



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



Solutions

Safety Instructions

Gammapilot M FMG60

4...20 mA HART

Ex d [ia] IIC T6, Ex de [ia] IIC T6
Ex NEPSI GYJ05399

XC001F-B

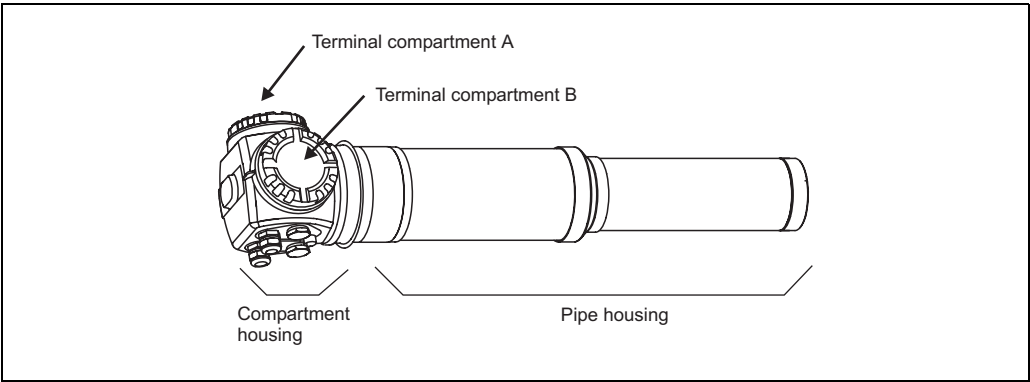
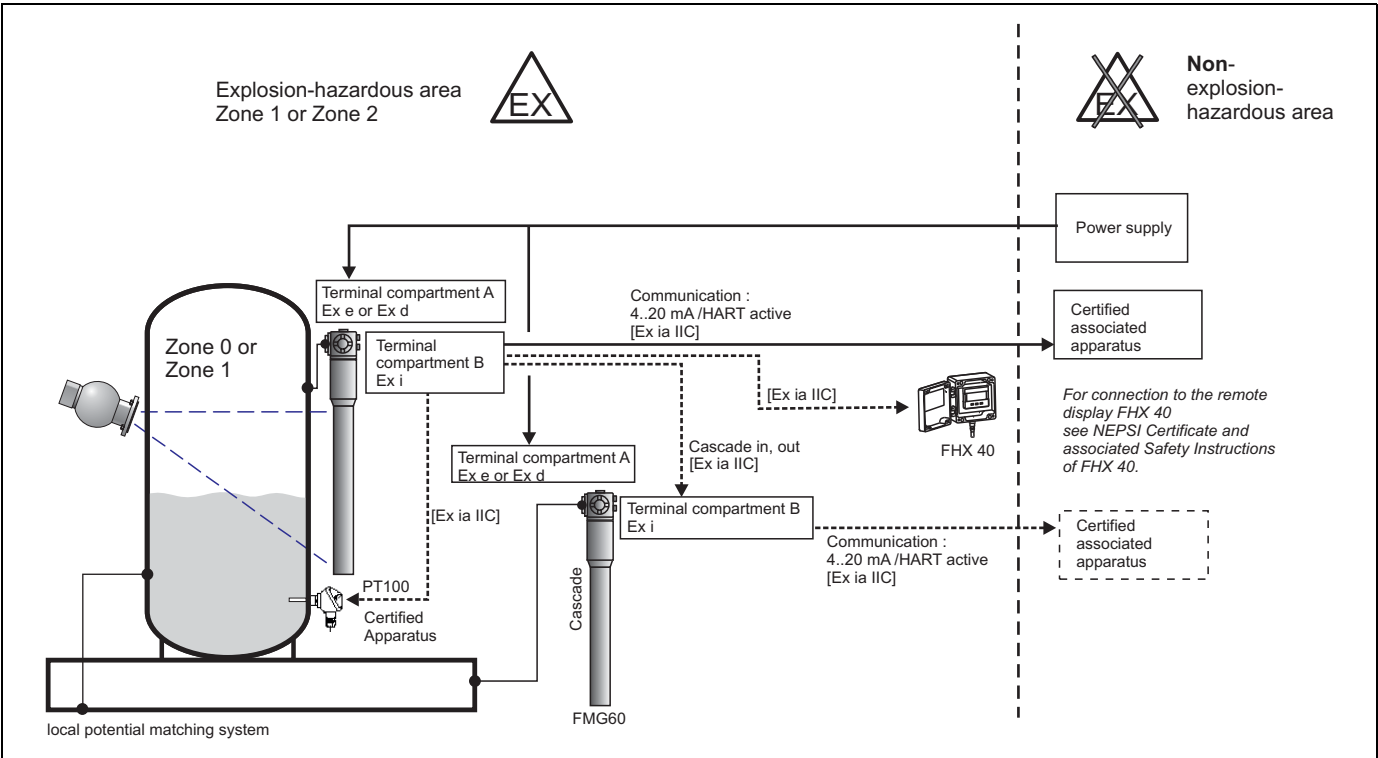
Safety Instructions for electrical apparatus for explosion-hazardous areas.
爆炸环境中电气仪表的安全指南。

