Level Pressure Flow Temperature Liquid Analysis Registration Systems Components Services Solutions

Safety Instructions

Micropilot M
FMR250
PROFIBUS PA, FOUNDATION Fieldbus

Ex ia IIC T1...T6 Ga

NEPSI GYJ13.1094X

en - Document: XA00447F-C
Safety instructions for electrical apparatus for explosion-hazardous areas
→ 3

zh - 文档：XA00447F-C
爆炸环境中电气仪表的安全指南
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XA00447F-C/00/B2/13.13
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Endress+Hauser
People for Process Automation

Micropilot M
FMR250

english

PROFIBUS PA, FOUNDATION Fieldbus

Associated Documentation

This document is an integral part of the following Operating Instructions:
PROFIBUS PA: BA00331F/00
FOUNDATION Fieldbus: BA00336F/00

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

Supplementary Documentation

Explosion-protection brochure:
CP00021Z/11

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**

Applied standards

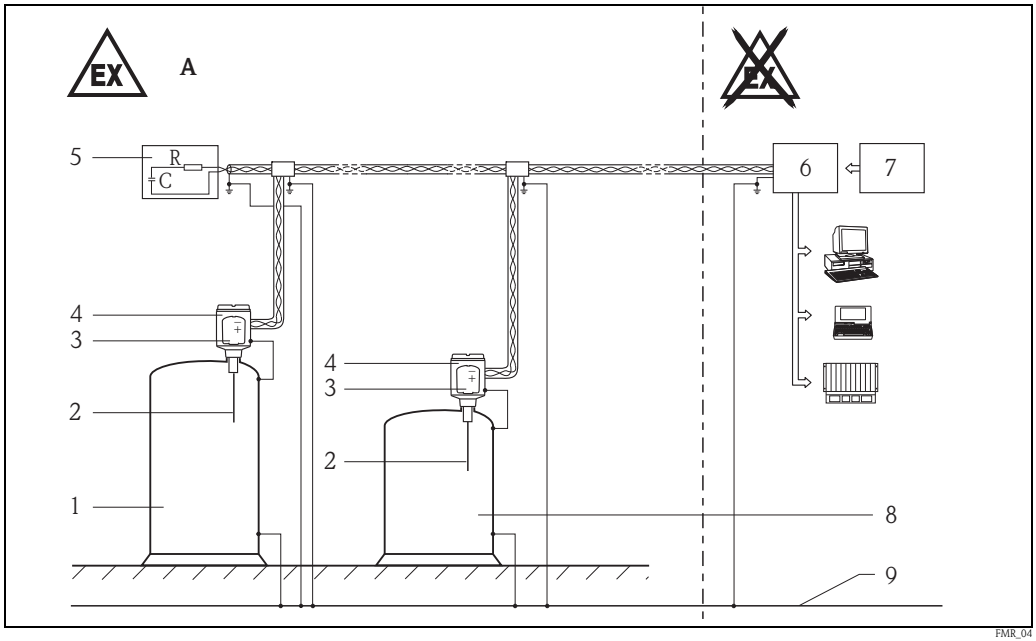
GB 3836.1-2010
GB 3836.4-2010
GB 3836.20-2010

Safety instructions: Special conditions

Permitted ambient temperature range at the electronics housing: –40 °C ≤ Ta ≤ +80 °C.
Observe the information in the temperature tables.

