



IECEX Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEX PTB 12.0044X	Page 1 of 5	<u>Certificate history:</u>
Status:	Current	Issue No: 4	Issue 3 (2020-11-09)
Date of Issue:	2023-11-17		Issue 2 (2019-05-10)
Applicant:	Endress + Hauser SE+Co. KG Hauptstrasse 1, 79689 Maulburg Germany		Issue 1 (2017-09-01)
Equipment:	Micropilot type FMR5x-... / OFMR5x-...		Issue 0 (2012-12-07)
Optional accessory:			
Type of Protection:	General requirements, Flameproof Enclosures "d", Intrinsic safety "i", increased safety "e", dust ignition protection by enclosure "t", Equipment with Separation Elements or combined Levels of Protection		
Marking:	For details see attachment.		

Approved for issue on behalf of the IECEx
Certification Body:

Dr.-Ing. Martin Thedens

Position:

**Head of Department "Explosion Protection in Sensor Technology
and Instrumentation"**

Signature:
(for printed version)

Thedens
20.11.23

Date:
(for printed version)

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Certificate issued by:

Physikalisch-Technische Bundesanstalt (PTB)
Bundesallee 100
38116 Braunschweig
Germany





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Manufacturer: **Endress+Hauser GmbH+Co.KG**
Hauptstrasse 1
79689 Maulburg
Germany

Manufacturing locations:

Endress+Hauser (Suzhou) Automation Instrumentation Co. Ltd. China – Singapore Industrial Park (SIP) Su-Hong-Zhong-Lu, No. 491 Jiangsu Province, 215021 Suzhou China	Endress+Hauser (India) Automation Instrumentation Pvt. Ltd. M-192, Waluj MIDC, Aurangabad - 431 136 Maharashtra State India	Endress+Hauser (USA) Automation Instrumentation Inc. 2340 Endress Place Greenwood, Indiana 46143 United States of America
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See following pages for more locations

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :

The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2017 Edition:7.0	Explosive atmospheres - Part 0: Equipment - General requirements
IEC 60079-1:2014 Edition:7.0	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
IEC 60079-11:2011 Edition:6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
IEC 60079-26:2021 Edition:4.0	Explosive atmospheres - Part 26: Equipment with Separation Elements or combined Levels of Protection
IEC 60079-31:2013 Edition:2	Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"
IEC 60079-7:2017 Edition:5.1	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Report:

[DE/PTB/ExTR12.0058/04](#)

Quality Assessment Report:

[DE/TUN/QAR06.0003/10](#)



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EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

The microwave units Micropilot, type series FMR/OFMR5x... are used for the contactless, continuous measurement of liquid and solid media in explosion hazardous areas with gas or dust atmospheres. The microwave units Micropilot consist of various types of housings, electronic modules with optional surge protection adapted to the supply and evaluating circuits, different RF modules with associated antennas.

For further details see attachment.

Listing of all components used.

Certificate	Manufacturer	Subject and type
IECEX KEM 09.0041 U	Endress+Hauser Flowtec AG	Transmitter Enclosure Type H*****
IECEX KEM 08.0048 U	Endress+Hauser Flowtec AG	Display type DP...
IECEX KEM 09.0029 U	Endress+Hauser SE+Co.KG	ProTof Communication board/terminal module identified by transmission code TRC[xx]
IECEX KEM 09.0030 U	Endress+Hauser SE+Co.KG	ProTof Feed Through board TRC[10], Main Boards [TRC14, 12,15, 41] and Bluetooth board TRC[44]

SPECIFIC CONDITIONS OF USE: YES as shown below:

Specific conditions for use details see attachment.



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DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)

- Type of protection 'nA' from EN 60079-15 no longer applied
- Type of protection increased safety with protection level 'ec' applied
- Adaptation to the requirements from IEC 60079-26:2021
- Partial adaptation to the requirements of IEC 60079-31:2022
- Documentation revised
- Operating instructions (XA) revised
- Type plate revised



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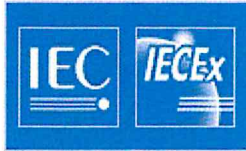
Additional manufacturing locations:

Endress+Hauser Yamanashi Co., Ltd
862-1 Mitsukunugi Sakaigawa-cho
Fuefuki-shi Yamanashi Pref. 406-0846
Japan

**Endress+Hauser (Brasil) Instrumentação e
Aut.Ltda.**
Estrada Municipal Antonio Sesti
600 Bairro Recreio Costa Verde
Itatiba, SP - 13254-085
Brazil

Annex:

COCA120044-04.pdf



General product information:

The microwave units Micropilot, type series FMR/OFMR5x-... are used for the contact less, continuous measurement of liquid and solid media in explosion hazardous areas with gas or dust atmosphere. The microwave units Micropilot are suitable for use in explosion hazardous areas with gas atmosphere (Group II) of category 1G, 1/2G, 1/2/3G or 3G or for use in explosion hazardous areas with dust atmosphere (Group II) of category 1D or 1/2D resp. for use in explosion hazardous areas which require equipment of EPLs Ga, Ga/Gb, Ga/Gb/Gc, Gc, Da or Da/Db.

Short microwave pulses are radiated from the antenna, reflected by the medium surface and picked up again by the antenna. The delay time between radiation and receiving is measured and converted into a signal to calculate the level.

The microwave units Micropilot consist of various types of housings, electronic modules with optional surge protection adapted to the supply and evaluating circuits, different RF modules with associated antennas. The electronic versions provide different power and output signals (voltage values, voltage forms, protocols). There are mounting accessories available (e.g. mounting bracket, a mounting device and collar flanges in various sizes etc.).

