

Safety Instructions

Micropilot FMR66B/67B

Ex ia IIIC T* °C Da/Db

Ex ia IIIC T* °C Db



Micropilot FMR66B/67B

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About this document

This document has been translated into several languages. Legally determined is solely the English source text.

Associated documentation

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

HART

- BA02250F (FMR66B)
- BA02251F (FMR67B)

PROFIBUS PA

- BA02264F (FMR66B)
- BA02265F (FMR67B)

PROFINET

- BA02269F (FMR66B)
- BA02270F (FMR67B)

Supplementary documentation

Explosion protection brochure: CP00021Z

The Explosion-protection brochure is available:

- In the download area of the Endress+Hauser website:
www.endress.com -> Downloads -> Brochures and Catalogs ->
Text Search: CP00021Z
- On the CD for devices with CD-based documentation

Manufacturer's certificates**Certificate of Conformity**

Certificate number:

Production Maulburg, Germany
TÜV 23.0083 X

Production Itatiba, Brazil
TÜV 23.0084 X

Production Greenwood, Indiana, USA
TÜV 23.0085 X

Affixing the certificate number certifies conformity with the following standards (depending on the device version):

- ABNT NBR IEC 60079-0:2020
- ABNT NBR IEC 60079-11:2013
- IEC 60079-26:2021

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

FMR6xB	-	*****	+	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: Micropilot

-  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
 FMR66B, FMR67B

Basic specifications

Position 1, 2 (Approval)		
Selected option		Description
FMR6xB	MH	INMETRO Ex ia IIIC Txxx°C Da/Db
		INMETRO Ex ia IIIC Txxx°C Db

Position 3, 4 (Output)		
Selected option		Description
FMR6xB	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
FMR6xB	M	Prepared for display FHX50B + Gland M20
	N	Prepared for display FHX50B + Thread NPT1/2
	O	Prepared for display FHX50B + Thread M20

Position 6 (Housing, Material)		
Selected option		Description
FMR6xB	B	Single compartment; Alu, coated
	J	Dual compartment; Alu, coated
	K	Dual compartment; 316L
	M	Dual compartment L-shape; Alu, coated
	N	Dual compartment L-shape; 316L, coated

Position 7 (Electrical Connection)

Selected option		Description
FMR6xB	B	Gland M20, brass nickel plated, IP66/68 NEMA Type 4X/6P
	C	Gland M20, 316L, IP66/68 NEMA Type 4X/6P
	F	Thread M20, IP66/68 NEMA Type 4X/6P
	G	Thread G1/2, IP66/68 NEMA Type 4X/6P
	H	Thread NPT1/2, IP66/68 NEMA Type 4X/6P

Position 8 (Application)

Selected option		Description
FMR6xB	F	Process temperature -40...+80°C
	J	Process temperature -40...+150°C
	L	Process temperature -40...+200°C
FMR66B	H	Process temperature -40...+130°C
FMR67B	B	Process temperature -20...+150°C
	D	Process temperature -20...+200°C
	N	Process temperature -40...+280°C
	P	Process temperature -40...+450°C

Position 9, 10 (Antenna)

Selected option		Description
FMR66B	BS	Encapsulated, PVDF, 40mm/1-1/2"
FMR6xB	GA	Drip-off, PTFE 50mm/2"
FMR67B	GP	Flush mount, PTFE, 80mm/3"
	GT	Horn, 316L, 65mm/2.6"

Position 11, 12 (Process Connection, Sealing Surface)

Selected option		Description
FMR67B	JD	Alignment device, UNI flange

Position 16 (Seal)		
Selected option		Description
FMR66B	A	PVDF encapsulated
FMR6xB	D	VKM Viton GLT
	G	EPDM
FMR67B	J	HNBR
	P	FFKM Kalrez
	U	Graphite

Position 17 (Air Purge Connection)		
Selected option		Description
FMR6xB	1	G1/4
	2	NPT1/4
	3	Adapter G1/4
	4	Adapter NPT1/4

Optional specifications

ID Jx, Kx (Test, Certificate, Declaration)		
Selected option		Description
FMR6xB	JL	Ambient temp. transmitter -50°C/-58°F, sensor see specification

