \text{ V}$	or $U_i = 24 \text{ V}$
$I_i = 500 \text{ mA}$	$I_i = 250 \text{ mA}$
$P_i = 5.5 \text{ W}$	$P_i = 1.2 \text{ W}$
$L_i = 10 \text{ } \mu\text{H}$	
$C_i = 5 \text{ nF}$	
Leak current $\leq 50 \text{ } \mu\text{A}$	

Option

- Power supply and signal circuit for remote display, e.g. FHX40, in protection type: intrinsic safety Ex ia IIC or IIB

Power supply:	
$U_o = 4.2 \text{ V}$	
$I_o = 34 \text{ mA}$	
$P_o = 36 \text{ mW}$	
effective inner inductance	$L_i = \text{negligible}$
effective inner capacitance	$C_i = \text{negligible}$
Characteristic curve: linear	

- The criteria for interconnection between the instrument and the associated apparatus is as below:  
 $U_o \leq U_i$ ,  $I_o \leq I_i$ ,  $P_o \leq P_i$ ,  $C_o \geq C_i + C_c$ ,  $L_o \geq L_i + L_c$

Note:  $C_c$  and  $L_c$  represent the distributed capacitance and distributed inductance of cable.

T12-OVP

- Power supply and signal circuit in protection type: intrinsic safety Ex ia IIC or IIB (FISCO model or ENTITY concept (individual interconnection))

Power supply:	
$U_i = 17.5 \text{ V}$	or $U_i = 24 \text{ V}$
$I_i = 273 \text{ mA}$	$I_i = 250 \text{ mA}$
$P_i = 1.2 \text{ W}$	$P_i = 1.2 \text{ W}$
$L_i = 10 \text{ } \mu\text{H}$	
$C_i = 5 \text{ nF}$	
Leak current $\leq 50 \text{ } \mu\text{A}$	

# Micropilot M

## FMR230, FMR231, FMR240

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### 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：

- 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 ia IIC T1...T6 Ga/Gb  
Ex ia IIC T1...T6 Gb

#### 适用标准

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

## 安全指南：特殊条件

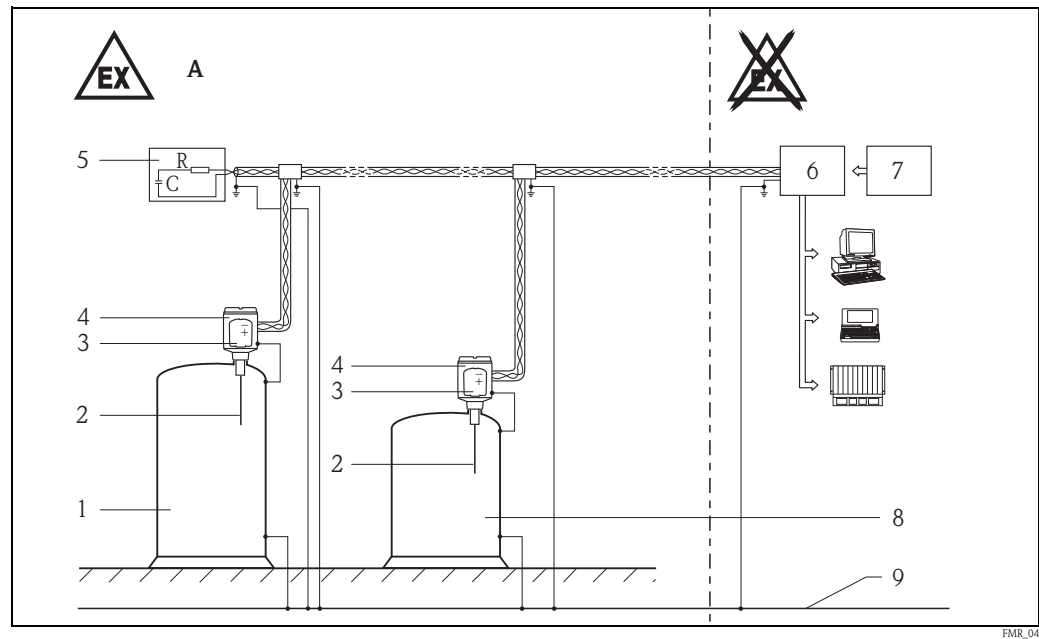
电子部件外壳处的允许环境温度范围： $-40\text{ °C} \leq T_a \leq +80\text{ °C}$ 。  
遵守温度表中的信息。

