

Safety Instructions

Micropilot FMR50/51/52

4-20 mA HART

Ex ia IIC T6...T1 Ga/Gb





Micropilot FMR50/51/52

4-20 mA HART


Table of contents

Associated documentation	4
Supplementary documentation	4
Manufacturer's certificates	4
Manufacturer address	4
Extended order code	4
Safety instructions: General	7
Safety instructions: Special conditions	7
Safety instructions: Installation	8
Safety instructions: Zone 0	9
Temperature tables	9
Connection data	9

Associated documentation	<p>This document is an integral part of the following Operating Instructions:</p> <ul style="list-style-type: none"> ■ BA01045F/00 (FMR50) ■ BA01049F/00 (FMR51, FMR52) 										
Supplementary documentation	<p>Explosion-protection brochure: CP00021Z/11</p> <p>The Explosion-protection brochure is available:</p> <ul style="list-style-type: none"> ■ 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	<p>Certificate of Conformity</p> <p>Certificate number: CML 17JPN1331X</p> <p>Affixing the certificate number certifies conformity with the following standards (depending on the device version):</p> <ul style="list-style-type: none"> ■ JNIOH-TR-46-1 : 2015 ■ JNIOH-TR-46-6 : 2015 ■ IEC 60079-26 : 2014 										
Manufacturer address	<p>Endress+Hauser SE+Co. KG Hauptstraße 1 79689 Maulburg, Germany Address of the manufacturing plant: See nameplate.</p>										
Extended order code	<p>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.</p> <p>Structure of the extended order code</p> <table border="0" style="width: 100%; text-align: center;"> <tr> <td style="width: 30%;">FMR5x</td> <td style="width: 10%;">–</td> <td style="width: 30%;">*****</td> <td style="width: 10%;">+</td> <td style="width: 20%;">A*B*C*D*E*F*G*..</td> </tr> <tr> <td><i>(Device type)</i></td> <td></td> <td><i>(Basic specifications)</i></td> <td></td> <td><i>(Optional specifications)</i></td> </tr> </table> <p>* = Placeholder At this position, an option (number or letter) selected from the specification is displayed instead of the placeholders.</p> <p><i>Basic specifications</i></p> <p>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.</p> <p><i>Optional specifications</i></p> <p>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).</p>	FMR5x	–	*****	+	A*B*C*D*E*F*G*..	<i>(Device type)</i>		<i>(Basic specifications)</i>		<i>(Optional specifications)</i>
FMR5x	–	*****	+	A*B*C*D*E*F*G*..							
<i>(Device type)</i>		<i>(Basic specifications)</i>		<i>(Optional specifications)</i>							

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

FMR50, FMR51, FMR52

Basic specifications

Position 1, 2 (Approval)		
Selected option		Description
FMR50	Jl	JPN Ex ia IIC T6...T1 Ga/Gb
FMR51 FMR52	JA	JPN Ex ia IIC T6...T1 Ga/Gb

Position 3 (Power Supply, Output)		
Selected option		Description
FMR5x	A	2-wire, 4-20 mA HART
	B	2-wire, 4-20 mA HART, switch output (PFS)

Position 4 (Display, Operation)		
Selected option		Description
FMR5x	A	Without, via communication
	C	SD02, 4-line, push buttons + data backup function
	L	Prepared for display FHX50 + M12 connection
	M	Prepared for display FHX50 + custom connection

Position 5 (Housing)		
Selected option		Description
FMR5x	C	GT20 dual compartment, Alu coated
FMR51 FMR52	B	GT18 dual compartment, 316L

Position 6 (Electrical Connection)		
Selected option		Description
FMR5x	A	Gland M20, IP66/68 NEMA4X/6P
	B	Thread M20, IP66/68 NEMA4X/6P
	C	Thread G1/2, IP66/68 NEMA4X/6P
	D	Thread NPT1/2, IP66/68 NEMA4X/6P

