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Safety Instructions
Micropilot FMR62, FMR67

4-20 mA HART

ATEX, IECEx: Ex ia/ic [ia Ga] IIC Ga/Gb/Gc
Ex ia/ec [ia Ga] IIC Ga/Gb/Gc

Endress+Hauser
People for Process Automation

Micropilot FMR62, FMR67

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.

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:

- BA01619F/00 (FMR62)
- BA01620F/00 (FMR67)

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:
EC_00477

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:
IBExU16ATEX1194 X

List of applied standards: See EU Declaration of Conformity.

IEC Declaration of Conformity

Certificate number:
IECEx IBE16.0035 X

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

- IEC 60079-0 : 2017
- IEC 60079-7 : 2015
- IEC 60079-11 : 2011
- IEC 60079-26 : 2014

Manufacturer address

Endress+Hauser SE+Co. KG
Hauptstraße 1
79689 Maulburg, Germany

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

FMR6x	–	**********	+	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

FMR62, FMR67

Basic specifications

Position 1, 2 (Approval)		
Selected option		**Description**
FMR6x	BD	ATEX II 1/2/3 G Ex ia/ic [ia Ga] IIC T6...T1 Ga/Gb/Gc
	BL	ATEX II 1/2/3 G Ex ia/ec [ia Ga] IIC T6...T1 Ga/Gb/Gc
	ID	IECEx Ex ia/ic [ia Ga] IIC T6...T1 Ga/Gb/Gc
	IL	IECEx Ex ia/ec [ia Ga] IIC T6...T1 Ga/Gb/Gc

Position 3 (Power Supply, Output)		
Selected option		**Description**
FMR6x	A	2-wire, 4-20 mA HART
	B	2-wire, 4-20 mA HART, switch output (PFS)
	C	2-wire, 4-20 mA HART, 4 to 20 mA

Position 4 (Display, Operation)		
Selected option		**Description**
FMR6x	A	Without, via communication
	C	SD02, 4-line, push buttons + data backup function
	E	SD03, 4-line, illum., touch control + data backup function
	L [1)]	Prepared for display FHX50 + M12 connection
	M [1)]	Prepared for display FHX50 + custom connection
	N [1)]	Prepared for display FHX50 + NPT1/2"

1) FHX50 is approved according to DEK12.0046X or DEKRA 12ATEX0151X.

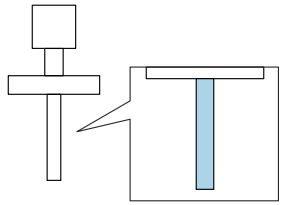
Position 5 (Housing)		
Selected option		**Description**
FMR6x	B	GT18 dual compartment, 316L
	C	GT20 dual compartment, Alu, coated

Position 6 (Electrical Connection)		
Selected option		**Description**
FMR6x	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
	I [1) 2)]	Plug M12, IP66/68 NEMA4X/6P
	M [1) 2)]	Plug 7/8", IP66/68 NEMA4X/6P

1) Only in connection with Position 1, 2 = BD, ID
2) Only in connection with Position 3 = A

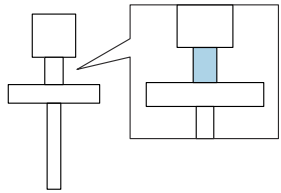
Position 7, 8 (Antenna)		
Selected option		**Description**
FMR62	GE	Integrated, PEEK, 3/4"
	GF	Integrated, PEEK, 1-1/2"
	GM	PTFE cladded flush mount DN50
	GN	PTFE cladded flush mount DN80
FMR67	GA	Drip-off, PTFE DN50
	GP	PTFE flush mount DN80

Shown in the temperature tables exemplary as follows:



Position 9, 10 (Seal)		
Selected option		**Description**
FMR62	A5	FKM Viton GLT, -40...150°C/-40...302°F
	A6	FKM Viton GLT, -40...200°C/-40...392°F
	C1	FFKM Kalrez, -20...150°C/-4...302°F
	C2	FFKM Kalrez, -20...200°C/-4...392°F
	F5	PTFE cladded, -40...150°C/-40...302°F
	F6	PTFE cladded, -40...200°C/-40...392°F
FMR67	A3	FKM Viton GLT, -40...80°C/-40...176°F
	A5	FKM Viton GLT, -40...150°C/-40...302°F
	A6	FKM Viton GLT, -40...200°C/-40...392°F

