

Safety Instructions

Liquicap M

FMI51, FMI52, FTI51, FTI52

II 1/2 G Ex ia IIC Ga / Ex db IIC Gb

II 1/2 G Ex ia IIC Ga / Ex db eb IIC Gb

II 1/2 D Ex ia IIIC Da / Ex tb IIIC Db



Liquicap M FMI51, FMI52, FTI51, FTI52

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About this document



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

The document translated into EU languages is available:

- In the download area of the Endress+Hauser website:
www.endress.com -> Downloads -> Manuals and Datasheets -> Type: Ex Safety Instruction (XA) -> Text Search: ...
- In the Device Viewer: www.endress.com -> Product tools -> Access device specific information -> Check device features



If not yet available, the document can be ordered.

Associated documentation

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

- BA00297F/00, BA00298F/00 (FMI51, FMI52)
- BA00299F/00 (FTI51, FTI52)

Supplementary documentation

Explosion-protection brochure: CP00021Z/11

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

EU Declaration of Conformity

Declaration Number:
EG05020

The EU Declaration of Conformity is available:

In the download area of the Endress+Hauser website:
www.endress.com -> Downloads -> Declaration -> Type: EU Declaration -> Product Code: ...

EU type-examination certificate

Certificate number:
BVS 05 ATEX E 090 X

List of applied standards: See EU Declaration of Conformity.

Manufacturer address Endress+Hauser SE+Co. KG
 Hauptstraße 1
 79689 Maulburg, Germany
 Phone: +49 7622 28-0
 Address of the manufacturing plant: See nameplate.

Other standards Among other things, the following standards shall be observed in their current version for proper installation:

- IEC/EN 60079-14: "Explosive atmospheres - Part 14: Electrical installations design, selection and erection"
- EN 1127-1: "Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology"

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

FMI5x, FTI5x	-	*****	+	A*B*C*D*E*F*G*..
<i>(Device type)</i>		<i>(Basic specifications)</i>		<i>(Optional specifications)</i>

* = 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: Liquicap M



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

FMI51, FMI52

Basic specifications

Position 1 (Approval)		
Selected option		Description
FMI5x	L	ATEX II 1/2 G Ex ia IIC T6...T3 Ga / Ex db IIC T6...T3 Gb, WHG, XA, note safety instruction (XA) (electrostatic charging)!

Position 7 (Electronics, Output)		
Selected option		Description
FMI5x	A	FEI50H; 4-20mA HART + display
	B	FEI50H; 4-20mA HART

Position 8 (Housing)		
Selected option		Description
FMI5x	5	T13 Alu IP66 NEMA4X + gas-tight probe seal + separate conn. compartment

Position 9 (Cable Entry)		
Selected option		Description
FMI5x	A	Gland M20 (EEx d > thread M20)
	B	Thread G1/2 ¹⁾
	C	Thread NPT1/2
	D	Thread NPT3/4

1) Reduction M20x1.5 to G1/2 enclosed

Optional specifications

No options specific to hazardous locations are available.

Device type

FTI51, FTI52

Basic specifications

Position 1 (Approval)		
Selected option		Description
FTI5x	G ¹⁾	ATEX II 1/2 G Ex ia IIC T6...T3 Ga / Ex db eb IIC T6...T3 Gb, WHG, XA, ATEX II 1/2 D Ex ia IIIC T ₂₀₀ 200°C Da / Ex tb IIIC T90°C Db note safety instruction (XA) (electrostatic charging)!
	L	ATEX II 1/2 G Ex ia IIC T6...T3 Ga / Ex db IIC T6...T3 Gb, WHG, XA, note safety instruction (XA) (electrostatic charging)!