Position 7, 8 (Antenna)		
Selected option		Description
FMR50 FMR51	Bx	Horn (different sizes)
FMR52	BO	Horn 50 mm/2", -196...200°C, flush mount
	BP	Horn 80 mm/3", -196...200°C, flush mount

Position 9, 10 (Seal)		
Selected option		Description
FMR51	A5	Viton GLT, -40...150°C
	C1	Kalrez, -20...150°C

Position 11-13 (Process Connection)		
Selected option		Description
FMR50	GGF RGF UAE XRO XxG	ANSI, DIN, JIS: flange, threads, hygienic or other standardized process connections
FMR51	AFx, AGx, AHx, AJx, ARx, ASx, ATx Cxx Kxx Pxx Rxx Txx	ANSI, DIN, JIS: flange, threads, hygienic or other standardized process connections
FMR52	AFK, AGK, AHK, AJK CFK, CGK, CHK, CJK Kxx Mxx TDK, TFK, THK	ANSI, DIN, JIS: flange, threads, hygienic or other standardized process connections
FMR5x	YYY	Special version, TSP-no. to be spec.

Optional specifications

Nine respectively ten double combinations of numbers or characters.

Here are some examples:

ID Jx (Test, Certificate)		
Selected option		Description
FMR52	JN	Ambient temperature transmitter -50°C

ID Nx, Ox (Accessory Mounted)		
Selected option		Description
FMR5x	NA	Overvoltage protection
	NF ¹⁾	Bluetooth
FMR51	OM	Antenna extension (different sizes)
	OU	
	OV	
	OW	Horn protection, PTFE, no airpurge possible

1) Only in connection with Position 4 = C

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.

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.

Basic specification, Position 5 = C

In Zone 0, avoid sparks caused by impact and friction.

Device type FMR50, FMR52 (planar, enamel)

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

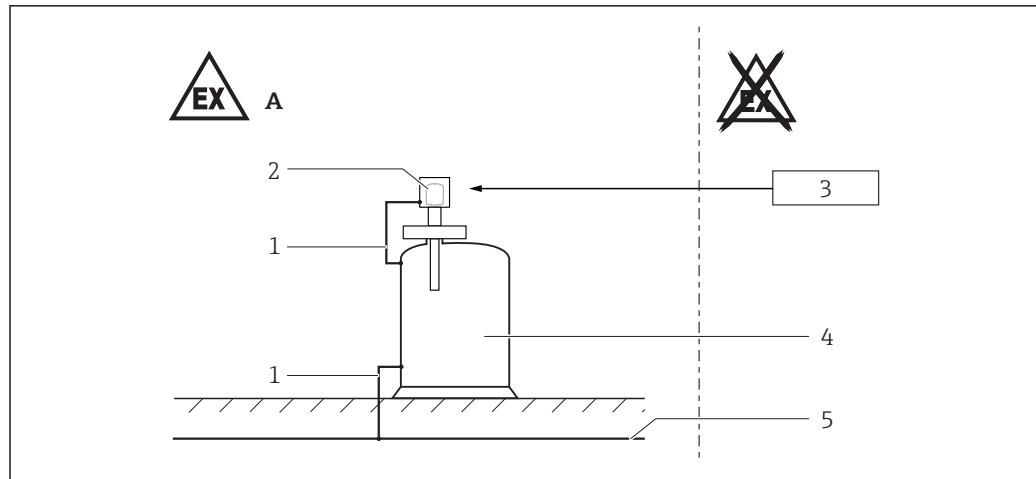
Device type FMR51 and Optional specification, ID Nx, Ox = OW

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

Device type FMR51 and Optional specification, ID Nx, Ox = OM, ON, OR, OS, OU, OV, OP, OT

Avoid contact between sensor and tank wall. Take into account tank fittings and flow conditions (avoid sparks caused by impact and friction).

Safety instructions: Installation



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- A Zone 0, Zone 1
 1 Potential equalization line
 2 Electronic insert
 3 Certified associated apparatus
 4 Tank; Zone 0, Zone 1
 5 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.
- 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 ($T_{a,\min}$), ($T_{a,\max} + 20\text{ K}$).