Shown in the temperature tables exemplary as follows:



Position 11-13 (Process Connection)		
Selected option		**Description**
FMR62	AxK	Flange (different sizes), PTFE>316/316L
	CxK	Flange (different sizes), PTFE>316L
	GxJ	Thread ISO (different sizes), 316L
	KxK	Flange (different sizes), PTFE>316L
	MxK	Slotted-nut (different sizes), PTFE>316L
	RxJ	Thread ANSI (different sizes), 316L
	TxK	Tri-Clamp (different sizes), PTFE>316L
FMR67	AxJ	Flange (different sizes), 316/316L
	CxJ	Flange (different sizes), 316L
	GGJ	Thread ISO228 G1-1/2, 316L
	KxJ	Flange (different sizes), 316L
	RGJ	Thread ANSI MNPT1-1/2, 316L
	XxA	Align. device (different sizes)
	XxG	Flange (different sizes), PP
	XxJ	Flange (different sizes), 316L

Position 14 (Air Purge Connection)		
Selected option		**Description**
FMR67	A [1)]	W/o
	1 [2)]	G1/4
	2 [2)]	NPT1/4
	3 [1)]	Adapter G1/4
	4 [1)]	Adapter NPT1/4

1) Only in connection with Position 7, 8 = GA
2) Only in connection with Position 7, 8 = GP

Optional specifications

ID Nx (Accessory Mounted)		
Selected option		**Description**
FMR6x	NA [1)]	Overvoltage protection

1) Only in connection with Position 1, 2 = BD, ID

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.
- 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:
$-40\ °C \leq T_a \leq +80\ °C$

- 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 (≤ 0.5 m) generating strong electrostatic charges.
- The device can be set up in the partition that separates hazardous areas for Category 1 and Category 3 equipment.

- With regard to the process connection, it is essential to ensure ingress protection of at least IP67.
- In the area of the process connection outside the device, implement suitable measures to ensure that the hazardous area meets Zone 2 requirements (e.g. natural venting).
- Avoid electrostatic charging of the sensor (e.g. do not rub dry and install outside the filling flow).

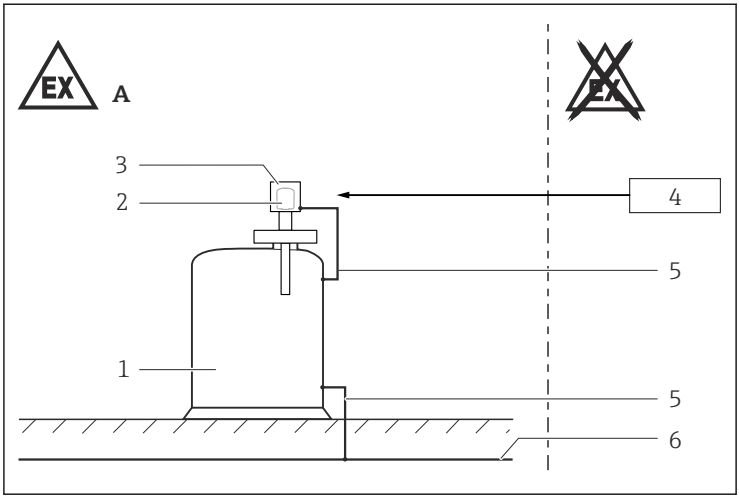
Device type FMR67 and Basic specification, Position 11-13 = XxA

- In Zone 0, 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 FMR67 and Basic specification, Position 14 = 1, 2

- If equipment with Ga/Gb or Da/Db is required: In the closed state the minimum degree of protection of the installation must be IP67.
- After removing the air purge connection: Lock the opening with a suitable plug.
  - Torque: 6-7 Nm
  - For Da/Db: thread engagement > 5 turns
- Degree of protection IP67 must be fulfilled.

Safety instructions: Installation



A Zone 2
1 Tank; Zone 0, Zone 2
2 Electronic insert
3 Enclosure
4 Certified associated apparatus
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.
- Continuous service temperature of the connecting cable: −40 °C to ≥ +85 °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 K).

Basic specification, Position 4 = N
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.