ID Px, Rx (Accessory Enclosed)		
Selected option		Description
FMR6xB	PA	Weather protection cover, 316L ¹⁾

1) Only in connection with Position 6 = J, K, M, N

Safety instructions: General

- The device is intended to be used in explosive atmospheres as defined in the scope of IEC 60079-0 or equivalent national standards. 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.
- Devices suitable for zone separation (marked Ga/Gb or Da/Db) are always suitable for installation in the less critical zone (Gb or Db). Due to space limitations the corresponding marking maybe not indicated on the nameplate.
- 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.
- Only use the device in media to which the wetted materials have sufficient durability.
- 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: Special conditions

- 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.
- Avoid sparks caused by impact and friction.
- In the case of process connections made of polymeric material or with polymeric coatings, avoid electrostatic charging of the plastic surfaces.
- Avoid electrostatic charging of the sensor (e.g. do not rub dry and install outside the filling flow).

Optional specification, ID Px, Rx = PA

Connect the weather protection cover to the local potential equalization.

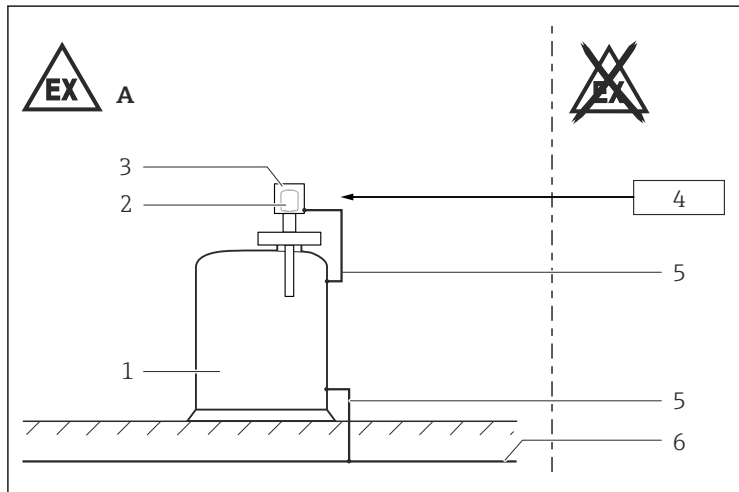
Device type FMR67B and Basic specification, Position 11, 12 = JD

- In Zone 20, avoid sparks caused by impact and friction.
- Changing the position of the alignment device must be impossible:
 - After the alignment of the antenna via the pivot bracket
 - After tightening of the clamping flange
 - After setting the damping ring (torque 10 to 11 Nm)
- Degree of protection IP67 must be fulfilled.

Device type FMR67B and Basic specification, Position 17 = 1, 2, 3, 4

- In Zone 20, avoid sparks caused by impact and friction.
- After removing the air purge connection: Lock the opening with a suitable plug.
Torque: 6-7 Nm
- Degree of protection IP67 must be fulfilled.

Safety instructions: Installation



A0025536

- A Zone 21
- 1 Tank; Zone 20, Zone 21
- 2 Electronic insert
- 3 Enclosure
- 4 Associated intrinsically safe power supply units
- 5 Potential equalization line
- 6 Local potential equalization

- After aligning (rotating) the enclosure, retighten the fixing screw.
- Continuous service temperature of the connecting cable: $\geq T_a + 20 \text{ K}$.
- Perform the following to achieve the degree of protection IP66/67:
 - Screw the cover tight.
 - Mount the cable entry correctly.

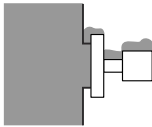
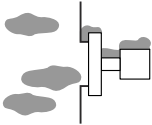
- Seal unused entry glands with suitable sealing plugs that correspond to the type of protection.
- Supplied cable glands and metallic sealing plugs comply with the requirements of type of protection marked on the nameplate.
- The plastic sealing plug is used only as transport protection.
- Observe the pertinent guidelines when interconnecting intrinsically safe circuits.
- Observe the maximum process conditions according to the manufacturer's Operating Instructions.
- Install the device to exclude any mechanical damage or friction during the application. Pay particular attention to flow conditions and tank fittings.