1) Only in connection with Position 8 = 5

Position 7 (Electronics, Output)		
Selected option		Description
FTI5x	1	FEI51; 2-wire 19-253 VAC
	2	FEI52; 3-wire PNP 10-55 VDC
	4	FEI54; relay DPDT, 19-253 VAC, 19-55 VDC
	5 ¹⁾	FEI55; 8/16 mA, 11-35 VDC

1) Only in connection with Position 1 = L and Position 8 = 5

Position 8 (Housing)		
Selected option		Description
FTI5x	4	F13 Alu IP66 NEMA4X + gas-tight probe seal
	5	T13 Alu IP66 NEMA4X + gas-tight probe seal + separate conn. compartment
	6	F27 316L IP66/67 NEMA6P + gas-tight probe seal

Position 9 (Cable Entry)		
Selected option		Description
FMI5x	A	Gland M20 (EEx d > thread M20)
	B	Thread G1/2 ¹⁾
	C	Thread NPT1/2
	D	Thread NPT3/4

1) Reduction M20x1.5 to G1/2 enclosed

Optional specifications

No options specific to hazardous locations are available.

Safety instructions: General

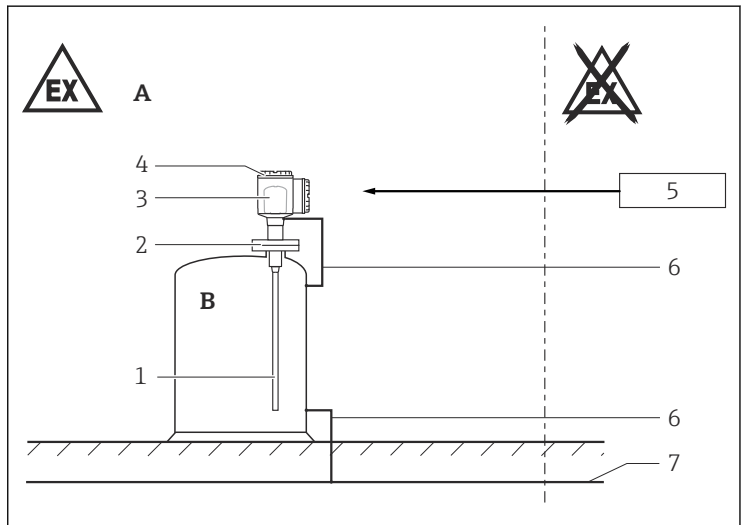
- The device is intended to be used in explosive atmospheres as defined in the scope of EN IEC 60079-0 or equivalent national standards. If no potentially explosive atmospheres are present or if additional protective measures have been taken: The device may be operated according to the manufacturer's specifications.
- 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)
- Modifications 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

- 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.
- 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.
- The sensors can be installed in the boundary wall between Zone 0 or Zone 20 and the less hazardous area Zone 1 or Zone 21. In this configuration, the process connection is installed in Zone 0 or Zone 20, while the sensor enclosure is installed in Zone 1 or Zone 21.
- Material specification of the separating element: > 10 mm glass feed-through, edged with > 1 mm stainless steel.

Safety instructions: Installation



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- A Basic specification, Position 1 = L: Zone 1
Basic specification, Position 1 = G: Zone 1, Zone 21
- B Basic specification, Position 1 = L: Zone 0, [Ex ia]
Basic specification, Position 1 = G: Zone 0, Zone 20, [Ex ia]
- 1 Rope or rod probes
- 2 Zone division
- 3 Electronic insert
- 4 Enclosure
- 5 Certified associated apparatus
- 6 Potential equalization line
- 7 Potential equalization

