

# Micropilot M

## FMR 230, FMR 231, FMR 240

### T12 housing PROFIBUS PA, FOUNDATION Fieldbus



- (de)** Sicherheitshinweise für elektrische Betriebsmittel für explosionsgefährdete Bereiche.
- (en)** Safety instructions for electrical apparatus certified for use in explosion-hazardous areas.
- (fr)** Conseils de sécurité pour matériels électriques destinés aux zones explosibles.
- (es)** Instrucciones de seguridad de aparatos eléctricos homologados para su utilización en áreas expuestas a riesgos de deflagración. Si no entiende este manual, puede pedir un ejemplar en su idioma.
- (it)** Istruzioni di sicurezza per apparecchiature elettriche certificate per l'utilizzo in aree con pericolo di esplosione. Se il presente manuale non risulta comprensibile potete ordinarne una copia tradotta nella vostra lingua.
- (nl)** Veiligheidsinstructies voor elektrisch materieel in explosiegevaarlijke omgeving. Wanneer u deze handleiding niet kunt lezen, kunt u een in uw landstaal vertaalde handleiding bij ons bestellen.
- (fi)** Turvallisuusohjeita sähkölaitteille, jotka on vahvistettu käytettäväksi räjähdysvaarallisilla alueilla. Jos et ymmärrä tätä käsikirjaa, voit tilata meiltä käännöksen omalla kansallisella kielelläsi.
- (sv)** Säkerhetsföreskrifter för elektrisk utrustning certifierad för användning i explosionsfarliga områden. Om du inte förstår denna manual, kan en översatt kopia på ditt eget språk beställas från oss.
- (da)** Sikkerhedsforskrifter for elektriske apparater certificeret til brug i eksplosionsfarlige områder. Hvis du ikke forstår denne manual, kan en oversat kopi af den på dit eget sprog bestilles fra os.
- (pt)** Instruções de segurança para dispositivos eléctricos certificados para utilização em áreas de risco de incêndio. Se não compreender este manual, pode encomendar-nos directamente uma cópia na sua língua.
- (el)** Οδηγίες ασφαλείας για ηλεκτρικές συσκευές που εγκρίνονται για χρήση σε περιοχές με κίνδυνο εκρήξεων. Αν δεν μπορείτε να κατανοήσετε το περιεχόμενο του εγχειριδίου αυτού, μπορείτε να παραγγείλετε από την εταιρεία μας ένα αντίτυπο μεταφρασμένο στη γλώσσα σας.





# Micropilot M

## FMR230, FMR231, FMR240

### T12 housing

### PROFIBUS PA, FOUNDATION Fieldbus

## Safety instructions for electrical apparatus for explosion-hazardous areas



**Labelling:**

**Zone 0/1**

- For atmospheres which are explosive due to gases, mist or vapour \_\_\_\_\_
- Sensor Zone 0, housing Zone 1 \_\_\_\_\_

Allocation of the assembly point hazardous zones to the category of the explosion-protected devices or sensors:

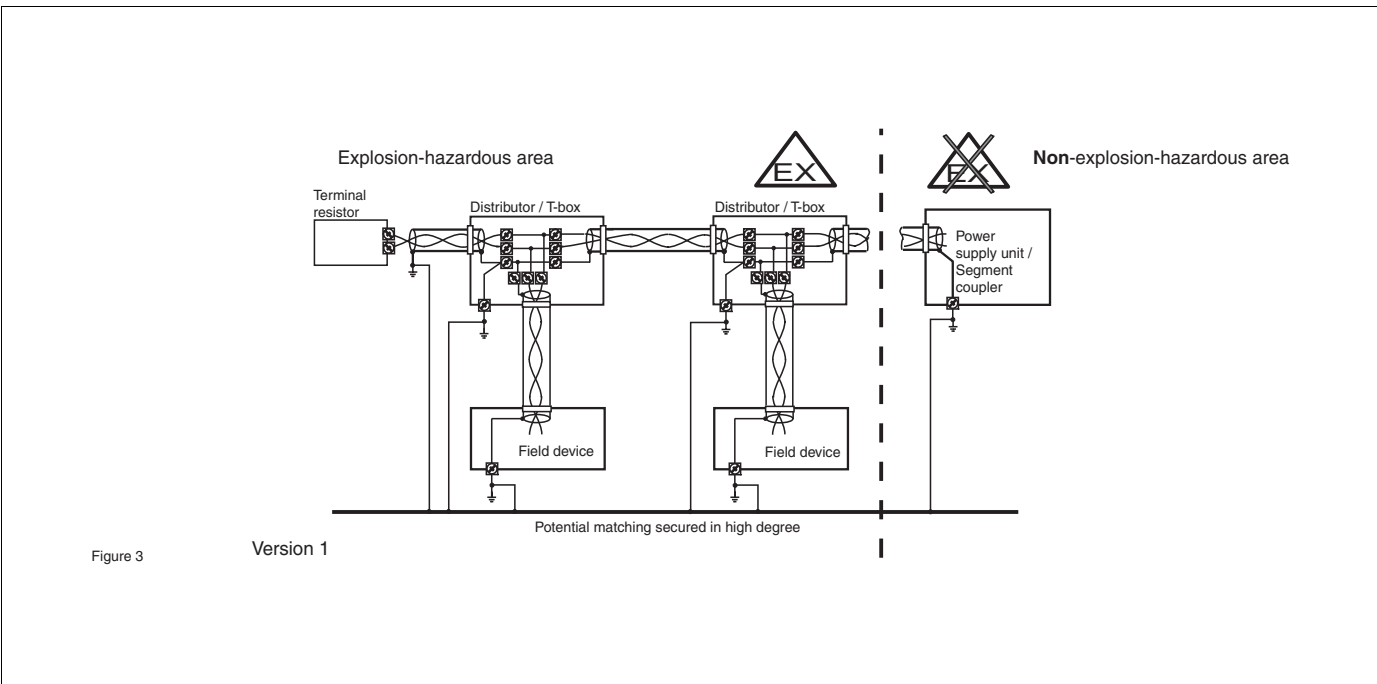
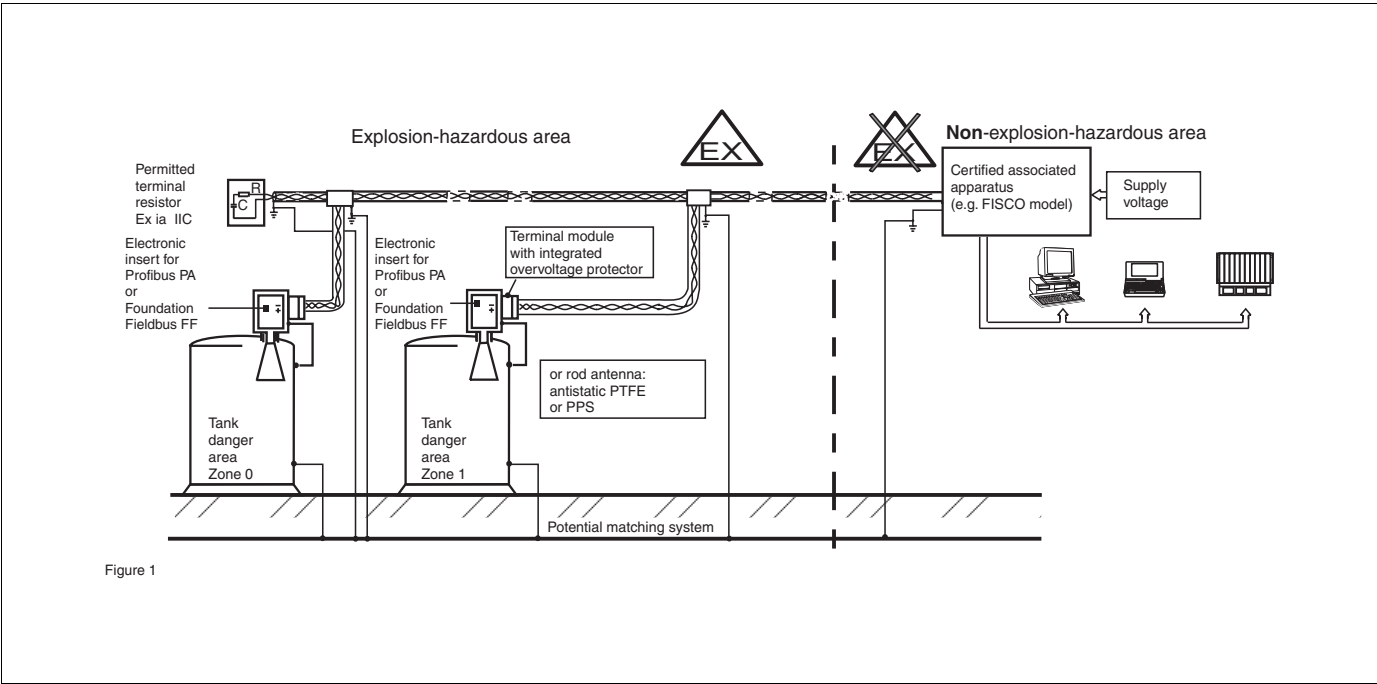
Hazardous zone at the assembly point	
Danger due to gases, mist or vapour	Zone 0
Danger due to gases, mist or vapour	Zone 1
Danger due to gases, mist or vapour	Zone 2