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

F12, F23

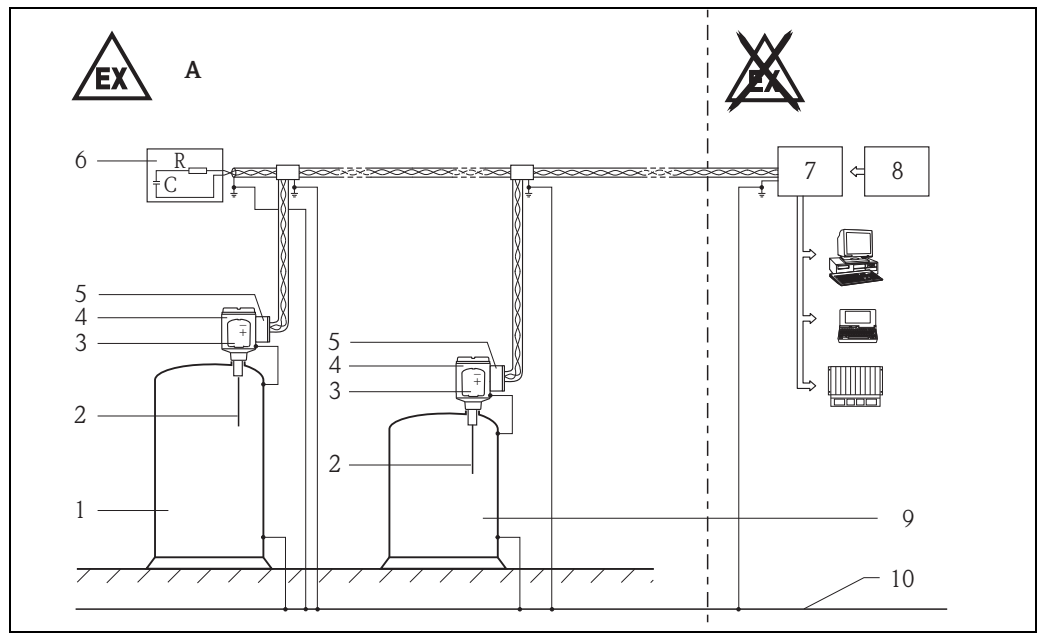


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A 区域 1

- 1 液罐，危险区，区域 0
- 2 天线型号 (→ 12, “特殊条件”)
- 3 电子插件
- 4 外壳：
  - F12 (铝)
  - F23 (316L)
 可选远程显示屏，例如 FHX40；  
可选带有或不带有 VU331 显示屏和操作模块
- 5 允许的终端电阻 Ex ia IIC
- 6 经认证的关联设备 (FISCO 模型)
- 7 电源
- 8 液罐，危险区，区域 1
- 9 电势均衡

T12 - OVP



2

A 区域 1

- 1 液罐，危险区，区域 0
- 2 天线型号 (→ 12, “特殊条件”)
- 3 电子插件
- 4 外壳：  
- T12-OVP (铝)  
可选带有或不带有 VU331 显示屏和操作模块
- 5 带集成过电压保护装置的终端模块
- 6 允许的终端电阻 Ex ia IIC
- 7 经认证的关联设备 (FISCO 模型)
- 8 电源
- 9 液罐，危险区，区域 1
- 10 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。
- 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 (→ 15, “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)。
- 电缆持续工作温度  $\geq T_a + 5 \text{ K}$ 。
- 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)。
- 变送器的外壳装备有接地端子；在安装和使用的过程中，用户应确保该端子可靠接地。
- 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。