Intrinsic safety

Ex ic

Basic specification, Position 1, 2 = BD, ID

- The device is only suitable for connection to certified, intrinsically safe equipment with explosion protection Ex ic.
- If the conditions $U_i > U_o$, ($I_i > I_o$), $C_a > C_i + C_{cable}$ and $L_a > L_i + L_{cable}$ are met, the energy-limited installation concept (Ex ic) allows energy-limited devices or associated energy-limited devices to be connected according to the entity concept.
- 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 V_{rms}. If the device is equipped with more than one input, the dielectric strength of each individual input to ground is at least 500 V_{rms}, and the dielectric strength of the inputs vis-à-vis one another is also at least 500 V_{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.

Increased safety

Ex ec

Basic specification, Position 1, 2 = BL, IL

In potentially explosive atmospheres:

- Do not disconnect electrical connections when energized.
- Do not connect the service tool (e.g. FXA291).

Cable specification

Basic specification, Position 3	**Cross section connecting wire**	**Stripped insulation**
A, B, C	0.5 to 2.5 mm^2	10 mm

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 = 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}.

Temperature tables

Optional specification, ID Nx = 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.

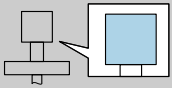
1st column: Position 5 = A, B, ...

2nd column: Temperature classes T6 (85 °C) to T1 (450 °C)

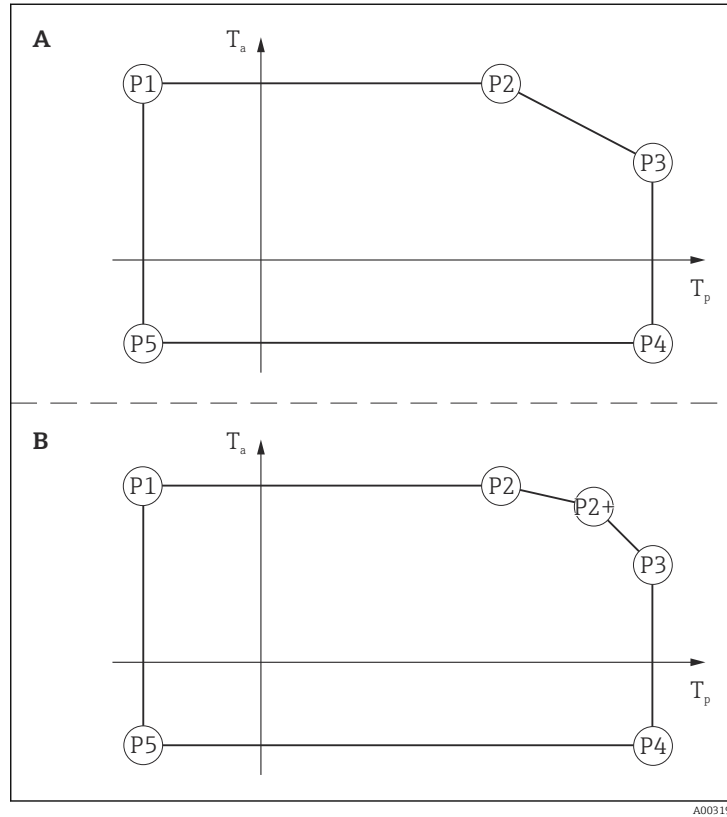
Column P1 to P5: Position (temperature value) on the axes of the derating
- T_a: Ambient temperature in °C
- T_p: Process temperature in °C

Column P2+ is only relevant for version B of the derating.

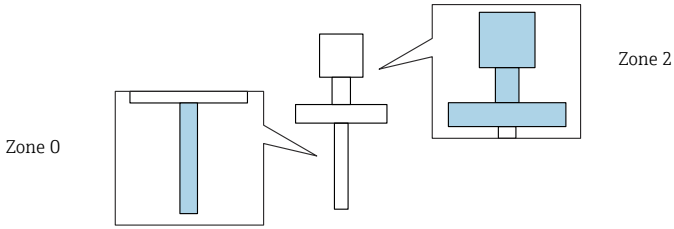
Example table

 = C		P1		P2		P2+		P3		P4		P5	
		T_p	T_a	T_p	T_a	T_p	T_a	T_p	T_a	T_p	T_a	T_p	T_a
	T6	–40	51	51	51	–	–	85	46	85	–40	–40	–40
	T5	–40	64	64	64	–	–	100	59	100	–40	–40	–40
	T4... T1	–40	64	64	64	–	–	130	54	130	–40	–40	–40