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. If the device is only equipped with one input, the dielectric strength of the input is at least $500\text{ V}_{\text{rms}}$. If the device is equipped with more than one input, the dielectric strength of each individual input to ground is at least $500\text{ V}_{\text{rms}}$, and the dielectric strength of the inputs vis-à-vis one another is also at least $500\text{ V}_{\text{rms}}$.
- Observe the pertinent guidelines when interconnecting intrinsically safe circuits.
- The device can be connected to the Endress+Hauser FXA291 service tool: refer to the Operating Instructions and specifications in the "Overvoltage protection" chapter.
- The device can be equipped with the Bluetooth® module: refer to the Operating Instructions and specifications in the "Bluetooth® module" chapter.

Basic specification, Position 3 = A

When the device is connected to certified intrinsically safe circuits of Category Ex ib for Equipment Groups IIC and IIB, the type of protection changes to Ex ib IIC and Ex ib IIB. Do not operate the antenna in Zone 0 if connecting to an intrinsically safe circuit of Category Ex ib.

Basic specification, Position 3 = B

When the intrinsically safe Ex ia circuits of the device are connected to certified intrinsically safe circuits of Category Ex ib for Equipment Groups IIC or IIB, the type of protection changes to Ex ib [ia] IIC or Ex ib [ia] IIB. Regardless of the power supply, all the internal circuits correspond to Ex ia IIC type of protection (e.g. service interface, external display, sensor).

Potential equalization

Integrate the device into the local potential equalization.

Overvoltage protection

- If an overvoltage protection against atmospheric over voltages is required: no other circuits may leave the enclosure during normal operation without additional measures.
- 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).
- Observe the safety instructions of the overvoltage protection.

Optional specification, ID Nx, Ox = NA (Overvoltage protection Type OVP10 and Type OVP20)

The intrinsically safe input power circuit of the device is isolated from ground. If the device is only equipped with one input, the dielectric strength of the input is at least 290 V_{rms}. If the device is equipped with more than one input, the dielectric strength of each individual input to ground is at least 290 V_{rms}, and the dielectric strength of the inputs vis-à-vis one another is also at least 290 V_{rms}.

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.
- Associated devices with galvanic isolation between the intrinsically safe and non-intrinsically safe circuits are preferred.
- Only use the device in media to which the silicone rubber potting compound of the electronic insert and the enclosure made of PBT, aluminum or 316L have sufficient durability.
- If there is a risk of dangerous potential differences within Zone 0 (e.g. through the occurrence of atmospheric electricity), implement suitable measures for intrinsically safe circuits in Zone 0.

Temperature tables

→  12

Connection data

Optional specification, ID Nx, Ox = NA (Overvoltage protection Type OVP10 and Type OVP20)
When using the internal overvoltage protection: No changes to the connection values.

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

Ex ia

Power supply and signal circuit with protection type: intrinsic safety Ex ia IIC, Ex ia IIB.

Basic specification, Position 3 = A

Terminal 1 (+), 2 (-)
Power supply $U_i = 30 \text{ V}$ $I_i = 300 \text{ mA}$ $P_i = 1 \text{ W}$ effective inner inductance $L_i = 0$ effective inner capacitance $C_i = 12 \text{ nF}$

Basic specification, Position 3 = B

Terminal 1 (+), 2 (-)	Terminal 3 (+), 4 (-)
Power supply $U_i = 30\text{ V}$ $I_i = 300\text{ mA}$ $P_i = 1\text{ W}$ effective inner inductance $L_i = 0$ effective inner capacitance $C_i = 5\text{ nF}$	Switch output (PFS) $U_i = 30\text{ V}$ $I_i = 300\text{ mA}$ $P_i = 1\text{ W}$ effective inner inductance $L_i = 0$ effective inner capacitance $C_i = 6\text{ nF}$