Basic specification, Position 5 = N, O

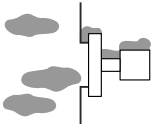
Observe the requirements according to IEC/EN 60079-14 for conduit systems and the wiring- and installation instructions of the suitable Safety Instructions (XA). In addition, observe national regulations and standards for conduit systems.

Permitted ambient conditions

Ex ia IIIC Txxx°C Da/Db

Process Zone 20		Enclosure Zone 21
Continuous dust submersion		Dust accumulation or temporary explosive dust atmosphere
Continuous explosive dust atmosphere and deposits		Dust accumulation or temporary explosive dust atmosphere

Ex ia IIIC Txxx°C Db

Process Zone 21		Enclosure Zone 21
Continuous dust deposits or temporary explosive dust atmosphere		Dust accumulation or temporary explosive dust atmosphere

Intrinsic safety

- The device is only suitable for connection to certified, intrinsically safe equipment with explosion protection Ex ia / Ex ib.
- The intrinsically safe input power circuit of the device is isolated from ground. The dielectric strength is at least 500 V_{rms}.

Potential equalization

Integrate the device into the local potential equalization.

Safety instructions: Zone separation Zone 20, Zone 21

Basic specification, Position 9, 10 = BS

- Material specification of the separating element:
 - PVDF plastic: ≥ 1 mm
 - Maximum process temperature T_p: 80 °C
 - Maximum Working Pressure (MWP): 3 bar
- The antenna must not be subjected to abrasive or corrosive medium that may adversely affect the partition for the zone separation.

Basic specification, Position 9, 10 = Gx

- The separating element is not directly in contact with the process (process-wetted).
- Material specification of the separating element:
 - Glass feedthrough: ≥ 1 mm
 - Stainless steel weld: ≥ 1 mm

Basic specification, Position 9, 10 in connection with Position 16

The sealing is directly in contact with the process (process-wetted).

Temperature tables



- The specified surface temperature takes into account all direct heat influences from process heat and self-heating at the enclosure.
- The specified ambient and process temperature ranges exclusively refer to the explosion protection and must not be exceeded. Operationally permitted ambient temperature ranges can be restricted depending on the version: See Operating Instructions.
- Do not exceed the max. ambient temperature at the enclosure.

For detailed information see Technical Information.



Protection type of enclosure: IP66/67



Optional specification, ID Jx, Kx = JL

Lower limit of the ambient temperature for explosion protection changes to -50 °C.

Specific conditions of use:

- The surface temperature is
 - for equipment protection level (EPL) Da: $T_{200} \text{ xxx } ^\circ\text{C}$ (with 200 mm dust deposit)
 - and equipment protection level (EPL) Db: $T_L \text{ xxx } ^\circ\text{C}$ (with dust accumulation T_L)
- The surface temperature is for equipment protection level (EPL) Db: $T_L \text{ xxx } ^\circ\text{C}$ (with dust accumulation T_L)



T_L marking:
The assigned surface temperature without dust layer is the same.

Description notes



Unless otherwise indicated, the positions always refer to the basic specification.

	Position 6 (Housing, Material)
	B, J, K, M, N

FMR66B

Ex ia IIIC $T_{200} \text{ 80}^\circ\text{C}$ Da/Db
Ex ia IIIC $T_L \text{ 80}^\circ\text{C}$ Db

Position 8 (Application)
F

Position 9, 10 (Antenna)
BS

Maximum surface temperature	Process temperature range	Ambient temperature range
$T_{200} \text{ 80 } ^\circ\text{C}$	$-20 \text{ } ^\circ\text{C} \leq T_p \leq +80 \text{ } ^\circ\text{C}$	$-20 \text{ } ^\circ\text{C} \leq T_a \leq +55 \text{ } ^\circ\text{C}$

FMR66B, FMR67B

Ex ia IIIC T₂₀₀ 150°C Da/Db

Ex ia IIIC T_L 150°C Db

Position 8 (Application)
B, H, J

Position 9, 10 (Antenna)
GA

Maximum surface temperature	Process temperature range	Ambient temperature range
T ₂₀₀ 80 °C	-40 °C ≤ T _p ≤ +80 °C	-40 °C ¹⁾ ≤ T _a ≤ +60 °C
T ₂₀₀ 100 °C	-40 °C ≤ T _p ≤ +100 °C	-40 °C ¹⁾ ≤ T _a ≤ +55 °C
T ₂₀₀ 130 °C	-40 °C ≤ T _p ≤ +130 °C	-40 °C ¹⁾ ≤ T _a ≤ +50 °C
T ₂₀₀ 150 °C	-40 °C ≤ T _p ≤ +150 °C	-40 °C ¹⁾ ≤ T _a ≤ +45 °C

