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Safety Instructions
Micropilot FMR66B/67B

Ex ta/tb IIIC Txxx°C Da/Db
Ex tb IIIC Txxx°C Db

Endress+Hauser
People for Process Automation

Micropilot FMR66B/67B

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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:

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 on the Internet:
www.endress.com/Downloads

Certificates and declarations

NEPSI Declaration of Conformity

Certificate number:
GYJ23.1015X

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

- GB/T 3836.1-2021
- IEC 60079-26 : 2021-02
- GB/T 3836.31-2021

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	NG	NEPSI Ex ta/tb IIIC Txxx°C Da/Db NEPSI Ex tb IIIC Txxx°C Db

Position 3, 4 (Output)		
Selected option		**Description**
FMR6xB	BA	2-wire, 4-20 mA HART
	BB	2-wire, 4-20 mA HART, switch output [1]
	BC	2-wire, 4-20 mA HART + 4 to 20 mA analog [1]
	DA	2-wire, PROFIBUS PA
	FA	PROFINET over Ethernet-APL, 10Mbit/s

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

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
FMR66B	H	Process temperature -40...+130°C
FMR67B	J	Process temperature -40...+150°C
	L	Process temperature -40...+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
FMR67B	U	Graphite

Position 17 (Air Purge Connection)		
Selected option		**Description**
FMR67B	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**
FMR67B	JL	Ambient temp. transmitter -50°C/-58°F, sensor see specification

ID Nx, Ox (Accessory Mounted)		
Selected option		**Description**
FMR6xB	NA	Overvoltage protection [1]

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

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
- For installation, use and maintenance of the device, users must also observe the requirements stated in the Operating Instructions and the standards:
  - GB 50257-2014: "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering".
  - GB/T 3836.13-2021: "Explosive atmospheres, Part 13: Equipment repair, overhaul, reclamation and modification".
  - GB/T 3836.15-2017: "Explosive atmospheres, Part 15: Electrical installations design, selection and erection".
  - GB/T 3836.16-2022: "Explosive atmospheres, Part 16: Electrical installations inspection and maintenance".
  - GB 15577-2018: "Safety regulations for dust explosive prevention and protection". (Only if installed in dust hazardous area.)
- 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: Specific conditions of use

- For light metal flanges or flange faces (e.g. titanium, zirconium), avoid sparks caused by impact and friction.
- 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.

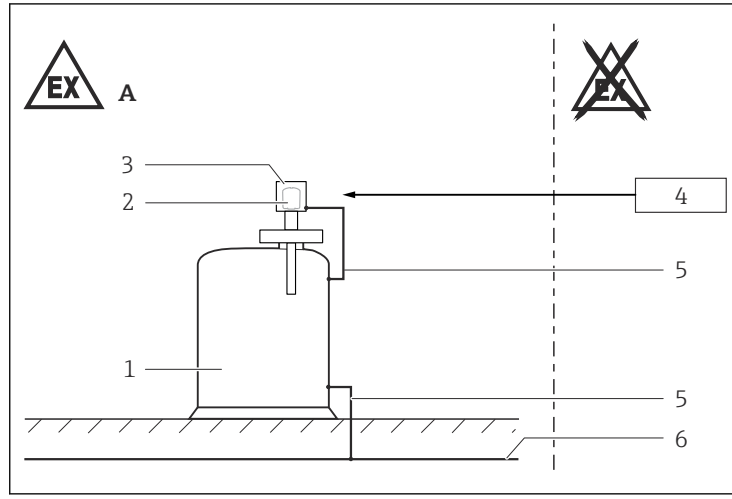
- Avoid sparks caused by impact and friction.
- In the case of process connections made of polymeric material or with polymeric coatings, avoid electrostatic charging of the plastic surfaces.
- Avoid electrostatic charging of the sensor (e.g. do not rub dry and install outside the filling flow).

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



A Zone 21
1 Tank; Zone 20, Zone 21
2 Electronic insert
3 Enclosure
4 Power supply
5 Potential equalization line
6 Local potential equalization

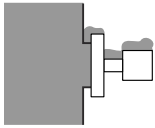
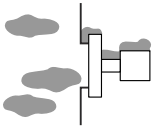
- After aligning (rotating) the enclosure, retighten the fixing screw.
- Do not open in a potentially explosive dust atmosphere.
- Seal the cable entry or piping tight (see protection type of enclosure in the "Temperature tables" chapter).
- Before operation:
  - Screw in the cover all the way.
  - Tighten the securing screw on the cover.

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.

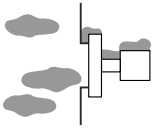
Basic specification, Position 7 = G
Devices under the protection type “Equipment dust ignition protection by enclosure (Ex t)" with G threaded holes are not intended for new installations, but only for replacing equipment in existing installations. Use of this equipment shall comply with the local installation requirements.

Permitted ambient conditions

Ex ta/tb 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 tb 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

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.

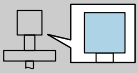
Optional specification, ID Jx, Kx = JL
Lower limit of the ambient temperature for explosion protection changes to −50 °C.