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

Micropilot FMR50/51/52

4-20 mA HART

Table of contents

Notes on the structure	12
Example diagrams of possible deratings	14
Zone 0: 1 channel	15
Zone 0: 2 channels	15
Zone 0, Zone 1: 1 channel	16
Zone 0, Zone 1: 2 channels	16
Zone 1: 1 channel	17
Zone 1: 2 channels	20

Notes on the structure

Extract from the extended order code

Device type

FMR50, FMR51, FMR52

Basic specifications

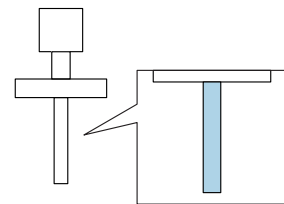
Position 1, 2 (Approval)		
Selected option		Description
FMR50	Jl	JPN Ex ia IIC T6...T1 Ga/Gb
FMR51 FMR52	JA	JPN Ex ia IIC T6...T1 Ga/Gb

Position 3 (Power Supply, Output)		
Selected option		Description
FMR5x	A	2-wire, 4-20 mA HART
	B	2-wire, 4-20 mA HART, switch output (PFS)

Position 5 (Housing)		
Selected option		Description
FMR5x	C	GT20 dual compartment, Alu coated
FMR51 FMR52	B	GT18 dual compartment, 316L

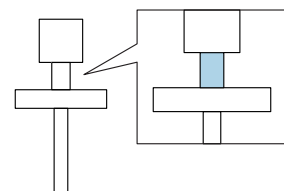
Position 7, 8 (Antenna)		
Selected option		Description
FMR50 FMR51	Bx	Horn (different sizes)
FMR52	BO	Horn 50 mm/2", -196...200°C, flush mount
	BP	Horn 80 mm/3", -196...200°C, flush mount


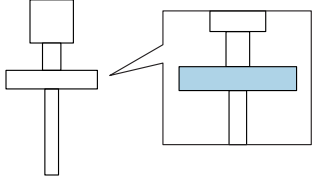
 Shown in the temperature tables exemplary as follows:



Position 9, 10 (Seal)		
Selected option		Description
FMR51	A5	Viton GLT, -40...150°C
	C1	Kalrez, -20...150°C

 Shown in the temperature tables exemplary as follows:





Position 11-13 (Process Connection)		
Selected option		Description
FMR50	GGF RGF UAE XR0 XxG	ANSI, DIN, JIS: flange, threads, hygienic or other standardized process connections
FMR51	AFx, AGx, AHx, AJx, ARx, ASx, ATx Cxx Kxx Pxx Rxx Txx	ANSI, DIN, JIS: flange, threads, hygienic or other standardized process connections
FMR52	AFK, AGK, AHK, AJK CFK, CGK, CHK, CJK Kxx Mxx TDK, TFK, THK	ANSI, DIN, JIS: flange, threads, hygienic or other standardized process connections
FMR5x	YYY	Special version, TSP-no. to be spec.
<p> Shown in the temperature tables exemplary as follows:</p>		


Optional specifications

ID Jx (Test, Certificate)		
Selected option		Description
FMR52	JN	Ambient temperature transmitter -50°C

General notes

-  *Optional specification, ID Nx, Ox = NA (Overvoltage protection Type OVP10 and Type OVP20)*
When using the internal overvoltage protection: Reduce the admissible ambient temperature at the enclosure by 2 K.
-  Observe the permitted temperature range at the antenna.