Safety instructions: Installation

F12, F23

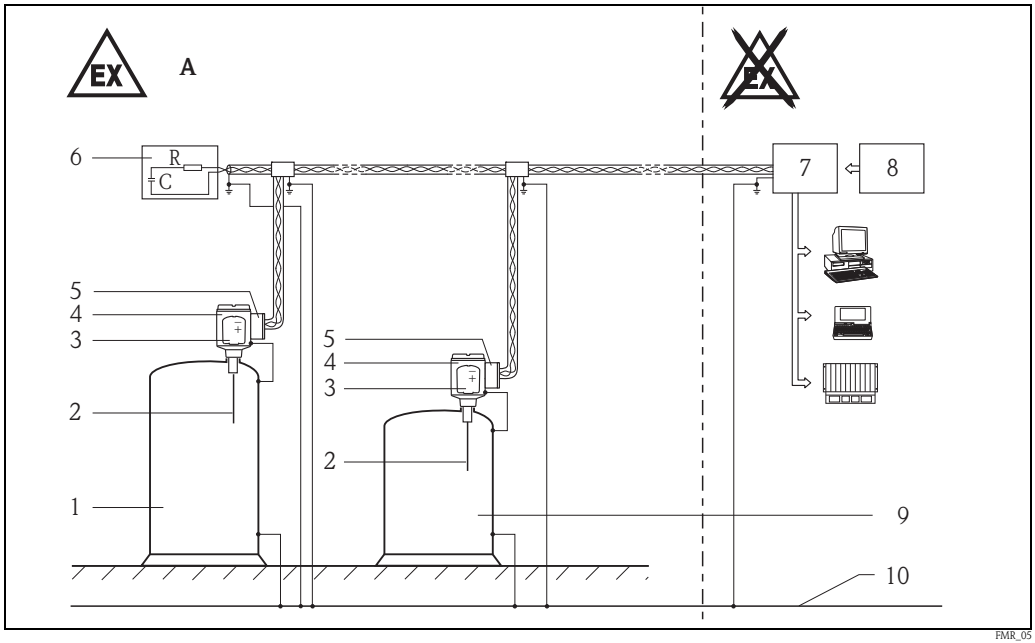


1

A *Zone 1*

1 *Tank, hazardous area Zone 0*
2 *Horn or parabolic antenna*
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 *Horn or parabolic antenna*
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 ≥ Ta +5 K.
- The housing of transmitter is equipped with a ground terminal; users must ensure that it is reliably connected to ground during installation and use.
- The type of protection changes as follows when the devices are connected to certified intrinsically safe circuits of Category Ex ib for Equipment Groups IIC and IIB: Ex ib IIC T6 or Ex ib IIB T6.
  Do not operate the antenna in Zone 0 if the transmitter is connected to an intrinsically safe circuit of Category Ex ib.
- The pertinent guidelines must be observed when intrinsically safe circuits are connected together acc. IEC/EN 60079-14 (Proof of Intrinsic Safety). (E.g. when using the Commubox or DXR375 handheld terminal or other certified apparatus.)

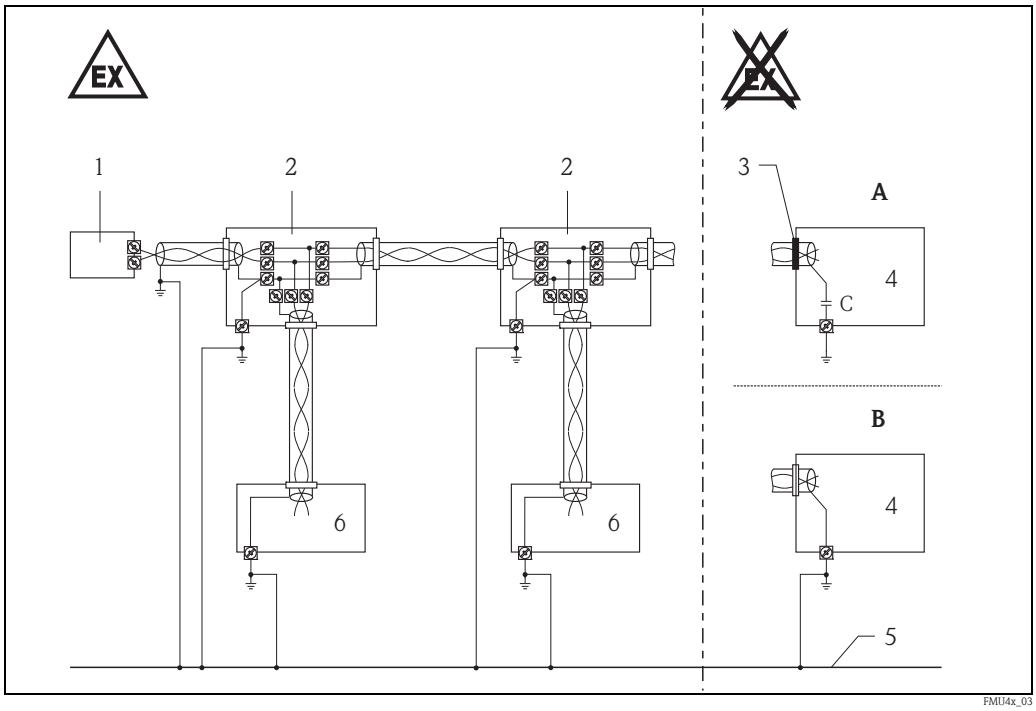
Air purge connection FMR250:
- In closed state the installation must have ingress protection ≥ IP67.
- Purging pressure > internal pressure of the vessel.
- In the not purging state a respective stop cock or valve must be closed.
  With open valve or stop cock and without purging fluid explosible atmospheres may be released or flames may enter from the outside.

