



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



Solutions

Safety Instructions

Levelflex M

FMP40

HART

Zone 20/21, Zone 20/22, Zone 21

NEPSI GYJ111017

XA00381F-B



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 FMP40

english

HART

Associated Documentation

This document is an integral part of the following Operating Instructions:
BA242F/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

Zone 20/21

Zone 20/22

Zone 21

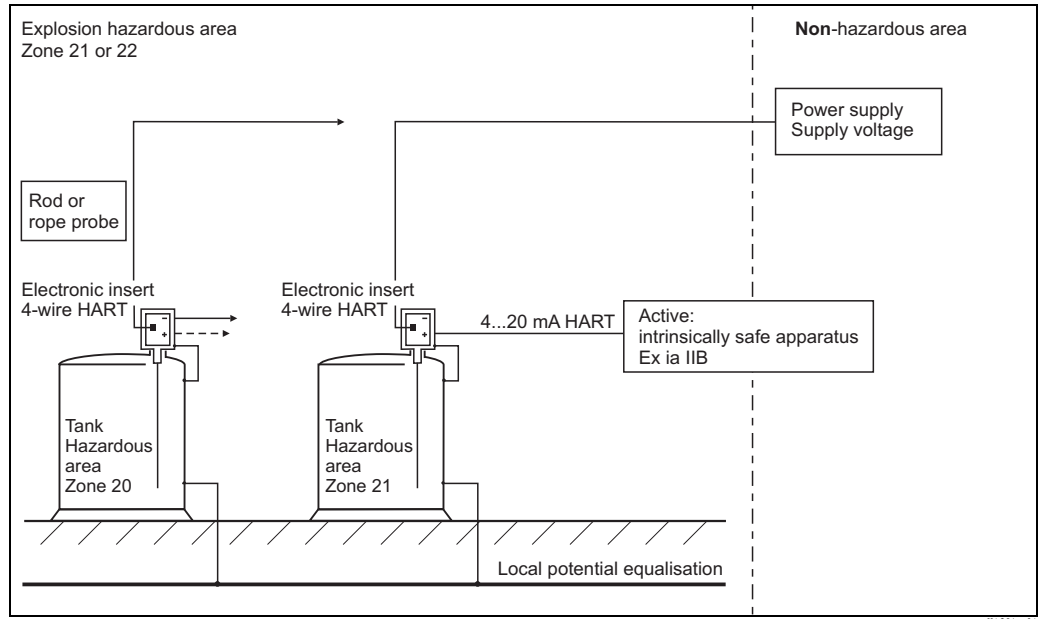


Fig. 1

4-wire:

Power supply Ue	Ue = 90...253 V AC, or Ue = 10.5...32 V DC, 50/60 Hz Um = 250 V AC	Um = 60 V DC	Housing protection IP6x Observe voltage version
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Signal circuit	4...20 mA	Ex ia IIB, Ex ib IIB	see also Tab. 2 comment *1
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Application	Zone 20/21 or Zone 20/22 Zone 21	Probe in Zone 20, housing in Zone 21 or Probe in Zone 20, housing in Zone 22 Probe and housing in Zone 21
Type of protection	IP6x	
Max. working pressure	dependent on the probe	
Process temperature	dependent on the probe	

Housing F12		-40 °C ≤ Tu ≤ +80 °C	optionally with or without VU331 display and operating module
	Zone 21 (only on request)	only closed electronics compartment cover permitted	T 115 °C
	Zone 22 (for types with FMP40-Q.....)	electronics compartment cover with inspection glass permitted	T 83 °C

