



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



Solutions

Safety Instructions

Levelflex M FMP41C HART

Ex ia IIC T6...T1
NEPSI GYJ111018



XA00404F-C

en - Safety instructions for electrical apparatus for explosion-hazardous areas.

zh - 爆炸环境中电气仪表的安全指南。

Levelflex M FMP41C

english

HART

**Associated
Documentation**

This document is an integral part of the following Operating Instructions:
BA276F/00
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

Ex ia IIC T6...T1

T12 - OVP

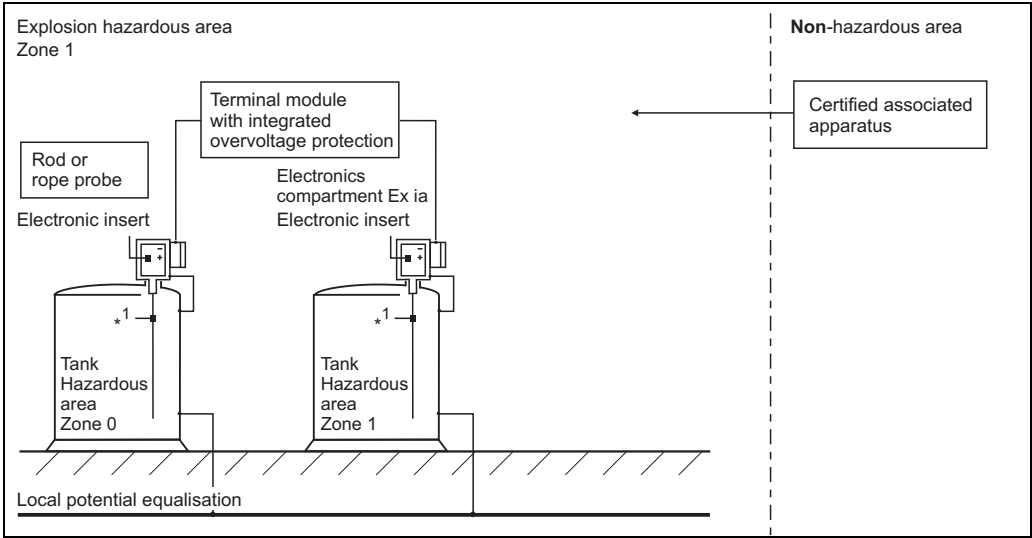


Fig. 1

F12, F23

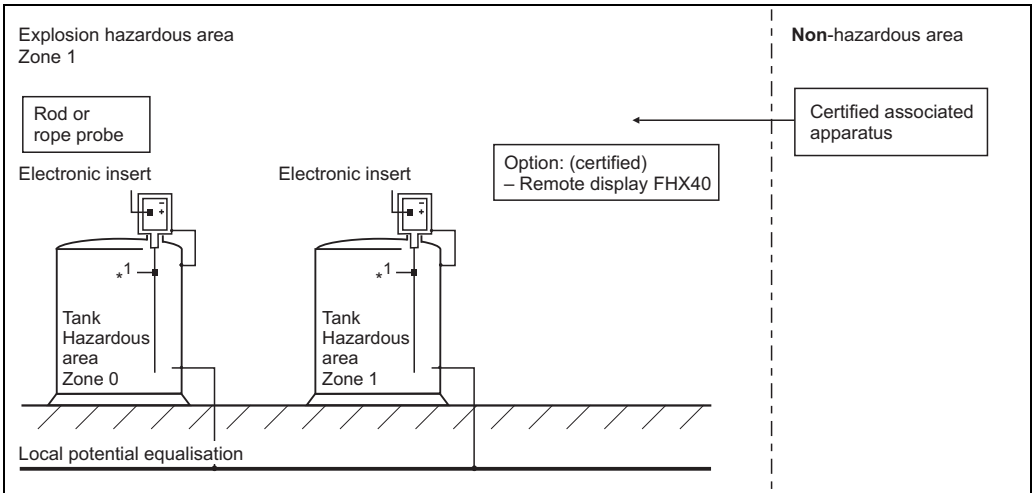


Fig. 2

Certified associated apparatus	T12 - OVP	Uo ≤ 30 V Io ≤ 273 mA Po ≤ 1 W	[Ex ia] IIC
	F12, F23	Uo ≤ 30 V Io ≤ 300 mA Po ≤ 1 W	