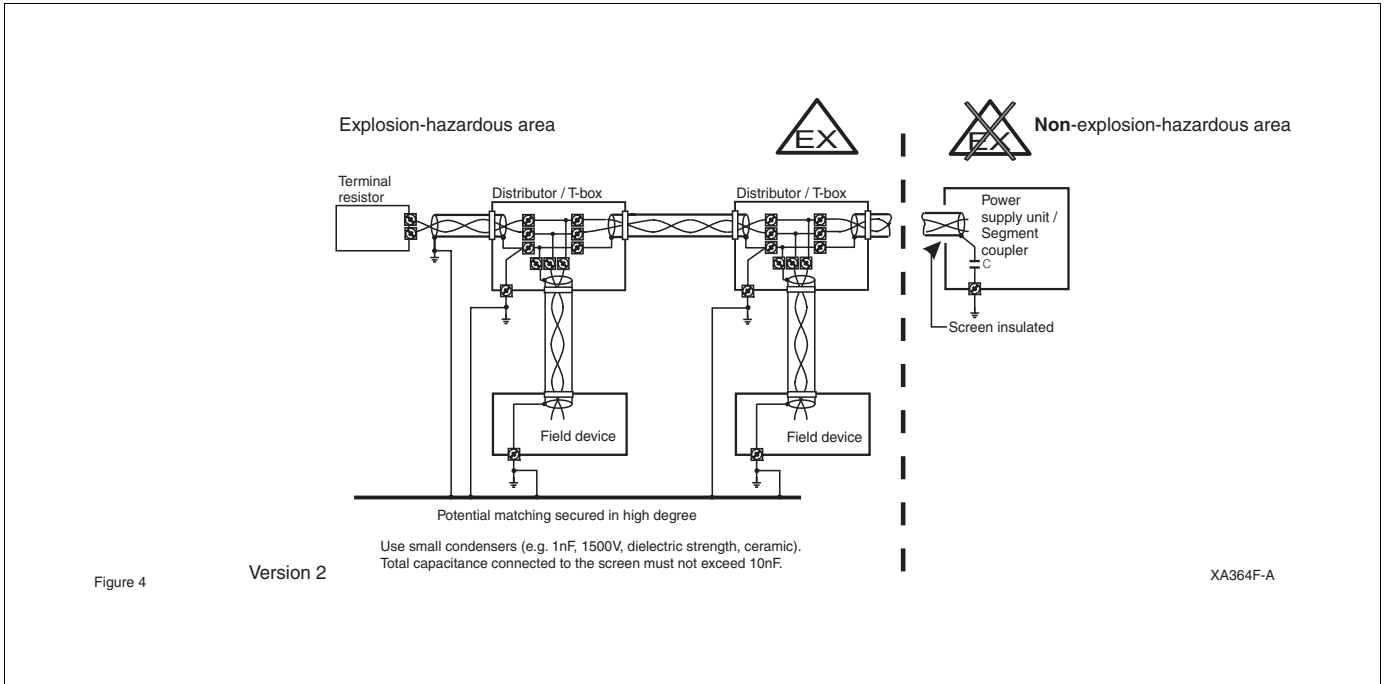
**Labelling the type of protection:**

**Ex ia IIC T6...T1**

- Explosion-protected electrical apparatus as per IEC standard (Ex) \_\_\_\_\_
- Type of protection \_\_\_\_\_
- Explosion group \_\_\_\_\_
- Temperature class \_\_\_\_\_







<b>Certified associated apparatus</b>	U <sub>o</sub> = 17.5 V or U <sub>o</sub> = 24 V I <sub>o</sub> = 273 mA I <sub>o</sub> = 250 mA P <sub>o</sub> = 1.2 W P <sub>o</sub> = 1.2 W	Electronic insert: PROFIBUS PA or FOUNDATION Fieldbus FF FISCO model or ENTITY concept (individual interconnection) [Ex ia] IIC or [Ex ib] IIC
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	Zone 0/1 or Zone 1	Housing Zone 1
<b>Type of protection</b>	Ex ia IIC T6..T1	IECEX PTB 04.0015X
<b>Max. operating pressure</b>	dependent on the antenna	

<b>Housing</b>	<b>T12 - OVP</b>	-40 °C ≤ T <sub>u</sub> ≤ 80 °C	T12 housing with integrated overvoltage protector optionally with or without VU331 display and operating module
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<b>Option</b>	<b>Service interface</b>	<b>Commubox with associated ToF cable</b>	<b>ONLY FOR SERVICE PURPOSES</b> observe associated Safety Instructions (XA...)
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<b>Version</b>	FMR230-..E.....	Horn antenna	up to 150 °C
	FMR230-..V or K.....	Horn antenna	up to 200 °C
	FMR230-..D.....	Horn antenna	up to 250 °C
	FMR230-..F.....	Horn antenna	up to 350 °C
	FMR230-..G.....	Horn antenna	up to 400 °C
	FMR230-..L.....	Horn antenna	up to 280 °C
