

Safety Instructions

Levelflex

FMP51/52/54/55/56/57

4-20 mA HART

Ex db [ia] IIC T6...T1 Ga/Gb



Levelflex FMP51/52/54/55/56/57

4-20 mA HART

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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:

- BA01001F/00 (FMP51, FMP52, FMP54)
- BA01003F/00 (FMP55)
- BA01004F/00 (FMP56, FMP57)

Supplementary documentation

Special Documentation for cable gland M20 Ex d: SD02550F/00

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**Certificate of Conformity**

Certificate number:
CML 18JPN1079X

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

- JNIO SH-TR-46-1 : 2020
- JNIO SH-TR-46-2 : 2018
- JNIO SH-TR-46-6 : 2015

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

FMP5x	–	*****	+	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: Levelflex



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

FMP51, FMP52, FMP54, FMP55, FMP56, FMP57

Basic specifications

Position 1, 2 (Approval)		
Selected option		Description
FMP5x	JC	JPN Ex db ia IIC T6...T1 Ga/Gb
FMP54	JD, JE	JPN Ex db ia IIC T6...T1 Ga/Gb

Position 3 (Power Supply, Output)		
Selected option		Description
FMP5x	C	2-wire, 4-20 mA HART, 4...20 mA

Position 4 (Display, Operation)		
Selected option		Description
FMP5x	A	Without, via communication
	C	SD02, 4-line, push buttons + data backup function
	E	SD03, 4-line, illum., touch control + data backup function

Position 5 (Housing)		
Selected option		Description
FMP5x	C	GT20 dual compartment, Alu coated

Position 6 (Electrical Connection)		
Selected option		Description
FMP5x	B	Thread M20, IP66/68 NEMA4X/6P

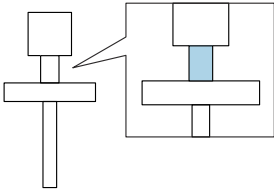
Position 7, 8 (Probe)		
Selected option		Description
FMP51	AA-AD, AL, AM BA-BD LA, LB MB, MD Ux	Type specified in in form, sizes, materials
FMP52	Cx Ox	Type specified in in form, sizes, materials

Position 7, 8 (Probe)		
Selected option		Description
FMP54	AE, AF Bx Lx Ux	Type specified in in form, sizes, materials
FMP55	Cx Nx Ux	Type specified in in form, sizes, materials
FMP56	LA, LB	Type specified in in form, sizes, materials
FMP57	Ax Lx	Type specified in in form, sizes, materials
FMP5x	YY	Special version, TSP-no. to be spec.

Position 9, 10 (Seal)		
Selected option		Description
FMP51	A4	Viton, -30...150 °C
	B3	EPDM, -40...120 °C
	C3	Kalrez, -20...200 °C
	Y9	Special version, TSP-no. to be spec.
FMP54	D1	Graphite, -196...280 °C (XT), saturated steam max 200 °C
	D2	Graphite, -196...450 °C (HT)
FMP56	AB	Viton, -30...120 °C
	B3	EPDM, -40...120 °C
	Y9	Special version, TSP-no. to be spec.
FMP57	A4	Viton, -30...150 °C
	B3	EPDM, -40...120 °C
	Y9	Special version, TSP-no. to be spec.



Shown in the temperature tables
exemplary as follows:



Position 11-13 (Process Connection)		
Selected option		Description
FMP51	AEx, AFJ, AFM, AGJ, AGM, AHJ, AJx, AKx, AQx, ARx, ASJ, ASM, ATJ, ATM Cxx Gxx Kxx Rxx Wxx	ANSI, DIN, JIS: flange, threads, hygienic or other standardized process connections
FMP52	Axx Cxx Kxx Mxx Txx	ANSI, DIN, JIS: flange, threads, hygienic or other standardized process connections
FMP54	AxJ GxJ Kxx Lxx Pxx Rxx Wxx	ANSI, DIN, JIS: flange, threads, hygienic or other standardized process connections
FMP55	Axx Cxx Kxx	ANSI, DIN, JIS: flange, threads, hygienic or other standardized process connections
FMP56	GDE RDE	ANSI, DIN, JIS: flange, threads, hygienic or other standardized process connections
FMP57	Axx Cxx GGE Kxx RGE	ANSI, DIN, JIS: flange, threads, hygienic or other standardized process connections
FMP5x	YYY	Special version, TSP-no. to be spec.

Optional specifications

Eleven double combinations of numbers or characters.

