Safety Instructions
Gammapilot M FMG60
4-20 mA HART

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

TÜV 13.0916

Segurança
INMETRO TÜVRheinland OCP 0004

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Safety instructions for electrical apparatus for explosion-hazardous areas

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Gammapilot M
FMG60

4-20 mA HART

Associated Documentation

This document is an integral part of the following Operating Instructions:
BA00236F/00

The Operating Instructions which are supplied and correspond to the device type apply.

Supplementary Documentation

Explosion-protection brochure:
CP00021Z/11

Designation

Explanation of the labelling and type of protection can be found in the explosion protection brochure.

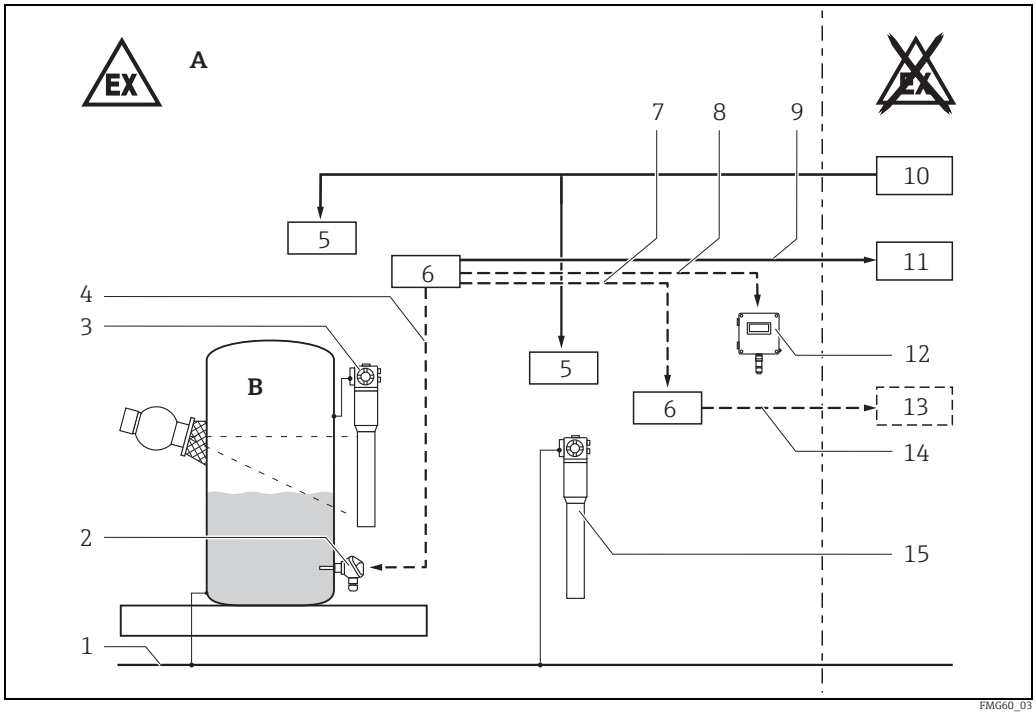
Designation of type of protection	**Ex de [ia Ga] IIC T6 Gb** **Ex d [ia Ga] IIC T6 Gb**

Applied standards

ABNT NBR IEC 60079-0 :2008
ABNT NBR IEC 60079-1 :2009
ABNT NBR IEC 60079-7 :2008
ABNT NBR IEC 60079-11:2009
ABNT NBR IEC 60079-26:2008

Circuit 4...20 mA/HART (active) in type of protection Intrinsic Safety "ia"

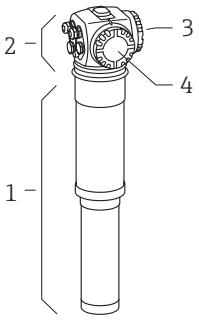
Type:
FMG60-**B1*****, FMG60-**E1*****, FMG60-**J1*****, FMG60-**K1*****,
FMG60-**L1*****