Option Remote display	FHX40	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 should be connected reliably.
- Only intrinsically-safe signal circuit permitted:
Minimum requirement for: probe in Zone 20: Ex ia IIB
probe in Zone 21: Ex ib IIB
(intrinsically safe values, see Tab. 2).
- The intrinsically safe signal circuit of the device is isolated from ground potential and has a dielectric strength of at least 500 Vrms with respect to it.
- The intrinsically safe signal circuits are galvanically isolated from other circuits up to a peak value of the nominal voltage of 375 V.
- The connection compartment cover must be mounted before commissioning (voltage activation).
Isolation between an intrinsically-safe signal circuit and a non-intrinsically safe power supply circuit must not be lifted.
- Connection compartment cover: "Do not open under voltage".
- 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).
- After aligning (rotating) the housing, retighten the fixing screw (see Operating Instructions).
- Only use suitable cable entries for the application.
- Continuous duty temperature of the cable $\geq T_a + 5$ K.
- The electronics compartment can be opened under voltage for configuring the device.
If the cover of electronics compartment is opened make sure that no dust may deposit.
Cover of terminal compartment or cover of electronics compartment: Torque ≥ 40 Nm.
- Only install the devices in media for which the wetted materials have sufficient durability.
- Install the device to exclude any mechanical damage or friction during the application.
Pay particular attention to flow conditions and fittings.
- Clean the surface of the product in time to prevent the product from being covered by the dust layer.
- 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".
 - GB15577-1995: "Safety regulations for dust explosive prevention and protection".
 - GB12476.2-2006: "Electrical apparatus for use in the presence of combustible dust, Part 1-2: Electrical apparatus protected by enclosures and surface temperature limitation - Selection, installation and maintenance".

Zone 21 - Application (housing without blanketing)

Tab. 1

4-wire in the F12 housing

Maximum permitted medium temperature (process connection) Probe in Zone 20 or Zone 21	Maximum permitted ambient temperature at the electronics housing (electronics housing in Zone 21) 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
+ 80 °C	80 °C	80 °C	80 °C	80 °C	80 °C
+ 95 °C	75 °C	75 °C	75 °C	75 °C	80 °C
+130 °C	70 °C	75 °C	70 °C	75 °C	80 °C
+150 °C	65 °C	75 °C	70 °C	75 °C	80 °C

Note: permitted probe temperature range must be observed

Tab. 2

Electrical data

Power supply circuit:		
Voltage version	AC	DC
Supply voltage	90...253 V AC, 50/60 Hz	10.5...32 V DC
Max. power	3.5 VA	1 W
Um	253 V AC	60 V DC

**Signal circuit in protection type:
intrinsic safety Ex ia IIB or Ex ib IIB**

For installation as per IEC/EN 60079-14 for connection to a certified intrinsically safe circuit with the following maximum values	
Version	active
	U _o = 21.4 V I _o = 237.48 mA P _o = 1.271 W R _i = 90.1 ohms Characteristic curve: linear Permanent values: I _o = 85 mA P _o = 1.17 W
effective inner inductance * ¹	Li = negligible
effective inner capacitance * ¹	Ci ≤ 10 nF
permitted outer capacitance for electric circuit in category ia * ¹	La = 0.15 mH, Ca ≤ 1 μF La = 0.5 mH, Ca ≤ 870 nF La = 1 mH, Ca ≤ 840 nF La = 3 mH, Ca ≤ 810 nF
permitted outer capacitance for electric circuit in category ib * ¹	La = 3 mH Ca = 1.22 μF

*¹: If the signal circuit is situated in Zone 21 or Zone 22 and the electrical connection is protected by means of suitable measures against mechanical damage (short-circuit/interruption), the values for the inner and permitted outer inductances and capacitances corresponding to material group IIB do not have to be taken into consideration. The measure for energy limitation by means of intrinsic safety (ia or ib, depending on the application) is not affected by this.