Description notes

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

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

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

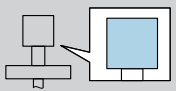
- (1): 1 channel used
- (2): 2 channels used

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

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

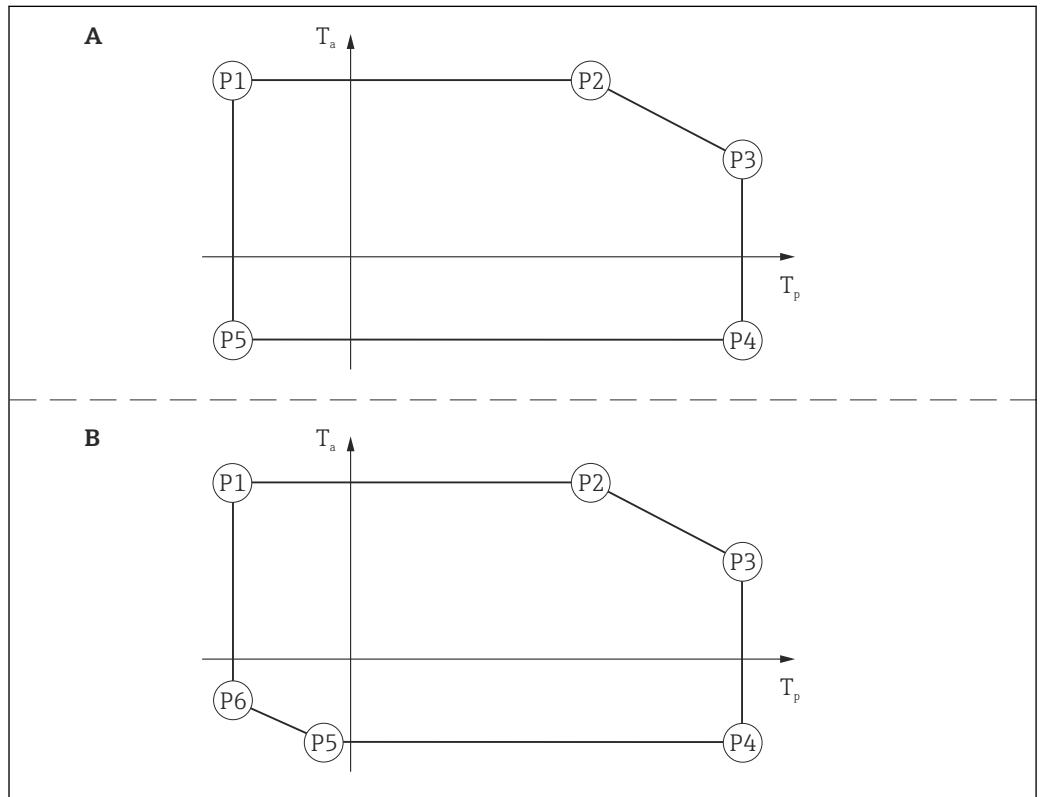
- T_a: Ambient temperature in °C
- T_p: Process temperature in °C

i Column P6 is only relevant for version B of the derating.
 → 14

 = C	(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	
	A, B, C	T6	-40	60	60	60	85	53	85	-40	-40	-40	-	-
		T5	-40	75	75	75	100	68	100	-40	-40	-40	-	-
		T4	-40	80	80	80	135	67	135	-40	-40	-40	-	-
		T3	-40	80	80	80	200	51	200	-40	-40	-40	-	-

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Example diagrams of possible deratings

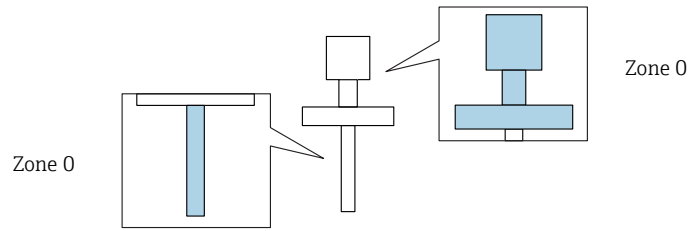


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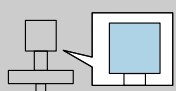
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Zone 0: 1 channel

