



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



Solutions

Safety Instructions

Micropilot M

FMR230, FMR231, FMR244, FMR245

4-20 mA HART

Ex ia IIC T1...T6 Ga/Gb

Ex ia IIC T1...T6 Gb

NEPSI GYJ12.1379X



en - Document: XA00372F-D

Safety instructions for electrical apparatus for explosion-hazardous areas

→ 3

zh - 文档: XA00372F-D

爆炸环境中电气仪表的安全指南

→ 11

Micropilot M

FMR230, FMR231, FMR244, FMR245

4-20 mA HART

Associated Documentation	This document is an integral part of the following Operating Instructions: BA00218F/00 (FMR230), BA00219F/00 (FMR231), BA00248F/00 (FMR244), BA00251F/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 ia IIC T1...T6 Ex ia IIC T1...T6	Ga/Gb 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.

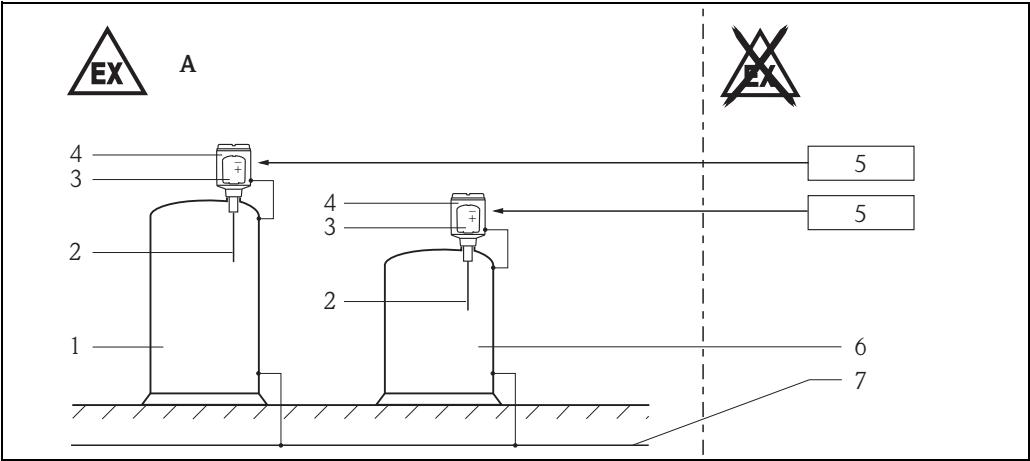
- The antenna contain surfaces, which can become electrostatically charged. For this reason, these antenna must not be arranged such that they can become dangerously charged from a flowing medium (e.g. filling curtain).
Avoid electrostatic charging of the antenna (e.g. do not rub dry).

Antenna versions

FMR230-..H.....	■ Horn antenna (enamelled), up to 200 °C
FMR231-..E or F.....	F12, F23 ■ PTFE rod antenna, up to 150 °C ■ Rod antenna (PTFE) with sanitary connection, up to 150 °C ■ Rod antenna (PTFE) threaded connection PVDF, up to 80 °C T12-OVP ■ PTFE rod antenna, up to 150 °C ■ Rod antenna (PTFE) with sanitary connection with gas-tight bushing, up to 150 °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

F12, F23

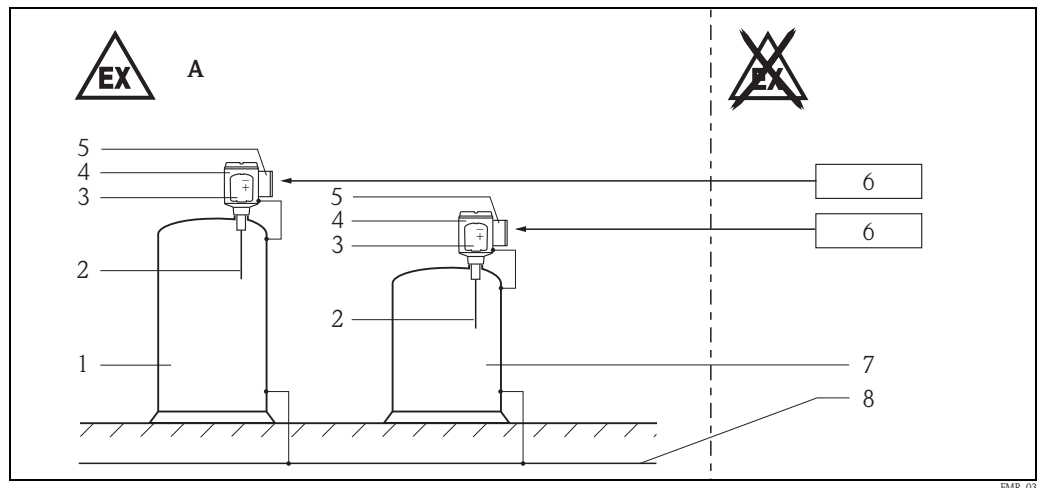


1

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 Certified associated apparatus
- 6 Tank, hazardous area Zone 1
- 7 Local potential equalization