As an option, the microwave units Micropilot may be operated with the Remote Display FHX50, with a surge protector module type OVP10 resp. OVP20 resp. with the Bluetooth module type BT10. Herewith, the data in the certificates resp. the Safety Instructions XA... are to be respected.

The relationship between the temperature classes and the maximum permissible ambient and process temperatures, depending on the used housing variants, I/O modules, RF modules and antennas as well as the use of a surge protection and the Remote Display FHX50 and the Bluetooth module type BT10 for the applied method of protection for explosion hazardous areas with gas or dust atmosphere is given in the temperature tables of the respective safety instructions XA... of the microwave units Micropilot types FMR/OFMR5x-... .



Type key

Micropilot FMR/OFMRxx, type series FMR/OFMRxx-aabcdeffgghh*+##

xx	Probe type
	50, 51, 52, 53, 54, 56 oder 57

aa	Approval code
BA	ATEX II 1G Ex ia IIC T6...T1 Ga
BB	ATEX II 1/2G Ex ia IIC T6...T1 Ga/Gb
BC	ATEX II 1/2G Ex ia/db [ia Ga] IIC T6...T1 Ga/Gb
BE	ATEX II 1D Ex ta IIIC T ₂₀₀ xx°C Da ¹⁾
BF	ATEX II 1/2 D Ex ta/tb IIIC T85°C Da/Db ¹⁾
BG	ATEX II 3G Ex ec ic IIC T6...T1 Gc ¹⁾
BH	ATEX II 3 G Ex ic IIC T6...T1 Gc ¹⁾
B2	ATEX II 1/2 G Ex ia IIC T6...T1 Ga/Gb ATEX II 1/2 D Ex ia IIIC T85°C Da/Db
B3	ATEX II 1/2 G Ex ia/db [ia Ga] IIC T6...T1 Ga/Gb ATEX II 1/2 D Ex ta/tb IIIC T85°C Da/Db ¹⁾
B4	ATEX II 1/2 G Ex ia IIC T6...T1 Ga/Gb ATEX II 1/2 G Ex ia/db [ia Ga] IIC T6 Ga/Gb

IA	IECEX Ex ia IIC T6...T1 Ga
KA	IECEX / KC Ex ia IIC T6...T1 Ga
IB	IECEX Ex ia IIC T6...T1 Ga/Gb
KB	IECEX / KC Ex ia IIC T6...T1 Ga/Gb
IC	IECEX Ex ia/db [ia Ga] IIC T6...T1 Ga/Gb
KC	IECEX / KC Ex ia/db [ia Ga] IIC T6...T1 Ga/Gb
IE	IECEX Ex ta IIIC T ₂₀₀ xx°C Da ¹⁾
KE	IECEX / KC Ex ta IIIC T ₂₀₀ xx°C Da
IF	IECEX Ex ta/tb IIIC T85°C Da/Db ¹⁾
KF	IECEX / KC Ex ta/tb IIIC Txx°C Da/Db
IG	IECEX Ex ec ic IIC T6...T1 Gc ¹⁾
IH	IECEX Ex ic IIC T6...T1 Gc ¹⁾
I2	IECEX Ex ia IIC T6...T1 Ga/Gb ; IECEX Ex ia IIIC T85°C Da/Db
I3	IECEX Ex ia/db [ia Ga] IIC T6...T1 Ga/Gb ; IECEX Ex ta/tb IIIC T85°C Da/Db ¹⁾
I4	IECEX Ex ia IIC T6...T1 Ga/Gb, IECEX Ex ia/db [ia Ga] IIC T6 Ga/Gb

Marking changes in combination with the display, operation mode: "L", "M" or "N"

b		Power Supply, Output
A		2-wire; 4-20mA HART
B		2-wire; 4-20mA HART, switch output
C		2-wire; 4-20mA HART, 4-20mA
E		2-wire; FOUNDATION Fieldbus, switch output
G		2-wire; PROFIBUS PA, switch output
K		4-wire 90-253VAC, 4-20mA HART
L		4-wire 10,4-48VDC, 4-20mA HART
Y		Special version not relevant for safety; e.g. adjustment

c		Display, Operation
A		Without Display
C		LCD SD02, push button + data backup function
E		LCD SD03, touch control + data backup function
L		Prepared for remote display FHX50 + M12 connection
M		Prepared for remote display FHX50 + custom connection
N		Prepared for display FHX50 + NPT1/2 thread, custom connection
Y		Special version not relevant for safety; e.g. adjustment

d		Housing
A		GT19 dual compartment, Plastics PBT
B		GT18 dual compartment, 316L
C		GT20 dual compartment, Alu coated
Y		Special version not relevant for safety; e.g. colour, coating, ...

e		Electrical Connection (cable glands)
A		Gland M20, IP66/68 Type 4X/6P Encl.
B		Thread M20, IP66/68 Type 4X/6P Encl.
C		Thread G1/2, IP66/68 Type 4X/6P Encl.
D		Thread NPT1/2, IP66/68 Type 4X/6P Encl.
I		Plug M12, IP66/68 Type 4X/6P Encl.
J		Gland M20, Plastic blue, IP66/68 Type 4X/6P Encl.
M		Plug 7/8", IP66/68 Type 4X/6P Encl.
Y		Special version not relevant for safety; e.g. adjustment

ff		Antenna
		Type specified in form, sizes, materials

gg		Seal
		If available for specified type, materials, sizes,; any single letter or number or combination

hhh		Process Connection
		triple combinations of numbers or characters representing ANSI DIN JIS flange, threads, hygienic or other standardized process connections



*	Air Purge Connection
	if available

#	Options
	Options not mandatory (multiple selection possible)

Marking in combination with the remote-display, operation mode: "L", "M" or "N"