	FMR230-..M.....	Horn antenna	up to 400 °C
	FMR231-..A or B.....	PPS rod antenna	up to 120 °C
	FMR231-..H or J.....	Antistatic PTFE rod antenna	up to 150 °C
	FMR240-.....	Horn antenna	up to 150 °C
	FMR240-.....	Wave guide antenna	up to 200 °C

**Safety-relevant instructions for installation in explosion-hazardous areas:**

- 1.) Install the device according to the manufacturer's instructions and any other valid standards and regulations.
- 2.) The intrinsically-safe input power circuit of the Micropilot M FMR2xx is isolated from ground potential and has a dielectric strength of at least 290 Vrms with respect to it.
- 3.) 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. 1a, 1b and Tab. 2a, 2b).
- 4.) After aligning (rotating) the housing, retighten the fixing screw (Allen screw on the threaded neck).
- 5.) For grounding the screen, see figure 3 and figure 4.
- 6.) Continuous duty temperature of the cable ≥ T<sub>amb</sub> +5 K.
- 6.1 If antenna extensions over 3 m-long are used, they should be fixed mechanically (using guy ropes).
- 6.2 FMR240 or FMR230 with shut-off mechanism: the entire arrangement must at least meet the requirements as per IP67 in accordance with IEC/EN 60529.  
If the device needs to be disassembled for e.g. service purposes, we recommend securing the shut-off mechanism against opening or closing it with an additional blind flange.  
The operator is entirely responsible for ensuring that the complete arrangement is permissible for the respective application.

