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71670281
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Safety Instructions
Gammapilot FMG50

Control Drawing IS
Class I, II, III, Div. 1, Groups A-G
Class I, Zone 1, AEx/Ex db ia IIC Gb
Class I, Div. 2, Groups A-D

Endress+Hauser
People for Process Automation

Gammapilot FMG50

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About this document

The document number of these Safety Instructions (XA) must match the information on the nameplate.

Associated documentation

All documentation is available on the Internet:
www.endress.com/Deviceviewer
(enter the serial number from the nameplate).

To commission the device, please observe the Operating Instructions pertaining to the device:

BA01966F

Certificates and declarations

CSA C/US certificate

Certificate number:
80047505

Manufacturer address

Endress+Hauser SE+Co. KG
Hauptstraße 1
79689 Maulburg, Germany

Address of the manufacturing plant: See nameplate.

Extended order code

The extended order code is indicated on the nameplate, which is affixed to the device in such a way that it is clearly visible. Additional information about the nameplate is provided in the associated Operating Instructions.

Structure of the extended order code

FMG50	–	**********	+	A*B*C*D*E*F*G*..
(Device type)		*(Basic specifications)*		*(Optional specifications)*

* = Placeholder
At this position, an option (number or letter) selected from the specification is displayed instead of the placeholders.

Basic specifications

The features that are absolutely essential for the device (mandatory features) are specified in the basic specifications. The number of positions depends on the number of features available.
The selected option of a feature can consist of several positions.

Optional specifications

The optional specifications describe additional features for the device (optional features). The number of positions depends on the number of features available. The features have a 2-digit structure to aid identification (e.g. JA). The first digit (ID) stands for the feature group and consists of a number or a letter (e.g. J = Test, Certificate). The second digit constitutes the value that stands for the feature within the group (e.g. A = 3.1 material (wetted parts), inspection certificate).

More detailed information about the device is provided in the following tables. These tables describe the individual positions and IDs in the extended order code which are relevant to hazardous locations.

Extended order code: Gammapilot

The following specifications reproduce an extract from the product structure and are used to assign:
- This documentation to the device (using the extended order code on the nameplate).
- The device options cited in the document.

Device type

FMG50

Basic specifications

Position 1, 2 (Approval)		
Selected option		**Description**
FMG50	CB	CSA C/US IS Cl. I, II, III, Div. 1, Gp. A-G; Cl. I, Zone 1, AEx/Ex db ia IIC T6 Gb; Cl. I, Div. 2, Gp. A-D

Position 3, 4 (Output)		
Selected option		**Description**
FMG50	BA	2-wire, 4-20 mA HART
	DA	2-wire, PROFIBUS PA
	FA	2-wire, PROFINET, 10Mbit/s (APL)

Position 5 (Display, Operation)		
Selected option		**Description**
FMG50	A	W/o; via communication
	C	Segment display w/o buttons
	D	Segment display w/o buttons + Bluetooth
	E	Graphic display
	F	Graphic display + Bluetooth
	N	Prepared for display FHX50B + Thread NPT1/2

Position 8 (Application)		
Selected option		**Description**
FMG50	A	Ambient temperature -40...60°C/ -40...140°F (PVT)
	B	Ambient temperature -20...80°C/ -4...176°F (PVT HT) [1]
	C	Ambient temperature -40...80°C/ -40...176°F (NaI) [1]

1) For IS and Div. 2 applications: Limited to 70 °C

Optional specifications

ID Nx (Accessory Mounted)		
Selected option		**Description**
FMG50	NA	Overvoltage protection

Safety instructions: General

- The device is intended to be used in hazardous locations as defined in the Canadian Electrical Code, Part I or the National Electrical Code (NFPA70). If no potentially explosive atmospheres are present or if additional protective measures have been taken: The device may be operated according to the manufacturer's specifications.
- Comply with the installation and safety instructions in the Operating Instructions.
- Staff must meet the following conditions for mounting, electrical installation, commissioning and maintenance of the device:
  - Be suitably qualified for their role and the tasks they perform
  - Be trained in explosion protection
  - Be familiar with national regulations
- Install the device according to the manufacturer's instructions and national regulations.