Gammapilot M FMG60

Safety Instructions XC001F-B

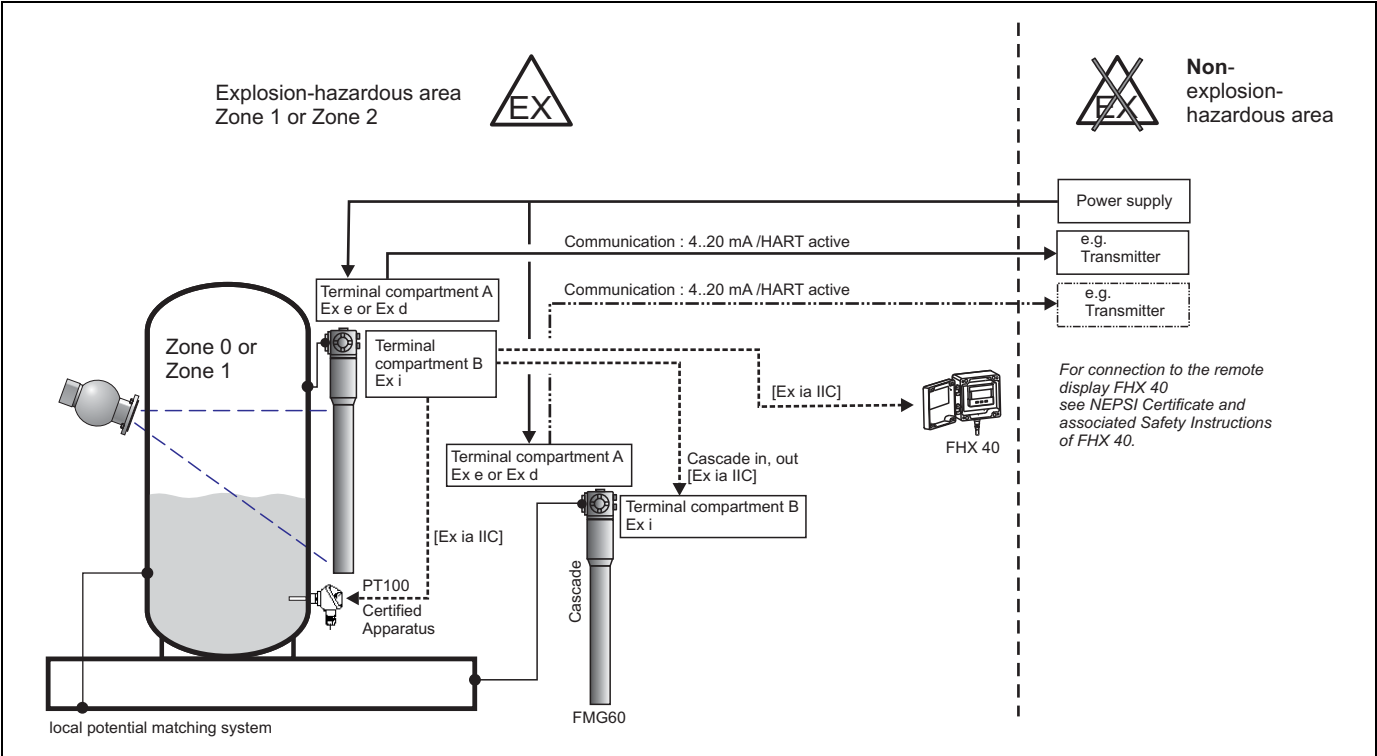
Associated Documentation	This document is an integral part of the following Operating Instructions: –HART: BA236F/00 The Operating Instructions which are supplied and correspond to the device type apply.	
Designation	Explanation of the labelling and type of protection can be found in the explosion protection brochure.	
Designation of explosion protection	Ex d [ia] IIC T6	Ex de [ia] IIC T6

Gammapilot M with circuit 4..20 mA/ Hart (active) in type of protection Intrinsic Safety "ia" :
Type : FMG 60-**B1***** , FMG60-**E1*****