1

A *Zone 1 or Zone 2*
B *Zone 0 or Zone 1*

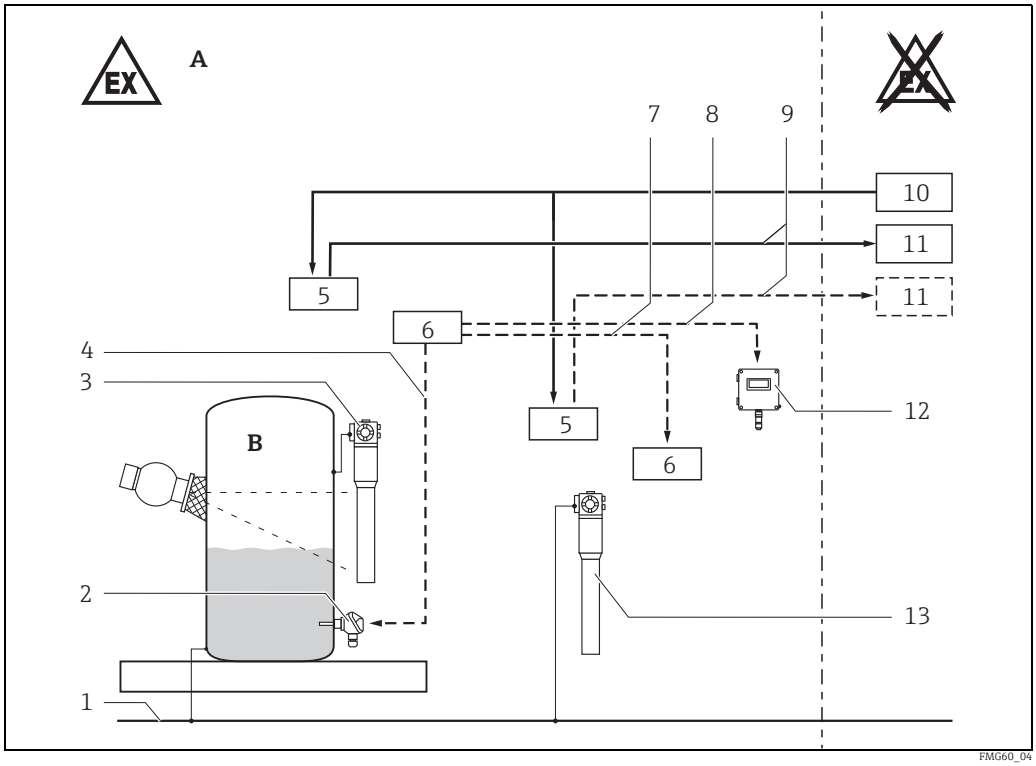
1 Local potential equalization line
2 PT100; certified apparatus
3 Gammapilot with NaJ crystal scintillator, PVT plastic scintillator
4 [Ex ia] circuit
5 Terminal compartment A (Ex d or Ex e)
6 Terminal compartment B (Ex i)
7 [Ex ia] circuit; Cascade in, out
8 [Ex ia] circuit
9 Communication: 4...20 mA/HART active [Ex ia]
10 Power supply
11 Certified associated apparatus
12 Remote display FHX40
13 Certified associated apparatus
14 Communication: 4...20 mA/HART active [Ex ia]
15 Gammapilot with NaJ crystal scintillator, PVT plastic scintillator



1 Pipe housing
2 Compartment housing
3 Terminal compartment A
4 Terminal compartment B

Circuit 4...20 mA/HART (active) in type of protection Increased Safety "e" or Flameproof Enclosure "d"

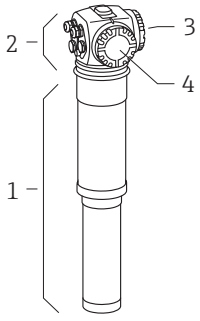
Type:
FMG60-**C1*****, FMG60-**D1*****, FMG60-**G1*****, FMG60-**H1*****