Approval code	Power supply; output	Display; Operation	Marking
BE	x	L, M or N	ATEX II 1D Ex ta [ia Da] IIIC T ₂₀₀ xx°C Da ^{c)}
BF	x	L, M or N	ATEX II 1/2 D Ex ta/tb [ia Da] IIIC T85°C Da/Db ^{d)}
BG	x	L, M or N	ATEX II 3G Ex ec [ia Ga] IIC T6...T1 Gc ^{a)}
BH	x	L, M or N	ATEX II 3G Ex ic [ia Ga] IIC T6 Gc ^{b)}
B3	x	L, M or N	ATEX II 1/2G Ex ia/db [ia Ga] IIC T6...T1 Ga/Gb, ATEX II 1/2D Ex ta/tb [ia Da] IIIC T85°C Da/Db ^{d)}
IE	x	L, M or N	IECEX Ex ta [ia Da] IIIC T ₂₀₀ xx°C Da ^{c)}
IF	x	L, M or N	IECEX Ex ta/tb [ia Da] IIIC T85°C Da/Db ^{d)}
IG	x	L, M or N	IECEX Ex ec [ia Ga] IIC T6...T1 Gc ^{a)}
IH	x	L, M or N	IECEX Ex ic [ia Ga] IIC T6 Gc ^{b)}
I3	x	L, M or N	IECEX Ex ia/db [ia Ga] IIC T6...T1 Ga/Gb, IECEX Ex ta/tb [ia Da] IIIC T85°C Da/Db ^{d)}

Note:

- Only for power supply, output / 020: B, C, E, G, K, L
- Only for power supply, output / 020: B, C, E, G
- The display circuit is suitable to be passed through the Zone 20. The display has only tested for Zone 21 as a Db-apparatus.
- In the case of EPLs Da/Db for application of ta/tb, the marking for partition wall apparatus is applied analogously to EN 60079-26:2015 and IEC 60079-26:2021.

Electrical data						
I/O Interface						
Approval Code	Power supply / Output (I/O Interface)			Type of protection	Electrical data/maximum values	
	Code	Mode (functional)	Module Transmission Code (TRC)		Supply/output (terminals 1 and 2)	Supply/output (terminals 3 and 4)
BA, BB, B2 IA, IB, I2 KA, KB, K2	A	4...20mA HART (IO210)	31	Ex ia IIC/IIIC	for connection to an intrinsically safe circuit, with the following maximum values: $U_i = 30\text{ V}$ $I_i = 300\text{ mA}$ $P_i = 1\text{ W}$ $L_i = 0\text{ }\mu\text{H}$ $C_i = 12\text{ nF}$	non-existent
BH IH KH				Ex ic IIC	for connection to an intrinsically safe circuit, with the following maximum values: $U_i = 35\text{ V}$ $I_i = \text{N/A}$ (current controlled circuit) $P_i = \text{N/A}$ $L_i = 0\text{ }\mu\text{H}$ $C_i = 12\text{ nF}$	non-existent
for application / certificates which need I/O-module with galvanic separation and use of 4...20mA HART in 1 channel mode (switch terminals closed)						
B4 ¹⁾ I4 ¹⁾ K4 ¹⁾	A	4...20mA HART (IO211) (for application / certificates which need I/O-modules with galvanic separation and use of 4...20mA HART in 1 channel mode (switch terminals closed))	02	Ex ia IIC ⁴⁾	for connection to an intrinsically safe circuit, with the following maximum values: $U_i = 30\text{ V}$ $I_i = 300\text{ mA}$ $P_i = 1\text{ W}$ $L_i = 0\text{ }\mu\text{H}$ $C_i = 5\text{ nF}$	Not used
BH ⁷⁾ IH ⁷⁾ KH ⁷⁾				Ex ic IIC	for connection to an intrinsically safe circuit, with the following maximum values: $U_i = 35\text{ V}$ $I_i = \text{N/A}$ (current controlled circuit) $P_i = \text{N/A}$ $L_i = 0\text{ }\mu\text{H}$ $C_i = 5\text{ nF}$	Not used
BC, B3, B4 ¹⁾ IC, I3, I4 ¹⁾ KC, K3, K4 ¹⁾	A	4...20mA HART (IO212)	03	Ex ia/db [ia Da] ⁴⁾	$U_N = 35\text{ V DC}^{2)}$ $U_m = 250\text{ V}$ $I_{nom} = 4 \dots 20\text{ mA}$ $I_{max} = 22\text{ mA}$ $P_{nom} = 0.7\text{ W}$	Not used
BF, B3 IF, I3 KF, K3				Ex tb IIIC ⁴⁾	$U_N = 35\text{ V DC}^{2)}$ $U_m = 250\text{ V}$ $I_{nom} = 4 \dots 20\text{ mA}$ $I_{max} = 22\text{ mA}$ $P_{nom} = 0,7\text{ W}$	Not used
BG IG KG				Ex ec ic IIC	$U_{nom} = 35\text{ V DC}^{2)}$ $I_{max} = 22\text{ mA}$ $P_{nom} = 0,7\text{ W}$ $U_m = 250\text{ V}$	Not used
BE ⁵⁾ , IE ⁵⁾ , KE ⁵⁾				Ex ta IIIC	Refer to Ex tb $I_{FAULT} = 54\text{ mA}$	Not used