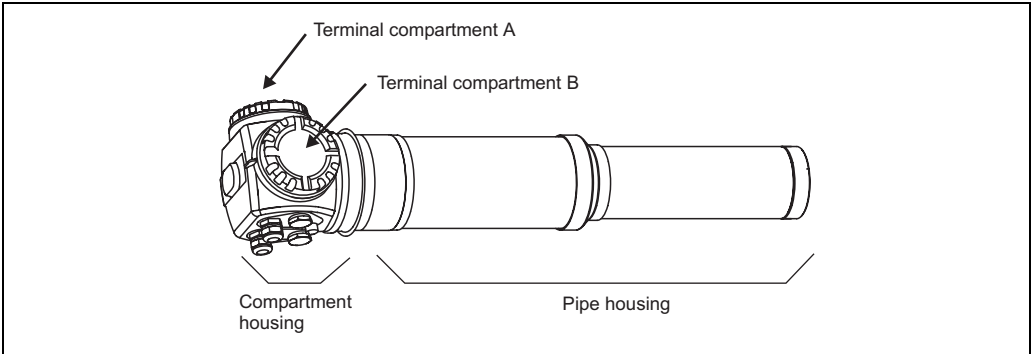


Certificate		NEPSI GYJ05399
Type of protection	Supply circuits (Terminal compartment A) :	Ex e or Ex d
	Signal circuits (Terminal compartment B) :	Ex [ia] IIC
Temperature class		T6
Ambient temperature	Detector without water cooling or detector with water cooling out of operation: ■ Instruments with NaI crystal :..... ■ Instruments with PVT plastic scintillator:	-40 °C ≤ Ta ≤ +60 °C -40 °C ≤ Ta ≤ +50 °C
	Detector with water cooling in operation: At the pipe housing (within the water cooling): ■ Instruments with NaI crystal :..... ■ Instruments with PVT plastic scintillator:	-40 °C ≤ Ta ≤ +60 °C -40 °C ≤ Ta ≤ +50 °C
	At the compartment housing:	-40 °C ≤ Ta ≤ +75 °C

Gammapilot M with circuit 4..20 mA/Hart (active) in type of protection Increased safety "e" or Flameproof Enclosure "d":
Type : FMG 60-**C1*****, FMG60-**D1*****



XC001F-A3

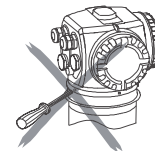


XC001F-A2

Certificate		NEPSI GYJ05399
Type of protection	Supply circuit and Signal circuit 4..20 mA/HART (Terminal compartment A) :	Ex e or Ex d
	Signal circuits (Terminal compartment B) :	Ex [ia] IIC
Temperature class		T6
Ambient temperature	Detector without water cooling or detector with water cooling out of operation: ■ Instruments with NaI crystal : ■ Instruments with PVT plastic scintillator:	-40 °C ≤ Ta ≤ +60 °C -40 °C ≤ Ta ≤ +50 °C
	Detector with water cooling in operation: At the pipe housing (within the water cooling): ■ Instruments with NaI crystal : ■ Instruments with PVT plastic scintillator: At the compartment housing:	-40 °C ≤ Ta ≤ +60 °C -40 °C ≤ Ta ≤ +50 °C -40 °C ≤ Ta ≤ +75 °C

Safety notes for installation in hazardous areas:

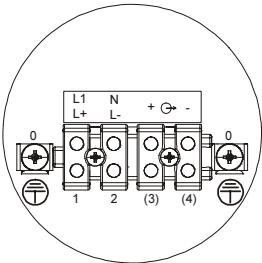
- For installation, use and maintenance of the product, users must observe the related requirements stated
 - in the Manufacturer's Safety and Operating Instructions,
 - in the standards of GB3836.13-2000: "Electrical Equipment for Use in Explosive Gas Atmospheres, Section 13: Examination and Servicing the Electrical Equipment for Use in Explosive Gas Atmospheres", GB3836.15-2000: "Electrical Equipment for Use in Explosive Gas Atmospheres, Section 15: Installation of Electrical Apparatus in Hazardous Areas (except in coal mines)", GB50257-1996: "Standards for Installation, Construction and Acceptance of Electrical Equipment in Explosive and Fire Hazardous Environments", and
 - any other valid standards and regulations
- When the transmitter is used and serviced on site, users must strictly follow the principle of "opening after the power is shut off" when working with the electrical junction box and the electronics compartment.
- The housing of the transmitter is equipped with a ground terminal; users must ensure that it is reliably connected to ground during installation and use.
- Users must not modify the electrical components or the connection scheme of the system on their own.
- Do not operate the sensor outside the specified electrical, thermal and mechanical parameters.
- The cable entries of the transmitter must be equipped with cable entry devices certified by NEPSI which comply with the national standards specified in GB3836.1-2000, GB3836.2-2000 (or GB3836.3-2000) and which have the corresponding explosion protection class. Redundant cable entries must be sealed with blind plugs. Cable entries and blind plugs shall additionally ensure a degree of protection of at least IP65.
- To maintain the ingress protection IP 65/ IP 67 of the housing, install the housing cover and cable entry devices correctly.
- Cable entry devices and sealing plugs of the terminal compartment A must not be exchanged with those of the terminal compartment B.
- Do not open the terminal compartment A if the supply voltage is switched on and a combustible atmosphere is present.
- If a combustible atmosphere is present, wait 3 minutes after switching off the supply voltage, before opening the housing.
- During operation, the covers must be screwed all the way in and the cover's safety catch must be fastened.
- If the ambient temperature is higher than 70°C use connecting cables for continuous duty temperature $\geq 85^{\circ}\text{C}$.
- The safety screws at the pipe housing must not be loosened.



