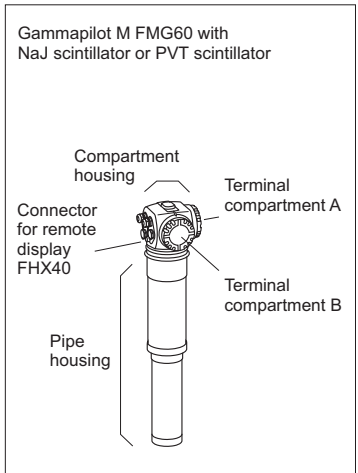


CAUTION:
The screws at the pipe housing must not be loosened!

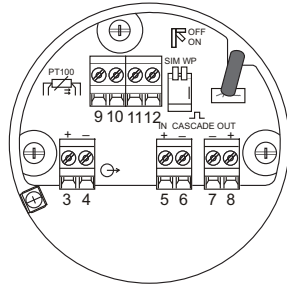
For previous connection depicted below refer to installation drawing: 960007338 A

CAUTION:
After connecting the FHX40 to the FMG60 the protective tube must be installed and secured by the screws.



Warning :
The non-metallic labels, surface and coatings may store an electrostatic charge and become a source of ignition in gas and dust environments. Clean with a damp cloth to prevent the buildup of electrostatic charge.

TERMINAL COMPARTMENT B



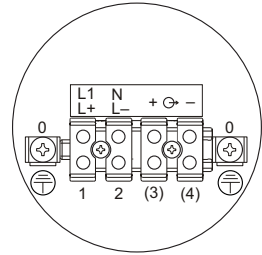
Intrinsically safe circuits Entity Parameters	Group A, B (IIC)	Group C, D (IIA, IIB)
PROFIBUS PA or FOUNDATION Fieldbus *1 *2 *3 FISCO Concept Vmax = 17.5 V Imax = 500 mA Pi = 5.5 W Ci ≤ 5 nF, Li ≤ 10 μH Leakage current ≤ 50 μA Entity Concept Vmax = 24 V Imax = 250 mA Pi = 1.2 W Ci ≤ 5 nF, Li ≤ 10 μH Leakage current ≤ 50 μA 		
PT100 Voc = 8.4 V Isc = 8.3 mA Po = 17.5 mW Ri = 1012 Ω	Ca = 5.2 μF La = 400 mH	Ca = 43 μF La = 400 mH
Cascade out Voc = 8.4 V Isc = 19.2 mA Po = 40.3 mW Ri = 439 Ω Only for connection to Gammapilot FMG60 signal circuit "Cascade in"	Ca = 5.1 μF La = 69 mH	Ca = 42 μF La = 199 mH
Cascade in Vmax = 8.4 V Imax = 19.2 mA Pi = 40.3 mW Ci = 0 Li = 67 μH Only for connection to Gammapilot FMG60 signal circuit "Cascade out"		
Connection for FHX40 Voc = 4.7 V Isc = 37.7 mA Po = 44.3 mW For connection to the FM approved intrinsically safe Endress+Hauser display FHX40 with associated cable. Observe Installation Drawing 960411-1006. This circuit may also be connected to the FM approved Endress+Hauser Service Interface Commubox FXA193 with associated connection cable for ToF instruments. Observe Installation Drawing FES 0072.		

*1 Only available at the version FMG60-**E*****
 *2 The device is suitable for connection to a PROFIBUS PA or FOUNDATION Fieldbus system acc. to both the Entity Concept and the FISCO Concept.
 *3 The polarity for connecting (+) and (-) is of no importance due to an internal rectifier.

INTRINSICALLY SAFE Class I, Div. 1, Group A, B, C, D or Zone 1, IIC

- FM approved apparatus must be installed acc. to manufacturer instructions.
- FM approved associated apparatus must meet the following requirements: $U_o/V_o/I_t \leq U_i/V_{max}$ and $I_o/I_{sc}/I_t \leq I_i/I_{max}$ and $P_o/P_{max} \leq P_i/P_{max}$.
- The maximum permissible values of voltage and current as well as the maximum permissible external capacitance and inductance are shown in the table above.
 $C_o/C_a \geq C_i + C_{cable}$; $L_o/L_a \geq L_i + L_{cable}$.
- The installation must be in accordance with the National Electrical Code ANSI/NFPA 70 and ANSI/ISA-RP 12.06.01 (except chapter 5).
- The maximum non-hazardous area voltage must not exceed 250 V.
- Be aware of multiple earthing of screen. The screen must be connected in accordance with the National Electrical Code.
- Wiring: Use cables not subject to short circuiting.
 Use wires suitable for 20 K above surrounding ambient.
- Do not operate a temperature sensor with "ib" circuit in Zone 0!
- Do not operate a temperature sensor with "ic" circuit in Zone 0 or Zone 1!
- WARNING: Substitution of components may impair intrinsic safety.