Position 3 = A, B: 1 channel used

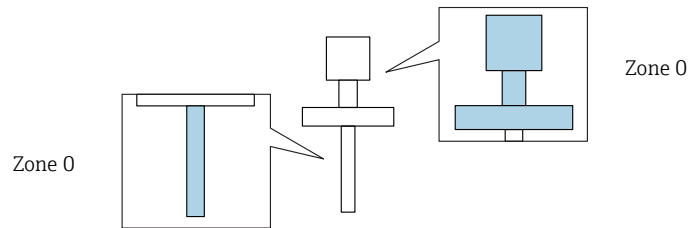


FMR5x

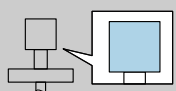
 = B, C	(1)	P1		P2		P3		P4		P5		P6		
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
	A, B	T6	-20	48	48	48	60	44	60	-20	-20	-20	-	-
		T5	-20	60	60	60	60	60	60	-20	-20	-20	-	-

Zone 0: 2 channels

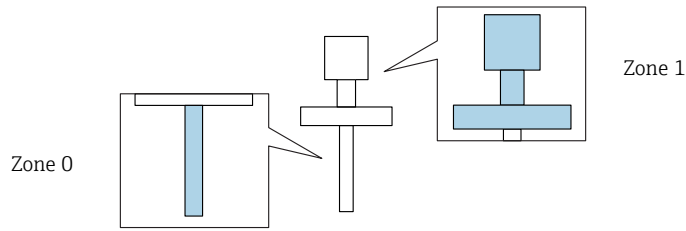
Position 3 = B: 2 channels used



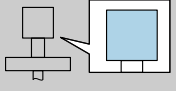
FMR5x

 = B, C	(2)	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	
	B	T6	-20	39	39	39	60	34	60	-20	-20	-20	-	-
		T5	-20	51	51	51	60	49	60	-20	-20	-20	-	-

Zone 0, Zone 1: 1 channel *Position 3 = A, B: 1 channel used*

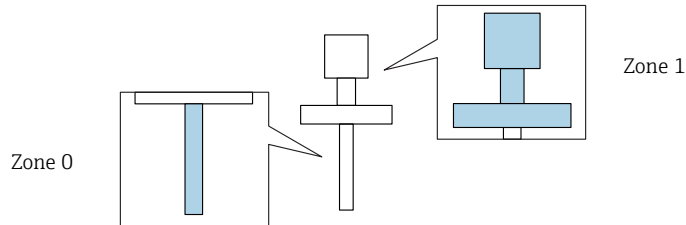


FMR5x

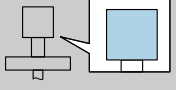
 = B, C	(1)	P1		P2		P3		P4		P5		P6		
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
	A, B	T6	-20	60	60	60	60	60	60	-40 -50 ¹⁾	-20	-40 -50 ¹⁾	-	-
		T5	-20	75	60	75	60	75	60	-40 -50 ¹⁾	-20	-40 -50 ¹⁾	-	-
		T4	-20	80	60	80	60	80	60	-40 -50 ¹⁾	-20	-40 -50 ¹⁾	-	-

1) Only in connection with Optional specification, ID Jx = JN

Zone 0, Zone 1: 2 channels *Position 3 = B: 2 channels used*



FMR5x

 = B, C	(2)	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	
	B	T6	-20	51	51	51	51	49	51	-40 -50 ¹⁾	-20	-40 -50 ¹⁾	-	-
		T5	-20	66	60	66	60	66	60	-40 -50 ¹⁾	-20	-40 -50 ¹⁾	-	-
		T4	-20	75	60	75	60	75	60	-40 -50 ¹⁾	-20	-40 -50 ¹⁾	-	-

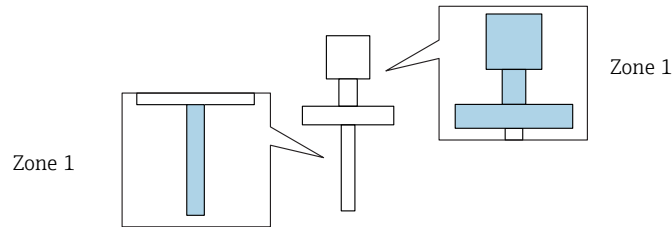
1) Only in connection with Optional specification, ID Jx = JN

Zone 1: 1 channel

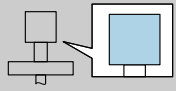
Position 3 = A, B: 1 channel used

Page references to the temperature tables of the respective device types: See the following list.