Terminal compartment A : Increased safety "e" or Flameproof Enclosure "d"

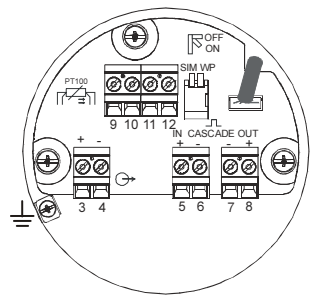
Type	Type of protection of terminal compartment A :
FMG60-C*B***** FMG60-C*C*****	Increased Safety "e"
FMG60-D*D***** FMG60-D*E*****	Flameproof Enclosure "d"

The cable entries of the transmitter must be equipped with cable entry devices certified by NEPSI which comply with the national standards specified in GB3836.1-2000, GB3836.2-2000 (or GB3836.3-2000) and which have the corresponding explosion protection class. Redundant cable entries must be sealed with blind plugs. Cable entries and blind plugs shall additionally ensure a degree of protection of at least IP65. For explosion protection type Increased Safety "e" the cable gland type "U2.UNI Dicht EEx e II, PTB 98 ATEX 3109" of Manufacturer Pflitsch GmbH und Co. KG is permitted in combination with the Gammapilot M detector.



Supply circuit		
Type AC-Power supply FMG 60-*1*****	L1 N	Ue = 90..253 VAC , 50/60 Hz, 8,5 VA
Type DC-Power supply FMG 60-*2*****	L+ L-	Ue = 18..36 VDC, 3,5 W Um = 253 VAC
Signal circuit		
FMG 60-**B1***** FMG 60-**E1*****	 + -	not connected
FMG 60-**C1***** FMG 60-**D1*****	 + -	4...20 mA/ HART (active) Um = 253 VAC The detector ensures galvanic isolation up to a maximum of 253 VAC between the signal circuit and any other circuit.

Terminal compartment B : Intrinsic Safety "ia"



FMG60-**B1*****, FMG60-**E1*****,
FMG60-**C1*****, FMG60-**D1*****

Signal circuit			Maximum External Parameters (Ex ia IIC)
4..20 mA/ Hart (active) see note *1		$U_0 = 21.2\text{ V}$ $I_0 = 92\text{ mA}$ $P_0 = 479\text{ mW}$ $R_i = 235\text{ }\Omega$ $C_i = 13.4\text{ nF}$ $L_i = 0$ Characteristic curve: linear $U_i = 30\text{ V}$ $I_i = 13\text{ mA}$ $P_i = 390\text{ mW}$	$C_0 = 156\text{ nF}$; $L_0 = 0,15\text{ mH}$ $C_0 = 116\text{ nF}$; $L_0 = 1\text{ mH}$
PT100		$U_0 = 8.4\text{ V}$ $I_0 = 8.3\text{ mA}$ $P_0 = 17.5\text{ mW}$ $R_i = 1012\text{ }\Omega$ $C_i = 0$ $L_i = 0$ Characteristic curve: linear	$C_0 = 1200\text{ nF}$; $L_0 = 1\text{ mH}$ $C_0 = 1800\text{ nF}$; $L_0 = 0.15\text{ mH}$
Cascade out		$U_0 = 8.4\text{ V}$ $I_0 = 19.2\text{ mA}$ $P_0 = 40.3\text{ mW}$ $R_i = 439\text{ }\Omega$ $C_i = 5.3\text{ nF}$ $L_i = 67\text{ }\mu\text{H}$ Characteristic curve: linear Only for connection to Gammapilot FMG60 Signal circuit "Cascade in"	$C_0 = 5.1\text{ }\mu\text{F}$; $L_0 = 69\text{ mH}$
Cascade in		$U_i = 8.4\text{ V}$ $I_i = 19.2\text{ mA}$ $P_i = 40.3\text{ mW}$ $C_i = 0$ $L_i = 67\text{ }\mu\text{H}$ Only for connection to Gammapilot FMG60 Signal circuit "Cascade out"	
Connection for FHX40		$U_0 = 4.7\text{ V}$ $I_0 = 37.7\text{ mA}$ $P_0 = 44.3\text{ mW}$ $R_i = 125\text{ }\Omega$ $C_i = 12.7\text{ nF}$ $L_i = 0$ Characteristic curve: linear	For connection to the NEPSI approved display FHX40 with associated cable in type of protection Ex ia IIC. Observe associated Safety Instructions ! $C_0 = 150\text{ }\mu\text{F}$, $L_0 = 25\text{ mH}$

*1 Note : Available at the types FMG60-**B1*****, FMG60-**E1*****,
not connected at the types FMG60-**C1*****, FMG60-**D1*****

Signal circuits in type of protection Intrinsic Safety "ia":

- Observe the rules for interconnection of intrinsically safe circuits according to the applicable standards (GB3836.15-2000)
- When the transmitter is connected to intrinsically safe instruments and associated equipment to establish the intrinsically safe explosion-protected system, it must conform to the following specifications:
 $U_o \leq U_i$, $I_o \leq I_i$, $P_o \leq P_i$, $C_o \geq C_i + C_c$, $L_o \geq L_i + L_c$
(Note: C_c and L_c represent the permissible distributed capacitance and inductance of the respective connected cable)
- The cable that connects the intrinsically safe instrument and associated equipment shall be a shielded cable with an outer insulation sheath and its shield layer shall be grounded.
- The intrinsically safe circuits are safely isolated against the other circuits up to a peak value of the rated voltage of 375 V.
- The intrinsically safe circuits of the instrument are earth-free and voltage-proof to earth by at least 500 Vrms
- Do not interconnect the 4..20mA/HART signal circuits of the instruments of a cascade set.
- If connecting the detector to approved intrinsically safe instruments of the category "ib", the type of protection changes in the following way: Ex ib.
- Do not operate a temperature sensor with ib-circuit in Zone 0.