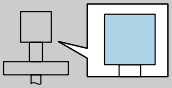
Example diagrams of possible deratings



Ex ia/ic: Zone 0, Zone 2



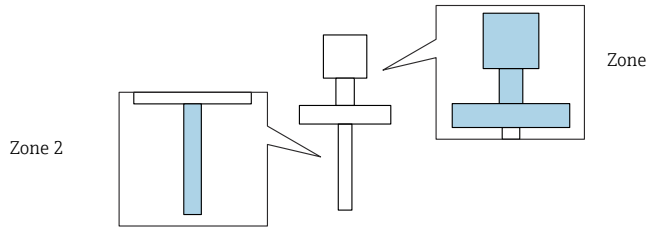
FMR6x

 = *B, C*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	–20	51	51	51	–	–	60	49	60	–20	–20	–20
	T5	–20	64	60	64	–	–	60	64	60	–20	–20	–20
	T4	–20	64	60	64	–	–	60	64	60	–20	–20	–20
	T3… T1	–20	64	60	64	–	–	60	64	60	–20	–20	–20

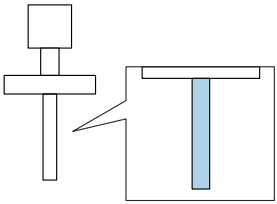
Ex ic: Zone 2

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

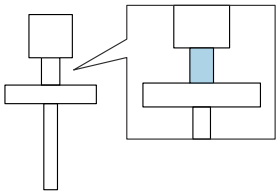
- FMR62 → 18
- FMR67 → 22



FMR62



= GE, GF, GM, GN



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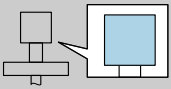
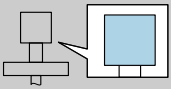
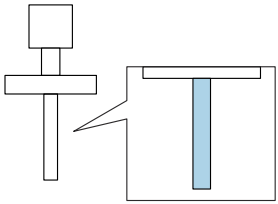
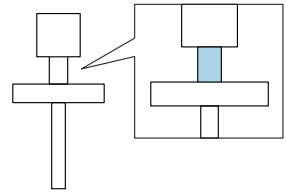
 = *B*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	–40	51	51	51	–	–	85	45	85	–40	–40	–40
	T5	–40	64	64	64	–	–	100	58	100	–40	–40	–40
	T4	–40	64	64	64	–	–	135	52	135	–40	–40	–40
	T3… T1	–40	64	64	64	–	–	150	47	150	–40	–40	–40

 = *C*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	–40	51	51	51	–	–	85	47	85	–40	–40	–40
	T5	–40	64	64	64	–	–	100	60	100	–40	–40	–40
	T4	–40	64	64	64	–	–	135	56	135	–40	–40	–40
	T3… T1	–40	64	64	64	–	–	150	54	150	–40	–40	–40

FMR62



= GE, GF, GM, GN



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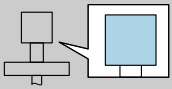
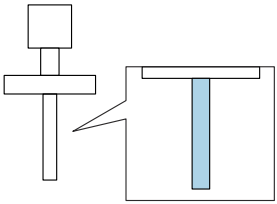
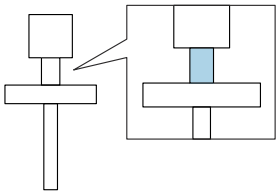
 = *B, C*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	–40	51	51	51	–	–	85	48	85	–40	–40	–40
	T5	–40	64	64	64	–	–	100	61	100	–40	–40	–40
	T4	–40	64	64	64	–	–	135	58	135	–40	–40	–40
	T3… T1	–40	64	64	64	–	–	200	53	200	–40	–40	–40

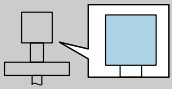
FMR62

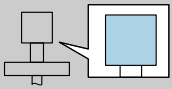


= GE, GF, GM, GN

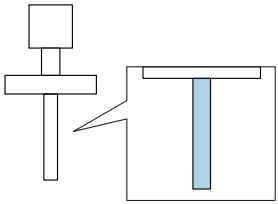


= C1

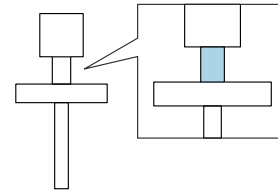
 = *B*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	–20	51	51	51	–	–	85	45	85	–20	–20	–20
	T5	–20	64	64	64	–	–	100	58	100	–20	–20	–20
	T4	–20	64	64	64	–	–	135	52	135	–20	–20	–20
	T3… T1	–20	64	64	64	–	–	150	47	150	–20	–20	–20