F12, F23

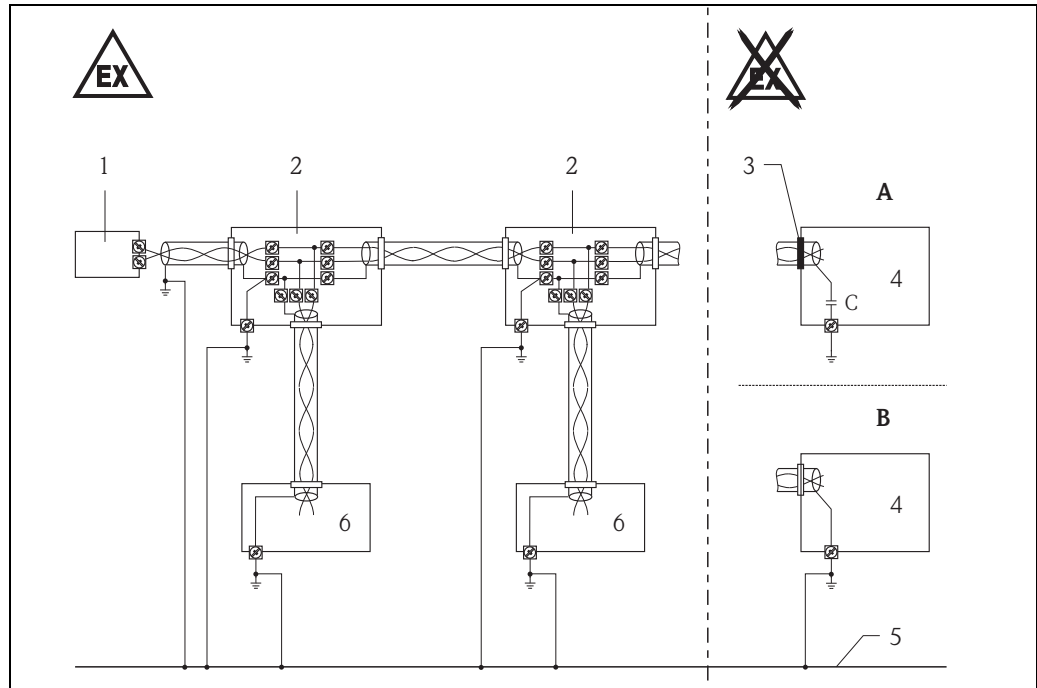
- 设备的本安型输入电源电路与地电势是绝缘的，相对地电势至少有  $500 \text{ V}_{\text{rms}}$  绝缘强度。

T12 - OVP

- 设备的本安型输入电源电路与地电势是绝缘的，相对地电势至少有  $290 \text{ V}_{\text{rms}}$  绝缘强度。

## 电势均衡

- 屏蔽接地 → 3。



3

- A 版本 1**  
使用小型电容器 (例如 1 nF, 1500 V, 绝缘强度, 陶瓷)。  
连接到屏蔽的总电容不得超过 10 nF。
- B 版本 2**
- 1 端电阻  
2 配电盘 / 接线盒  
3 屏蔽层绝缘  
4 电源单元 / 分段耦合器  
5 电势平衡 (保持在高等级)  
6 现场设备

## 过电压保护

F12, F23

- 对于按照国家规范或标准要求进行过电压保护的装置, 安装本设备时应使用过电压保护装置。

T12 - OVP

- 集成的过电压保护装置满足 IEC/EN 60079-14 第 12.3 节中规定的要求。

## 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 (→ 17, “区域 0 - 应用”):  
-20 °C ≤ T ≤ +60 °C  
0.8 bar ≤ p ≤ 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。
- 在本安型和非本安型电路间最好采用电气隔离的相关设备。