1) Optional specification, ID Jx, Kx = JL: -50 °C

Ex ia IIIC T₂₀₀ 200°C Da/Db

Ex ia IIIC T_L 200°C Db

Position 8 (Application)
D, L

Position 9, 10 (Antenna)
GA, GP

Maximum surface temperature	Process temperature range	Ambient temperature range
T ₂₀₀ 100 °C	-40 °C ¹⁾ ≤ T _p ≤ +100 °C	-40 °C ²⁾ ≤ T _a ≤ +60 °C
T ₂₀₀ 150 °C	-40 °C ¹⁾ ≤ T _p ≤ +150 °C	-40 °C ²⁾ ≤ T _a ≤ +55 °C
T ₂₀₀ 200 °C	-40 °C ¹⁾ ≤ T _p ≤ +200 °C	-40 °C ²⁾ ≤ T _a ≤ +50 °C

- 1) Position 16 = J, P: -20 °C
- 2) Optional specification, ID Jx, Kx = JL: -50 °C

FMR67B

Ex ia IIIC T₂₀₀ 280°C Da/Db

Ex ia IIIC T_L 280°C Db

Position 8 (Application)
N

Position 9, 10 (Antenna)
GT

Maximum surface temperature	Process temperature range	Ambient temperature range
T ₂₀₀ 150 °C	-40 °C ≤ T _p ≤ +150 °C	-40 °C ¹⁾ ≤ T _a ≤ +65 °C
T ₂₀₀ 200 °C	-40 °C ≤ T _p ≤ +200 °C	-40 °C ¹⁾ ≤ T _a ≤ +60 °C
T ₂₀₀ 280 °C	-40 °C ≤ T _p ≤ +280 °C	-40 °C ¹⁾ ≤ T _a ≤ +50 °C

1) Optional specification, ID Jx, Kx = JL: -50 °C

Ex ia IIIC T₂₀₀ 450°C Da/Db

Ex ia IIIC T_L 450°C Db

Position 8 (Application)
P

Position 9, 10 (Antenna)
GT

Maximum surface temperature	Process temperature range	Ambient temperature range
T ₂₀₀ 150 °C	-40 °C ≤ T _p ≤ +150 °C	-40 °C ¹⁾ ≤ T _a ≤ +65 °C
T ₂₀₀ 200 °C	-40 °C ≤ T _p ≤ +200 °C	-40 °C ¹⁾ ≤ T _a ≤ +60 °C
T ₂₀₀ 450 °C	-40 °C ≤ T _p ≤ +450 °C	-40 °C ¹⁾ ≤ T _a ≤ +30 °C

1) Optional specification, ID Jx, Kx = JL: -50 °C

Connection data *Basic specification, Position 3 = BA*

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


Basic specification, Position 3 = DA

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

Basic specification, Position 3 = FA

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

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

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

Cable entry: Connection compartment

Cable gland: *Basic specification, Position 7 = B*

Thread	Clamping range	Material	Sealing insert	O-ring
M20x1,5	ø 8 to 10.5 mm	Ms, nickel-plated	Silicone	EPDM (ø 17x2)

Cable gland: *Basic specification, Position 7 = C*

Thread	Clamping range	Material	Sealing insert	O-ring
M20x1,5	ø 7 to 12 mm	1.4404	NBR	EPDM (ø 17x2)



- The tightening torque refers to cable glands installed by the manufacturer:
 - Recommended: 3.5 Nm
 - Maximum: 10 Nm
- This value may be different depending on the type of cable. However, the maximum value must not be exceeded.
- Only suitable for fixed installation. The operator must pay attention to a suitable strain relief of the cable.
- To maintain the ingress protection of the enclosure: Install the enclosure cover, cable glands and blind plugs correctly.



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