Gammapilot M FMG60

安全指南 XC001F-B

相关资料

该文件是下列操作手册的组成部分：
-HART：BA236F/00
根据用户订购仪表的具体型号所提供的相应操作手册。

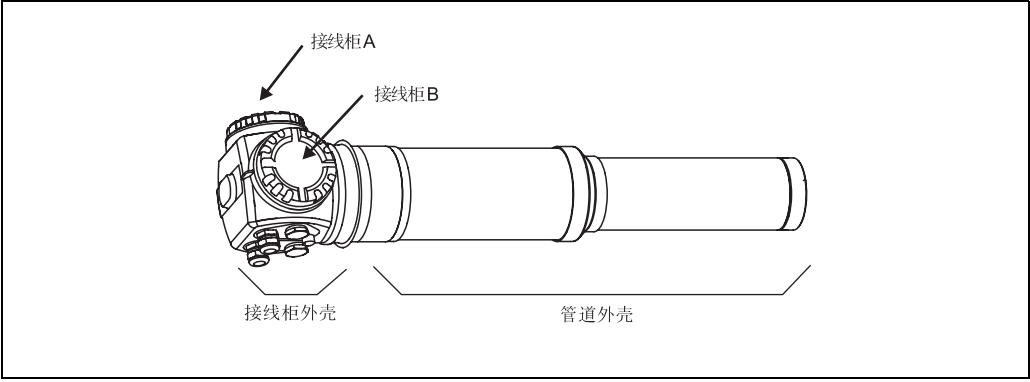
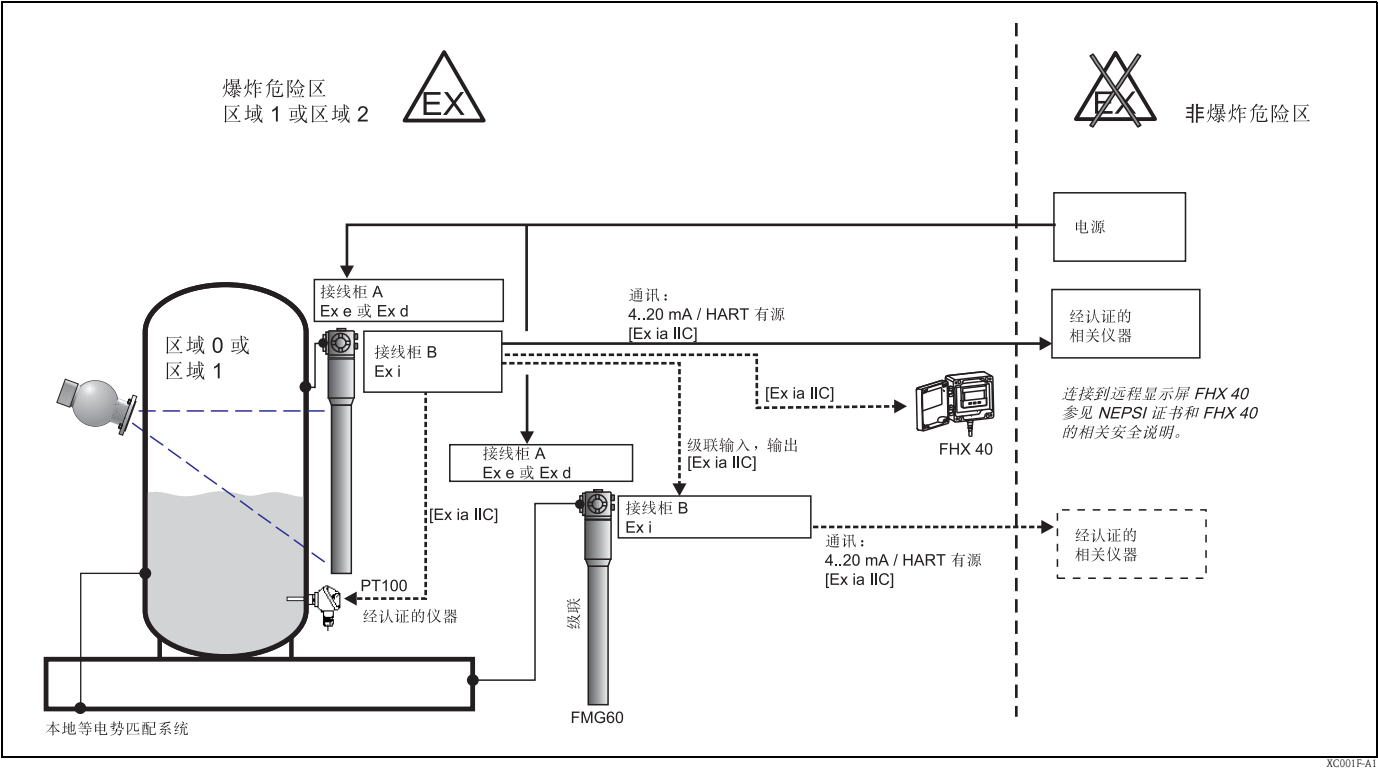
名称