- Install the device to exclude any mechanical damage or friction during the application. Pay particular attention to flow conditions and tank fittings.
- In potentially explosive atmospheres:
 - Do not disconnect the electrical connection of the power supply circuit when energized.
 - Do not open the connection compartment cover and the electronics compartment cover when energized.
- Only use certified cable entries suitable for the application. Observe national regulations and standards. Accordingly, the connection terminal does not include any ignition sources.
- When operating the transmitter enclosure at an ambient temperature under $-20\text{ }^{\circ}\text{C}$, use appropriate cables and cable entries permitted for this application.
- When connecting through a conduit entry approved for this purpose, mount the associated sealing unit directly at the enclosure.
- Seal unused entry glands with approved sealing plugs that correspond to the type of protection. The plastic transport sealing plug does not meet this requirement and must therefore be replaced during installation.
- Before operation:
 - Screw in the cover all the way.
 - Tighten the securing clamp on the cover.
- Observe the maximum process conditions according to the manufacturer's Operating Instructions.
- At high medium temperatures, note flange pressure load capacity as a factor of temperature.
- To maintain the ingress protection of the enclosure IP66/68:
 - Screw the cover tight.
 - Mount the cable entry correctly.
- If a dynamic load is expected: Mechanically fix probes which are more than 3 m.
- Level probes with ground tubes: Suitable for use in Group IIC, IIB, IIA.
- Level probes without ground tubes: Suitable for use in Group IIC, IIB, IIA, if avoiding electrostatic charging of the probe.
Designation of the device with warning sign: "Avoid electrostatic charging".

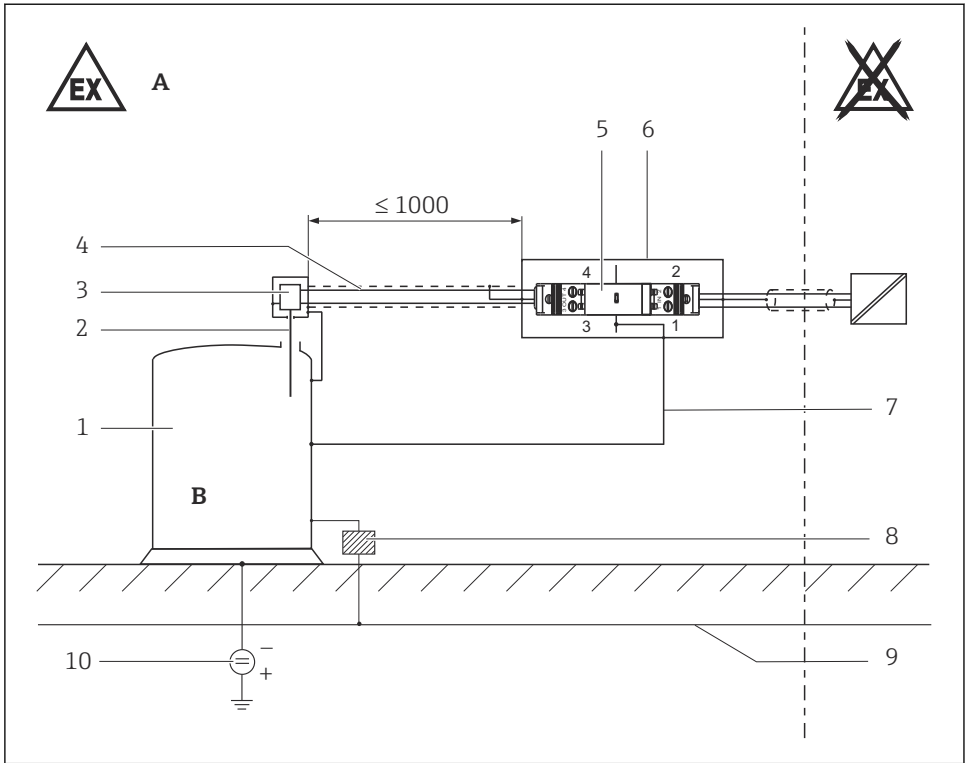
Basic specification, Position 1 = G

Connect the device:

- Using suitable cable and wire entries of protection type "Increased safety (Ex eb)".
- Using piping systems of protection type "Increased safety (Ex eb)".

Overvoltage protection

For installations which require overvoltage protection to comply with national regulations or standards, install the device using overvoltage protection (e.g. HAW56x from Endress+Hauser).



