IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

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

Certificate No.:	IECEx PTB 12.0044X	issue No.:0	Certificate history:
Status:	**Current**		
Date of Issue:	**2012-12-07**	Page 1 of 3	

Applicant: **Endress+Hauser GmbH + Co. KG**
Hauptstrasse 1, D-79689 Maulburg
Germany

Electrical Apparatus: **Microwave unit Micropilot type series FMR5x-...**
Optional accessory:

Type of Protection: **General requirements, Construction and verification test of flameproof enclosures of electrical apparatus, Intrinsic safety 'i' , Equipment protection by type of protection "n" , Equipment with equipment protection level (EPL) Ga, Equipment dust ignition protection by enclosure "t"**

Marking:
Ex ia IIC T6...T1 Ga or
Ex ia IIC T6...T1 Ga/Gb or
Ex ic [ia Ga] IICT6...T1Ga/Gb/Gc or
Ex nA [ia Ga] IICT6...T1 Ga/Gb/Gc or
Ex nA IIC T6...T1 Gc or
Ex ic IIC T6...T1 Gc or
Ex d [ia] IIC T6...T1 Ga/Gb or
Ex ia IIIC Txx°C T500 xx°C Da or
Ex ia IIIC Txx°C Da/Db or
Ex ta IIIC Txx°C T500 xx°C Da or
Ex ta IIIC Txx°C Da/Db

Approved for issue on behalf of the IECEx Certification Body: Dr.-Ing. U. Johannsmeyer

Position: Department Head "Intrinsic Safety and Safety of Systems"

Signature:
(for printed version)

Date: 2013-01-09

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

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

IECEx Certificate of Conformity

Certificate No.: IECEx PTB 12.0044X

Date of Issue: **2012-12-07** Issue No.: **0**

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

Additional Manufacturing location (s):
Refer to Annex 2 for a list of manufacturing 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 electrical apparatus 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 : 2011 Edition: 6.0	Explosive atmospheres - Part 0: General requirements
IEC 60079-1 : 2007-04 Edition: 6	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
IEC 60079-11 : 2011-06 Edition: 6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
IEC 60079-15 : 2010 Edition: 4	Explosive atmospheres - Part 15: Equipment protection by type of protection "n"
IEC 60079-26 : 2006 Edition: 2	Explosive atmospheres - Part 26: Equipment with equipment protection level (EPL) Ga
IEC 60079-31 : 2008 Edition: 1	Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosure 't'

*This Certificate **does not** indicate compliance with electrical 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/ExTR12.0058/00

Quality Assessment Report:

DE/TUN/QAR06.0003/03

IECEx Certificate of Conformity

Certificate No.: IECEx PTB 12.0044X

Date of Issue: **2012-12-07** Issue No.: **0**

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Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

The microwave units Micropilot, type series FMR5x 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 annex.

CONDITIONS OF CERTIFICATION: YES as shown below:

For further details see annex.

Annexe: Annex 2 to IECEx PTB 12-0044 X issue 0.pdf, Annex 1 to IECEx PTB 12-0044 X issue 0.pdf

Applicant: Endress+Hauser GmbH + Co. KG,
Hauptstrasse 1, D-79689 Maulburg, Germany

Electrical Apparatus: Microwave unit Micropilot type series FMR5x-...

Description of equipment

The microwave units Micropilot, type series FMR5x 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 of EPLs Ga, Ga/Gb, Ga/Gb/Gc or Gc or for use in explosion hazardous areas with dust atmosphere of EPLs 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 or with a surge protector module type OVP10 resp. OVP20 or with the modules TRM10 resp.TRM20 with screwed terminals. Herewith, the data in the certificates 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 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 FMR5x-... .

Type key		
Micropilot FMRxx, type series FMRxx-aabcdeffgghhh*+#		
xx		**Probe type** 50, 51,52, 53, 54, 56 oder 57
aa		**Approval code**
IA		IECEx Ex ia IIC T6 Ga
IB		IECEx Ex ia IIC T6 Ga/Gb
IC		IECEx Ex d [ia] IIC T6 Ga/Gb [2)]
ID		IECEx Ex ic [ia Ga] IIC T6 Ga/Gb/Gc [1)]
IE		IECEx Ex ta IIIC T_{500} xx°C Da [2)]
IF		IECEx Ex ta IIIC Txx °C Da/Db [2)]
IG		IECEx Ex nA IIC T6 Gc [2)]
IH		IECEx Ex ic IIC T6 Gc [2)]
IL		IECEx Ex nA [ia Ga] IIC T6 Ga/Gb/Gc [1)]
IK		IECEx Ex ia IIIC T_{500} xx°C Da
I2		IECEx Ex ia IIC T6 Ga/Gb ; IECEx Ex ia IIIC Txx°C Da/Db
I3		IECEx Ex d [ia] IIC T6 Ga/Gb ;