防爆标志和防护类型的说明请查询防爆手册。

防爆代号

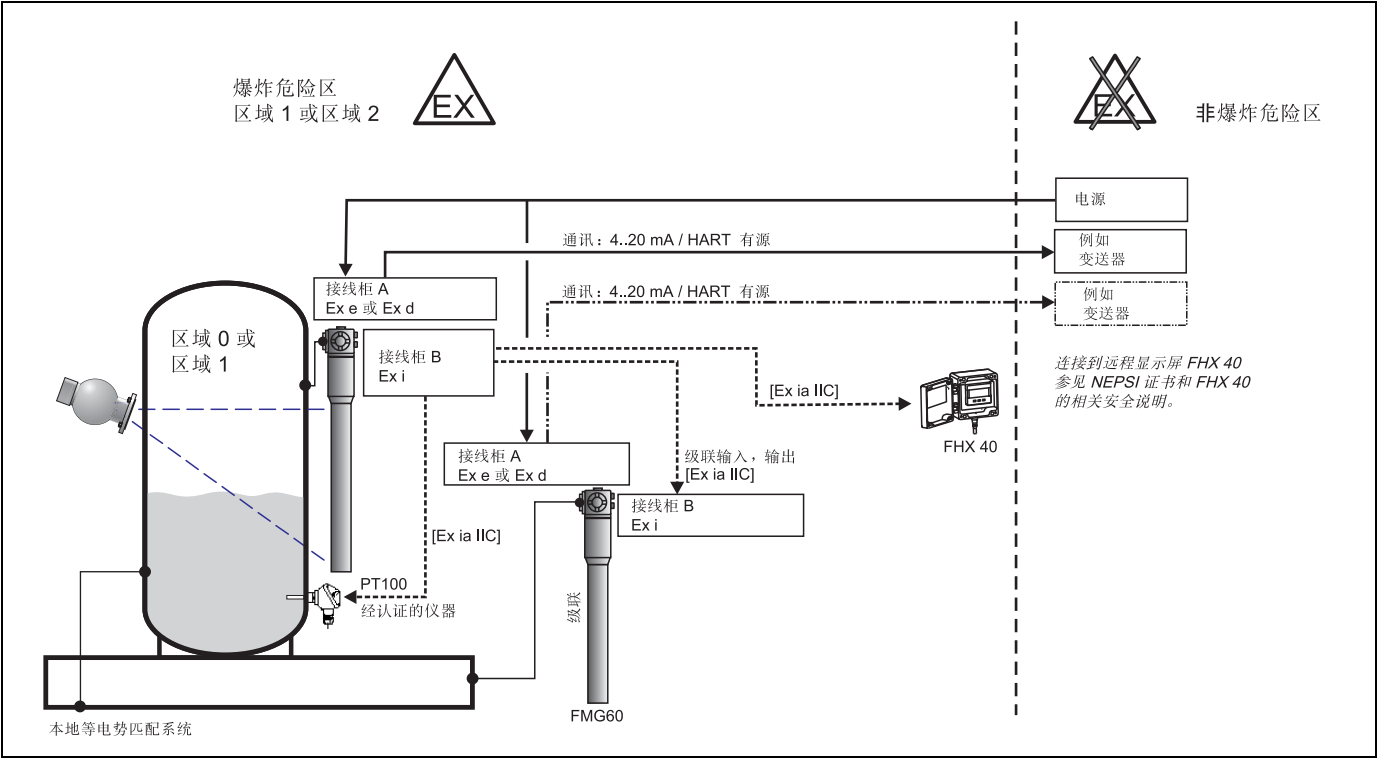
Ex d [ia] IIC T6
Ex de [ia] IIC T6

Gammapilot M，电路 4..20 mA/ HART (有源) 防护类型，本质安全型 “ia”：
类型：FMG 60-**B1****，FMG60-**E1****