T12-OVP



2

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-OVP (Aluminium)
optionally with or without VU331 display and operating module
- 5 Terminal module with integrated overvoltage protector
- 6 Certified associated apparatus
- 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 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).
- 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.

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.

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
(→ 8, "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	FMR231	FMR244	FMR245
T6	+ 80 °C + 60 °C	+55 °C +60 °C	+55 °C +60 °C	+60 °C +60 °C	+60 °C +60 °C
T5	+ 95 °C + 75 °C	+70 °C +75 °C	+70 °C +75 °C	+75 °C +75 °C	+75 °C +75 °C
T4	+130 °C + 80 °C	+70 °C +80 °C	+65 °C +80 °C	+70 °C +80 °C	+70 °C +80 °C
T3 *1	+150 °C + 80 °C	+70 °C +80 °C	+55 °C +80 °C	not permitted	+65 °C +80 °C
T3	+195 °C + 80 °C	+60 °C +80 °C	not permitted	not permitted	+65 °C +80 °C
T2 *1	+250 °C + 80 °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	FMR231	FMR244	FMR245
T6	+ 80 °C + 60 °C	+50 °C +60 °C	+50 °C +60 °C	+55 °C +60 °C	+55 °C +60 °C
T5	+ 95 °C + 75 °C	+65 °C +75 °C	+65 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C
T4	+130 °C + 80 °C	+65 °C +80 °C	+55 °C +80 °C	+65 °C +80 °C	+65 °C +80 °C
T3 * ¹	+150 °C + 80 °C	+60 °C +80 °C	+45 °C +80 °C	not permitted	+60 °C +80 °C
T3	+195 °C + 80 °C	+45 °C +80 °C	not permitted	not permitted	+55 °C +80 °C
T2 * ¹	+250 °C + 80 °C	+30 °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	FMR231	FMR244	FMR245
T6	+ 80 °C + 60 °C	+55 °C +60 °C	+50 °C +60 °C	+55 °C +60 °C	+55 °C +60 °C
T5	+ 95 °C + 75 °C	+70 °C +75 °C	+65 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C
T4	+130 °C + 80 °C	+70 °C +80 °C	+65 °C +80 °C	+75 °C +80 °C	+70 °C +80 °C
T3 * ¹	+150 °C + 80 °C	+70 °C +80 °C	+65 °C +80 °C	not permitted	+70 °C +80 °C
T3	+195 °C + 80 °C	+65 °C +80 °C	not permitted	not permitted	+65 °C +80 °C
T2 * ¹	+250 °C + 80 °C	+60 °C +80 °C	not permitted	not permitted	not permitted

Zone 0 - Application

F12, F23

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	FMR244	FMR245
T6	+60 °C	+60 °C	+60 °C	+60 °C	+60 °C
T5	+60 °C	+75 °C	+75 °C	+75 °C	+75 °C
T4...T1	+60 °C	+80 °C	+80 °C	+80 °C	+80 °C

T12-OVP

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	FMR244	FMR245
T6	+60 °C	+60 °C	+60 °C	+60 °C	+60 °C
T5	+60 °C	+75 °C	+75 °C	+75 °C	+75 °C
T4...T1	+60 °C	+80 °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
- Only for connection to a certified intrinsically safe circuit with the following maximum values

Power supply:
Ui = 30 V Ii = 300 mA Pi = 1 W effective inner inductance Li = negligible effective inner capacitance Ci = 13 nF

Option

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

Power supply:
Uo = 4.2 V Io = 34 mA Po = 36 mW effective inner inductance Li = negligible effective inner capacitance Ci = negligible Characteristic curve: linear

- The criteria for interconnection between the instrument and the associated apparatus is as below:
Uo ≤ Ui, Io ≤ Ii, Po ≤ Pi, Co ≥ Ci+Cc, Lo ≥ Li+Lc
Note: Cc and Lc 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
- Only for connection to a certified intrinsically safe circuit with the following maximum values