 = *C*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	–20	51	51	51	–	–	85	47	85	–20	–20	–20
	T5	–20	64	64	64	–	–	100	60	100	–20	–20	–20
	T4	–20	64	64	64	–	–	135	56	135	–20	–20	–20
	T3… T1	–20	64	64	64	–	–	150	54	150	–20	–20	–20

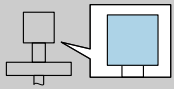
FMR62



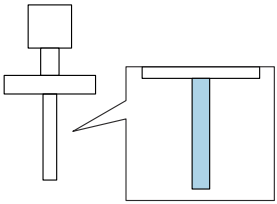
= GE, GF, GM, GN



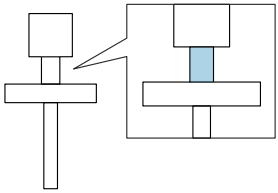
= C2

 = *B, C*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	–20	51	51	51	–	–	85	48	85	–20	–20	–20
	T5	–20	64	64	64	–	–	100	61	100	–20	–20	–20
	T4	–20	64	64	64	–	–	135	58	135	–20	–20	–20
	T3… T1	–20	64	64	64	–	–	200	53	200	–20	–20	–20

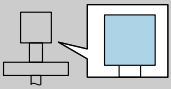
FMR67

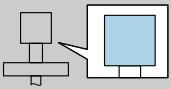


= GA

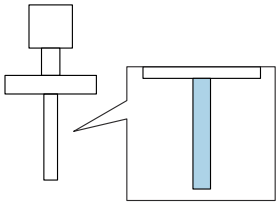


= A3

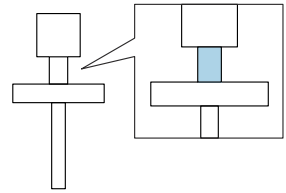
 = *B*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6... T1	−40	51	51	51	–	–	80	43	80	−40	−40	−40

 = *C*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6... T1	−40	51	51	51	–	–	80	47	80	−40	−40	−40

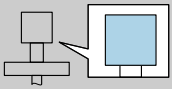
FMR67

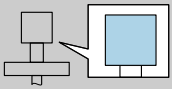


= GP

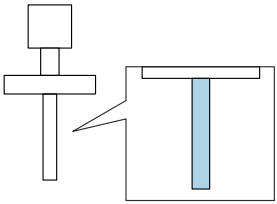


= A5

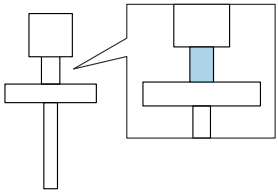
 = *B*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	–40	51	51	51	–	–	85	45	85	–40	–40	–40
	T5	–40	64	64	64	–	–	100	58	100	–40	–40	–40
	T4	–40	64	64	64	–	–	135	52	135	–40	–40	–40
	T3… T1	–40	64	64	64	–	–	150	47	150	–40	–40	–40

 = *C*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	–40	51	51	51	–	–	85	47	85	–40	–40	–40
	T5	–40	64	64	64	–	–	100	60	100	–40	–40	–40
	T4	–40	64	64	64	–	–	135	56	135	–40	–40	–40
	T3… T1	–40	64	64	64	–	–	150	54	150	–40	–40	–40

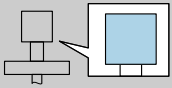
FMR67



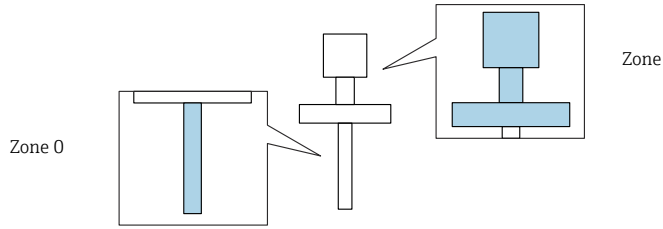
= GP



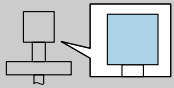
= A6

 = *B, C*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	−40	51	51	51	–	–	85	48	85	−40	−40	−40
	T5	−40	64	64	64	–	–	100	61	100	−40	−40	−40
	T4	−40	64	64	64	–	–	135	58	135	−40	−40	−40
	T3… T1	−40	64	64	64	–	–	200	53	200	−40	−40	−40