Tab. 1a HART, PROFIBUS PA

Zone 1 - Application								
Temperature class with / without VU331display	Maximum permitted medium temperature Antenna in Zone 1	Maximum permitted ambient temperature (at the electronics housing / electronics housing in Zone 1) dependent on the medium temperature						
		FMR230- ..E or V or K or D.....	FMR230- ..L.....	FMR230- ..M.....	FMR230- ..F or G.....	FMR231- .....	FMR240- .....	FMR240- wave guide antenna
T6	+80 °C +60 °C	+55 °C +60 °C	+60 °C +60 °C	+60 °C +60 °C	+55 °C +60 °C	+50 °C +60 °C	+55 °C +60 °C	+60 °C +60 °C
T5	+95 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C	+65 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C
T4	+130 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+65 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C
T3 (functional)	+150 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+70 °C +80 °C	+65 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C
T3	+195 °C +80 °C	+65 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+70 °C +80 °C	not permitted	not permitted	+75 °C +80 °C
T2 (functional)	+250 °C +80 °C	+60 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C	+65 °C +80 °C	not permitted	not permitted	not permitted
T2 (functional)	+280 °C +80 °C	not permitted	+70 °C +80 °C	+75 °C +80 °C	+65 °C +80 °C	not permitted	not permitted	not permitted
T2	+290 °C +80 °C	not permitted	not permitted	+75 °C +80 °C	+65 °C +80 °C	not permitted	not permitted	not permitted
T1 (functional)	+350 °C +80 °C	not permitted	not permitted	+70 °C +80 °C	+55 °C +80 °C	not permitted	not permitted	not permitted
T1 (functional)	+400 °C +80 °C	not permitted	not permitted	+70 °C +80 °C	+55 °C +80 °C	not permitted	not permitted	not permitted

permitted antenna temperature range must be observed  
functional = limited by maximum permitted antenna temperature

Tab. 1b FOUNDATION Fieldbus

Zone 1 - Application								
Temperature class with / without VU331 display	Maximum permitted medium temperature Antenna in Zone 1	Maximum permitted ambient temperature (at the electronics housing / electronics housing in Zone 1) dependent on the medium temperature						
		FMR230- ..E or V or K or D.....	FMR230- ..L.....	FMR230- ..M.....	FMR230- ..F or G.....	FMR231- .....	FMR240- .....	FMR240- wave guide antenna
T6	+80 °C +60 °C	+50 °C +55 °C	+55 °C +55 °C	+55 °C +55 °C	+50 °C +55 °C	+45 °C +55 °C	+50 °C +55 °C	+55 °C +55 °C
T5	+95 °C +75 °C	+65 °C +70 °C	+65 °C +70 °C	+65 °C +70 °C	+65 °C +70 °C	+60 °C +70 °C	+65 °C +70 °C	+65 °C +70 °C
T4	+130 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+65 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C
T3 (functional)	+150 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+70 °C +80 °C	+65 °C +80 °C	+ 70 °C + 80 °C	+75 °C +80 °C
T3	+195 °C +80 °C	+65 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+70 °C +80 °C	not permitted	not permitted	+75 °C +80 °C
T2 (functional)	+250 °C +80 °C	+60 °C +80 °C	+70 °C +80 °C	+75 °C +80 °C	+65 °C +80 °C	not permitted	not permitted	not permitted
T2 (functional)	+280 °C +80 °C	not permitted	+70 °C +80 °C	+75 °C +80 °C	+65 °C +80 °C	not permitted	not permitted	not permitted
T2	+290 °C +80 °C	not permitted	not permitted	+75 °C +80 °C	+65 °C +80 °C	not permitted	not permitted	not permitted
T1 (functional)	+350 °C +80 °C	not permitted	not permitted	+70 °C +80 °C	+55 °C +80 °C	not permitted	not permitted	not permitted
T1 (functional)	+400 °C +80 °C	not permitted	not permitted	+70 °C +80 °C	+55 °C +80 °C	not permitted	not permitted	not permitted

permitted antenna temperature range must be observed  
 functional = limited by maximum permitted antenna temperature

**Instructions:**

- 7.) The type of protection changes as follows when the transmitter is connected to certified intrinsically-safe circuits of Category Ex ib for Equipment Groups IIC and IIB: Ex ib IIC T6 and Ex ib IIB T6.  
 Do not operate the antenna in Zone 0 if the transmitter is connected to an intrinsically-safe circuit of Category Ex ib.
- 7.1 When interconnecting intrinsically-safe circuits, the regulations for interconnecting intrinsically-safe circuits must be observed (IEC/EN 60079-14); (Proof of Intrinsic Safety).  
 (E.g. when using Commubox or handheld terminal DXR375 or other certified apparatus or for installation according to the ENTITY concept).