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 Vrms with respect to it.
- On installations requiring overvoltage protection to comply with national regulations or standards, this device shall be installed using an overvoltage protector.
- Option: overvoltage protector HAW262Z or HAW56x (→ 3)
  – connect the external overvoltage protector and the apparatus to the local potential equalisation
  – establish potential matching both inside and outside of the explosion-hazardous area
  – the cable connecting the overvoltage protector and the measuring device must be no longer than 1 m
  – the cable must be routed protected, e.g. in an armoured hose.

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 Vrms with respect to it.
- The integrated overvoltage protector meets the requirements as per IEC/EN 60079-14, Section 12.3.

Potential equalization

- For earthing the screen → 3.



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*

Safety instructions: Zone 0

- Only operate devices in potentially explosive vapour/air mixtures under atmospheric conditions (→ 🖹 8, "Zone 0 - Application"):
  -20 °C ≤ T ≤ +60 °C
  0.8 bar ≤ p ≤ 1.1 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 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

Housing F12, T12-OVP

Temperature class	Max. permitted medium temperature at the antenna (process connection) Tmed	Max. permitted ambient temperature at the electronics housing (Ta)	
		PROFIBUS PA	FOUNDATION Fieldbus
T6	+ 80 °C + 60 °C	+55 °C +60 °C	+50 °C +55 °C
T5	+ 95 °C + 75 °C	+70 °C +75 °C	+65 °C +70 °C
T4	+130 °C + 80 °C	+70 °C +80 °C	+70 °C +80 °C
T3	+195 °C + 80 °C	+65 °C +80 °C	+65 °C +80 °C
T2, T1 (functional) *1	+200 °C + 80 °C	+65 °C +80 °C	+65 °C +80 °C

Housing F23

Temperature class	Max. permitted medium temperature at the antenna (process connection) Tmed	Max. permitted ambient temperature at the electronics housing (Ta)	
		PROFIBUS PA	FOUNDATION Fieldbus
T6	+ 80 °C + 60 °C	+55 °C +60 °C	+50 °C +55 °C
T5	+ 95 °C + 75 °C	+70 °C +75 °C	+65 °C +70 °C
T4	+130 °C + 80 °C	+70 °C +80 °C	+70 °C +80 °C
T3	+195 °C + 80 °C	+60 °C +80 °C	+60 °C +80 °C
T2, T1 (functional) *1	+200 °C + 80 °C	+60 °C +80 °C	+60 °C +80 °C

Zone 0 - Application

Temperature class	Max. permitted medium temperature (Antenna in Zone 0)	Max. permitted ambient temperature at the electronics housing (in Zone 1) dependent on the medium temperature	
		PROFIBUS PA	FOUNDATION Fieldbus
T6	+60 °C	+60 °C	+55 °C
T5	+60 °C	+75 °C	+70 °C
T4 - T1	+60 °C	+80 °C	+80 °C

Connection data

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

Power supply:			
F12, F23	Ui = 17.5 V Ii = 500 mA Pi = 5.5 W	or Ui = 24 V Ii = 250 mA Pi = 1.2 W	Li = 10 µH Ci = 5 nF Leak current ≤ 50 µA
T12-OVP (reduced values)	Ui = 17.5 V Ii = 273 mA Pi = 1.2 W	or Ui = 24 V Ii = 250 mA Pi = 1.2 W	Li = 10 µH Ci = 5 nF Leak current ≤ 50 µA

Option

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

Power supply:		
F12, F23	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.