TERMINAL COMPARTMENT A



Supply circuit		
	Terminal	Supply voltage
AC type	L1 N	90...253 VAC, 50/60 Hz
DC type	L+ L-	18...35 VDC
Signal circuit		
		not connected

EXPLOSION PROOF Class I, Div. 1, Group A, B, C, D or Zone 1, IIC

- Install per National Electrical Code (NEC).
- Control room equipment must not use or generate over 250 V.
- Supply wires shall be installed in conduit in accordance with the NEC.
- 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 cover.
- Use supply wires suitable for 20 K above surrounding ambient.
- Sealing plugs of the terminal compartment A must not be exchanged with those of the terminal compartment B.
- Types with stainless steel terminal housing (FMG60-*****1***, FMG60-*****2***)
 Seal not required (apparatus was tested with 15 feet conduit).
- Types with aluminium terminal housing (FMG60-*****3***, FMG60-*****4***)
 Seal required at enclosure wall!
- The equipment includes flamepath joints, consult with the manufacturer if repair of the flamepath joints is necessary.

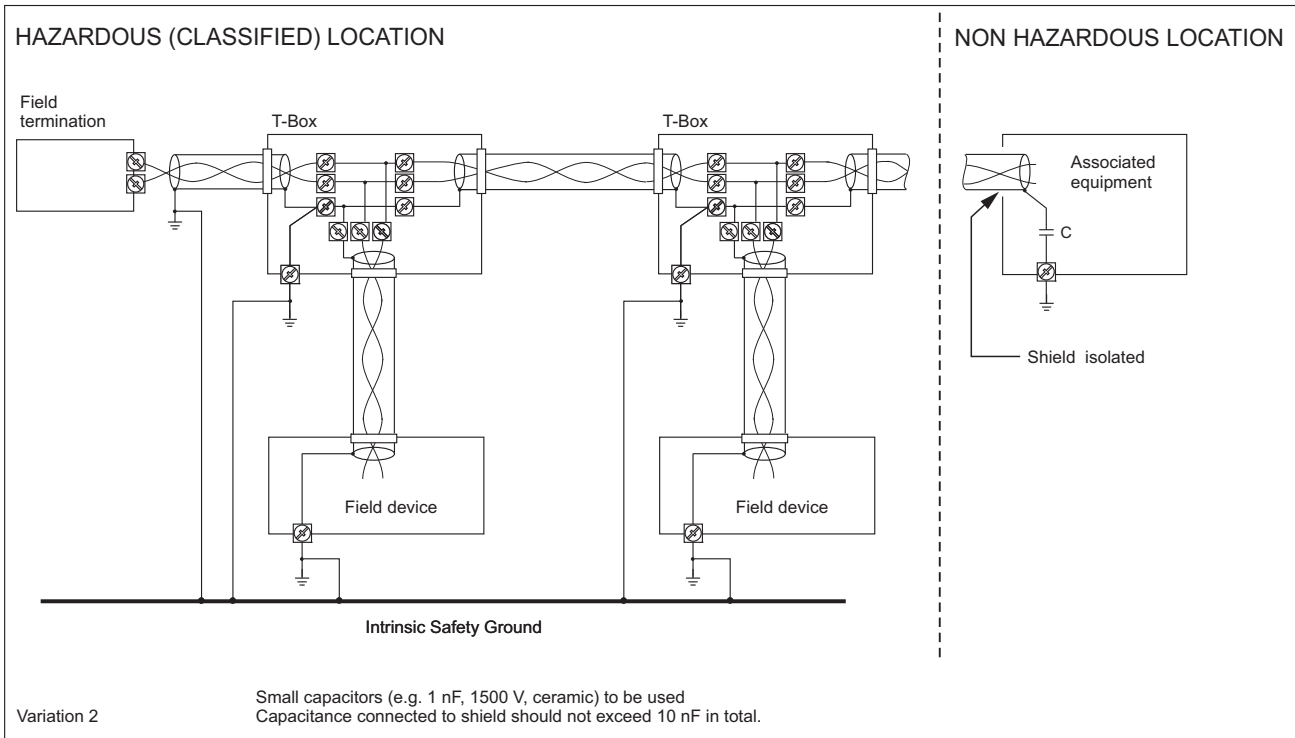
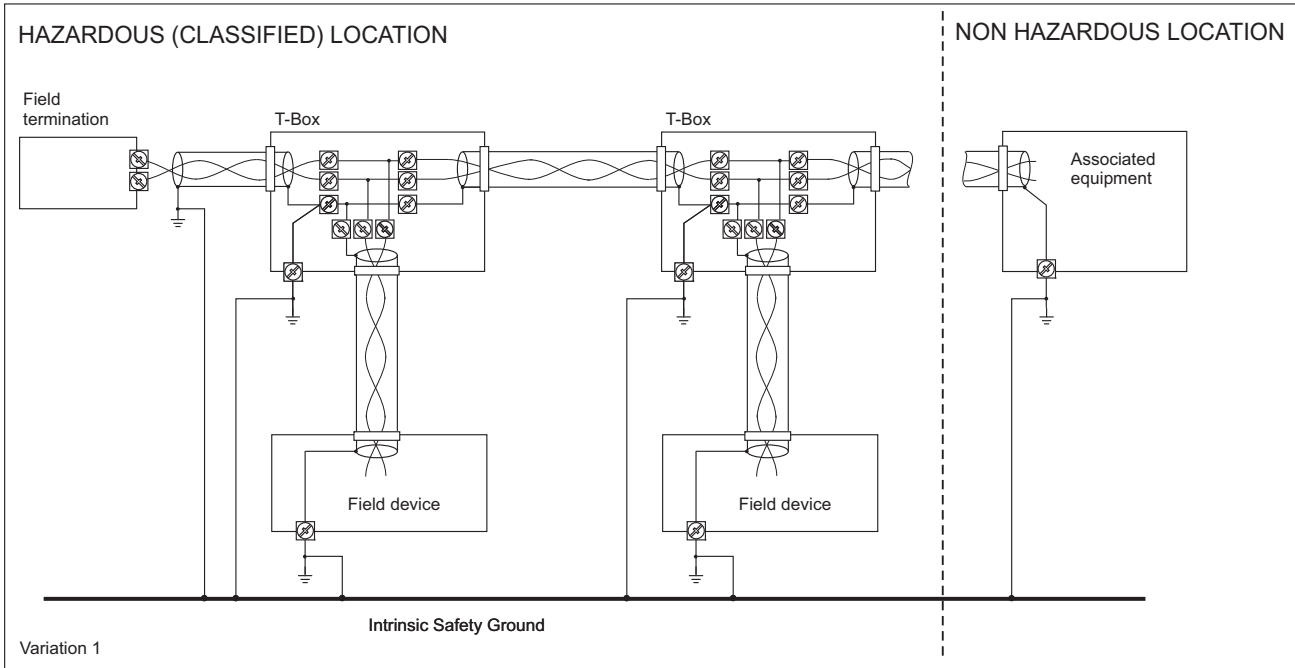
Class II, Div. 1, Group E, F, G, Class III