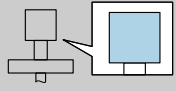
- FMR50 → 17
- FMR51 → 17
- FMR52 → 18



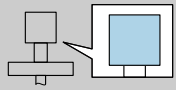
FMR50

 = C	(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
	A, B	T6	-40	60	60	60	80	58	80	-40	-40	-40	-	-

FMR51

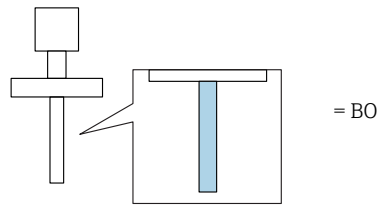
 = B	(1)		P1		P2		P3		P4		P5		P6	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
	A, B	T6	-40	60	60	60	85	54	85	-40	-40	-40	-	-
		T5	-40	75	75	75	100	69	100	-40	-40	-40	-	-
		T4	-40	80	80	80	135	68	135	-40	-40	-40	-	-
		T3 ¹⁾	-40	80	80	80	150	65	150	-40	-40	-40	-	-

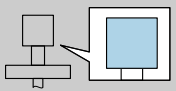
1) Functional: Maximum permissible process temperature

 = C	(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
	A, B	T6	-40	60	60	60	85	55	85	-40	-40	-40	-	-
		T5	-40	75	75	75	100	70	100	-40	-40	-40	-	-
		T4	-40	80	80	80	135	70	135	-40	-40	-40	-	-
		T3 ¹⁾	-40	80	80	80	150	68	150	-40	-40	-40	-	-

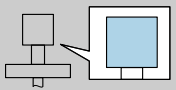
1) Functional: Maximum permissible process temperature

FMR52



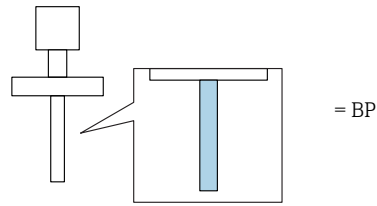
 = B	(1)	P1		P2		P3		P4		P5		P6		
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
	A, B	T6	-196	60	60	60	85	55	85	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-3
		T5	-196	75	75	75	100	70	100	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-3
		T4	-196	80	80	80	135	71	135	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-3
		T3	-196	80	80	80	200	59	200	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-3

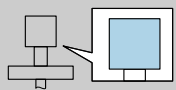
1) Only in connection with Optional specification, ID Jx = JN

 = C	(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	
	A, B	T6	-196	60	60	60	85	56	85	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-14
		T5	-196	75	75	75	100	71	100	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-14
		T4	-196	80	80	80	135	72	135	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-14
		T3	-196	80	80	80	200	63	200	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-14

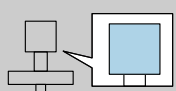
1) Only in connection with Optional specification, ID Jx = JN

FMR52



 = B	(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	
	A, B	T6	-196	60	60	60	85	54	85	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	10
		T5	-196	75	75	75	100	69	100	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	10
		T4	-196	80	80	80	135	69	135	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	10
		T3	-196	80	80	80	200	55	200	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	10

1) Only in connection with Optional specification, ID Jx = JN

 = C	(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	
	A, B	T6	-196	60	60	60	85	55	85	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-8
		T5	-196	75	75	75	100	70	100	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-8
		T4	-196	80	80	80	135	71	135	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-8
		T3	-196	80	80	80	200	60	200	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-8

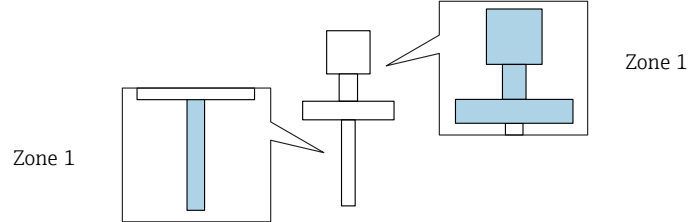
1) Only in connection with Optional specification, ID Jx = JN

Zone 1: 2 channels

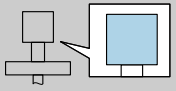
Position 3 = B: 2 channels used

Page references to the temperature tables of the respective device types: See the following list.