Power supply and signal circuit in protection type: intrinsic safety Ex ia IIC or IIB		
Micropilot with electronic insert for PROFIBUS PA or FOUNDATION Fieldbus FF Ex ia IIC: as per FISCO model or ENTITY concept (individual interconnection)		
U <sub>i</sub> = 17.5 V I <sub>i</sub> = 273 mA P <sub>i</sub> = 1.2 W	or U <sub>i</sub> = 24 V I <sub>i</sub> = 250 mA P <sub>i</sub> = 1.2 W	L <sub>i</sub> = 10 µH C <sub>i</sub> = 5 nF Leak current ≤ 50 µA



OPTION		ONLY FOR SERVICE PURPOSES				
For connecting the Commubox service interface with the associated ToF cable:						
Commubox output + ToF cable: U <sub>o</sub> = 3.74 V I <sub>o</sub> = 9.9 mA P <sub>o</sub> = 9.2 mW	effective inner inductance	Li = negligible				
	effective inner capacitance	Ci = negligible				
Characteristic curve: linear						
		for material group IIC: permitted outer inductance	Lo ≤ 340 mH			
		permitted outer capacitance	Co ≤ 100 µF			
When interconnected to a Micropilot M, the following results apply:						
For material group:	Lo =	0.15 mH	0.5 mH	1 mH	2 mH	5 mH
IIC	Co	≤ 8 µF	≤ 7 µF	≤ 5.5 µF	≤ 5 µF	≤ 4 µF
IIB	Co	10 µF				

**Zone 0 Safety Instructions:**

8.) Potentially explosive air/vapour mixtures must only occur under atmospheric conditions:

$$-20\text{ °C} \leq T \leq +60\text{ °C}$$

$$0.8\text{ bar} \leq p \leq 1.1\text{ bar}$$

If no potentially explosive mixtures are present, or if additional protective measures have been taken according to EN 1127-1, the transmitters may be operated under other atmospheric conditions in accordance with the manufacturer's specifications.

9.) The antenna must only be used in media, for which the materials used have sufficient durability.

9.1 The integrated overvoltage protector meets the requirements of IEC/EN 60079-14 Section 12.3.

9.2 The measuring device must be integrated into the local potential matching system.

10.) Associated apparatus with galvanic isolation between intrinsically-safe and non-intrinsically-safe circuits are preferred.

**Tab. 2a HART, PROFIBUS PA**

Zone 0 - Application				
Temperature class with / without VU331 display	Maximum permitted medium temperature Antenna in Zone 0 (see point 8)	Maximum permitted ambient temperature (at the electronics housing / electronics housing in Zone 1) dependent on the medium temperature		
		FMR230	FMR231	FMR240
T6	+60 °C	+60 °C	+60 °C	+60 °C
T5	+60 °C	+75 °C	+75 °C	+75 °C
T4, T3, T2, T1	+60 °C	+80 °C	+80 °C	+80 °C

**Tab. 2b FOUNDATION Fieldbus**

Zone 0 - Application				
Temperature class with / without VU331 display	Maximum permitted medium temperature Antenna in Zone 0 (see point 8)	Maximum permitted ambient temperature (at the electronics housing / electronics housing in Zone 1) dependent on the medium temperature		
		FMR230	FMR231	FMR240
T6	+60 °C	+55 °C	+55 °C	+55 °C
T5	+60 °C	+70 °C	+70 °C	+70 °C
T4, T3, T2, T1	+60 °C	+80 °C	+80 °C	+80 °C