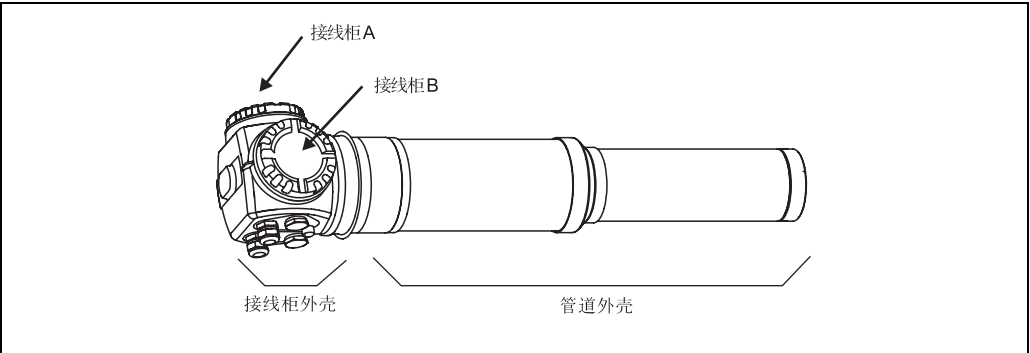


证书		NEPSI GYJ05399
防护类型	电源电路 (接线柜 A):	Ex e 或 Ex d
	信号电路 (接线柜 B):	Ex [ia] IIC
温度等级		T6
环境温度	无水冷检测器或 有水冷检测器，但未运行： ■ NaI 晶体仪器：..... ■ PVT 塑料闪烁器：.....	-40 °C ≤ Ta ≤ +60 °C -40 °C ≤ Ta ≤ +50 °C
	带运行水冷系统的检测器： 在管路外壳处 (水冷系统内)： ■ NaI 晶体仪器：..... ■ PVT 塑料闪烁器：..... 接线柜外壳处：.....	-40 °C ≤ Ta ≤ +60 °C -40 °C ≤ Ta ≤ +50 °C -40 °C ≤ Ta ≤ +75 °C

Gammapilot M，电路 4..20 mA/HART (有源)，防护类型增强安全“e”或防火罩“d”：
类型：FMG 60-**C1****，FMG60-**D1****



XC001F-A3

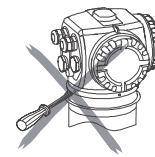


XC001F-A2

证书		NEPSI GYJ05399
防护类型	电源电路和 信号电路 4..20 mA/HART (接线柜 A):	Ex e 或 Ex d
	信号电路 (接线柜 B):	Ex [ia] IIC
温度等级		T6
环境温度	无水冷检测器或 有水冷检测器，但未运行: ■ NaI 晶体仪器: ■ PVT 塑料闪烁器:	-40 °C ≤ Ta ≤ +60 °C -40 °C ≤ Ta ≤ +50 °C
	带运行水冷系统的检测器: 在管路外壳处 (水冷系统内): ■ NaI 晶体仪器: ■ PVT 塑料闪烁器: 接线柜外壳处:	-40 °C ≤ Ta ≤ +60 °C -40 °C ≤ Ta ≤ +50 °C -40 °C ≤ Ta ≤ +75 °C

在防爆区安装的安全提示：

- 在安装、使用和维护产品时，用户必须遵守
 - “制造商安全和操作说明”，
 - GB3836.13-2000 标准中的规定：“爆炸性气体环境中使用的电子设备，第 13 节：爆炸性气体环境中使用的电子设备的检查和维护”，GB3836.15-2000：“爆炸性气体环境中使用的电子设备，第 15 节：防爆区中电子仪器的安装 (除煤矿之外)”，GB50257-1996：“爆炸性及火灾危险环境下电子设备的安装、构架和验收标准”，及
 - 其它任何有效的标准和规定
- 当在现场使用和维护变送器时，用户在使用电子接线盒和电子接线柜时必须严格遵守“先断电再开箱”的准则。
- 变送器的外壳装配有接地端子；在安装和使用的过程中，用户应确保该端子可靠接地。
- 用户不得擅自修改电子部件或系统连接布局。
- 请勿在指定的电气、热量和机械因数之外运行传感器。
- 变送器的电缆入口必须装配有经 NEPSI (国际防爆实验室) 认证的电缆入口设备，必须符合 GB3836.1-2000，GB3836.2-2000 (或 GB3836.3-2000) 中规定的国家标准及相应的防爆等级。冗余电缆入口必须用绝缘塞密封。电缆入口和绝缘塞应确保至少 IP65 的保护等级。
- 要维持外壳入口防护 IP65/67，请正确安装外壳封盖和电缆入口。
- 电缆入口设备和接线柜 A 的密封塞不得与接线柜 B 的互换。
- 如果供电电压处于打开状态且处于易燃环境中，请勿打开接线柜 A。
- 如果存在易燃环境，请等待供电电压切断 3 分钟后才打开外壳。
- 在操作过程中，盖罩必须始终拧紧且盖罩的安全销子必须紧固。
- 如果环境温度高于 70°C，则请使用持续工作温度 $\geq 85^{\circ}\text{C}$ 的连接电缆。
- 管道外壳处的安全螺丝不得松脱。

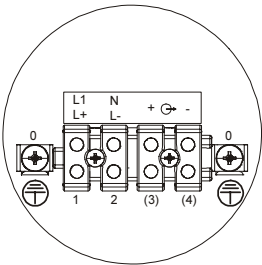


接线柜 A：

增强安全 “e” 或防火罩 “d”

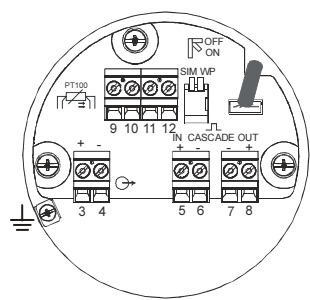
类型	接线柜 A 的防护类型：
FMG60-C*B***** FMG60-C*C*****	增强安全 “e”
FMG60-D*D***** FMG60-D*E*****	防火罩 “d”