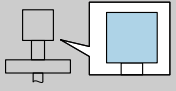
- FMR50 → 20
- FMR51 → 20
- FMR52 → 21



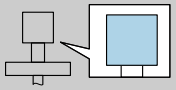
FMR50

 = C	(2)	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	
	B	T6	-40	51	51	51	80	49	80	-40	-40	-40	-	-

FMR51

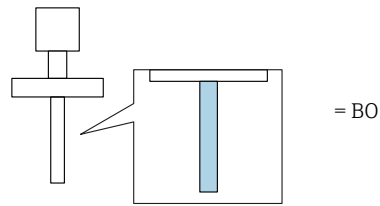
 = B	(2)	P1		P2		P3		P4		P5		P6		
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
	B	T6	-40	51	51	51	85	44	85	-40	-40	-40	-	-
		T5	-40	66	66	66	100	59	100	-40	-40	-40	-	-
		T4	-40	75	75	75	135	62	135	-40	-40	-40	-	-
		T3 ¹⁾	-40	75	75	75	150	59	150	-40	-40	-40	-	-

1) Functional: Maximum permissible process temperature

 = C	(2)	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	
	B	T6	-40	51	51	51	85	45	85	-40	-40	-40	-	-
		T5	-40	66	66	66	100	60	100	-40	-40	-40	-	-
		T4	-40	75	75	75	135	65	135	-40	-40	-40	-	-
		T3 ¹⁾	-40	75	75	75	150	62	150	-40	-40	-40	-	-

1) Functional: Maximum permissible process temperature

FMR52



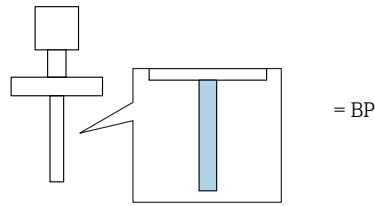
= B	(2)		P1		P2		P3		P4		P5		P6	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
	B	T6	-196	51	51	51	85	45	85	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-3
		T5	-196	66	66	66	100	60	100	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-3
		T4	-196	75	75	75	135	65	135	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-3
		T3	-196	75	75	75	200	53	200	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-3

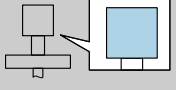
1) Only in connection with Optional specification, ID Jx = JN

= C	(2)		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
	B	T6	-196	51	51	51	85	47	85	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-14
		T5	-196	66	66	66	100	62	100	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-14
		T4	-196	75	75	75	135	67	135	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-14
		T3	-196	75	75	75	200	58	200	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-14

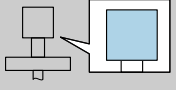
1) Only in connection with Optional specification, ID Jx = JN

FMR52



 = B	(2)		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
	B	T6	-196	51	51	51	85	44	85	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	10
		T5	-196	66	66	66	100	59	100	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	10
		T4	-196	75	75	75	135	63	135	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	10
		T3	-196	75	75	75	200	49	200	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	10

1) Only in connection with Optional specification, ID Jx = JN

 = C	(2)		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
	B	T6	-196	51	51	51	85	46	85	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-8
		T5	-196	66	66	66	100	61	100	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-8
		T4	-196	75	75	75	135	65	135	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-8
		T3	-196	75	75	75	200	54	200	-40 -50 ¹⁾	-40 -50 ¹⁾	-40 -50 ¹⁾	-196	-8

1) Only in connection with Optional specification, ID Jx = JN



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