Tab. 4

Thermal data

An irreversible thermal fuse with cut-off temperature of 115 °C is implemented in the FMP40 4-wire transmitter			
	Probe located in Zone 20	Electronics housing located in Zone 21 Zone 22	
Maximum permitted ambient temperature	-40...+150 °C	-40...+80 °C	
Maximum surface temperature at 40 °C ambient temperature	+40 °C	+ 80 °C	+43 °C
Maximum surface temperature at 80 °C ambient temperature	+80 °C	+115 °C	+83 °C
Maximum surface temperature for probe ambient temperatures > 80 °C and under simultaneous compliance of the ambient temperature at the electronics housing in accordance with Tab. 1	...+150 °C (identical to process temperature)	+115 °C	+83 °C

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相关资料

本文档是下列操作手册的组成部分：
BA242F/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

区域 20/21
区域 20/22
区域 21

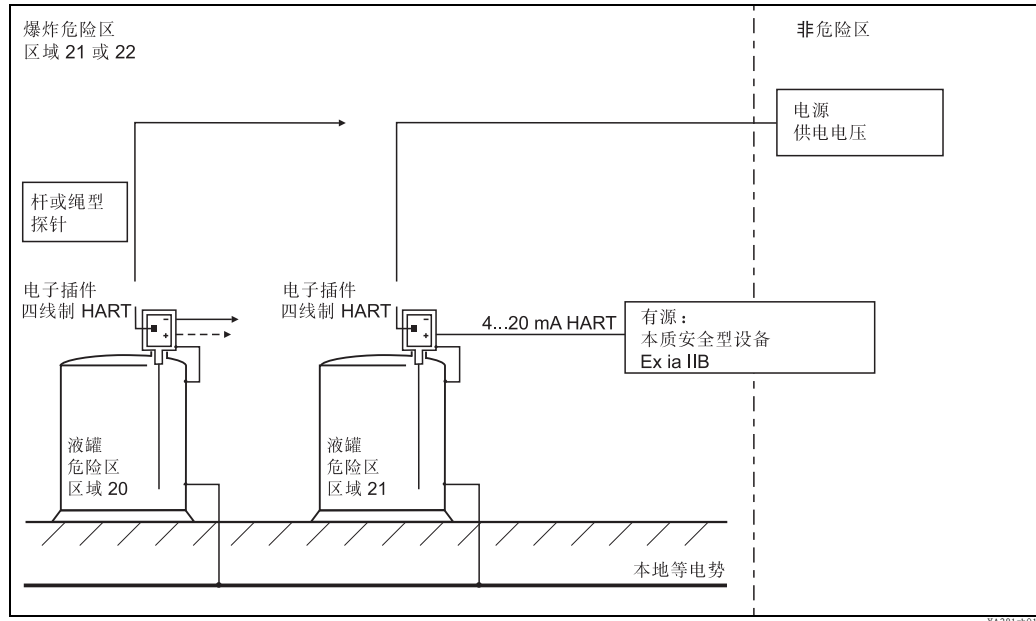


图 1

四线制：

电源 U_e	$U_e = 90...253 \text{ V AC}$ ， 或 $U_e = 10.5...32 \text{ V DC}$ ， 50/60 Hz $U_m = 250 \text{ V AC}$ $U_m = 60 \text{ V DC}$	外壳防护 IP6x 注意电压型号
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信号电路	4...20 mA	Ex ia IIB， Ex ib IIB	参见表 2 注释 *1
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应用	区域 20/21 或 区域 20/22 区域 21	探针在区域 20 中，外壳在区域 21 中，或者 探针在区域 20 中，外壳在区域 22 中 探针和外壳在区域 21 中
防护类型	IP6x	
最大工作压力	取决于探针	
过程温度	取决于探针	

外壳 F12		$-40 \text{ }^\circ\text{C} \leq T_u \leq +80 \text{ }^\circ\text{C}$	可选带有或不带有 VU331 显示屏 和操作模块
	区域 21 (仅在要求时)	仅允许使用闭合的 电子部件柜盖	T 115 °C
	区域 22 (对于带 FMP40-Q..... 的类型)	允许使用带观察窗的 电子部件柜盖	T 83 °C