Ex ia/ec: Zone 0, Zone 2



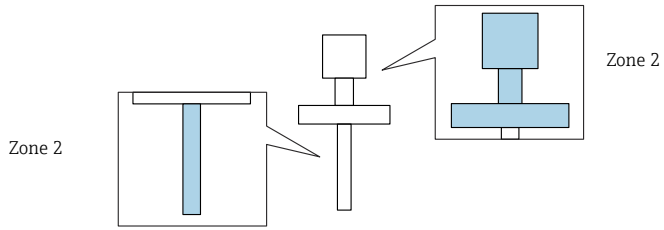
FMR6x

 = *B, C*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	–20	41	41	41	–	–	60	36	60	–20	–20	–20
	T5	–20	56	56	56	–	–	60	55	60	–20	–20	–20
	T4	–20	64	60	64	–	–	60	64	60	–20	–20	–20
	T3… T1	–20	64	60	64	–	–	60	64	60	–20	–20	–20

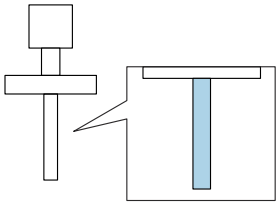
Ex ec: Zone 2

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

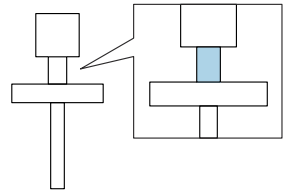
- FMR62 → 27
- FMR67 → 31



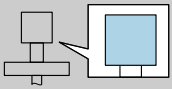
FMR62

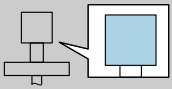


= GE, GF, GM, GN

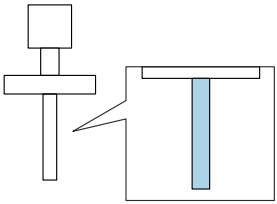


= A5, F5

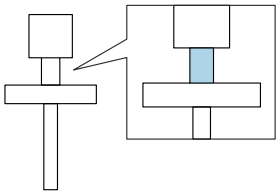
 = *B*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	–40	41	41	41	–	–	85	33	85	–40	–40	–40
	T5	–40	56	56	56	–	–	100	48	100	–40	–40	–40
	T4	–40	64	64	64	–	–	135	52	135	–40	–40	–40
	T3… T1	–40	64	64	64	–	–	150	47	150	–40	–40	–40

 = *C*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	–40	41	41	41	–	–	85	36	85	–40	–40	–40
	T5	–40	56	56	56	–	–	100	51	100	–40	–40	–40
	T4	–40	64	64	64	–	–	135	56	135	–40	–40	–40
	T3… T1	–40	64	64	64	–	–	150	54	150	–40	–40	–40

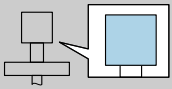
FMR62



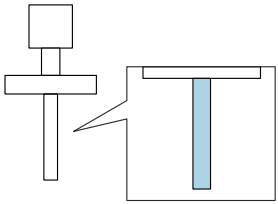
= GE, GF, GM, GN



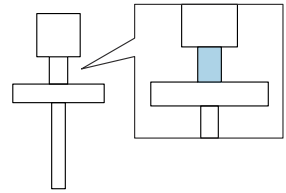
= A6, F6

 = *B, C*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	−40	41	41	41	–	–	85	37	85	−40	−40	−40
	T5	−40	56	56	56	–	–	100	52	100	−40	−40	−40
	T4	−40	64	64	64	–	–	135	58	135	−40	−40	−40
	T3… T1	−40	64	64	64	–	–	200	53	200	−40	−40	−40

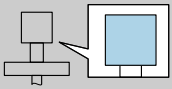
FMR62

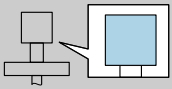


= GE, GF, GM, GN

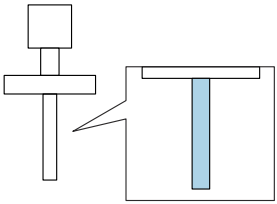


= C1

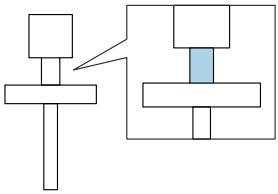
 = *B*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	–20	41	41	41	–	–	85	33	85	–20	–20	–20
	T5	–20	56	56	56	–	–	100	48	100	–20	–20	–20
	T4	–20	64	64	64	–	–	135	52	135	–20	–20	–20
	T3… T1	–20	64	64	64	–	–	150	47	150	–20	–20	–20