- Do not operate the device outside the specified electrical, thermal and mechanical parameters.
- Avoid electrostatic charging:
  - Of plastic surfaces (e.g. enclosure, sensor element, special varnishing, attached additional plates, ...)
  - Of isolated capacities (e.g. isolated metallic plates)
- Alterations to the device can affect the explosion protection and must be carried out by staff authorized to perform such work by Endress+Hauser.

Safety instructions: Specific conditions of use

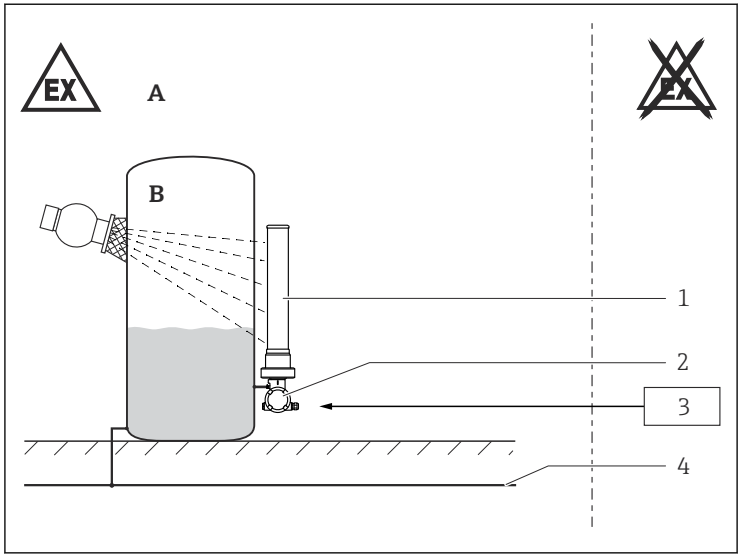
- To avoid electrostatic charging: Do not rub surfaces with a dry cloth.
- In the event of additional or alternative special varnishing on the enclosure or other metal parts or for adhesive plates:
  - Observe the danger of electrostatic charging and discharge.
  - Do not install in the vicinity of processes (≤ 0.5 m) generating strong electrostatic charges.

Designation AEx/Ex db ia IIC Gb

- Type of protection Ex ia refers to the protection method for field wiring connections and transmitter enclosure electronics.
- Type of protection Ex db refers to the protection method for sensor enclosure.

Detector pipe (Ex d)
Flameproof joints are not intended to be repaired.

Safety instructions: Installation



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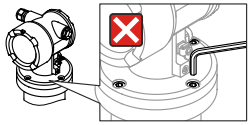
A Zone 1; Class I, II, III, Div. 1, Groups A-G or Class I, Div. 2, Groups A-D
B Zone 0 or 1 or 2; Class I, Div. 1 or Div. 2
1 Detector pipe (XP / Ex d)
2 Enclosure
3 Certified associated apparatus
4 Local potential equalization

- After aligning (rotating) the enclosure, retighten the fixing screw.
- The safety screws at the pipe enclosure must not be loosened:



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- Continuous service temperature of the connecting cable: ≥ T_a+20 K.
- Observe the pertinent guidelines when interconnecting intrinsically safe circuits.

Basic specification, Position 5 = N
Observe national regulations and standards for conduit systems.

Potential equalization

Integrate the device into the local potential equalization.

Overvoltage protection

Optional specification, ID Nx = NA
The intrinsically safe input power circuit of the device is isolated from ground. The dielectric strength is at least 290 V_{rms}.