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 2 Dimensions in mm

A Zone 1

B Zone 0

1 Tank

2 Probe

3 Electronic insert

4 e.g. metal hose, metal pipe

5 Overvoltage protection, e.g. HAW56xZ

6 Grounding via top-hat rail or 51003750 metallic protective enclosure

7 Potential equalization line $\geq 4 \text{ mm}^2 \text{ Cu}$

8 Insulator (optional)

9 Potential equalization

10 Cathodic protection (Object voltage $\leq 24 \text{ V}$), (optional)

Safety instructions: Ex d joints

- If required or if in doubt: ask manufacturer for specifications.
- Flameproof joints are not intended to be repaired.

Safety instructions:
Zone separation
Zone 0, Zone 1

- Zone separation realized by the process connections.
- Versions of process connection:
 - Thread
 - Flange
- Process connections with thread:
 - Thread pitch ≥ 0.7
 - Thread engagement ≥ 5 turns
 - Screw-in depth ≥ 8 mm
- Ensure gas-tight installation of the process connections.
- After mounting and connecting the probe, it is essential to ensure tightness at the process connection of IP67.
- It is the responsibility of the plant operator to ensure sealing in the vicinity of the process connection.

Safety instructions:
Zone 20, Zone 21

- Do not open in a potentially explosive dust atmosphere.
- Avoid electrostatic charging of the sensor cable (e.g. do not rub dry and install outside the filling flow).

Temperature tables

Permitted ambient temperature range at the electronics enclosure:
 $-50\text{ °C} \leq T_a \leq +70\text{ °C}$

Observe the information in the temperature tables.

Application in gas

Device type FMI51, FMI52, Basic specification, Position 1 = L

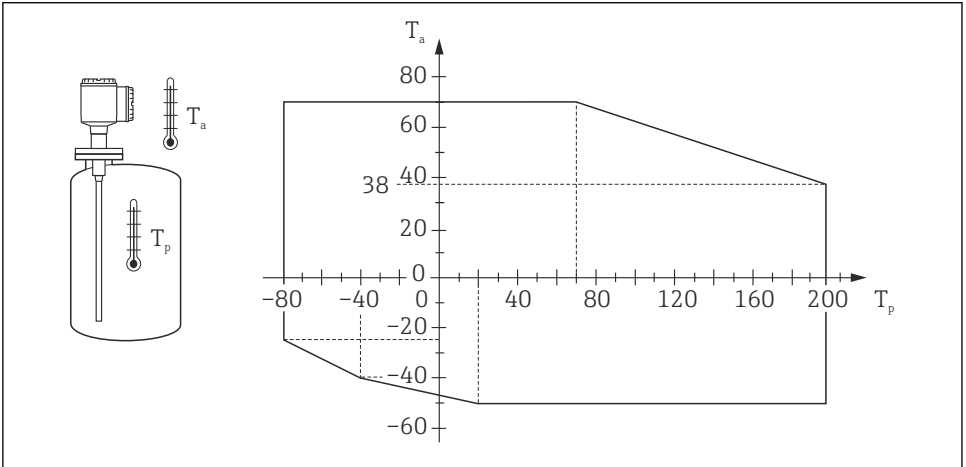
Basic specification, Position 7	Temperature class	Ambient temperature T_a (ambient): enclosure	Process temperature T_p (process)
A, B	T6	$-50\text{ °C} \leq T_a \leq +60\text{ °C}$	$-80\text{ °C} \leq T_p \leq +200\text{ °C}$
	T4/T3	$-50\text{ °C} \leq T_a \leq +70\text{ °C}$	

Device type FTI51, FTI52, Basic specification, Position 1 = L, G

Basic specification, Position 7	Temperature class	Ambient temperature T_a (ambient): enclosure	Process temperature T_p (process)
1, 2, 4	T6	$-50\text{ °C} \leq T_a \leq +60\text{ °C}$	$-80\text{ °C} \leq T_p \leq +200\text{ °C}$
	T4/T3	$-50\text{ °C} \leq T_a \leq +70\text{ °C}$	