 = *C*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	–20	41	41	41	–	–	85	36	85	–20	–20	–20
	T5	–20	56	56	56	–	–	100	51	100	–20	–20	–20
	T4	–20	64	64	64	–	–	135	56	135	–20	–20	–20
	T3… T1	–20	64	64	64	–	–	150	54	150	–20	–20	–20

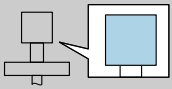
FMR62



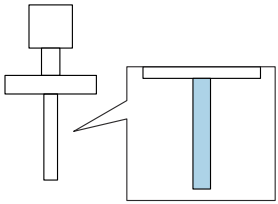
= GE, GF, GM, GN



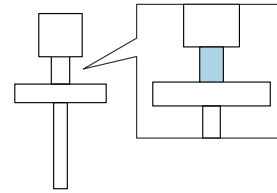
= C2

 = *B, C*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	–20	41	41	41	–	–	85	37	85	–20	–20	–20
	T5	–20	56	56	56	–	–	100	52	100	–20	–20	–20
	T4	–20	64	64	64	–	–	135	58	135	–20	–20	–20
	T3… T1	–20	64	64	64	–	–	200	53	200	–20	–20	–20

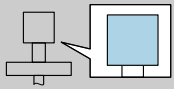
FMR67



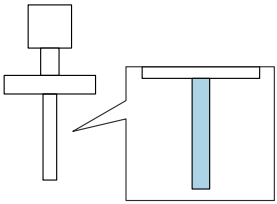
= GA



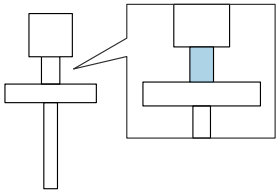
= A3

 = *B, C*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6... T1	−40	41	41	41	–	–	80	32	80	−40	−40	−40

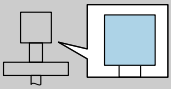
FMR67

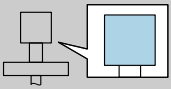


= GP

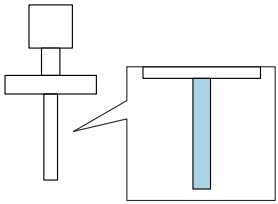


= A5

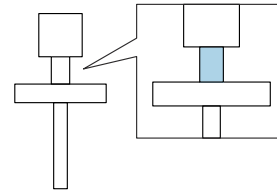
 = *B*		P1		P2		P2+		P3		P4		P5	
		T_p	T_a	T_p	T_a	T_p	T_a	T_p	T_a	T_p	T_a	T_p	T_a
	T6	−40	41	41	41	–	–	85	33	85	−40	−40	−40
	T5	−40	56	56	56	–	–	100	48	100	−40	−40	−40
	T4	−40	64	64	64	–	–	135	52	135	−40	−40	−40
	T3... T1	−40	64	64	64	–	–	150	47	150	−40	−40	−40

 = *C*		P1		P2		P2+		P3		P4		P5	
		T_p	T_a	T_p	T_a	T_p	T_a	T_p	T_a	T_p	T_a	T_p	T_a
	T6	−40	41	41	41	–	–	85	36	85	−40	−40	−40
	T5	−40	56	56	56	–	–	100	51	100	−40	−40	−40
	T4	−40	64	64	64	–	–	135	56	135	−40	−40	−40
	T3... T1	−40	64	64	64	–	–	150	54	150	−40	−40	−40

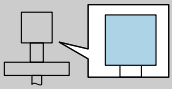
FMR67



= GP



= A6

 = *B, C*		**P1**		**P2**		**P2+**		**P3**		**P4**		**P5**	
		T_p	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**	**T_p**	**T_a**
	T6	–40	41	41	41	–	–	85	37	85	–40	–40	–40
	T5	–40	56	56	56	–	–	100	52	100	–40	–40	–40
	T4	–40	64	64	64	–	–	135	58	135	–40	–40	–40
	T3… T1	–40	64	64	64	–	–	200	53	200	–40	–40	–40

Connection data

Cable entry: Connection compartment

Ex ic

Basic specification, Position 1, 2 = BD, ID

Not relevant.