BA, BB, B2, B4 ¹⁾ IA, IB, I2, I4 ¹⁾ KA, KB, K2, K4 ¹⁾	B	4..20mA HART+ switch (IO211)	02	Ex ia IIC/IIIC	for connection to an intrinsically safe circuit, with the following maximum values: $U_i = 30\text{ V}$ $I_i = 300\text{ mA}$ $P_i = 1\text{ W}$ $L_i = 0\text{ }\mu\text{H}$ $C_i = 5\text{ nF}$	for connection to an intrinsically safe circuit, with the following maximum values: $U_i = 30\text{ V}$ $I_i = 300\text{ mA}$ $P_i = 0.7\text{W}/0.85\text{W}/1.0\text{ W}^3)$ $L_i = 0\text{ }\mu\text{H}$ $C_i = 6\text{ nF}$
BH IH KH				Ex ic IIC	for connection to an intrinsically safe circuit, with the following maximum values: $U_i = 35\text{ V}$ $I_i = \text{N/A}$ (current controlled circuit) $P_i = \text{N/A}$ $L_i = 0\text{ }\mu\text{H}$ $C_i = 5\text{ nF}$	for connection to an intrinsically safe circuit, with the following maximum values: $U_i = 35\text{ V}$ $I_i = \text{N/A}$ (current controlled circuit) $P_i = 0.7\text{W}/0.85\text{W}/1.0\text{ W}^3)$ $L_i = 0\text{ }\mu\text{H}$ $C_i = 6\text{ nF}$
BC, B3, B4 ¹⁾ IC, I3, I4 ¹⁾ KC, K3, K4 ¹⁾	B	4..20mA HART+ switch (IO212)	03	Ex ia/db [ia Ga] ⁴⁾	$U_{\text{nom}} = 35\text{ V DC}^2)$ $U_m = 250\text{ V}$ $I_{\text{max}} = 22\text{ mA}$ $P_{\text{nom}} = 0,7\text{ W}$	$U_N = 35\text{ V DC}^2)$ $U_m = 250\text{ V}$ $P_{\text{nom}} = 0,7\text{ W}$
BF, B3 IF, I3 KF, K3				Ex tb IIIC ⁴⁾	$U_N = 35\text{ V DC}^2)$ $U_m = 250\text{ V}$ $I_{\text{nom}} = 4 \dots 20\text{ mA}$ $I_{\text{max}} = 22\text{ mA}$ $P_{\text{nom}} = 0,7\text{ W}$	$U_N = 35\text{ V DC}^2)$ $U_m = 250\text{ V}$ $P_{\text{nom}} = 0,7\text{ W}$
BG IG KG				Ex ec ic IIC	$U_N = 35\text{ V DC}^2)$ $U_m = 250\text{ V}$ $I_{\text{nom}} = 4 \dots 20\text{ mA}$ $I_{\text{max}} = 22\text{ mA}$ $P_{\text{nom}} = 0,7\text{ W}$	$U_N = 35\text{ V DC}^2)$ $U_m = 250\text{ V}$ $P_{\text{nom}} = 0,7\text{ W}$
BE ⁵⁾ , IE ⁵⁾ , KE ⁵⁾				Ex ta IIIC	Refer to Ex tb $I_{\text{FAULT}} = 54\text{ mA}$	Refer to Ex tb, $R_{\text{FAULT}} = 380.3\text{ }\Omega$
BA, BB, B2, B4 ¹⁾ IA, IB, I2 I4 ¹⁾ KA, KB, K2, K4 ¹⁾	C	4..20mA HART+ 4..20mA (IO214)	04, 24	Ex ia IIC/IIIC	for connection to intrinsically safe circuits, with the following maximum values: $U_i = 30\text{ V}$ $I_i = 300\text{ mA}$ $P_i = 1\text{ W}$ $L_i = 0\text{ }\mu\text{H}$ $C_i = 30\text{ nF}$	for connection to intrinsically safe circuits, with the following maximum values: $U_i = 30\text{ V}$ $I_i = 300\text{ mA}$ $P_i = 1\text{ W}$ $L_i = 0\text{ }\mu\text{H}$ $C_i = 30\text{ nF}$
BH IH KH				Ex ic IIC	for connection to intrinsically safe circuits, with the following maximum values: $U_i = 30\text{ V}$ $I_i = \text{N/A}$ (current controlled circuit) $P_i = \text{N/A}$ $L_i = 0\text{ }\mu\text{H}$ $C_i = 30\text{ nF}$	for connection to intrinsically safe circuits, with the following maximum values: $U_i = 30\text{ V}$ $I_i = \text{N/A}$ (current controlled circuit) $P_i = \text{N/A}$ $L_i = 0\text{ }\mu\text{H}$ $C_i = 30\text{ nF}$