- 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)”。

**安全指南：区域 1**

- 在将设备连接到 Ex ib 类本安型电路时，防护级别变为 Ex ib。  
请勿在区域 0 中操作 Ex ib 类本安型电路。

**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**

**F12**

	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
PROFIBUS PA	T6	+ 80 °C + 60 °C	+55 °C	+60 °C	+60 °C	+60 °C	+55 °C	+60 °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
PROFIBUS PA	T5	+ 95 °C + 75 °C	+70 °C	+75 °C	+75 °C	+75 °C	+70 °C	+75 °C	+75 °C
FOUNDATION Fieldbus (基金会现场总线)			+75 °C	+75 °C	+75 °C	+75 °C	+75 °C	+75 °C	+75 °C
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T4	+130 °C + 80 °C	+70 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+65 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T3 *1	+150 °C + 80 °C	+70 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C	+70 °C +80 °C	+55 °C +80 °C	+65 °C +80 °C	+75 °C +80 °C
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T3	+195 °C + 80 °C	+60 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C	+70 °C +80 °C	不允许	不允许	+75 °C +80 °C
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T2 *1	+250 °C + 80 °C	+55 °C +80 °C	+70 °C +80 °C	+70 °C +80 °C	+65 °C +80 °C	不允许	不允许	不允许
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T2 *1	+280 °C + 80 °C	不允许	+65 °C +80 °C	+70 °C +80 °C	+65 °C +80 °C	不允许	不允许	不允许
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T2	+290 °C + 80 °C	不允许	不允许	+70 °C +80 °C	+65 °C +80 °C	不允许	不允许	不允许
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T1 *1	+350 °C + 80 °C	不允许	不允许	+70 °C +80 °C	+60 °C +80 °C	不允许	不允许	不允许
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T1 *1	+400 °C + 80 °C	不允许	不允许	+65 °C +80 °C	+55 °C +80 °C	不允许	不允许	不允许

## F23

	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
PROFIBUS PA	T6	+ 80 °C + 60 °C	+50 °C +60 °C	+55 °C +60 °C	+55 °C +60 °C	+55 °C +60 °C	+50 °C +60 °C	+55 °C +60 °C	+60 °C +60 °C
FOUNDATION Fieldbus (基金会现场总线)			+45 °C +55 °C	+50 °C +55 °C	+50 °C +55 °C	+50 °C +55 °C	+45 °C +55 °C	+50 °C +55 °C	+55 °C
PROFIBUS PA	T5	+ 95 °C + 75 °C	+65 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C	+65 °C +75 °C	+70 °C +75 °C	+75 °C +75 °C
FOUNDATION Fieldbus (基金会现场总线)			+60 °C +70 °C	+65 °C +70 °C	+65 °C +70 °C	+65 °C +70 °C	+60 °C +70 °C	+65 °C +70 °C	+70 °C
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T4	+130 °C + 80 °C	+65 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+70 °C +80 °C	+55 °C +80 °C	+60 °C +80 °C	+70 °C +80 °C
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T3 *1	+150 °C + 80 °C	+60 °C +80 °C	+65 °C +80 °C	+70 °C +80 °C	+65 °C +80 °C	+45 °C +80 °C	+55 °C +80 °C	+65 °C +80 °C
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T3	+195 °C + 80 °C	+45 °C +80 °C	+65 °C +80 °C	+70 °C +80 °C	+65 °C +80 °C	不允许	不允许	+65 °C +80 °C
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T2 *1	+250 °C + 80 °C	+30 °C +80 °C	+60 °C +80 °C	+65 °C +80 °C	+55 °C +80 °C	不允许	不允许	不允许
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T2 *1	+280 °C + 80 °C	不允许	+60 °C +80 °C	+65 °C +80 °C	+55 °C +80 °C	不允许	不允许	不允许
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T2	+290 °C + 80 °C	不允许	不允许	+65 °C +80 °C	+55 °C +80 °C	不允许	不允许	不允许
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T1 *1	+350 °C + 80 °C	不允许	不允许	+60 °C +80 °C	+45 °C +80 °C	不允许	不允许	不允许
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T1 *1	+400 °C + 80 °C	不允许	不允许	+60 °C +80 °C	+45 °C +80 °C	不允许	不允许	不允许