Ex ec

Basic specification, Position 1, 2 = BL, IL

Cable gland: *Basic specification, Position 6 = A*

Basic specification, Position 5 = B, C

preferably for Position 5 = B

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

preferably for Position 5 = C

Thread	Clamping range	Material	Sealing insert	O-ring
M20x1,5	ø 8 to 10.5 mm [1] (ø 6.5 to 13 mm) [2]	Ms, nickel-plated	Silicone	EPDM (ø 17x2)

1) Standard
2) Separate clamping inserts available

- 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.

Cable entry: Electronics compartment

Cable gland: *Basic specification, Position 4 = M*

Not relevant.

Terminals

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

Ex ic

Basic specification, Position 1, 2 = BD, ID

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

Basic specification, Position 3 = A

Terminal 1 (+), 2 (–)
Power supply U_i = 35 V I_i = not applicable (current-controlled circuit) P_i = not applicable effective inner inductance L_i = 0 effective inner capacitance C_i = 5 nF

Basic specification, Position 3 = B

Terminal 1 (+), 2 (–)	Terminal 3 (+), 4 (–)
Power supply U_i = 35 V I_i = not applicable (current-controlled circuit) P_i = not applicable effective inner inductance L_i = 0 effective inner capacitance C_i = 5 nF	Switch output (PFS) U_i = 35 V I_i = not applicable (current-controlled circuit) P_i = 1 W effective inner inductance L_i = 0 effective inner capacitance C_i = 6 nF

Basic specification, Position 3 = C

Terminal 1 (+), 2 (–)	Terminal 3 (+), 4 (–)
Power supply U_i = 30 V I_i = not applicable (current-controlled circuit) P_i = not applicable effective inner inductance L_i = 0 effective inner capacitance C_i = 30 nF	Output 4 to 20 mA U_i = 30 V I_i = not applicable P_i = not applicable effective inner inductance L_i = 0 effective inner capacitance C_i = 30 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 V effective inner inductance L_i = negligible effective inner capacitance C_i = negligible													
U_o = 7.3 V I_o = 60 mA P_o = 110 mW													
L_o (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 (µF) [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 (µF) [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

Ex ec

Basic specification, Position 1, 2 = BL, IL

Power supply and signal circuit with protection type: not intrinsically safe.

Basic specification, Position 3 = A

Terminal 1 (+), 2 (–)
Power supply U_N = 35 V_{DC} U_m = 250 V I_N = 4 to 20 mA I_{max} = 22 mA P_N = 0.7 W

Basic specification, Position 3 = B

The power consumption of I/O modules with passive PFS output can be limited for certain applications.

- Recommended: Power consumption = 1 W. This is obtained for a supply voltage at the terminals of 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.

Table for the PFS serial resistance (R_V):

Power consumption	1.0 W
Total power consumption	1.88 W
Internal resistance R_i	760 Ω

U_{max} [V]	R_V min
35	205 Ω
34	177 Ω
33	150 Ω
32	122 Ω
31	95 Ω
30	67 Ω
29	39 Ω
28	12 Ω
27	0 Ω

For values associated with a higher or lower internal power consumption please contact Endress+Hauser.

Terminal 1 (+), 2 (–)	Terminal 3 (+), 4 (–)
Power supply U_N = 35 V_{DC} U_m = 250 V I_N = 4 to 20 mA I_{max} = 22 mA P_N = 0.7 W	Switch output (PFS) U_N = 35 V_{DC} U_m = 250 V P_N = 0.7 W

Basic specification, Position 3 = C

Terminal 1 (+), 2 (–)	Terminal 3 (+), 4 (–)
Power supply U_N = 30 V_{DC} U_m = 250 V I_N = 4 to 20 mA I_{max} = 22 mA P_N = 0.7 W	Output 4 to 20 mA U_N = 30 V_{DC} U_m = 250 V I_N = 4 to 20 mA I_{max} = 22 mA P_N = 0.7 W

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 V effective inner inductance L_i = negligible effective inner capacitance C_i = negligible													
U_o = 7.3 V I_o = 60 mA P_o = 110 mW													
L_o (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 (µF) [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 (µF) [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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