Device type FTI51, FTI52, Basic specification, Position 1 = L

Basic specification, Position 7	Temperature class	Ambient temperature T_a (ambient): enclosure	Process temperature T_p (process)
5	T6	$-50\text{ °C} \leq T_a \leq +55\text{ °C}$	$-80\text{ °C} \leq T_p \leq +200\text{ °C}$
	T4/T3	$-50\text{ °C} \leq T_a \leq +70\text{ °C}$	



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T_a Ambient temperature in °C

T_p Process temperature in °C

Application in dust

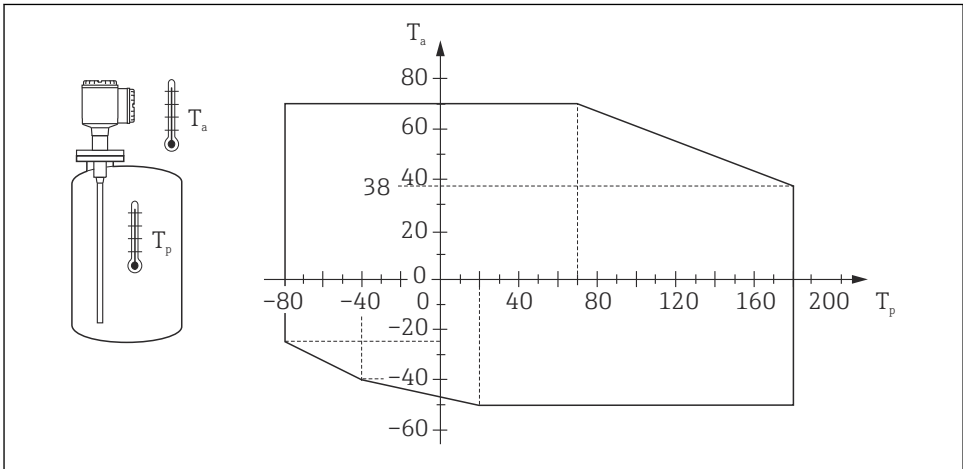


Limitations of the maximum ambient temperature at the electronics enclosure may be required dependent on device configuration, process temperatures and temperature classification.

- Maximum heat developed at the probe in Zone 20 under fault conditions and dust layer: < 20 K.
- Maximum heat developed at the enclosure surface in Zone 21 under fault conditions: < 20 K.

	Probe in Zone 20	Electronics enclosure in Zone 21
Maximum surface temperature at a process temperature or ambient temperature of 70 °C	$T_{200} 90\text{ °C at } T_p = +70\text{ °C}^{1)}$	$T_{90}\text{ °C at } T_a = +70\text{ °C}$
Maximum surface temperature for probe process temperatures ≥ 80 to 180 °C, under compliance of the permitted ambient temperature at the electronics enclosure.	$T_{200} 200\text{ °C at } T_p = +180\text{ °C}$	$T_{90}\text{ °C at } T_a = +38\text{ °C}$

1) Surface temperature at a process temperatures above 70 °C: $T_p = +20\text{ K}$



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T_a Ambient temperature in °C

T_p Process temperature in °C

Connection data

Device type FMI51, FMI52, Basic specification, Position 1 = L

Basic specification, Position 7	Electrical data
A, B	$U \leq 30\text{ V}_{DC}$ $P \leq 1\text{ W}$

Device type FTI51, FTI52, Basic specification, Position 1 = L, G

Basic specification, Position 7	Power supply	Relay circuit
1	19 to 253 V _{AC}	-
2	10 to 55 V _{DC}	-
4	19 to 253 V _{AC}	253 V _{AC} / 4 A 1500 VA / cos φ = 1 750 VA / cos φ > 0.7
	19 to 55 V _{DC}	30 V _{DC} / 4 A 125 V _{DC} / 0.2 A

Device type FTI51, FTI52, Basic specification, Position 1 = L

Basic specification, Position 7	Electrical data
5	U ≤ 35 V _{DC} P ≤ 1 W



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