



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



Solutions

Safety Instructions

Levelflex M

FMP40, FMP43, FMP45

HART, PROFIBUS PA, FOUNDATION Fieldbus

Ex d ia [ia Ga] IIC T6...T1 Ga/Gb

NEPSI GYJ12.1261X



en - Document: XA00380F-B
Safety instructions for electrical apparatus for explosion-hazardous areas
→ 3

zh - 文档: XA00380F-B
爆炸环境中电气仪表的安全指南
→ 9

Levelflex M

FMP40, FMP43, FMP45

english

HART, PROFIBUS PA, FOUNDATION Fieldbus

Associated Documentation

This document is an integral part of the following Operating Instructions:
 HART: BA00242F/00 (FMP40), BA00357F/00 (FMP43), BA00279F/00 (FMP45)
 PROFIBUS PA: BA00243F/00 (FMP40), BA00358F/00 (FMP43), BA00280F/00 (FMP45)
 FOUNDATION Fieldbus: BA00244F/00 (FMP40), BA00359F/00 (FMP43), BA00281F/00 (FMP45)

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

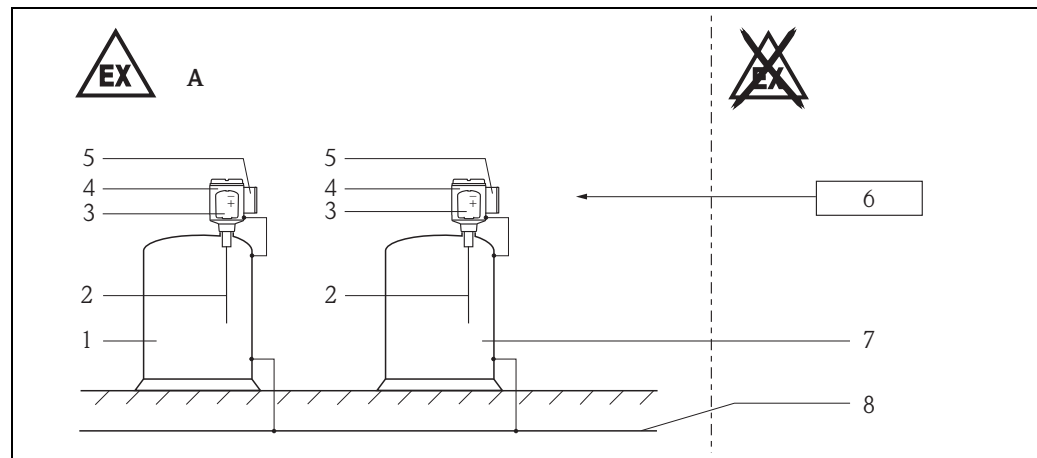
Ex d ia [ia Ga] IIC T6...T1 Ga/Gb

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: $-40\text{ °C} \leq T_a \leq +60\text{ °C}$.
Observe the information in the temperature tables.

**Safety instructions:
Installation**

1

A Zone 1

- 1 Tank; hazardous area Zone 0
 2 Probe: Rod, rope or coax
 3 Electronic insert
 4 Housing: optionally with or without VU331 display and operating module;
 Electronics compartment Ex ia
 5 Connection compartment (Ex d) *1
 6 Supply voltage
 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.
- Do not operate the device outside the specified electrical, thermal and mechanical parameters.
- 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 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 (→ 5).
- After aligning (rotating) the housing, retighten the fixing screw (see Operating Instructions).
- Do not open the connection compartments under voltage in an explosive atmosphere.
- Connection compartment cover: "Do not open under voltage in explosive atmospheres" *1.
- Only M20x1.5, G ½ or ½ NPT cable entry can be used for installation, which also should be in accordance with GB3836.1-2000 and GB3836.2-2000. Close unused entry glands with sealing plugs.
- For operating the transmitter housing at an ambient temperature under -20 °C , appropriate cables and cable entries permitted for this application must be used.
- Continuous duty temperature of the cable $\geq T_a + 5\text{ K}$.
- When connecting the transmitter housing via piping entries permitted for this purpose, the associated seal mechanisms must be arranged directly at the housing.
- Install the device to exclude any mechanical damage or friction during the application.
Pay particular attention to flow conditions and fittings.
- Changes in electrical and mechanical parts of the equipment could harm the type of explosion protection and are not allowed for the user.

FMP43

- The device with separable probe in separated mode shall be closed by protective cover.