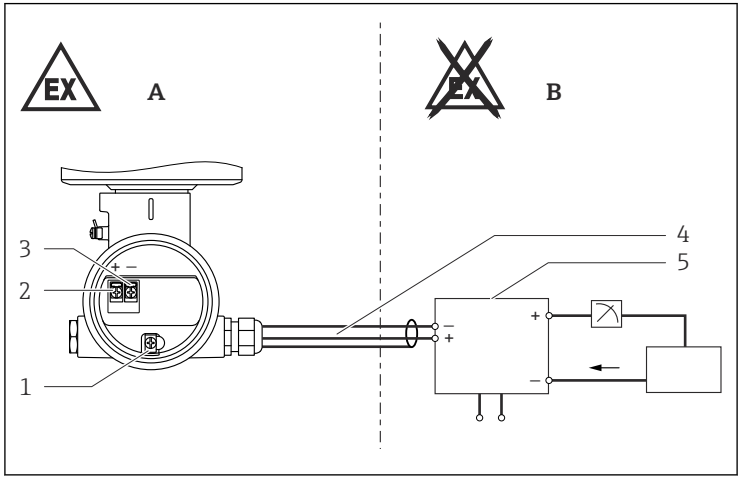
Intrinsic safety

General

- Install per National Electrical Code (NFPA70) or Canadian Electrical Code, Part I (C22.1), as applicable.
- For transmitter parameters: See "Connection data" section.
- Associated devices with galvanic isolation between the intrinsically safe and non-intrinsically safe circuits are preferred.
- Control room equipment may not use or generate over 250 V_{rms}.
- Always follow the installation instructions provided by the intrinsic safety barrier manufacturer when installing this equipment.
- WARNINGS: Substitution of components may impair intrinsic safety.
- The transmitter enclosure is to be connected to ground via internal or external ground terminals.
- The intrinsically safe input power circuit of the device is isolated from ground. The dielectric strength is at least 500 V_{rms}.

4-20 mA HART

Basic specification, Position 3, 4 = BA



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A Hazardous Location: Class I, II, III, Div. 1, Groups A-G; Class I, Zone 1, IIC Gb
B Non-hazardous (unclassified) location
1 Internal ground terminal (for cable shield)
2 Positive terminal
3 Negative terminal
4 Intrinsically safe wiring
5 Barrier / Associated equiment

Entity installation

Use an intrinsic safety barrier or other associated equipment that is approved for the country in use and satisfies the following conditions: $U_o \leq U_i$, $I_o \leq I_i$, $C_o \geq C_i + C_{cable}$, $L_o \geq L_i + L_{cable}$ and $P_o \leq P_i$.

PROFIBUS PA

Basic specification, Position 3, 4 = DA

FISCO installation

- The FISCO concept allows interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criteria for interconnection is that the voltage (U_i), the current (I_i) and the power (P_i) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (U_o), the current (I_o) and the power (P_o) levels which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance (C_i) and inductance (L_i) of each apparatus (other than the termination) connected to the fieldbus must be less than or equal to 5 nF and 10 µH respectively.
- In each segment only one active device, normally the associated apparatus, is allowed to provide the necessary energy for the fieldbus system. The voltage U_o of the associated apparatus has to be limited to the range of 14 to 24 V_{DC}. All other equipment connected to the bus cable has to be passive, meaning that they are not allowed to provide energy to the system, except to a leakage current of 50 µA for each connected device. Separately powered equipment needs a galvanic isolation to assure that the intrinsically safe fieldbus circuit remains passive.
- The cable used to interconnect the devices needs to have the parameters in the following range:
  - Loop resistance, R: 15 to 150 Ω/km
  - Inductance per unit length, L: 0.4 to 1 mH/km
  - Capacitance per unit length, C: 80 to 200 nF/km
  - $C = C_{line/line} + 0.5\ C_{line/screen}$, if both lines are floating, or
  - $C = C_{line/line} + C_{line/screen}$, if the screen is connected to one line
  - Length of spur cable: 30 m
  - Length of trunk cable: 1 km
  - Length of splice: 1 m
- At each end of the trunk cable an approved infallible line termination with the following parameters is suitable:
  - R = 90 to 100 Ω
  - C = 0 to 2.2 µF
- One of the allowed terminations might already be integrated in the associated apparatus.
- The number of passive devices connected to the bus segment is not limited due to IS reasons. If the above rules are respected, up to a total length of 1000 m (sum of the length of trunk cable and all spur cables), the inductance and capacitance of the cable will not impair the intrinsic safety of the installation.

Entity installation

Use an intrinsic safety barrier or other associated equipment that is approved for the country in use and satisfies the following conditions: $U_o \leq U_i$, $I_o \leq I_i$, $C_o \geq C_i + C_{cable}$, $L_o \geq L_i + L_{cable}$ and $P_o \leq P_i$.