Application	Zone 0/1 or Zone 1	Probe in Zone 0 and housing in Zone 1 or probe and housing in Zone 1
Type of protection	Ex ia IIC T6...T1	
Max. working pressure	dependent on the probe	
Process temperature	dependent on the probe	

Housing	T12 - OVP (with integrated overvoltage protector)	-40 °C ≤ Tu ≤ +80 °C	optionally with or without VU331 display and operating module
	F12, F23 (SS 316L)	-40 °C ≤ Tu ≤ +80 °C	optionally with or without VU331 display and operating module

F12, F23:

Option	Remote display, e.g. FHX40	NEPSI certified	observe associated Safety Instructions
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Safety instructions: Installation

- Install the device according to the manufacturer's instructions and any other valid standards and regulations.
- Do not operate the device outside the specified electrical, thermal and mechanical parameters.
- The external earth connection facility shall be connected reliably.

T12 - OVP:

- The intrinsically safe input power circuit of the device is isolated from ground potential. The dielectric strength to earth is limited by 600 V electrode arresters.

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.
- 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 (Tab. 1 and Tab. 3).
- After aligning (rotating) the housing, retighten the fixing screw (see Operating Instructions).
- Continuous duty temperature of the cable ≥ Ta +5 K.
- Install the device to exclude any mechanical damage or friction during the application.
Pay particular attention to flow conditions and fittings.

Special conditions *1

- The probes (rod and rope version) have plastic surfaces, which can become electrostatically charged. For hazardous locations (classified) of Zone 0 resp. Zone 1, the electrostatic limits have to be observed.

Category	Admissible transmitted charge Q in nC		
	IIA	IIB	IIC
1	60	30	10
2	60	30	10
3	No limit		

For the device this results in the following relationship:

Area/Components with plastic surfaces	Measured transmitted charge Q in nC (Test Report)	Special conditions required for the following material groups		
Flange cladding	< 75	IIA	IIB	IIC
Rod	< 30	–	–	IIC
Rope	< 10	–	–	–
Rope weight	< 30	–	–	IIC

Measures:

Instruments with flange cladding (plastic) may be installed in hazardous locations (classified) of Zone 0 or Zone 1 without further protective measures, if charging of the flange cladding is prevented by the installation (e.g. no exposed plastic surfaces or installation in metallic connection parts/nozzles).

Tab. 1

Zone 1 - Application

Housing T12 - OVP				
Temperature class with or without VU331 display	Maximum permitted medium temperature (process connection) Probe in Zone 1	Maximum permitted ambient temperature at the electronics housing (electronics housing in Zone 1) dependent on the medium temperature		
		FMP41C	FMP41C with remote electronics / spacer tube	FMP41C with remote electronics / spacer hose
T6	+ 80 °C + 60 °C	57 °C 60 °C	59 °C 60 °C	60 °C 60 °C
T5	+ 95 °C + 75 °C	72 °C 75 °C	74 °C 75 °C	75 °C 75 °C
T4	+130 °C + 80 °C	72 °C 80 °C	78 °C 80 °C	80 °C 80 °C
T3 (functional) * ²	+150 °C + 80 °C	68 °C 80 °C	77 °C 80 °C	80 °C 80 °C
T3, T2, T1	+195 °C + 80 °C	62 °C 80 °C	76 °C 80 °C	80 °C 80 °C