Power supply:
U _i = 30 V I _i = 273 mA P _i = 1 W effective inner inductance L _i = negligible effective inner capacitance C _i = 13 nF



Micropilot M

FMR230, FMR231, FMR244, FMR245

4-20 mA HART

相关资料	本文档是下列操作手册的组成部分： BA00218F/00 (FMR230), BA00219F/00 (FMR231), BA00248F/00 (FMR244), BA00251F/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。		
	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： $-40\text{ }^{\circ}\text{C} \leq T_a \leq +80\text{ }^{\circ}\text{C}$ 。
遵守温度表中的信息。

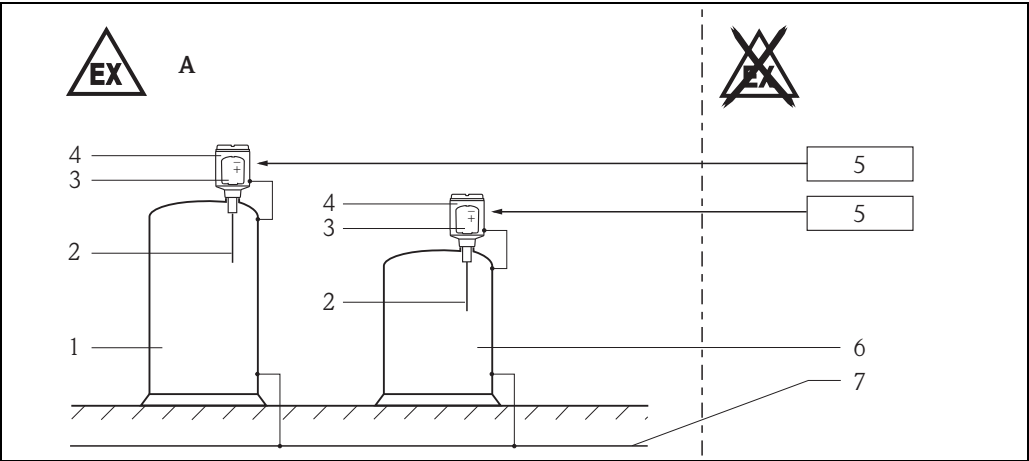
■ 天线的某些表面可能会有静电积聚。因此，布置天线时应避免天线因流体介质 (例如填料板) 而积聚电荷，这会带来危险。
请避免天线积聚静电 (如不要干擦)。

天线型号

FMR230-..H.....	■ 喇叭形天线 (搪瓷)，最高达 200 °C
FMR231-.E 或 F.....	F12, F23 ■ PTFE 杆型天线，最高达 150 °C ■ 带清洁连接的杆型天线 (PTFE)，最高达 150 °C ■ 带螺纹连接 PVDF 的杆型天线 (PTFE)，最高达 80 °C T12 - OVP ■ PTFE 杆型天线，最高达 150 °C ■ 带清洁连接 (具有气密套管) 的杆型天线 (PTFE)，最高达 150 °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

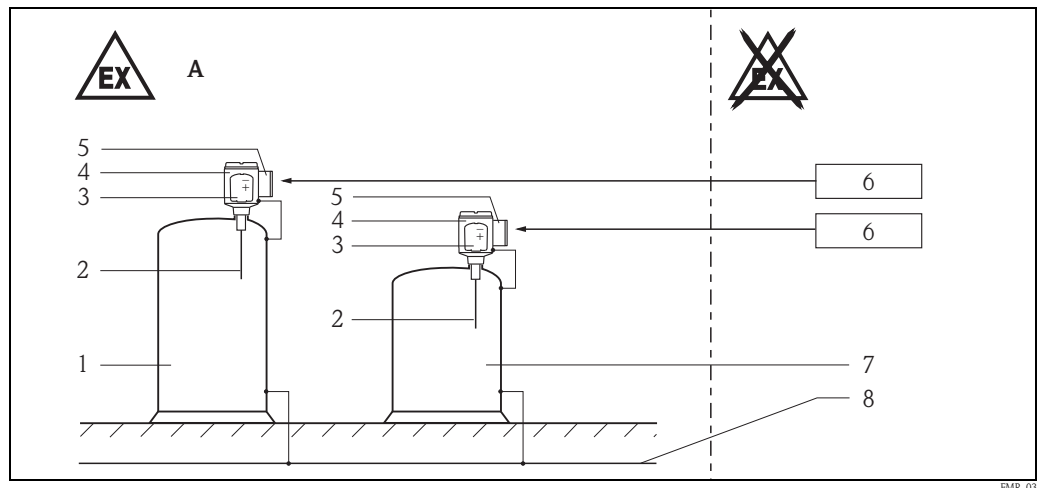
F12, F23



 1

- 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 经认证的关联设备
- 6 液罐，危险区，区域 1
- 7 本地电势均衡