Here are some examples:

ID Jx (Test, Certificate)		
Selected option		Description
FMP54	JN	Ambient temperature transmitter -50 °C

ID Mx (Probe Design)		
Selected option		Description
FMP5x	MB	Sensor remote, 3 m/9 ft cable, detachable + mounting bracket
FMP51	MC	Sensor remote, 6 m/18 ft cable, detachable + mounting bracket
FMP52	MD	Sensor remote, 9 m/27 ft cable, detachable + mounting bracket
FMP54-57		

ID Nx, Ox (Accessory Mounted)		
Selected option		Description
FMP5x	NF ¹⁾	Bluetooth
FMP51 FMP52 FMP55	NC	Gas-tight feed through

1) Only in connection with Position 4 = C, E

Safety instructions: General

- 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.
- Refer to the temperature tables for the relationship between the permitted ambient temperature for the sensor and/or transmitter, depending on the range of application and the temperature class.
- When replacing the probe electronics or opening the connection between the remote cable and the probe, a jumper plug must be used or a short-circuit must be established between the probe contact and the potential equalization conductor to avoid electrostatically charging the probe.

Safety
instructions:
Special conditions

Permitted ambient temperature range at the electronics enclosure:
 $-40\text{ °C} \leq T_a \leq +80\text{ °C}$

Optional specification, ID Jx = JN

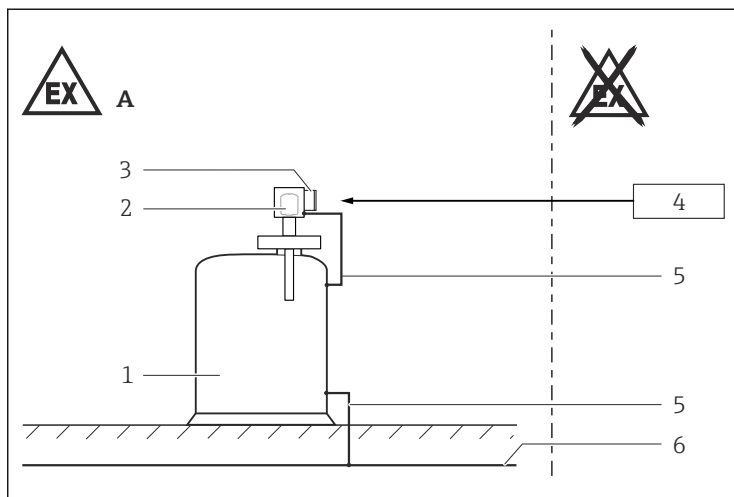
Permitted ambient temperature range at the electronics enclosure:
 $-50\text{ °C} \leq T_a \leq +80\text{ °C}$

- Observe the information in the temperature tables.
- 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 ($\leq 0.5\text{ m}$) generating strong electrostatic charges.
- Secure probes against swinging: e.g. by fixing them to the wall or floor or by installing them in the ground tube.

Device type FMP52, FMP55 and Device type FMP5x with non-conductive plastic coated probes

A probe coated with non-conductive material can be used if avoiding electrostatic charging (e.g. through friction, cleaning, maintenance, strong medium flow).

Safety instructions: Installation



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- A Zone 1
- 1 Tank; Zone 0, Zone 1
- 2 Electronics compartment Ex ia; Electronic insert
- 3 Connection compartment Ex db
- 4 Power supply
- 5 Potential equalization line
- 6 Potential equalization

- After aligning (rotating) the enclosure, retighten the fixing screw (see Operating Instructions).
- 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.
- 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°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.
- Continuous service temperature of the connecting cable: -40 °C to $\geq +85\text{ °C}$; in accordance with the range of service temperature taking into account additional influences of the process conditions ($T_{a,min}$), ($T_{a,max} + 20\text{ K}$).

Optional specification, ID Jx = JN

Continuous service temperature of the connecting cable:

-50 °C to $\geq +85\text{ °C}$; in accordance with the range of service temperature taking into account additional influences of the process conditions ($T_{a,min}$), ($T_{a,max} + 20\text{ K}$).

Explosion protection "Flameproof enclosure Ex db"

Flameproof equipment with G threaded entry holes is not intended for new installations but only for replacement of equipment in existing installations. Application of this equipment shall comply with the local installation requirements.

Intrinsic safety

- The device can be connected to the Endress+Hauser FXA291 service tool: refer to the Operating Instructions.
- The device can be equipped with the Bluetooth® module: refer to the Operating Instructions and specifications in the "Bluetooth® module" chapter.

Potential equalization

Integrate the device into the local potential equalization.

Bluetooth® module

Optional specification, ID Nx, Ox = NF

- With Bluetooth® module installed: Use of external hardware not allowed (e.g. external display, service interface).
- The intrinsically safe input power circuit of the Bluetooth® module is isolated from ground.

Safety instructions: Zone 0

- In the event of potentially explosive vapor/air mixtures, only operate the device under atmospheric conditions.
 - Temperature: -20 to +60 °C
 - Pressure: 80 to 110 kPa (0.8 to 1.1 bar)
 - Air with normal oxygen content, usually 21 % (V/V)
- If no potentially explosive mixtures are present, or if additional protective measures have been taken, the device may also be operated under non-atmospheric conditions in accordance with the manufacturer's specifications.