Note: permitted probe temperature range must be observed

*² functional = limited by maximum permitted probe temperature

Housing F12				
Temperature class with or without VU331 display	Maximum permitted medium temperature (process connection) Probe in Zone 1	Maximum permitted ambient temperature at the electronics housing (electronics housing in Zone 1) dependent on the medium temperature		
		FMP41C	FMP41C with remote electronics / spacer tube	FMP41C with remote electronics / spacer hose
T6	+ 80 °C + 60 °C	57 °C 60 °C	59 °C 60 °C	60 °C 60 °C
T5	+ 95 °C + 75 °C	72 °C 75 °C	74 °C 75 °C	75 °C 75 °C
T4	+130 °C + 80 °C	72 °C 80 °C	78 °C 80 °C	80 °C 80 °C
T3 (functional) * ²	+150 °C + 80 °C	68 °C 80 °C	77 °C 80 °C	80 °C 80 °C
T3, T2, T1	+195 °C + 80 °C	62 °C 80 °C	76 °C 80 °C	80 °C 80 °C

Note: permitted probe temperature range must be observed

*² functional = limited by maximum permitted probe temperature

Housing F23				
Temperature class with or without VU331 display	Maximum permitted medium temperature (process connection) Probe in Zone 1	Maximum permitted ambient temperature at the electronics housing (electronics housing in Zone 1) dependent on the medium temperature		
		FMP41C	FMP41C with remote electronics / spacer tube	FMP41C with remote electronics / spacer hose
T6	+ 80 °C + 60 °C	56 °C 60 °C	59 °C 60 °C	60 °C 60 °C
T5	+ 95 °C + 75 °C	71 °C 75 °C	74 °C 75 °C	75 °C 75 °C
T4	+130 °C + 80 °C	67 °C 80 °C	77 °C 75 °C	80 °C 80 °C
T3 (functional) *2	+150 °C + 80 °C	62 °C 80 °C	75 °C 75 °C	80 °C 80 °C
T3, T2, T1	+195 °C + 80 °C	51 °C 80 °C	73 °C 75 °C	80 °C 80 °C

Note: permitted probe temperature range must be observed

*2 functional = limited by maximum permitted probe temperature

- 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 and Ex ib IIB T6. Do not operate the probe in Zone 0 if the transmitter is connected to an intrinsically safe circuit of Category Ex ib.
- Changes in electrical and mechanical parts of the equipment could harm the type of explosion protection and are not allowed for the user.

T12 - OVP:

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

F12, F23:

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

Tab. 2a

**Power supply and signal circuit in protection type:
intrinsic safety Ex ia IIC or IIB**

T12 - OVP	U _i = 30 V I _i = 273 mA P _i = 1 W	effective inner inductance effective inner capacitance	Li = negligible Ci = 13 nF
F12, F23	U _i = 30 V I _i = 300 mA P _i = 1 W	effective inner inductance effective inner capacitance	Li = negligible Ci = 13 nF

Tab. 2b

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

F12, F23	U _o = 4.2 V I _o = 34 mA P _o = 36 mW	effective inner inductance effective inner capacitance characteristic curve	Li = negligible Ci = negligible linear	Co = 4 µF Lo = 5 mH
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- The criteria for interconnection between the instrument and the associated apparatus is as below:
U_o ≤ U_i, I_o ≤ I_i, P_o ≤ P_i, Co ≥ Ci + Cc, Lo ≥ Li + Lc
Note: Cc and Lc represent the distributed capacitance and distributed inductance of cable.

Safety instructions:
Zone 0

- Only operate devices in potentially explosive vapour/air mixtures under atmospheric conditions *³:
 $-20\text{ °C} \leq T \leq +60\text{ °C}$
 $0.8\text{ bar} \leq p \leq 1.1\text{ bar}$
- 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)".

Tab. 3

Zone 0 - Application

Temperature class with or without VU331 display	Maximum permitted medium temperature (process connection) Probe in Zone 0 * ³	Maximum permitted ambient temperature at the electronics housing (electronics housing in Zone 1) dependent on the medium temperature		
		FMP41C	FMP41C with remote electronics / spacer tube	FMP41C with remote electronics / spacer hose
T6	+60 °C	60 °C	60 °C	60 °C
T5	+60 °C	75 °C	75 °C	75 °C
T4, T3, T2, T1	+60 °C	80 °C	80 °C	80 °C

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相关资料	本文档是下列操作手册的组成部分： BA276F/00 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	Ex ia	IIC T6...T1