远程显示器选项	FHX40	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。
- 外部接地连接部件应可靠连接。
- 仅允许使用本安型信号电路：
最低要求：探针在区域 20 中：Ex ia IIB
探针在区域 21 中：Ex ib IIB
(本安型数值参见表 2)。
- 设备的本安型信号电路与地电势绝缘，绝缘强度至少为对地 500 Vrms。
- 本安型信号电路应与标称电压峰值最高达 375 V 的其他电路电绝缘。
- 必须在调试 (接通电压) 前装上接线柜盖。
本安型信号电路与非本安型电源电路之间的绝缘不得升高。
- 接线柜盖：“勿带电压开启”。
- 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 (表 1)。
- 在对齐 (旋转) 外壳后，重新拧紧固定螺丝 (参见操作说明)。
- 仅使用适用于应用情况的电缆入口。
- 电缆持续工作温度 $\geq T_a + 5 K$ 。
- 为了配置设备，可以带电压打开电子部件柜。
如果电子部件柜盖打开，要确保没有积灰。
接线柜的盖罩或电子部件柜的盖罩：扭矩 $\geq 40 Nm$ 。
- 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。
- 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。
- 及时清洁产品表面，防止产品表面积灰。
- 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”。
 - GB15577-1995：“粉尘防爆安全规程”。
 - GB12476.2-2006：“可燃性粉尘环境用电气设备 第 1 部分：用外壳和限制表面温度保护的电气设备 第 2 节：电气设备的选择、安装和维护”。

区域 21 - 应用 (无密封外壳)

表 1

F12 外壳中的四线制

允许的最大 输入温度 (工艺连接件) 探针在区域 20 或 区域 21 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 21 内) 取决于介质温度				
	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
+ 80 °C	80 °C	80 °C	80 °C	80 °C	80 °C
+ 95 °C	75 °C	75 °C	75 °C	75 °C	80 °C
+130 °C	70 °C	75 °C	70 °C	75 °C	80 °C
+150 °C	65 °C	75 °C	70 °C	75 °C	80 °C

注意：必须遵守允许的探针温度范围

表 2
电气参数

电源电路：		
电压型号	AC	DC
供电电压	90...253 V AC, 50/60 Hz	10.5...32 V DC
最大功率	3.5 VA	1 W
Um	253 V AC	60 V DC

信号电路防护类型：
本安型 Ex ia IIB 或 Ex ib IIB

对于根据 IEC/EN 60079-14 来连接具有下列最大值的经过认证的本安型电路的安装	
版本	有源
	Uo = 21.4 V Io = 237.48 mA Po = 1.271 W Ri = 90.1 ohm 特征曲线：线性 永久值： Io = 85 mA Po = 1.17 W
有效内部电感 *1	Li = 可忽略
有效内部电容 *1	Ci ≤ 10 nF
ia 类电子线路的允许外部电容 *1	La = 0.15 mH, Ca ≤ 1 μF La = 0.5 mH, Ca ≤ 870 nF La = 1 mH, Ca ≤ 840 nF La = 3 mH, Ca ≤ 810 nF
ib 类电子线路的允许外部电容 *1	La = 3 mH Ca = 1.22 μF

*1：如果信号电路位于区域 21 或区域 22 中，而电气连接又有防止机械损坏（短路 / 中断）的适当防护，则不必考虑与材料组 IIB 相对应的内外外部允许电感和电容的数值。
本安型 (ia 或 ib, 取决于应用) 能量限制措施不受本条件影响。

表 4
热力学数据

FMP40 四线制变送器中使用了切断温度为 115 °C 的不可逆热力学保险丝			
	探针位于	电子外壳位于	
	区域 20	区域 21	区域 22
最大允许环境温度	-40...+150 °C	-40...+80 °C	
40 °C 环境温度下的最大表面温度	+40 °C	+ 80 °C	+43 °C
80 °C 环境温度下的最大表面温度	+80 °C	+115 °C	+83 °C
探针环境温度 > 80 °C 且符合表 1 中规定的电子外壳处的环境温度时的最大表面温度。	...+150 °C (等于过程温度)	+115 °C	+83 °C

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