Ethernet - APL

Basic specification, Position 3, 4 = FA

2-WISE installation

- The 2-WISE concept allows interconnection of intrinsically safe apparatus and associated apparatus not specially assessed for such a combination. For the acceptance of the interconnection of the different intrinsically safe circuits of these apparatus, the comparison of the voltage U_i with U_o, the current I_i with I_o, and the power P_i with P_o of the interconnected circuits must demonstrate that U_i, I_i and P_i are equal to or greater than U_o, I_o and P_o of the connected circuits. In addition, the maximum internal capacitance (C_i) and maximum internal inductance (L_i) of each apparatus (other than those from auxiliary devices) connected to a 2-WISE system must not exceed 5 nF and 10 H respectively.
- In a powered 2-WISE system only 2 ports (power source and power load) are allowed to be connected at the opposite ends of a cable, with a maximum of two auxiliary devices connected in between. The power source port supplies DC power to the system, and the power load port consumes DC power from the system. Auxiliary device ports may also consume DC power from the system. The voltage U_o of a power source port must be in the range of 14 to 17.5 V.
- Any other device connected to the cable shall be passive, meaning that it is not allowed to provide energy to the system, with the exception of a leakage current of 1 mA for a power load port and a leakage current of 50 A for each auxiliary device port. The intrinsically safe circuit of a 2-WISE port shall be galvanically isolated from non-intrinsically safe circuits.
- The parameters of cable used to interconnect 2-WISE ports must be as follows:
  - Cable resistance, R_c: 15 to 150 Ω/km
  - Cable inductance, L_c: 0.4 to 1 mH/km
  - Cable capacitance, C_c: 45 to 200 nF/km
  - $C = C_{line/line} + 0.5\ C_{line/screen}$, if both lines are floating, or
  - $C = C_{line/line} + C_{line/screen}$, if the screen is connected to one line
  - Length of cable (not including cable stubs): ≤ 200 m
  - Length of cable stubs: ≤ 1 m
- If the above rules are respected, the inductance and the capacitance of the cable will not impair the intrinsic safety of the installation.

Entity installation

Use an intrinsic safety barrier or other associated equipment that is approved for the country in use and satisfies the following conditions: $U_o \leq U_i$, $I_o \leq I_i$, $C_o \geq C_i + C_{cable}$, $L_o \geq L_i + L_{cable}$ and $P_o \leq P_i$.

Class I, Div. 2, Groups A-D

- Install per National Electrical Code (NFPA70) or Canadian Electrical Code, Part I (C22.1), as applicable.
- Use wiring and sealing methods appropriate for the location.
- The device is a nonincendive (NI) electrical equipment per UL121201 and CSA C22.2 No. 213.
- Associated apparatus not required.
- Enclosure is not required to be explosionproof/flameproof when installed in Class I, Division 2 locations.
- WARNINGS: Substitution of components may impair suitability for hazardous locations. Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

Basic specification, Position 5 = N
When prepared for use with an approved remote display FHX50B, remote display is suitable for Class I, Division 2 locations only and connection between transmitter enclosure and remote display is nonincendive field wiring.

Temperature tables

Intrinsic safety

Basic specification, Position 3, 4 = BA

with Basic specification, Position 8	**Temperature class**	**Ambient temperature T_a (ambient)** *with Basic specification*	
		Position 5 = A, N	*Position 5 = C, D, E, F*
= A	T6	−40 °C ≤ T_a ≤ +60 °C	−40 °C ≤ T_a ≤ +60 °C
= B	T6	−20 °C ≤ T_a ≤ +70 °C	−20 °C ≤ T_a ≤ +60 °C
	T5	−20 °C ≤ T_a ≤ +75 °C	−20 °C ≤ T_a ≤ +65 °C
= C	T6	−40 °C ≤ T_a ≤ +70 °C	−40 °C ≤ T_a ≤ +60 °C
	T5	−40 °C ≤ T_a ≤ +75 °C	−40 °C ≤ T_a ≤ +65 °C