Specific conditions of use:
- The surface temperature is
  - for equipment protection level (EPL) Da: T_{200} xxx °C (with 200 mm dust deposit)
  - and equipment protection level (EPL) Db: T_L xxx °C (with dust accumulation T_L)
- The surface temperature is
  for equipment protection level (EPL) Db: T_L xxx °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 ta/tb IIIC T_{200} 80 °C Da/Db
Ex tb IIIC T_L 80 °C Db

Position 8 (Application)
F

Position 9, 10 (Antenna)
BS

Maximum surface temperature	**Process temperature range**	**Ambient temperature range**
T_{200} 80 °C	−20 °C ≤ T_p ≤ +80 °C	−20 °C ≤ T_a ≤ +65 °C

FMR66B, FMR67B

Ex ta/tb IIIC T_{200} 150 °C Da/Db
Ex tb IIIC T_L 150 °C Db

Position 8 (Application)
F, H, J

Position 9, 10 (Antenna)
GA, GP

Maximum surface temperature	Process temperature range	Ambient temperature range
T_{200} 80 °C	−40 °C ≤ T_p ≤ +80 °C	−40 °C ≤ T_a ≤ +65 °C
T_{200} 100 °C	−40 °C ≤ T_p ≤ +100 °C [1]	−40 °C ≤ T_a ≤ +60 °C
T_{200} 130 °C	−40 °C ≤ T_p ≤ +130 °C [1]	−40 °C ≤ T_a ≤ +55 °C
T_{200} 150 °C	−40 °C ≤ T_p ≤ +150 °C [1] [2]	−40 °C ≤ T_a ≤ +50 °C

1) Position 8 = F: 80 °C
2) Position 8 = H: 130 °C

FMR67B

Ex ta/tb IIIC T_{200} 200 °C Da/Db
Ex tb IIIC T_L 200 °C Db

Position 8 (Application)
L

Position 9, 10 (Antenna)
GA, GP

Maximum surface temperature	Process temperature range	Ambient temperature range
T_{200} 100 °C	−40 °C ≤ T_p ≤ +100 °C	−40 °C ≤ T_a ≤ +60 °C
T_{200} 150 °C	−40 °C ≤ T_p ≤ +150 °C	−40 °C ≤ T_a ≤ +55 °C
T_{200} 200 °C	−40 °C ≤ T_p ≤ +200 °C	−40 °C ≤ T_a ≤ +50 °C

Ex ta/tb IIIC T_{200} 280 °C Da/Db
Ex tb 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 ≤ T_a ≤ +65 °C
T_{200} 200 °C	−40 °C ≤ T_p ≤ +200 °C	−40 °C ≤ T_a ≤ +60 °C
T_{200} 280 °C	−40 °C ≤ T_p ≤ +280 °C	−40 °C ≤ T_a ≤ +55 °C

Ex ta/tb IIIC T_{200} 450 °C Da/Db
Ex tb 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 ≤ T_a ≤ +65 °C
T_{200} 200 °C	−40 °C ≤ T_p ≤ +200 °C	−40 °C ≤ T_a ≤ +60 °C
T_{200} 450 °C	−40 °C ≤ T_p ≤ +450 °C	−40 °C ≤ T_a ≤ +45 °C

Connection data

Basic specification, Position 3, 4 = BA, BB, BC

Power supply	
Channel 1 U ≤ 35 V_{DC}	Channel 2 (only *BB, BC*) U ≤ 35 V_{DC}

Basic specification, Position 3 = DA

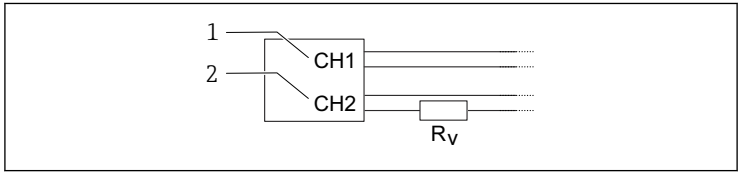
Power supply
U ≤ 32 V_{DC}

Basic specification, Position 3 = FA

Power supply
U ≤ 15 V_{DC}

Serial resistance (R_V)

Basic specification, Position 3, 4 = BB (only channel 2)



1 4 to 20 mA
2 Switch output

The power consumption have to be limited for certain applications.

- Recommended: Power consumption ≤ 1 W. This is obtained for a supply voltage up to 27 V_{DC}.
- For higher supply voltages (U_{max}): Insert a serial resistance (R_V) in order to limit the power consumption, see table below.

U_{max} [V]	R_V min
35	199 Ω
34	171 Ω
33	143 Ω
32	115 Ω
31	88 Ω
30	60 Ω
29	32 Ω
28	4 Ω
27	0 Ω

Cable entry: Connection compartment

Ex tb

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.
- The cable glands are suitable for a low risk of mechanical danger (4 Joule) and must be mounted in a protected position if larger impact energy levels are expected.
- To maintain the ingress protection of the enclosure: Install the enclosure cover, cable glands and blind plugs correctly.

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