2

A *Zone 1 or Zone 2*
B *Zone 0 or Zone 1*

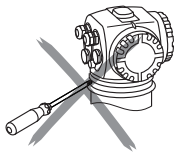
1 *Local potential equalization line*
2 *PT100; certified apparatus*
3 *Gammapilot with NaJ crystal scintillator, PVT plastic scintillator*
4 *[Ex ia] circuit*
5 *Terminal compartment A (Ex d or Ex e)*
6 *Terminal compartment B (Ex i)*
7 *[Ex ia] circuit; Cascade in, out*
8 *[Ex ia] circuit*
9 *Communication: 4...20 mA/HART active*
10 *Power supply*
11 *E.g. transmitter*
12 *Remote display FHX40*
13 *Gammapilot with NaJ crystal scintillator, PVT plastic scintillator*



1 *Pipe housing*
2 *Compartment housing*
3 *Terminal compartment A*
4 *Terminal compartment B*

Safety instructions: Installation

- Comply with the installation and safety instructions in the Operating Instructions.
- 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.
- To maintain the ingress protection of the housing IP65/IP67, install the housing cover, cable glands and blind plugs correctly.
- Connect the apparatus to the on-site potential equalization line.
- Cable glands as well as 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 when energized.
- In an explosive atmosphere: Minimum waiting time before opening the terminal compartment A after switching off the power supply: 3 minutes.
- During operation, the covers must be screwed all the way in and the safety catch of cover must be fastened.
- The safety screws at the pipe housing must not be loosened:



When using the water cooling

- Use connecting cables for continuous service temperature $T \geq T_a$ +5 K.

Avoid electrostatic charging

- In case of additional or alternative special varnishing of the enclosure or other metallic parts:
  - Do not rub the surfaces dry.
  - Do not install in the vicinity of processes generating strong electrostatic charges.
- Avoid electrostatic charging:
  - Of plastic surfaces (e.g. housing, sensor element, special varnishing , attached additional plates, ..)
  - Of isolated capacities (e.g. isolated metallic plates)

Power supply in type of protection Increased Safety "e"

- Only use suitable certified Ex e cable glands providing an ingress protection rating of at least IP65/IP67, which are suitable for the intended ambient temperature range.
- Replace cable glands and sealing plugs only with identical parts.

Power supply in type of protection Flameproof Enclosure "d"

- Connect the device using suitable certified Ex d cable glands or using conduit systems of protection type Flameproof Enclosure "d".
- Close unused entry glands with approved Ex d sealing plugs.

Signal circuit in type of protection Intrinsic Safety "ia"

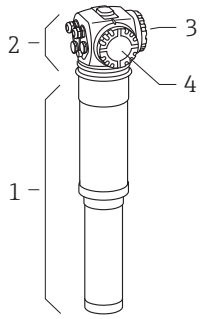
- The pertinent guidelines must be observed when intrinsically safe circuits are connected together (Proof of Intrinsic Safety).
- The instrinsically safe circuits are galvanically isolated from other circuits up to a peak value of the nominal voltage of 375 V.
- The intrinsically safe circuits of the device are isolated from ground potential and have a dielectric strength of at least 500 V_{rms} with respect to it.
- When the device is connected to an intrinsically safe circuit Ex ib, the type of protection changes to Ex ib. Do not operate the temperature sensor in Zone 0 if the device is connected to an intrinsically safe circuit of Category Ex ib.
- Do not interconnect the 4...20 mA/HART signal circuits of the devices of a cascade set.

Temperature tables

Temperature class
T6

Gammapilot with NaJ crystal scintillator or PVT plastic scintillator:

Ambient temperature	
Detector without water cooling or detector with water cooling out of operation: ▪ Devices with NaJ crystal scintillator: ▪ Devices with PVT plastic scintillator:	 $-40\ °C \le T_a \le +60\ °C$ $-40\ °C \le T_a \le +60\ °C$
Detector with water cooling in operation: At the pipe housing (within the water cooling): ▪ Devices with NaJ crystal scintillator: ▪ Devices with PVT plastic scintillator: At the compartment housing:	 $-40\ °C \le T_a \le +60\ °C$ $-40\ °C \le T_a \le +60\ °C$ $-40\ °C \le T_a \le +80\ °C$