BC, BF, B3, B4¹⁾ IC, IF, I3, I4¹⁾ KC, KF, K3, K4¹⁾	C	4..20mA HART+ 4..20mA (IO215)	05, 25	Ex ia/db [ia Ga] ⁴⁾ Ex tb IIIC	$U_N = 10.4 \dots 30 \text{ V dc}^{2)}$ $U_m = 250 \text{ V}$ $I_{max} = 22 \text{ mA}$ $P_N = 0.7 \text{ W}$	$U_N = 10.4 \dots 30 \text{ V dc}^{2)}$ $U_m = 250 \text{ V}$ $I_{max} = 22 \text{ mA}$ $P_N = 0.7 \text{ W}$
				Ex ec ic IIC	$U_N = 10.4 \dots 30 \text{ V dc}^{2)}$ $I_{max} = 22 \text{ mA}$ $P_N = 0.7 \text{ W}$ $U_m = 250 \text{ V}$	$U_N = 10.4 \dots 30 \text{ V dc}^{2)}$ $I_{max} = 22 \text{ mA}$ $P_N = 0.7 \text{ W}$ $U_m = 250 \text{ V}$
				Ex ta IIIC	Refer to Ex tb $I_{FAULT} = 54 \text{ mA}$	Refer to Ex tb $I_{FAULT} = 54 \text{ mA}$
BA, BB, B2; B4¹⁾ IA, IB, I2, I4¹⁾ KA, KB, K2, K4¹⁾	E, G	Fieldbus + switch (IO220)	26, 28	Ex ia IIC/IIIC	FISCO with $U_i = 17.5 \text{ V}$, $I_i = 550 \text{ mA}$, $P_i = 5.5 \text{ W}$, $C_i = 5 \text{ nF}$, $L_i = 10 \mu\text{H}$ or for connection to an intrinsically safe circuit, with the following maximum values: $U_i = 30 \text{ V}$ $I_i = 300 \text{ mA}$ $P_i = 1.2 \text{ W}$ $L_i = 10 \mu\text{H}$ $C_i = 5 \text{ nF}$	passive: for connection to intrinsically safe circuits, with the following maximum values: $U_i = 30 \text{ V}$ $I_i = 300 \text{ mA}$ $P_i = 1.0 \text{ W}$ $L_i = 0 \mu\text{H}$ $C_i = 6 \text{ nF}$
				Ex ic IIC	FISCO with $U_i = 17.5 \text{ V}$ $I_i = \text{N/A}$ $P_i = \text{N/A}$, $C_i = 5 \text{ nF}$, $L_i = 10 \mu\text{H}$ or for connection to an energy limited circuit, with the following maximum values $U_i = 32 \text{ V}$ $I_i = \text{N/A}$ (current controlled circuit) $P_i = \text{N/A}$ $L_i = 10 \mu\text{H}$ $C_i = 5 \text{ nF}$	passive: for connection to an intrinsically safe circuit, with the following maximum values: $U_i = 35 \text{ V}$ $I_i = 300 \text{ mA}$ $P_i = 0.7/0.85/1.0 \text{ W}^{3)}$ $L_i = 0 \mu\text{H}$ $C_i = 6 \text{ nF}$
BC, BF, B3, B4¹⁾ IC, IF; I3, I4¹⁾ KC, KF, K3, K4¹⁾	E, G	Fieldbus + switch (IO221)	27, 29	Ex ia/db [ia Ga] ⁴⁾ Ex tb IIIC ⁴⁾	$U_N = 9..32 \text{ V dc}^{2)}$ $U_m = 250 \text{ Vac}$ $P_N = 880 \text{ mW}$	$U_N = 10.4..35 \text{ V dc}^{2)}$ $U_m = 250 \text{ Vac}$ $P_N = 0.7/0.85/1.0 \text{ W}^{3)}$
				Ex ec ic IIC	$U_N = 9..32 \text{ V dc}^{2)}$ $U_m = 250 \text{ Vac}$ $P_N = 880 \text{ mW}$	$U_N = 10.4 \dots 35 \text{ V dc}^{2)}$ $U_m = 250 \text{ Vac}$ $P_N = 0.7/ 0.85/ 1.0 \text{ W}^{3)}$
				Ex ta IIIC	$U_N = 9 \dots 20 \text{ V DC}$ $U_m = 250 \text{ V AC}$ $P_N = P_{FAULT} = 880\text{mW}$	Refer to Ex tb $R_{FAULT} = 380,3 \Omega$



BC, BF, BG, B3 IC, IF, IG, I3 KC, KF, KG, K3	L	4-wire DC + 4..20mA HART (IO410)	08	Ex ia/db [ja Ga] ⁴⁾ Ex tb IIIC ⁴⁾ Ex ec ic IIC	$U_N = 10.4 \dots 48 \text{ V dc}^{2)}$ $U_m = 250 \text{ V}$ $I_N = 300 \text{ mA}$ $P_N = 1328 \text{ mW}$	$U_N = 22 \text{ V dc}^{2)}$ $U_m = 250 \text{ V}$ $I_{\max} = 22 \text{ mA}$
BC, BF, BG, B3 IC, IF, IG, I3 KC, KF, KG, K3	K	4-wire AC + 4..20mA HART (IO411)	09	Ex ia/db [ja Ga] ⁴⁾ Ex tb IIIC ⁴⁾ Ex ec ic IIC	$U_N = 90 \dots 253 \text{ V ac}^{2)}$ 50/60 Hz; $U_m = 250 \text{ V}$ $I_{\max} = 160 \text{ mA}$ $P_N = 1540 \text{ mW}$	$U_N = 22 \text{ V dc}^{2)}$ $U_m = 250 \text{ V}$ $I_{\max} = 22 \text{ mA}$

Note:

- 1) Multiple marking; type of protection selected for first installation must be indicated and may not be changed.
- 2) Specifies maximum value, which includes 10% safety margin for typical power line variations.
- 3) Different Pi values are applicable resulting in different maximum surface temperatures, refer to thermal data.
- 4) N/A
- 5) The values of the respective position apply, provided that the values do not exceed the stated P_i or $P_{\text{nom}} + 10\%$ for an extended period; Which can be prevented by
 - using a power source with power limitation,
 - reducing the maximum voltage at the terminals of the device employing this module (either by using a suitable power supply, a limiting resistor or both. The resistor may be a load/communication resistor or a relay); the resistor to be installed outside of the device
 - monitoring the current and cut-off the supply in case 22 mA are exceeded (this applies to 4... 20 mA circuits only)

The power supply and signal output circuits of the I/O interfaces (Power supply / Output) with the order code B, C, E, G, K, L and A combined with I/O module TRC[02] and TRC[03] are safely galvanically isolated up to a peak voltage of 375 V from the intrinsically safe interface circuits and the other circuits and are separated up to a voltage of 500 VAC from ground potential.