T12 - OVP

	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
PROFIBUS PA	T6	+ 80 °C + 60 °C	+55 °C +60 °C	+60 °C +60 °C	+60 °C +60 °C	+55 °C +60 °C	+50 °C +60 °C	+55 °C +60 °C	+60 °C +60 °C
FOUNDATION Fieldbus (基金会现场总线)			+50 °C +55 °C	+55 °C +55 °C	+55 °C +55 °C	+50 °C +55 °C	+45 °C +55 °C	+50 °C +55 °C	+55 °C +55 °C
PROFIBUS PA	T5	+ 95 °C + 75 °C	+70 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C	+65 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C
FOUNDATION Fieldbus (基金会现场总线)			+65 °C +70 °C	+65 °C +70 °C	+65 °C +70 °C	+65 °C +70 °C	+60 °C +70 °C	+65 °C +70 °C	+65 °C +70 °C
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T4	+130 °C + 80 °C	+70 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+65 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T3 *1	+150 °C + 80 °C	+70 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+70 °C +80 °C	+65 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T3	+195 °C + 80 °C	+65 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+70 °C +80 °C	不允许	不允许	+75 °C +80 °C
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T2 *1	+250 °C + 80 °C	+60 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C	+65 °C +80 °C	不允许	不允许	不允许
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T2 *1	+280 °C + 80 °C	不允许	+70 °C +80 °C	+75 °C +80 °C	+65 °C +80 °C	不允许	不允许	不允许
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T2	+290 °C + 80 °C	不允许	不允许	+75 °C +80 °C	+65 °C +80 °C	不允许	不允许	不允许
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T1 *1	+350 °C + 80 °C	不允许	不允许	+70 °C +80 °C	+55 °C +80 °C	不允许	不允许	不允许
PROFIBUS PA + FOUNDATION Fieldbus (基金会现场总线)	T1 *1	+400 °C + 80 °C	不允许	不允许	+70 °C +80 °C	+55 °C +80 °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
PROFIBUS PA	T6	+60 °C	+60 °C	+60 °C	+60 °C
	T5	+60 °C	+75 °C	+75 °C	+75 °C
	T4...T1	+60 °C	+80 °C	+80 °C	+80 °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	+60 °C	+70 °C	+70 °C	+70 °C
	T4... T1	+60 °C	+80 °C	+80 °C	+80 °C

## 连接数据

F12, F23

- 电源和信号电路的防护类型：本安型 Ex ia IIC 或 IIB  
(FISCO 模型或 ENTITY 概念 (单独互连))

电源：	
U <sub>i</sub> = 17.5 V	或 U <sub>i</sub> = 24 V
I <sub>i</sub> = 500 mA	I <sub>i</sub> = 250 mA
P <sub>i</sub> = 5.5 W	P <sub>i</sub> = 1.2 W
L <sub>i</sub> = 10 μH	
C <sub>i</sub> = 5 nF	
泄漏电流 ≤ 50 μA	

可选件

- 远程显示屏 (例如 FHX40) 的电源和信号电路所使用的防护类型为：本安型 Ex ia IIC 或 IIB

电源：	
U <sub>o</sub> = 4.2 V	
I <sub>o</sub> = 34 mA	
P <sub>o</sub> = 36 mW	
有效内部电感 L <sub>i</sub> = 可忽略	
有效内部电容 C <sub>i</sub> = 可忽略	
特征曲线：线性	

- 仪器与关联设备之间的连接标准如下：U<sub>o</sub> ≤ U<sub>i</sub>, I<sub>o</sub> ≤ I<sub>i</sub>, P<sub>o</sub> ≤ P<sub>i</sub>, C<sub>o</sub> ≥ C<sub>i</sub>+C<sub>c</sub>, L<sub>o</sub> ≥ L<sub>i</sub>+L<sub>c</sub>  
注意：C<sub>c</sub> 和 L<sub>c</sub> 代表电缆的分布电容和分布电感。

T12 - OVP

- 电源和信号电路的防护类型：本安型 Ex ia IIC 或 IIB  
(FISCO 模型或 ENTITY 概念 (单独互连))

电源：	
U <sub>i</sub> = 17.5 V	或 U <sub>i</sub> = 24 V
I <sub>i</sub> = 273 mA	I <sub>i</sub> = 250 mA
P <sub>i</sub> = 1.2 W	P <sub>i</sub> = 1.2 W
L <sub>i</sub> = 10 μH	
C <sub>i</sub> = 5 nF	
泄漏电流 ≤ 50 μA	



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