Temperature tables

→ Safety Instructions: XA02672F/00



The Safety Instructions for temperature tables are available:
In the download area of the Endress+Hauser website:
www.endress.com -> Downloads ->
Manuals and Datasheets ->
Type: Ex Safety Instructions (XA) -> Text Search: ...



Observe the permitted temperature range at the probe.

Explanation of how to use the temperature tables



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

1st column: Position 5 = A, B, ...

2nd column: Position 3 = A, B, ..

- (1): 1 channel used
- (2): 2 channels used

3rd column: Temperature classes T6 (85 °C) to T1 (450 °C)

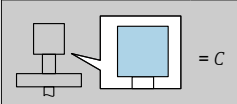
Column P1 to P6: Position (temperature value) on the axes of the derating

- T_a: Ambient temperature in °C
- T_p: Process temperature in °C

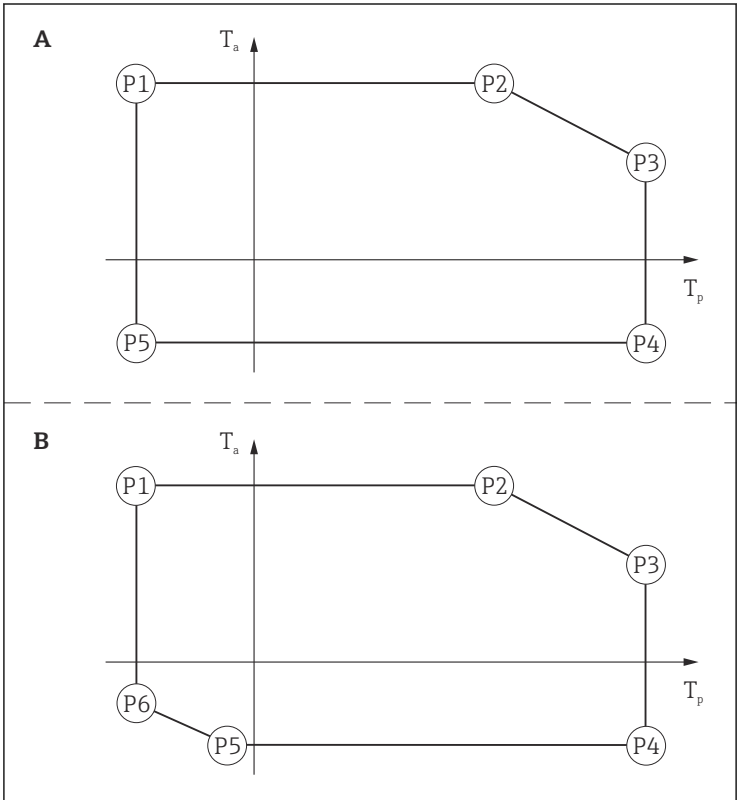


Column P6 is only relevant for version B of the derating.

Example table

	(1)		P1		P2		P3		P4		P5		P6	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
	C	T6	-20	60	60	60	80	56	80	-20	-20	-20	-	-

Example diagrams of possible deratings



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Connection data

Optional specification, ID Nx, Ox = NF
 When using the Bluetooth® module: No changes to the connection values.

Connection compartment Ex db

Terminal 1 (+), 2 (-)	Terminal 3 (+), 4 (-)
Power supply $U_N = 30\text{ V}_{DC}$ $U_m = 250\text{ V}$ $I_{max} = 22\text{ mA}$	Output 4 to 20 mA $U_N = 30\text{ V}_{DC}$ $U_m = 250\text{ V}$ $I_{max} = 22\text{ mA}$

Electronics compartment Ex ia

Service interface (CDI)

Taking the following values into consideration, the device can be connected to the certified Endress+Hauser FXA291 service tool or a similar interface:

Service interface													
$U_i = 7.3\text{ V}$ effective inner inductance $L_i = \text{negligible}$ effective inner capacitance $C_i = \text{negligible}$													
$U_o = 7.3\text{ V}$ $I_o = 100\text{ mA}$ $P_o = 160\text{ mW}$													
$L_o\text{ (mH)} =$	5.00	2.00	1.00	0.50	0.20	0.15	0.10	0.05	0.02	0.01	0.005	0.002	0.001
$C_o\text{ (}\mu\text{F)}^{1)} =$	0.73	1.20	1.60	2.00	2.60	-	3.20	4.00	5.50	7.30	10.00	12.70	12.70
$C_o\text{ (}\mu\text{F)}^{2)} =$	-	0.49	0.90	1.40	-	2.00	-	-	-	-	-	-	-

- 1) Values according to PTB "ispark" program
2) Values according to IEC/EN 60079-25, Annex C



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