The power supply and signal output circuit of the I/O interface (Power supply/Output) with the order code A combined with TRC[31] is electrically connected to the intrinsically safe interface circuit and isolated from ground potential up to a voltage of 500 VAC.



Service Interface (CDI) of the Main boards type MB10 TRC[11/14] or type MB20 TRC[12/15] or type MB30 TRC[41]

The type of protection of the service interface, which is intended for connection to the Endress + Hauser service interface FXA291 or any other interface is dependent on the "Approval Code" of the level gauges Micropilot type series FMR/OFMR5x-... .

If the interface is used in type of protection Intrinsic Safety Ex ia IIC/IIIC, the following maximum values are valid:

MB10/20: $U_o = 7.3 \text{ V}$ $I_o = 100 \text{ mA}$ $P_o = 160 \text{ mW}$ $C_i = 0 \text{ nF}$ $L_i = 0 \text{ mH}$	MB30: $U_o = 7.3 \text{ V}$ $I_o = 60 \text{ mA}$ $P_o = 110 \text{ mW}$ $C_i = 0 \text{ nF}$ $L_i = 0 \text{ mH}$
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The permissible external inductance and capacitance values are listed in the table below:

For interconnection Service Interface of ProToF-devices (e.g. Commubox FXA291)														
For Group IIC	L_o [μH]	1	2	5	10	20	50	100	150	200	500	1000	2000	5000
ISPARK PTB	C_o	$\leq 12,7$	$\leq 12,7$	$\leq 10,0$	$\leq 7,30$	$\leq 5,50$	$\leq 4,00$	3,20	-	$\leq 2,60$	$\leq 2,00$	$\leq 1,60$	$\leq 1,20$	$\leq 0,73$
EN 60079-25	[μF]	-	-	-	-	-	-	-	2,0	-	1,40	0,90	0,49	-

(Taken from EU Type Examination Certificate KEMA 09 ATEX 0062 U and Certificate of Conformity IECEx KEM 09.0030 U)

or

for connection to an intrinsically safe circuit
maximum value:

$$U_i = 7.3 \text{ V}$$

The rules for the interconnection of intrinsically safe circuits shall be observed.

If the interface is used in type of protection Intrinsic Safety Ex ic IIC the following maximum values are valid:

$$U_o = 7.3 \text{ V}$$

$$U_i = 7.3 \text{ V}$$

The rules for the interconnection of intrinsically safe circuits shall be observed.

If the interface is used in type of protection for non-sparking devices „Ex nA“ or for devices with dust explosion protection by enclosure „Ex ta“, the following maximum value is valid:

$$U_N = 6.5 \text{ V}$$

Interface of the display of the Mainboards type MB 10 [TRC11/14] or type MB20 [TRC12/15] or type MB30 [TRC41]

The type of protection for the interface of the display depends on the "Approval Code" of the microwave units Micropilot type series FMR/OFMR5x-... .

If the interface is used in type of protection Intrinsic Safety Ex ia IIC/IIIC, the following maximum values are valid:

MB10/20: $U_o = 7.3 \text{ V}$ $I_o = 327 \text{ mA}$ $P_o = 800 \text{ mW}$ $I_{\text{opeak}} = 1.65 \text{ A}$ $U_i = 7.3 \text{ V}$ $C_i = 0 \text{ nF}$ $L_i = 0 \text{ mH}$	MB30: $U_o = 7.3 \text{ V}$ $I_o = 90 \text{ mA}$ $P_o = 540 \text{ mW}$ $I_{\text{opeak}} = 1.65 \text{ A}$ $U_i = 7.3 \text{ V}$ $C_i = 0 \text{ nF}$ $L_i = 0 \text{ mH}$
The rules for the interconnection of intrinsically safe circuits shall be observed.	

If the interface is used in type of protection Intrinsic Safety Ex ic [ia] IIC, the following maximum values are valid:

MB10/20: $U_o = 7.3 \text{ V}$ $I_o = 327 \text{ mA}$ $P_o = 800 \text{ mW}$ $I_{\text{opeak}} = 1.65 \text{ A}$ $U_i = 7.3 \text{ V}$ $C_i = 0 \text{ nF}$ $L_i = 0 \text{ mH}$	MB30: $U_o = 7.3 \text{ V}$ $I_o = 90 \text{ mA}$ $P_o = 540 \text{ mW}$ $I_{\text{opeak}} = 1.65 \text{ A}$ $U_i = 7.3 \text{ V}$ $C_i = 0 \text{ nF}$ $L_i = 0 \text{ mH}$
The rules for the interconnection of intrinsically safe circuits shall be observed.	

If the interface is used in type of protection for devices of dust explosion protection by enclosure „Ex ta [ia] IIIC” or in application of protection by increased safety "Ex ec [ia] IIC", the following maximum values are valid:

MB10/20: $U_o = 7.3 \text{ V}$ $I_o = 327 \text{ mA}$ $P_o = 800 \text{ mW}$ $I_{\text{opeak}} = 1.65 \text{ A}$ $U_i = 7.3 \text{ V}$ $C_i = 0 \text{ nF}$ $L_i = 0 \text{ mH}$	MB30: $U_o = 7.3 \text{ V}$ $I_o = 90 \text{ mA}$ $P_o = 540 \text{ mW}$ $I_{\text{opeak}} = 1.65 \text{ A}$ $U_i = 7.3 \text{ V}$ $C_i = 0 \text{ nF}$ $L_i = 0 \text{ mH}$
The rules for the interconnection of intrinsically safe circuits shall be observed.	