Basic specification, Position 3, 4 = DA

with Basic specification, Position 8	**Temperature class**	**Ambient temperature T_a (ambient)** *with Basic specification*	
		Position 5 = A, N	*Position 5 = C, D, E, F*
= A	T6	−40 °C ≤ T_a ≤ +60 °C	−40 °C ≤ T_a ≤ +60 °C
= B	T6	−20 °C ≤ T_a ≤ +60 °C	−20 °C ≤ T_a ≤ +60 °C
	T5	−20 °C ≤ T_a ≤ +65 °C	−20 °C ≤ T_a ≤ +65 °C
= C	T6	−40 °C ≤ T_a ≤ +60 °C	−40 °C ≤ T_a ≤ +60 °C
	T5	−40 °C ≤ T_a ≤ +65 °C	−40 °C ≤ T_a ≤ +65 °C

Basic specification, Position 3, 4 = FA

with Basic specification, Position 8	**Temperature class**	**Ambient temperature T_a (ambient)** *with Basic specification*	
		Position 5 = A, N	*Position 5 = C, D, E, F*
= A	T6	−40 °C ≤ T_a ≤ +60 °C	−40 °C ≤ T_a ≤ +60 °C
= B	T6	−20 °C ≤ T_a ≤ +70 °C	−20 °C ≤ T_a ≤ +60 °C
	T5	−20 °C ≤ T_a ≤ +75 °C	−20 °C ≤ T_a ≤ +65 °C
= C	T6	−40 °C ≤ T_a ≤ +70 °C	−40 °C ≤ T_a ≤ +60 °C
	T5	−40 °C ≤ T_a ≤ +75 °C	−40 °C ≤ T_a ≤ +65 °C

Division 2

Basic specification, Position 3, 4 = BA, DA, FA

with Basic specification, Position 8	**Temperature class**	**Ambient temperature T_a (ambient)**
= A	T6	−40 °C ≤ T_a ≤ +60 °C
= B	T6	−20 °C ≤ T_a ≤ +70 °C
= C	T6	−40 °C ≤ T_a ≤ +70 °C

Connection data

Intrinsic safety

Basic specification, Position 3, 4 = BA

Power supply
$U_i \leq 30\ V_{DC}$ $I_i \leq 300\ mA$ $P_i \leq 1\ W$ $C_i \leq 10\ nF$ $L_i = 0$

Basic specification, Position 3, 4 = DA

Power supply	
FISCO $U_i \leq 17.5\ V_{DC}$ $I_i \leq 380\ mA$ $P_i \leq 5.32\ W$ $C_i \leq 5\ nF$ $L_i = 0$	Entity $U_i \leq 24\ V_{DC}$ $I_i \leq 300\ mA$ $P_i \leq 1.2\ W$ $C_i \leq 5\ nF$ $L_i = 0$

Basic specification, Position 3, 4 = FA

Power supply	
2-WISE $U_i \leq 17.5\ V_{DC}$ $I_i \leq 380\ mA$ $P_i \leq 5.32\ W$ $C_i \leq 5\ nF$ $L_i = 0$	Entity $U_i \leq 17.5\ V_{DC}$ $I_i \leq 300\ mA$ $P_i \leq 1.2\ W$ $C_i \leq 5\ nF$ $L_i = 0$

Division 2

Basic specification, Position 3, 4 = BA

Power supply circuit
$U \leq 35\ V_{DC}$ [1] $P \leq 1\ W$

1) Supplied by Class 2 or limited energy source in accordance with CSA/UL 61010-1-12

Basic specification, Position 3, 4 = DA

Power supply circuit
$U \leq 32\ V_{DC}$ [1] $P \leq 0.7\ W$

1) Supplied by Class 2 or limited energy source in accordance with CSA/UL 61010-1-12

Basic specification, Position 3, 4 = FA

Power supply circuit
$U \leq 15\ V_{DC}$ [1)] $P \leq 0.7\ W$

1) Supplied by Class 2 or limited energy source in accordance with CSA/UL 61010-1-12

In connection with: *Basic specification, Position 5 = N*
Installation according to the specifications of FHX50B.

Only the type of protection suitable for the device shall be connected!

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