Micropilot M
FMR250

中文

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：BA00331F/00
FOUNDATION Fieldbus (基金会现场总线)：BA00336F/00
根据用户订购仪表的具体型号所提供的相应操作手册。

补充文档

防爆手册：
CP00021Z/11

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**

适用标准

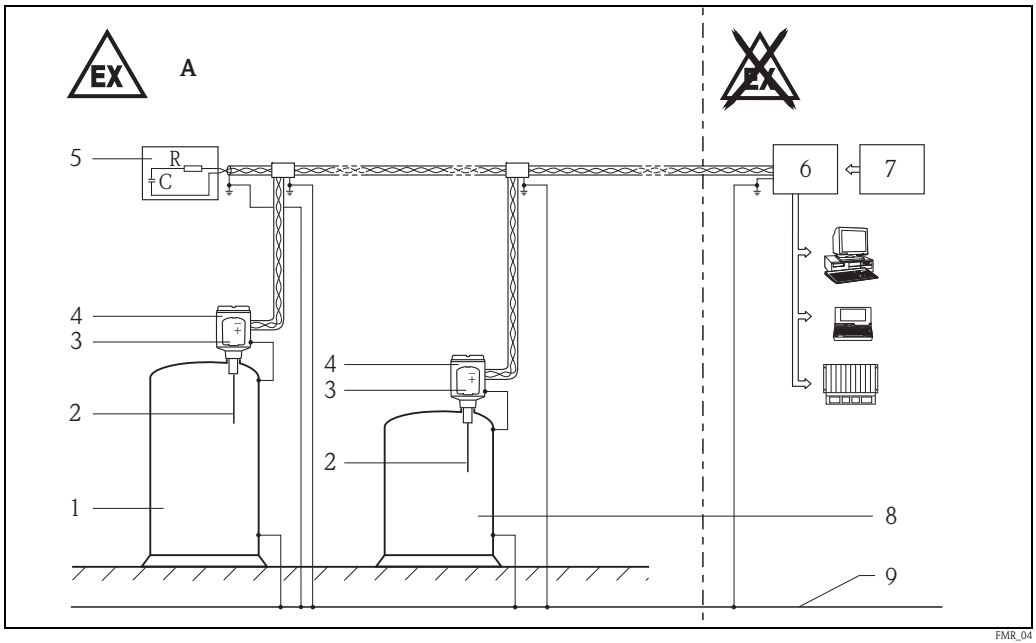
GB 3836.1-2010
GB 3836.4-2010
GB 3836.20-2010

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 °C ≤ Ta ≤ +80 °C。
遵守温度表中的信息。