- Installation shall be in accordance with NEC using threaded conduits or other wiring methods in accordance with Article 500 through Article 510.
- Use a dust tight seal at the conduit entry in Class II an III locations.
- 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 cover.
- Use supply wires suitable for 20 K above surrounding ambient.

Models with PVT or NaJ scintillator	Permissible ambient temperature	Temperature class
Detector without water cooling: • Instruments with NaJ crystal scintillator • Instruments with PVT plastic scintillator	-40 °C ≤ Ta ≤ +60 °C -40 °C ≤ Ta ≤ +60 °C	T6
Detector with water cooling in operation**: • Instruments with NaJ crystal scintillator • Instruments with PVT plastic scintillator	-40 °C ≤ Ta ≤ +75 °C -40 °C ≤ Ta ≤ +75 °C	T6
**Notes: With water cooling in operation, the temperature at the pipe housing (within the water cooling) cannot exceed +60°C. In case if water cooling fails, the permissible maximum ambient temperature is still +75°C.		

Water cooling: For additional information see Operating Instructions BA00329F (PA) and BA00330F (FF) (e.g. mounting, safety, flow rate).

Earthing of Screen



FISCO Concept

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 or V_{max}), the current (I_i or I_{max}) and the power (P_i or P_{max}) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (U_o or V_{oc} or V_t), the current (I_o or I_{sc} or I_t) and the power (P_o or P_{max}) 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 μ H 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 (or V_{oc} or V_t) of the associated apparatus has to be limited to the range of 14 V 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 μ A 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 ... 150 Ω /km
inductance per unit length L:	0.4 ... 1 mH/km
capacitance per unit length C:	80 ... 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:	\leq 30 m
length of trunk cable:	\leq 1 km
length of splice:	\leq 1 m

At each end of the trunk cable an approved infallible line termination with the following parameters is suitable:

R = 90 ... 100 Ω
C = 0 ... 2.2 μ F

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 I.S. 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.



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