T12 - OVP

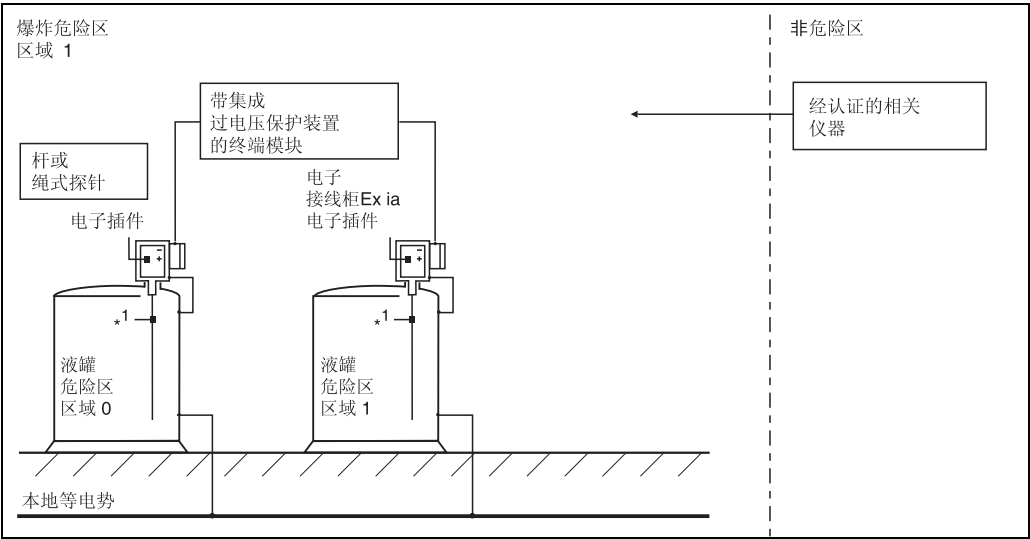


图 1

F12, F23

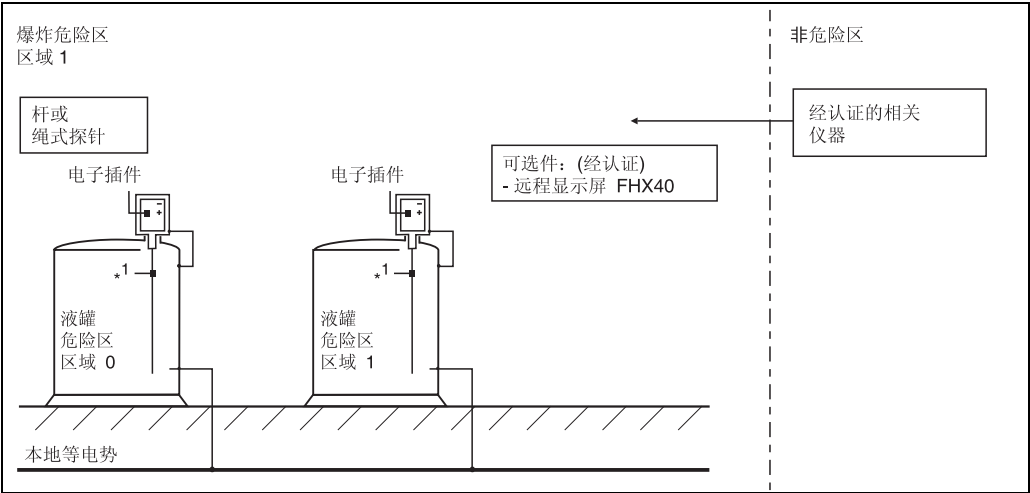


图 2

经认证的关联设备	T12 - OVP	$U_o \leq 30 \text{ V}$ $I_o \leq 273 \text{ mA}$ $P_o \leq 1 \text{ W}$	[Ex ia] IIC
	F12, F23	$U_o \leq 30 \text{ V}$ $I_o \leq 300 \text{ mA}$ $P_o \leq 1 \text{ W}$	

应用	区域 0/1，或者区域 1	探针在区域 0 而外壳在区域 1，或者探针和外壳都在区域 1
防护类型	Ex ia IIC T6...T1	
最大工作压力	取决于探针	
过程温度	取决于探针	