安全指南：安装

F12, F23

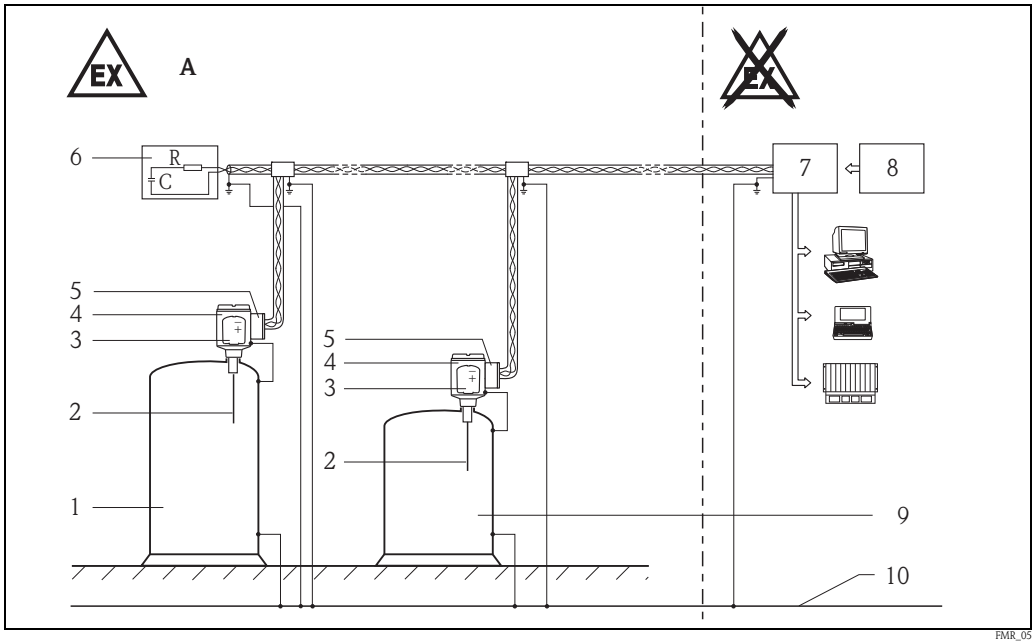


1

A *区域 1*

1 *液罐，危险区，区域 0*
2 *喇叭形天线或抛物面天线*
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



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A *区域 1*

1 *液罐，危险区，区域 0*
2 *喇叭形天线或抛物面天线*
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 *电势平衡*

- 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 (→ 13，“ 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 ≥ Ta +5 K。
- 变送器的外壳装备有接地端子；用户必须确保该端子在安装和使用过程中可靠接地。
- 当变送器连接到经认证的 IIC 和 IIB 设备组的 Ex ib 类本安型电路时，防护类型作如下改变：
  Ex ib IIC T6 或 Ex ib IIB T6。
  如果变送器连接到 Ex ib 类的本安型电路，则不要在区域 0 中使用天线。
- 根据 IEC/EN 60079-14 (本质安全型防护) 同时连接多个本安型电路时，必须遵守相关的准则。
  (例如，在使用 Commubox 或 DXR375 手持器或其他经认证的设备时。)

吹气清洗接口 FMR250：
- 在关闭状态下，安装必须具有 ≥ IP67 入口保护等级。
- 清洗压力 > 容器的内部压力。
- 在非清洗状态下，必须关闭各自的旋塞阀或阀门。
  在阀门或旋塞阀打开且没有清洗液时，可能会释放易爆炸的空气或者吸入外部的烟雾。

F12, F23

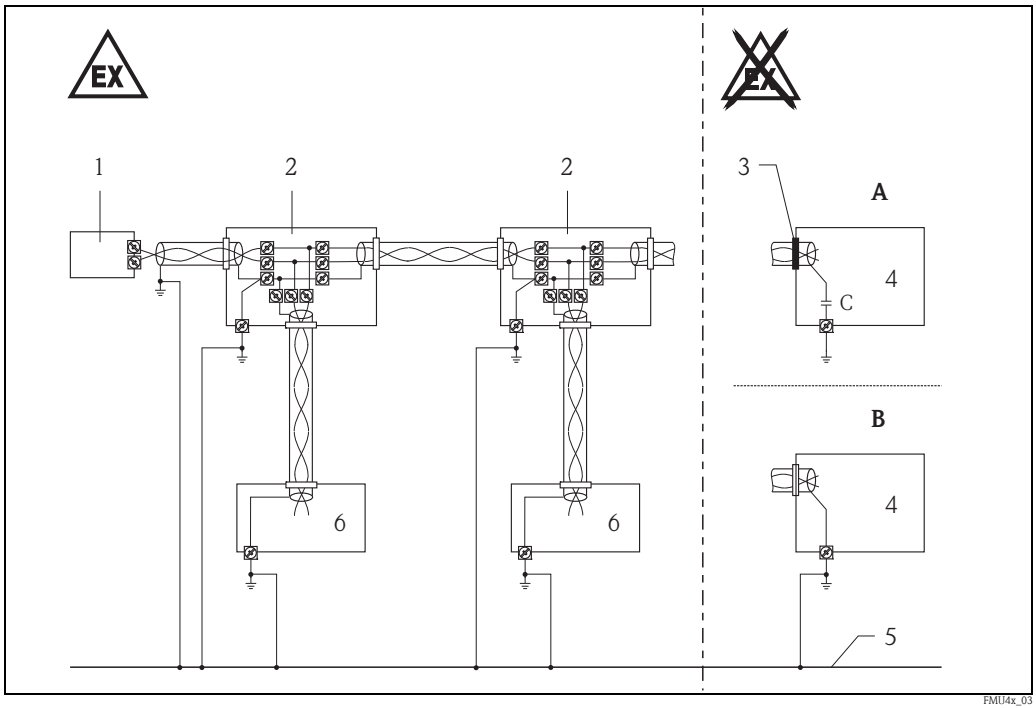
- 设备的本安型输入电源电路与地电势是绝缘的，相对地电势至少有 500 Vrms 绝缘强度。
- 对于按照国家规范或标准要求进行过电压保护的安装，安装本设备时应使用过电压保护装置。
- 可选件：过压保护装置 HAW262Z 或 HAW56x (→ 3)
  - 将外部过电压保护装置和设备连接到本地等电势线上
  - 在爆炸危险区的内部和外部建立等电势匹配
  - 连接到过电压保护装置和测量设备的电缆不得超过 1 m 长
  - 电缆布线必须进行防护，例如使用铠装电缆套管。