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：
电子接线柜 (Ex ia)
- 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 经认证的关联设备
- 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。
- 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 (→ 14, “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。

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 $500 V_{\text{rms}}$ 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 $290 V_{\text{rms}}$ 绝缘强度。

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安装，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
(→ 图 16, “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, 才可把设备安装在介质中。
- 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修 (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	FMR231	FMR244	FMR245
T6	+ 80 °C + 60 °C	+55 °C +60 °C	+55 °C +60 °C	+60 °C +60 °C	+60 °C +60 °C
T5	+ 95 °C + 75 °C	+70 °C +75 °C	+70 °C +75 °C	+75 °C +75 °C	+75 °C +75 °C
T4	+130 °C + 80 °C	+70 °C +80 °C	+65 °C +80 °C	+70 °C +80 °C	+70 °C +80 °C
T3 *1	+150 °C + 80 °C	+70 °C +80 °C	+55 °C +80 °C	不允许	+65 °C +80 °C
T3	+195 °C + 80 °C	+60 °C +80 °C	不允许	不允许	+65 °C +80 °C
T2 *1	+250 °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	FMR231	FMR244	FMR245
T6	+ 80 °C + 60 °C	+50 °C +60 °C	+50 °C +60 °C	+55 °C +60 °C	+55 °C +60 °C
T5	+ 95 °C + 75 °C	+65 °C +75 °C	+65 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C
T4	+130 °C + 80 °C	+65 °C +80 °C	+55 °C +80 °C	+65 °C +80 °C	+65 °C +80 °C
T3 * ¹	+150 °C + 80 °C	+60 °C +80 °C	+45 °C +80 °C	不允许	+60 °C +80 °C
T3	+195 °C + 80 °C	+45 °C +80 °C	不允许	不允许	+55 °C +80 °C
T2 * ¹	+250 °C + 80 °C	+30 °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	FMR231	FMR244	FMR245
T6	+ 80 °C + 60 °C	+55 °C +60 °C	+50 °C +60 °C	+55 °C +60 °C	+55 °C +60 °C
T5	+ 95 °C + 75 °C	+70 °C +75 °C	+65 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C
T4	+130 °C + 80 °C	+70 °C +80 °C	+65 °C +80 °C	+75 °C +80 °C	+70 °C +80 °C
T3 * ¹	+150 °C + 80 °C	+70 °C +80 °C	+65 °C +80 °C	不允许	+70 °C +80 °C
T3	+195 °C + 80 °C	+65 °C +80 °C	不允许	不允许	+65 °C +80 °C
T2 * ¹	+250 °C + 80 °C	+60 °C +80 °C	不允许	不允许	不允许

区域 0 - 应用

F12, F23

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	FMR244	FMR245
T6	+60 °C	+60 °C	+60 °C	+60 °C	+60 °C
T5	+60 °C	+75 °C	+75 °C	+75 °C	+75 °C
T4...T1	+60 °C	+80 °C	+80 °C	+80 °C	+80 °C

T12 - OVP

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	FMR244	FMR245
T6	+60 °C	+60 °C	+60 °C	+60 °C	+60 °C
T5	+60 °C	+75 °C	+75 °C	+75 °C	+75 °C
T4...T1	+60 °C	+80 °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
- 只用于连接到具有下述最大值的经认证的本安型电路

电源：
Ui= 30 V Ii = 300 mA Pi = 1 W 有效内部电感 Li = 可忽略 有效内部电容 Ci = 13 nF

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：
Uo = 4.2 V Io = 34 mA Po = 36 mW 有效内部电感 Li = 可忽略 有效内部电容 Ci = 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：Uo ≤ Ui, Io ≤ Ii, Po ≤ Pi, Co ≥ Ci+Cc, Lo ≥ Li+Lc
注意：Cc 和 Lc 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
- 只用于连接到具有下述最大值的经认证的本安型电路

电源：
U _i = 30 V I _i = 273 mA P _i = 1 W 有效内部电感 L _i = 可忽略 有效内部电容 C _i = 13 nF

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