Specific Conditions of Use

- 1) **Electrostatic charging of plastic surfaces resp. isolated parts of metal (TAGs) of the microwave units Micropilot type series FMR/OFMR5x-...**
 - a. The microwave units Micropilot type series FMR/OFMR5x-... in the version with a plastic enclosure (enclosure-code GT19) contain plastic surfaces that may be electrostatically charged. During operation of the mentioned microwave units Micropilot type series FMR/OFMR5x-... in explosion hazardous areas with gas or dust atmosphere the risk of electrostatic charging of these enclosure parts, caused by friction, cleaning, maintenance and operation in fluid flows, is to be considered. They shall not be operated near processes which are strongly charge generating (warning label).
 - b. The microwave units Micropilot type series FMR/OFMR50-aabcdeBMgghhh * + # ... in all types of housing contain plastic surfaces that may be electrostatically charged. During operation of the mentioned level gauges Micropilot in explosion hazardous areas with gas atmosphere the risk of electrostatic charging of these enclosure parts, caused by friction and cleaning is to be considered (warning label).
 - c. The microwave units Micropilot type series FMR/OFMR50/56-aabcB/Ce-BNgghhh*+#... and FMR/OFMR50/56-aabcB/CeBRgghhh*+#... in the version with a stainless-steel enclosure (enclosure-code GT18) or aluminum enclosure (enclosure-code GT20) include plastic surfaces which may be electrostatically charged. They are suitable for operating in potentially explosive atmospheres with dust atmosphere or in areas with gas atmosphere group IIA, even in the presence of strong charge generating processes, if any conductive parts are connected electrically to the equipotential bonding.
 - d. The microwave units Micropilot type series FMR/OFMR51/54/57-... in the version with a stainless-steel enclosure (enclosure-code) GT18 or aluminum enclosure (enclosure-code GT20) and the flexible sealing contain plastic surfaces that may be electrostatically charged. They are suitable to be operated in all explosion hazardous areas with gas atmosphere or dust atmosphere, even in the presence of strong charge generating processes, if any conductive parts are connected electrically to the equipotential bonding.
 - e. The microwave units Micropilot type series FMR/OFMR53-... in the version with a stainless-steel enclosure (enclosure-code GT18) or aluminum enclosure (enclosure-code GT20) and non-conductive rod, tube, screw in adapter and cladding and microwave units Micropilot types FMR/OFMR52-... in the version with stainless steel enclosure (enclosure-code GT18) or aluminum enclosure (enclosure-code GT20) contain plastic surfaces that may be electrostatically charged. They are suitable to be operated in explosion hazardous areas with dust atmosphere, even in the presence of strong charge generating processes, if any conductive parts are connected electrically to the equipotential bonding.

- f. The microwave units Micropilot type series FMR/OFMR53-... in all enclosure versions and non-conductive rod, tube and screw in adapter and cladding contain plastic surfaces that may be electrostatically charged. If they are operated in explosion hazardous areas with gas atmosphere, the danger of electrostatic charging of these enclosure parts, caused by friction and cleaning is to be considered (warning label).
- g. The microwave units Micropilot type series FMR/OFMR54-... in all enclosure versions with enameled horn antenna and in the version with planar antenna contain enclosure parts that may be electrostatically charged. During operation of the mentioned microwave units Micropilot type series FMR/OFMR54-... in explosion hazardous areas with gas atmosphere the danger of electrostatic charging of these enclosure parts, caused by friction and cleaning is to be considered (warning label).
- h. The horn antenna coverage includes plastic surfaces that may be electrostatically charged. It is suitable to operate in explosion hazardous areas with dust atmosphere or in potentially explosive areas with gas atmosphere group IIA and IIB as an accessory to the microwave unit Micropilot type series FMR/OFMR5x-..., even in the presence of strong charge-generating processes, if all conductive parts of the microwave unit Micropilot types FMR/OFMR5x-... are connected electrically to the equipotential bonding.
- i. The microwave units Micropilot type series FMR/OFMR5x-... in the version with a plastic enclosure (enclosure code GT19) and in the version with attached metal plates (TAGs), contain surfaces which can become charged. When operating the above-mentioned microwave units Micropilot types FMR/OFMR5x-... in hazardous areas with gas atmosphere, the danger of charging of these enclosure or the isolated capacitances, caused by friction, cleaning, maintenance and operation in media flows, must be pointed out. It must be observed, that when using one metal plate (TAG) a capacitance of ≤ 3 pF (suitable for use in potentially explosive atmospheres with gas atmosphere (equipment group II) or dust atmosphere (equipment group III) for categories 1 to 3-equipment) and when using two or three metal plates (TAGs), a capacitance of ≤ 10 pF (suitable for use in potentially explosive atmospheres with gas atmospheres (equipment group II) for categories 2 and 3-equipment for explosion groups IIA and IIB and for using in potentially explosive atmospheres with dust atmospheres (equipment group III) for categories 1 to 3-equipment) must be taken into account. The microwave units Micropilot types FMR/OFMR5x-... in the version with plastic housing (housing code GT19) and in the version with attached metal plates (TAGs) must not be operated in the near of processes generating strong charges (warning label).

2) Isolated installation

If the conductive enclosure / antenna parts of the microwave units Micropilot type series FMR/OFMR5x-... in an application as a Category 1- or 1/2-equipment cannot be connected to the local equipotential bonding (isolated installation), these conductive parts have to be electrostatically connected to the equipotential bonding (resistance ≤ 1 M Ω).

3) Impact and friction sparks

In the application as Category-1 equipment the microwave units Micropilot type series FMR/OFMR5x-... in the versions in which the material aluminum is used, shall be installed in such a way that sparking as a result of impact or friction between aluminum and steel (with the exception of stainless steel if the presence of rust particles can be excluded) is excluded.