Safety instructions:
Zone 0

- Only operate devices in potentially explosive vapour/air mixtures under atmospheric conditions (→ 6, "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.
- 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

Zone 1 - Application

FMP40

Temperature class	Max. permitted medium temperature (process connection) Probe in Zone 1	Max. permitted ambient temperature at the electronics housing (in Zone 1) dependent on the medium temperature				
		With 3/4" probe, compact	With 3/4" probe and remote electronics / spacer tube	With 1 1/2" probe, compact	With 1 1/2" probe and remote electronics / spacer tube	With remote electronics / spacer hose
T6	+ 80 °C + 60 °C	55 °C 60 °C	55 °C 60 °C	55 °C 60 °C	55 °C 60 °C	60 °C 60 °C
T5	+ 95 °C + 75 °C	55 °C 60 °C	55 °C 60 °C	55 °C 60 °C	55 °C 60 °C	60 °C 60 °C
T4	+130 °C + 80 °C	50 °C 60 °C	55 °C 60 °C	50 °C 60 °C	55 °C 60 °C	60 °C 60 °C
T3 *2, T2, T1	+150 °C + 80 °C	45 °C 60 °C	55 °C 60 °C	50 °C 60 °C	55 °C 60 °C	60 °C 60 °C

Note: permitted probe temperature range must be observed

*2: functional = limited by maximum permitted probe temperature

FMP43

Temperature class	Max. permitted medium temperature (process connection) Probe in Zone 1	Max. permitted ambient temperature at the electronics housing (in Zone 1) dependent on the medium temperature	
		Compact or compact detachable	Remote cable, detachable
T6	+ 80 °C + 60 °C	55 °C 60 °C	60 °C 60 °C
T5	+ 95 °C + 60 °C	55 °C 60 °C	60 °C 60 °C
T4	+130 °C + 60 °C	50 °C 60 °C	60 °C 60 °C
T3, T2, T1 *2	+150 °C + 60 °C	45 °C 60 °C	60 °C 60 °C

Note: the applicable temperature of probe must be within their specified limits

*2: functional = max. permissible process temperature

FMP45

Temperature class	Max. permitted medium temperature (process connection) Probe in Zone 1	Max. permitted ambient temperature at the electronics housing (in Zone 1) dependent on the medium temperature		
		Type A (XT version)	Type B (HT version)	With remote electronics / spacer hose
T6	+ 80 °C + 60 °C	58 °C 60 °C	59 °C 60 °C	60 °C 60 °C
T5	+ 95 °C + 75 °C	57 °C 60 °C	58 °C 60 °C	60 °C 60 °C
T4	+130 °C + 80 °C	55 °C 60 °C	57 °C 60 °C	60 °C 60 °C
T3 *2	+150 °C + 80 °C	53 °C 60 °C	56 °C 60 °C	60 °C 60 °C
T3	+195 °C + 80 °C	51 °C 60 °C	55 °C 60 °C	60 °C 60 °C
T2 *2	+250 °C + 80 °C	48 °C 60 °C	53 °C 60 °C	60 °C 60 °C
T2 *2	+290 °C + 80 °C	280 °C: 46 °C 60 °C	51 °C 60 °C	60 °C 60 °C
T1 *2	+400 °C + 80 °C	not allowed	48 °C 60 °C	60 °C 60 °C

Note: permitted probe temperature range must be observed

*2: functional = limited by maximum permitted probe temperature

Zone 0 - Application

FMP40

Temperature class	Max. permitted medium temperature (process connection) Probe in Zone 0	Max. permitted ambient temperature at the electronics housing (in Zone 1) dependent on the medium temperature				
		With ¾" probe, compact	With ¾" probe and remote electronics / spacer tube	With 1½" probe, compact	With 1½" probe and remote electronics / spacer tube	With remote electronics / spacer hose
T6...T1	+60 °C	60 °C	60 °C	60 °C	60 °C	60 °C

FMP43

Temperature class	Max. permitted medium temperature (process connection) Probe in Zone 0	Max. permitted ambient temperature at the electronics housing (in Zone 1) dependent on the medium temperature	
		Compact or compact detachable	Remote cable, detachable
T6...T1 *2	+60 °C	60 °C	60 °C

Note: the applicable temperature of probe must be within their specified limits

*2: functional = max. permissible process temperature

FMP45

Temperature class	Max. permitted medium temperature (process connection) Probe in Zone 0	Max. permitted ambient temperature at the electronics housing (in Zone 1) dependent on the medium temperature		
		Type A, (XT version)	Type B (HT version)	With remote electronics / spacer hose
T6...T1	+60 °C	60 °C	60 °C	60 °C

Connection data

Power supply
U _e ≤ 32 V DC U _m ≤ 250 V AC

Signal circuit
U _o = 4.2 V I _o = 34 mA P _o = 36 mW effective outer inductance L _o = 5 mH effective outer capacitance C _o = 4 μF