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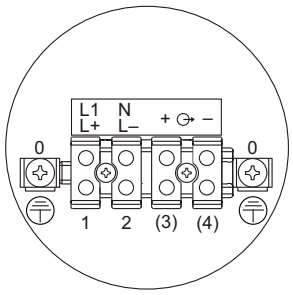
1 Pipe housing
2 Compartment housing
3 Terminal compartment A
4 Terminal compartment B

Type of protection	
Power supply circuit (Terminal compartment A)	Ex e or Ex d
Signal circuits (Terminal compartment B)	Ex ia

Connection data

Terminal compartment A

Increased Safety "e" or Flameproof Enclosure "d"

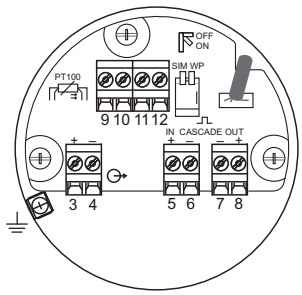


Power supply circuit		
Type AC-power supply FMG60-*1*******	L1 N	U_e = 90...253 VAC, 50/60 Hz, 8.5 VA
Type DC-power supply FMG60-*2*******	L+ L–	U_e = 18...36 VDC, 3.5 W U_m = 253 VAC

Signal circuit		
FMG60-**B1***** FMG60-**E1***** FMG60-**J1***** FMG60-**K1***** FMG60-**L1*****	⊖► + –	not connected
FMG60-**C1***** FMG60-**G1***** FMG60-**D1***** FMG60-**H1***** FMG60-**F1*****	⊖► + –	4...20 mA/HART (active) U_m = 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"



Signal circuit			Ex ia IIC	Ex ia IIB	Ex ib IIC	Ex ib IIB
4...20 mA/ HART (active) *1	+ –	U_o = 21.2 V I_o = 92 mA P_o = 479 mW R_i = 235 Ω C_i = 13.4 nF L_i = 0 Characteristic curve: linear U_i = 30 V I_i = 13 mA P_i = 390 mW	C_o = 150 nF at L_o = 0.15 mH C_o = 115 nF at L_o = 1 mH	C_o = 886 nF at L_o = 0.15 mH C_o = 686 nF at L_o = 1 mH	C_o = 169 nF L_o = 4 mH	C_o = 1.2 µF L_o = 15 mH
*1 only available at the versions: FMG60-**B1*****, FMG60-**E1*****, FMG60-**J1*****, FMG60-**K1*****, FMG60-**L1*****.						
PT100	PT100	U_o = 8.4 V I_o = 8.3 mA P_o = 17.5 mW R_i = 1012 Ω C_i = 0 L_i = 0 Characteristic curve: linear	C_o = 1200 nF at L_o = 1 mH C_o = 1800 nF at L_o = 0.15 mH	C_o = 6 µF at L_o = 1 mH C_o = 5.2 µF at L_o = 2 mH	C_o = 5.2 µF L_o = 400 mH	C_o = 43 µF L_o = 400 mH
Cascade out	– +	U_o = 8.4 V I_o = 19.2 mA P_o = 40.3 mW R_i = 439 Ω C_i = 5.3 nF L_i = 67 µH Characteristic curve: linear	C_o = 5.1 µF L_o = 69 mH	C_o = 42 µF L_o = 199 mH	C_o = 5.1 µF L_o = 69 mH	C_o = 42 µF L_o = 199 mH
Only for connection to FMG60 signal circuit "Cascade in"						
Cascade in	+ –	U_i = 8.4 V I_i = 19.2 mA P_i = 40.3 mW C_i = 0 L_i = 67 µH				
Only for connection to FMG60 signal circuit "Cascade out"						
Connection for FHX40		U_o = 4.7 V I_o = 37.7 mA P_o = 44.3 mW R_i = 125 Ω C_i = 12.7 nF L_i = 0 Characteristic curve: linear	For connection to the approved display FHX40 with associated cable in type of protection Intrinsic Safety Ex ia IIC or IIB. Observe associated Safety Instructions! C_o = 150 µF L_o = 25 mH			

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