4) **Over voltage protection**

The surge modules OVP10 (TRC16/38) or OVP20 (TRC17/39) to be used as an option meet the requirements of EN 60079-14, section 12.3. In applying these modules the power supply and signal output circuits of the I/O interface (Power supply/Output) are considered as isolated from earth, although the used 600 VAC gas discharge tubes (connected to the potential equalization) may trigger at 420 VAC due to their tolerances. For operation of the overvoltage protection modules OVP type OVP10 resp. OVP20 in the enclosures of the microwave units Micropilot type series FMR/OFMR5x ... the details of the temperature tables in the respective safety instructions XA ... of the microwave units Micropilot FMR/OFMR5x-... are to be considered.

5) **Chemical resistance**

For applications in areas with gas atmosphere requiring equipment of category 1 or category 1/2 all parts of the microwave units Micropilot type series FMR/OFMR5x-... in contact with the media may be used only in such media against which the wetted parts are sufficiently resistant.

6) **Scavenge junction**

If the microwave units Micropilot type series FMR/OFMR5x-... with scavenge junction are used in explosion hazardous areas with gas atmosphere, requiring Kategorie-1/2-equipment, the installation shall have an enclosure protection on min. IP 67 according to EN 60529 in the closed state. After removing the scavenge junction the opening has to be locked with a suitable plug, so that the degree of protection IP 67 is maintained.

7) **Alignment unit**

The microwave units Micropilot type series FMR/OFMR57-... in the version with alignment unit are to be installed in a way that after the alignment of the antenna via the pivot bracket and after the tightening of the clamping flange or the setting of the clamping ring by the hexagon-nut (torque 65-85 Nm) an adjustment of the position of the alignment unit is no longer possible and the degree of protection IP 67 is fulfilled.

8) **Antenna extension**

The microwave units Micropilot type series FMR/OFMR5x-... in the version with antenna extension are to be installed in such a way that contact between the sensor and the tank wall with consideration of the built-in parts of the tank and the flow conditions inside the tank can be excluded with sufficient certainty.

9) removed



10) Remote Display FHX 50

The regulations for installation in the safety instructions XA01053F-x or XA001055F-x of the Remote Display FHX50 (DEKRA 12 ATEX 0151 X) and in the safety instructions XA ... to the respective microwave units Micropilot type series FMR/OFMR5x-... are to be considered. In applications where a surge protector according to IEC/EN60079-14 section 12.3 is necessary for the safe operation of the microwave units Micropilot FMR/OFMR5x-..., for normal operating a risk assessment with respect to overvoltage influence is necessary using the remote displays FHX50 with the microwave unit Micropilot type series FMR/OFMR5x-... . For short-term service and control activities it is allowed to operate the remote displays FHX50 with the level transmitters Micropilot type series FMR/OFMR5x-... . When operate the Remote Display FHX50 with microwave units Micropilot type series FMR/OFMR5x-... with the plastic enclosure enclosure-code GT19 the temperature tables in the safety instructions XA ... of the microwave units Micropilot FMR/OFMR5x-... types are to be considered. By using the Transmitter Micropilot type FMR/OFMR5x-aabN...., the requirements acc. IEC/EN60079-14 sec. 9.4 for Conduit Systems – wiring- and the statements of the adequate safety advice XA... must be considered. In addition, national or other standards should be followed for conduit systems.

11) Interface Service / CDI

For normal operation of the microwave units Micropilot type series FMR/OFMR5x-..., in applications where a surge protector according to IEC/EN 60079-14 section 12.3 is required, the service interface / CDI interface shall be operated with further apparatus, installed outside the microwave units, only after a risk assessment has been carried out. For short-term service and control activities the operation of additional equipment, installed outside the microwave units, at the service interface / CDI interface is allowed.

12) Microwave units Micropilot type series FMR/OFMR5x-B4bcdeffgghh*+##...

When the microwave units Micropilot type series FMR/OFMR5x-B4bcdeffgghh*+##... (marking Ex II 1/2 G Ex ia IIC T6 Ga/Gb and Ex II 1/2 G Ex ia/db [ia Ga] IIC T6 Ga/Gb are put into service for the first time, the user has to select the mode of the first use on the label (see the relevant safety instructions XA ...).

In the application, Ex ia/db [ia Ga] IIC T6 Ga/Gb certified associated accessories (e.g. cable and cable glands and seals) are to be used for the enclosure, that meet the requirements of type of protection Flameproof Enclosure "d".

13) Microwave units Micropilot type series FMR/OFMR5x-... with enclosure enclosure-code B (GT18) und C (GT20)

If the enclosures of the microwave units Micropilot type series FMR/OFMR5x-... with enclosure-order codes B (GT18) and C (GT20) are used in microwave units Micropilot type series FMR/OFMR5x-... with approval codes BC, BE, BF, BG, BL, BK, B2, B3 und B4, separately certified accessories, such as cable glands and seals are to be used, appropriate for the applied type of protection.



14) Microwave units Micropilot type series FMR/OFMR5x-... with enclosure enclosure-code B (GT18) und C (GT20)

If the enclosures of the microwave units Micropilot type series FMR/OFMR5x-... with enclosure-codes B (GT18) and C (GT20) are used in microwave units Micropilot type series FMR/OFMR5x-... with approval codes BE, the measures listed in the safety instructions for the power limitation of the 4 ... 20 mA circuit(s) or the „Switch Output (PPS)“ must be observed.

15) Measures for zone separation

The zone partition of the device is made of a gas-tight glass feedthrough welded in a stainless-steel adapter (thickness of welding > 0.2 mm). It shall not be subjected to abrasive or corrosive medium.