Levelflex M

FMP40, FMP43, FMP45

文
中

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：BA00242F/00 (FMP40), BA00357F/00 (FMP43), BA00279F/00 (FMP45)

PROFIBUS PA：BA00243F/00 (FMP40), BA00358F/00 (FMP43), BA00280F/00 (FMP45)

FOUNDATION Fieldbus (基金会现场总线)：BA00244F/00 (FMP40), BA00359F/00 (FMP43), BA00281F/00 (FMP45)

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 d ia [ia Ga] IIC T6...T1 Ga/Gb

适用标准

GB 3836.1-2010

GB 3836.2-2010

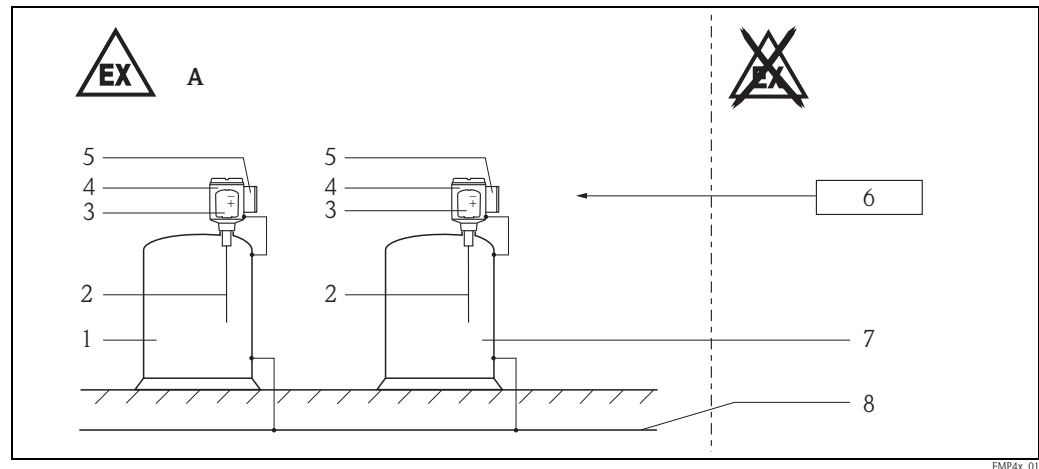
GB 3836.4-2010

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： $-40\text{ °C} \leq T_a \leq +60\text{ °C}$ 。
遵守温度表中的信息。

安全指南：
安装



1

A 区域 1

- 1 液罐：危险区区域 0
- 2 探针：探针棒、探针索或同轴电缆
- 3 电子插件
- 4 外壳：可选带有或不带有 VU331 显示屏和操作模块；
电子接线柜 Ex ia
- 5 接线柜 (Ex d) *1
- 6 供电电压
- 7 液罐：危险区区域 1
- 8 本地电位均衡

- 按照制造商的说明及其它有效标准和规定来安装设备。
- 使用设备时请勿超出指定的电、热和机械参数。
- 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。
- 电子部件外壳的允许环境温度（取决于应用范围）与温度组别之间的关系如下表所示（→ 5）。
- 在对齐（旋转）外壳后，重新拧紧固定螺丝（参见操作说明）。
- 在爆炸性空气环境中使用仪表时，请勿带电压开启接线柜。
- 接线柜盖：“请勿在爆炸性空气中带电压打开盖子”*1。
- 仅可使用 M20x1.5，G ½ 或 ½ NPT 电缆入口进行安装，同时还必须遵守 GB3836.1-2000 和 GB3836.2-2000 标准。用密封塞堵塞未使用的电缆入口。
- 要使变送器外壳在低于 -20 °C 的环境温度下工作，必须使用适合的电缆和电缆入口来满足此应用。
- 电缆持续工作温度 $\geq T_a + 5\text{ K}$ 。
- 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。
- 仪表的安装方式应能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。
- 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。

FMP43

- 带有独立探针的处于独立模式的设备应以防护盖盖上。

**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 6, “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。
- 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护 (煤矿除外)”。