外壳	T12 - OVP (带有集成过压保护器)	$-40^\circ\text{C} \leq T_u \leq +80^\circ\text{C}$	可选带有或不带有 VU331 显示屏和操作模块
	F12, F23 (SS 316L)	$-40^\circ\text{C} \leq T_u \leq +80^\circ\text{C}$	可选带有或不带有 VU331 显示屏和操作模块

F12, F23:

可选件	远程显示屏，例如 FHX40	NEPSI 认证	遵守相关的安全指南
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安全指南: 安装

- 按照制造商的说明及其它有效标准和规定来安装设备。
- 使用设备时请勿超出指定的电、热和机械参数。
- 外部接地设备应该连接牢固。

T12 - OVP:

- 设备的本质安全型输入电源电路与地电势在电气上隔离。对地绝缘强度限制为 600 V 电气放电装置。

F12, F23:

- 本安型设备的输入电源电路与地电势是绝缘的，它相对地电势至少有 500 Vrms 绝缘强度。
- 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下表所示(表 1 和表 3)。
- 在对齐(旋转)外壳后，重新拧紧固定螺丝(参见操作说明)。
- 电缆持续工作温度 $\geq T_a + 5 \text{ K}$ 。
- 仪表的安装方式应避免在应用期间遭受任何机械损坏或磨损。
请尤其注意流量状况和液罐装置。

特殊条件 *1

- 探针(棒杆型和绳索型)具有塑料表面，可能会带有静电。
特别是危险位置(分类)区域 0 及区域 1，必须遵守静电限制。

类别	允许的传输电荷 Q，单位 nC		
	IIA	IIB	IIC
1	60	30	10
2	60	30	10
3	无限制		

对于设备，这会导致下列关系：

带有塑料表面的区域 / 部件	测量的传输电荷 Q， 单位 nC (测试报告)	下列材料组所需要的特殊条件		
法兰覆层	< 75	IIA	IIB	IIC
探针棒	< 30	—	—	IIC
探针索	< 10	—	—	—
探针索重物	< 30	—	—	IIC

措施：
带有法兰覆层 (塑料) 的仪器，如果在安装时通过采取适当措施 (例如，使塑料表面不暴露在外，或者安装在金属连接部件 / 管口中) 来防止法兰覆层产生静电充电的话，可以在无需附加防护措施的情况下，安装在区域 0 或区域 1 的危险区域 (分类) 中。

表 1
区域 1 - 应用

外壳 T12 - OVP				
温度等级， 带有或不带 VU331 显示 屏	最大允许 输入温度 (工艺连接件) 探针在区域 1 中	电子部件外壳处的最大允许环境温度 (电子部件外壳在区域 1 内) 取决于介质温度		
		FMP41C	FMP41C 带有远程电子 部件 / 隔离管	FMP41C 带有远程电子 部件 / 隔离软管
T6	+ 80 °C + 60 °C	57 °C 60 °C	59 °C 60 °C	60 °C 60 °C
T5	+ 95 °C + 75 °C	72 °C 75 °C	74 °C 75 °C	75 °C 75 °C
T4	+130 °C + 80 °C	72 °C 80 °C	78 °C 80 °C	80 °C 80 °C
T3 (功能) *2	+150 °C + 80 °C	68 °C 80 °C	77 °C 80 °C	80 °C 80 °C
T3, T2, T1	+195 °C + 80 °C	62 °C 80 °C	76 °C 80 °C	80 °C 80 °C

提示：必须遵守允许的探针温度范围
*2 功能 = 受限于所允许的最大探针温度

外壳 F12				
温度等级， 带有或不带 VU331 显示 屏	最大允许 输入温度 (工艺连接件) 探针在区域 1 中	电子部件外壳处的最大允许环境温度 (电子部件外壳在区域 1 内) 取决于介质温度		
		FMP41C	FMP41C，带有远程电 子部件 / 隔离管	FMP41C 带有远程电子 部件 / 隔离软管
T6	+ 80 °C + 60 °C	57 °C 60 °C	59 °C 60 °C	60 °C 60 °C
T5	+ 95 °C + 75 °C	72 °C 75 °C	74 °C 75 °C	75 °C 75 °C
T4	+130 °C + 80 °C	72 °C 80 °C	78 °C 80 °C	80 °C 80 °C
T3 (功能) *2	+150 °C + 80 °C	68 °C 80 °C	77 °C 80 °C	80 °C 80 °C
T3, T2, T1	+195 °C + 80 °C	62 °C 80 °C	76 °C 80 °C	80 °C 80 °C