变送器的电缆入口必须装配有经 NEPSI (国际防爆实验室) 认证的电缆入口设备，必须符合 GB3836.1-2000， GB3836.2-2000 (或 GB3836.3-2000) 中规定的国家标准及相应的防爆等级。冗余电缆入口必须用绝缘塞密封。电缆入口和绝缘塞应确保至少 IP65 的保护等级。允许将防爆类型为增强安全 “e” 的电缆栓塞类型 “U2.UNI Dicht EEx e II， PTB 98 ATEX 3109” (制造商 Pflichtsch GmbH und Co. KG) 与 Gammapilot M 检测器一同使用。



电源电路		
交流类型电源 FMG 60-*1*****	L1 N	Ue = 90..253 VAC， 50/60 Hz， 8.5 VA
直流类型电源 FMG 60-*2*****	L+ L-	Ue = 18..36 VDC， 3.5 W Um = 253 VAC
信号电路		
FMG 60-**B1***** FMG 60-**E1*****	 + -	未连接
FMG 60-**C1***** FMG 60-**D1*****	 + -	4...20 mA/ HART (有源) Um = 253 VAC 检测器确保了信号电路和其它电路之间最大 253 VAC 的电气隔离。

接线柜 B：本质安全型 “ia”



FMG60-**B1****, FMG60-**E1****,
FMG60-**C1****, FMG60-**D1****

信号电路		最大外部参数 (Ex ia IIC)	
4...20 mA/ HART (有源) 参见提示 *1		$U_0 = 21.2\text{ V}$ $I_0 = 92\text{ mA}$ $P_0 = 479\text{ mW}$ $R_i = 235\text{ }\Omega$ $C_i = 13.4\text{ nF}$ $L_i = 0$ 特征曲线：线性 $U_i = 30\text{ V}$ $I_i = 13\text{ mA}$ $P_i = 390\text{ mW}$	$C_0 = 156\text{ nF} ; L_0 = 0.15\text{ mH}$ $C_0 = 116\text{ nF} ; L_0 = 1\text{ mH}$
PT100		$U_0 = 8.4\text{ V}$ $I_0 = 8.3\text{ mA}$ $P_0 = 17.5\text{ mW}$ $R_i = 1012\text{ }\Omega$ $C_i = 0$ $L_i = 0$ 特征曲线：线性	$C_0 = 1200\text{ nF} ; L_0 = 1\text{ mH}$ $C_0 = 1800\text{ nF} ; L_0 = 0.15\text{ mH}$
级联输出		$U_0 = 8.4\text{ V}$ $I_0 = 19.2\text{ mA}$ $P_0 = 40.3\text{ mW}$ $R_i = 439\text{ }\Omega$ $C_i = 5.3\text{ nF}$ $L_i = 67\text{ }\mu\text{H}$ 特征曲线：线性 只用于连接到 Gammapilot FMG60 信号电路 “级联输入”	$C_0 = 5.1\text{ }\mu\text{F} ; L_0 = 69\text{ mH}$
级联输入		$U_i = 8.4\text{ V}$ $I_i = 19.2\text{ mA}$ $P_i = 40.3\text{ mW}$ $C_i = 0$ $L_i = 67\text{ }\mu\text{H}$ 只用于连接到 Gammapilot FMG60 信号电路 “级联输出”	
FHX40 的连接		$U_0 = 4.7\text{ V}$ $I_0 = 37.7\text{ mA}$ $P_0 = 44.3\text{ mW}$ $R_i = 125\text{ }\Omega$ $C_i = 12.7\text{ nF}$ $L_i = 0$ 特征曲线：线性	用于连接到经 NEPSI (国际防爆实验室) 认证的显示屏 FHX40, 使用防护类型 Ex ia IIC 的相关电缆。 请遵守相关安全指南！ $C_0 = 150\text{ }\mu\text{F} ; L_0 = 25\text{ mH}$

*1 提示：可用于类型 FMG60-**B1****, FMG60-**E1****,
未连接于类型 FMG60-**C1****, FMG60-**D1****

信号电路防护类型本质安全型 “ia”：

- 请遵守适用标准 (GB3836.15-2000) 中的本安型电路互连准则
- 当变送器连接到本质安全型仪器和相关设备以建立本质安全型防爆系统，必须符合下列技术规范：
 $U_o \leq U_i$ ， $I_o \leq I_i$ ， $P_o \leq P_i$ ， $C_o \geq C_i + C_c$ ， $L_o \geq L_i + L_c$
(提示：Cc 和 Lc 表示各相应连接电缆的允许分布电容和电感)
- 连接本质安全型仪器和相关设备的电缆应为具有外部绝缘护套的屏蔽电缆，且其屏蔽层应接地。
- 本安型电路应与峰值为 375 V 额定电压的其它电路安全隔离。
- 仪器的本安型电路为免接地，且耐地面电压至少 500 Vrms
- 请勿互连级联机组仪器的 4..20mA/HART 信号电路。
- 如果将检测器与 “ib” 类的经认证的本质安全型仪器相连接，则防护类型以下述方式更改：
Ex ib。
- 请勿在区域 0 中使用带有 ib 电路的温度传感器。

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