温度表

区域 1 - 应用

FMP40

温度组别	最大允许的输入温度 (工艺连接件) 探针 位于区域 1	电子部件外壳 (区域 1) 处的最大允许温度取决于输入温度				
		带有 3/4" 探针, 紧凑型	带有 3/4" 探针和远程电子部件 / 隔离管	带有 1 1/2" 探针, 紧凑型	带有 1 1/2" 探针和远程电子部件 / 隔离管	带有远程电子部件 / 隔离软管
T6	+ 80 °C + 60 °C	55 °C 60 °C	55 °C 60 °C	55 °C 60 °C	55 °C 60 °C	60 °C 60 °C
T5	+ 95 °C + 75 °C	55 °C 60 °C	55 °C 60 °C	55 °C 60 °C	55 °C 60 °C	60 °C 60 °C
T4	+130 °C + 80 °C	50 °C 60 °C	55 °C 60 °C	50 °C 60 °C	55 °C 60 °C	60 °C 60 °C
T3 *2, T2, T1	+150 °C + 80 °C	45 °C 60 °C	55 °C 60 °C	50 °C 60 °C	55 °C 60 °C	60 °C 60 °C

提示: 必须遵守允许的探针温度范围
*2: 功能型 = 受限于最大允许的探针温度

FMP43

温度组别	最大允许的输入温度 (工艺连接件) 探针 位于区域 1	电子部件外壳 (区域 1) 处的最大允许温度取决于输入温度	
		紧凑型或紧凑拆卸型	远程电缆, 拆卸型
T6	+ 80 °C + 60 °C	55 °C 60 °C	60 °C 60 °C
T5	+ 95 °C + 60 °C	55 °C 60 °C	60 °C 60 °C
T4	+130 °C + 60 °C	50 °C 60 °C	60 °C 60 °C
T3, T2, T1 *2	+150 °C + 60 °C	45 °C 60 °C	60 °C 60 °C

提示: 探针的适用温度必须位于规定的限制范围之内
*2: 功能型 = 最大允许过程温度

FMP45

温度组别	最大允许的输入温度 (工艺连接件) 探针 位于区域 1	电子部件外壳 (区域 1) 处的最大允许温度取决于输入温度		
		类型 A (XT 版本)	类型 B (HT 版本)	带有远程电子部件 / 隔离软管
T6	+ 80 °C + 60 °C	58 °C 60 °C	59 °C 60 °C	60 °C 60 °C
T5	+ 95 °C + 75 °C	57 °C 60 °C	58 °C 60 °C	60 °C 60 °C
T4	+130 °C + 80 °C	55 °C 60 °C	57 °C 60 °C	60 °C 60 °C
T3 *2	+150 °C + 80 °C	53 °C 60 °C	56 °C 60 °C	60 °C 60 °C
T3	+195 °C + 80 °C	51 °C 60 °C	55 °C 60 °C	60 °C 60 °C
T2 *2	+250 °C + 80 °C	48 °C 60 °C	53 °C 60 °C	60 °C 60 °C
T2 *2	+290 °C + 80 °C	280 °C: 46 °C 60 °C	51 °C 60 °C	60 °C 60 °C
T1 *2	+400 °C + 80 °C	不允许	48 °C 60 °C	60 °C 60 °C

提示：必须遵守允许的探针温度范围

*2: 功能型 = 受限于最大允许的探针温度

区域 0 - 应用

FMP40

温度组别	最大允许的输入温度 (工艺连接件) 探针 位于区域 0	电子部件外壳 (区域 1) 处的最大允许温度取决于输入温度				
		带有 3/4" 探针, 紧 凑型	带有 3/4" 探针 和远程电子部 件 / 隔离管	带有 1 1/2" 探针, 紧 凑型	带有 1 1/2" 探针 和远程电子部 件 / 隔离管	带有远程电 子部件 / 隔 离软管
T6...T1	+60 °C	60 °C	60 °C	60 °C	60 °C	60 °C

FMP43

温度组别	最大允许的输入温度 (工艺连接件) 探针 位于区域 0	电子部件外壳 (区域 1) 处的最大允许温度取决于输入温度	
		紧凑型或紧凑拆卸型	远程电缆, 拆卸型
T6...T1 *2	+60 °C	60 °C	60 °C

提示：探针的适用温度必须位于规定的限制范围之内

*2: 功能型 = 最大允许过程温度

FMP45

温度组别	最大允许的输入温度 (工艺连接件) 探针 位于区域 0	电子部件外壳 (区域 1) 处的最大允许温度取决于输入温度		
		类型 A, (XT 版本)	类型 B (HT 版本)	带有远程电子部件 / 隔离软管
T6...T1	+60 °C	60 °C	60 °C	60 °C

连接数据

电源

$U_e \leq 32 \text{ V DC}$
 $U_m \leq 250 \text{ V AC}$

信号电路

$U_o = 4.2 \text{ V}$
 $I_o = 34 \text{ mA}$
 $P_o = 36 \text{ mW}$

有效外部电感 $L_o = 5 \text{ mH}$
有效外部电容 $C_o = 4 \text{ }\mu\text{F}$

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