提示：必须遵守允许的探针温度范围
*2 功能 = 受限于所允许的最大探针温度

外壳 F23				
温度等级， 带有或不带 VU331 显示 屏	最大允许 输入温度 (工艺连接件) 探针在区域 1 中	电子部件外壳处的最大允许环境温度 (电子部件外壳在区域 1 内) 取决于介质温度		
		FMP41C	FMP41C 带有远程电子 部件 / 隔离管	FMP41C 带有远程电子 部件 / 隔离软管
T6	+ 80 °C + 60 °C	56 °C 60 °C	59 °C 60 °C	60 °C 60 °C
T5	+ 95 °C + 75 °C	71 °C 75 °C	74 °C 75 °C	75 °C 75 °C
T4	+130 °C + 80 °C	67 °C 80 °C	77 °C 75 °C	80 °C 80 °C
T3 (功能) *2	+150 °C + 80 °C	62 °C 80 °C	75 °C 75 °C	80 °C 80 °C
T3, T2, T1	+195 °C + 80 °C	51 °C 80 °C	73 °C 75 °C	80 °C 80 °C

提示：必须遵守允许的探针温度范围

*2 功能 = 受限于是所允许的最大探针温度

- 当设备连接到经认证的 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 和 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 中操作探针。
- 改动设备的电气和机械部件会降低防爆保护的类型，用户请勿擅自改动。

T12 - OVP:

- 集成的过压保护器满足 IEC/EN 60079-14，第 12.3 节的要求

F12, F23:

- 对于按照国家规范或标准需要采用过压保护的装置应用，应该使用过压保护器来安装此设备。

表 2a

电源和信号电路的防护类型:

本安型 Ex ia IIC 或 IIB

T12 - OVP	Ui = 30 V Ii = 273 mA Pi = 1 W	有效内部电感 有效内部电容	Li = 可忽略 Ci = 13 nF
F12, F23	Ui = 30 V Ii = 300 mA Pi = 1 W	有效内部电感 有效内部电容	Li = 可忽略 Ci = 13 nF

表 2b

远程显示屏 (例如 FHX40) 的电源和信号电路所使用的保护类型为:

本安型 Ex ia IIC 或 IIB

F12, F23	Uo = 4.2 V Io = 34 mA Po = 36 mW	有效内部电感 有效内部电容 特征曲线	Li = 可忽略 Ci = 可忽略 线性	Co = 4 µF Lo = 5 mH
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- 仪器与关联设备间的连接标准如下：
 $U_o \leq U_i$ ， $I_o \leq I_i$ ， $P_o \leq P_i$ ， $C_o \geq C_i + C_c$ ， $L_o \geq L_i + L_c$
 注意：Cc 和 Lc 代表电缆的分布电容和分布电感。

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 *3:
-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有关大气条件下运行。
- 当仪表的接触部件具有足够耐久度时，才可将仪表安装于介质中。
- 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：“电气设备安装工程 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)”。

表 3
区域 0 - 应用

温度等级， 带有或不带 VU331 显示 屏	最大允许 输入温度 (工艺连接件) 探针在区域 0 中 *3	电子部件外壳处的最大允许环境温度 (电子部件外壳在区域 1 内) 取决于介质温度		
		FMP41C	FMP41C 带有远程电子 部件 / 隔离管	FMP41C 带有远程电子 部件 / 隔离软管
T6	+60 °C	60 °C	60 °C	60 °C
T5	+60 °C	75 °C	75 °C	75 °C
T4, T3, T2, T1	+60 °C	80 °C	80 °C	80 °C

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