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 Vrms 绝缘强度。
- 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。

电势平衡

- 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 *终端电阻*
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*

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 (→ 🖹8，“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它大气条件下运行。
- 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，用户还必须遵守
  操作手册和下列标准中的规定：
  – 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：维修与检修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

外壳 F12, T12-OVP

温度组别	天线 (过程连接) 处的最大允许输入温度 Tmed	电子部件外壳处的最大允许环境温度 (Ta)	
		PROFIBUS PA	FOUNDATION Fieldbus (基金会现场总线)
T6	+ 80 °C + 60 °C	+55 °C +60 °C	+50 °C +55 °C
T5	+ 95 °C + 75 °C	+70 °C +75 °C	+65 °C +70 °C
T4	+130 °C + 80 °C	+70 °C +80 °C	+70 °C +80 °C
T3	+195 °C + 80 °C	+65 °C +80 °C	+65 °C +80 °C
T2, T1 (功能型) *1	+200 °C + 80 °C	+65 °C +80 °C	+65 °C +80 °C

外壳 F23

温度组别	天线 (过程连接) 处的最大允许输入温度 Tmed	电子部件外壳处的最大允许环境温度 (Ta)	
		PROFIBUS PA	FOUNDATION Fieldbus (基金会现场总线)
T6	+ 80 °C + 60 °C	+55 °C +60 °C	+50 °C +55 °C
T5	+ 95 °C + 75 °C	+70 °C +75 °C	+65 °C +70 °C
T4	+130 °C + 80 °C	+70 °C +80 °C	+70 °C +80 °C
T3	+195 °C + 80 °C	+60 °C +80 °C	+60 °C +80 °C
T2, T1 (功能型) *1	+200 °C + 80 °C	+60 °C +80 °C	+60 °C +80 °C

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	
		PROFIBUS PA	FOUNDATION Fieldbus (基金会现场总线)
T6	+60 °C	+60 °C	+55 °C
T5	+60 °C	+75 °C	+70 °C
T4 - T1	+60 °C	+80 °C	+80 °C

连接数据

- 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：			
F12, F23	Ui = 17.5 V Ii = 500 mA Pi = 5.5 W	或 Ui = 24 V Ii = 250 mA Pi = 1.2 W	Li = 10 µH Ci = 5 nF 泄漏电流 ≤ 50 µA
T12-OVP (还原值)	Ui = 17.5 V Ii = 273 mA Pi = 1.2 W	或 Ui = 24 V Ii = 250 mA Pi = 1.2 W	Li = 10 µH Ci = 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：		
F12, F23	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。

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