		IECEx Ex ta IIIC Txx°C Da/Db [2]
I4		IECEx Ex ia IIC T6 Ga/Gb, IECEx Ex d [ia] IIC T6 Ga/Gb [2)]
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; 4-20mA 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		W/o LCD, via communication
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
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.
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)

note [1] ID, IL only in combination with a gastight feed through

[2] marking changes in combination with the display, operation mode: „L“ or „M“

Approval code	Power supply; output	Display; Operation	Marking
IE	x	L or M	IECEx Ex ta [ia] IIIC T500 xx°C Da
IF	x	L or M	IECEx Ex ta [ia Db] IIIC Txx°C Da/Db
IG	x	L or M	IECEx Ex nA [ia Ga] IIC T6 Gc
IH	x	L or M	IECEx Ex ic [ia Ga] IIC T6 Gc
I3	x	L or M	IECEx Ex d [ia] IIC T6 Ga/Gb, IECEx Ex ta [ia Db] IIIC Txx°C Da/Db

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)**
IA, IB, I2	**A**	4..20mA HART (IO210_2)	21	Ex ia IIC	for connection to an intrinsically safe circuit, with the following maximum values: U_i = 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 12 nF	non-existent
IG				Ex nA IIC	U_N = 35 V dc [2] I_N = 4 to 20 mA	non-existent
IH				Ex ic IIC	for connection to an intrinsically safe circuit, with the following maximum values: U_i = 35 V I_i = N/A (current controlled circuit) P_i = N/A L_i = 0 µH C_i = 12 nF	non-existent
I2, IK				Ex ia IIIC	for connection to an intrinsically safe circuit, with the following maximum values: U_i = 30 V I_i = 250 mA P_i = 0.6 W (Ta ≤ 85°C) L_i = 0 µH C_i = 12 nF	non-existent
I4[1)]	**A**	4..20mA HART (IO211)	02	Ex ia IIC	for connection to an intrinsically safe circuit, with the following maximum values:	Not used

		(for application / certificates which need I/O-modules with galvanic separation and use of 4...20mA HART in 1 channel mode (switch terminals closed)		Ex ia IIIC	U_i = 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 5 nF	
ID				Ex ic [ia Ga] IIC Ex ic	for connection to an intrinsically safe circuit, with the following maximum values: U_i = 35 V I_i = N/A (current controlled circuit) P_i = N/A L_i = 0 µH C_i = 5 nF	Not used
IC, I3, I4[1)]	**A**	4..20mA HART (IO212)	03	Ex d [ia] IIC	U_N = 35 V DC[2)] U_m = 250 V I_{nom} = 4 ... 20 mA I_{max} = 22 mA P_{nom} = 0,7 W	Not used
IE, IF, I3				Ex ta IIIC	U_N = 35 V DC[2)] U_m = 250 V I_{nom} = 4 ... 20 mA I_{max} = 22 mA P_{nom} = 0,7 W	Not used
IG				Ex nA IIC	U_N = 35 V DC[2)] U_m = 250 V I_{nom} = 4 ... 20 mA I_{max} = 22 mA P_{nom} = 0,7 W	Not used
IL				Ex nA [ia Ga] IIC	U_N = 35 V DC[2)] U_m = 250 V I_{nom} = 4 ... 20 mA I_{max} = 22 mA P_{nom} = 0,7 W	Not used
IA, IB, IK, I2, I4[1)]	**B**	4..20mA HART+ switch (IO211)	02	Ex ia IIC Ex ia IIIC	for connection to an intrinsically safe circuit, with the following maximum values: U_i = 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 5 nF	for connection to an intrinsically safe circuit, with the following maximum values: U_i = 30 V I_i = 300 mA P_i = 0,7W/0,85W/1W[3)] L_i = 0 µH C_i = 3 nF C_i = 5,28 nF (to ground)
ID, IH				Ex ic [ia Ga] IIC Ex ic IIC	for connection to an intrinsically safe circuit, with the following maximum values: U_i = 35 V I_i = N/A (current controlled circuit) P_i = N/A L_i = 0 µH C_i = 5 nF	for connection to an intrinsically safe circuit, with the following maximum values: U_i = 35 V I_i = N/A (current controlled circuit) P_i = 0.7W/0,85W/1W[3)] L_i = 0 µH C_i = 3 nF C_i = 5,28 nF (to ground)
IC, I3, I4[1)]	**B**	4..20mA HART+ switch (IO212)	03	Ex d [ia] IIC	U_N = 35 V DC[2)] U_m = 250 V I_{nom} = 4 ... 20 mA I_{max} = 22 mA P_{nom} = 0,7 W	U_N = 35 V DC[2)] U_m = 250 V P_{nom} = 0,7 W
IE, IF, I3				Ex ta IIIC	U_N = 35 V DC[2)] U_m = 250 V I_{nom} = 4 ... 20 mA I_{max} = 22 mA P_{nom} = 0,7 W	U_N = 35 V DC[2)] U_m = 250 V P_{nom} = 0,7 W
IG				Ex nA IIC	U_N = 35 V DC[2)] U_m = 250 V	U_N = 35 V DC[2)] U_m = 250 V

					I_{nom} = 4 ... 20 mA I_{max} = 22 mA P_{nom} = 0,7 W	P_{nom} = 0,7 W
IL				Ex nA [ia Ga] IIC	U_N = 35 V DC[2)] U_m = 250 V I_{nom} = 4 ... 20 mA I_{max} = 22 mA P_{nom} = 0,7 W	U_N = 35 V DC[2)] U_m = 250 V P_{nom} = 0,7 W
IA, IB, IK, I2 I4[1)]	**C**	4..20mA HART+ 4..20mA (IO214)	04	Ex ia IIC Ex ia IIIC	for connection to intrinsically safe circuits, with the following maximum values: U_i = 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 30 nF	for connection to intrinsically safe circuits, with the following maximum values: U_i = 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 30 nF
ID, IH				Ex ic [ia Ga] IIC Ex ic IIC	for connection to intrinsically safe circuits, with the following maximum values: U_i = 30 V I_i = N/A (current controlled circuit) P_i = N/A L_i = 0 µH C_i = 30 nF	for connection to intrinsically safe circuits, with the following maximum values: U_i = 30 V I_i = N/A (current controlled circuit) P_i = N/A L_i = 0 µH C_i = 30 nF
IC, IE, IF, I3, I4[1)]	**C**	4..20mA HART+ 4..20mA (IO215)	05	Ex d [ia] IIC Ex ta IIIC	U_N = 10.4 ... 30 V dc[2)] U_m = 250 V I_N = 4 ... 20 mA I_{max} = 22 mA P_N = 0.7 W	U_N = 10.4 ... 30 V dc[2)] U_m = 250 V I_N = 4 ... 20 mA I_{max} = 22 mA P_N = 0.7 W
IG				Ex nA IIC	U_N = 10.4 ... 30 V dc[2)] I_N = 4 ... 20 mA I_{max} = 22 mA P_N = 0.7 W	U_N = 10.4 ... 30 V dc[2)] I_N = 4 ... 20 mA I_{max} = 22 mA P_N = 0.7 W
IL				Ex nA [ia Ga] IIC	U_N = 10.4 ... 30 V dc[2)] U_m = 250 V I_N = 4 ... 20 mA I_{max} = 22 mA P_N = 0.7 W	U_N = 10.4 ... 30 V dc[2)] U_m = 250 V I_N = 4 ... 20 mA I_{max} = 22 mA P_N = 0.7 W
IA, IB, IK; I2; I4[1)]	**E,G**	Fieldbus + switch (IO220_2)	26	Ex ia IIC Ex ia IIIC	FISCO field device or for connection to an intrinsically safe circuit, with the following maximum values: U_i = 30 V I_i = 300 mA P_i = 1.2 W L_i = 10 µH C_i = 5 nF	passive: for connection to intrinsically safe circuits, with the following maximum values: U_i = 30 V I_i = 300 mA P_i = 1.0 W L_i = 0 µH C_i = 3 nF C_i = 5.28 nF (to ground) U_o = negligible low I_o = negligible low P_o = negligible low
ID, IH				Ex ic [ia Ga] IIC Ex ic IIC	FISCO field device or for connection to an energy limited circuit, with the following maximum values U_i = 32 V I_i = N/A (current controlled circuit) P_i = N/A L_i = 10 µH C_i = 5 nF	passive: for connection to an intrinsically safe circuit, with the following maximum values: U_i = 35 V I_i = 300 mA P_i = 0.7/0.85/1.0 W L_i = 0 µH C_i = 3 nF C_i = 5.28 nF (to ground) U_o = negligible low I_o = negligible low

						P_o = negligible low
IC, IE, IF; I3, I4[1)]	**E,G**	Fieldbus + switch (IO221_2)	27	Ex d [ia] IIC Ex ta IIIC	U_N = 9..32 V dc[2)] U_m = 250 Vac P_N ≤ 880 mW Fieldbus	U_N = 10.4..35 V dc[2)] U_m = 250 Vac P_N = 0.7/0.85/1.0 W[3)]
IG				Ex nA IIC	U_N = 9..32 V dc [2)] U_m = 250 Vac P_N ≤ 880 mW	U_N = 10.4 ... 35 V dc[2)] U_m = 250 Vac P_N ≤ 0.7/ 0.85/ 1.0 W[3)]
IL				Ex nA [ia Ga] IIC	U = 9..32 V dc[2)] U_m = 250 Vac P_N ≤ 880 mW Fieldbus	U_N = 10.4..35 V dc[2)] U_m = 250 Vac P_N = 0.7/0.85/1.0 W[3)]
IC, IE, IF, IG, IL, I3	**L**	4-wire DC + 4..20mA HART (IO410)	08	Ex d [ia] IIC Ex ta IIIC Ex nA IIC Ex nA [ia Ga] IIC	U_N = 22 V dc[2)] U_m = 250 V I_{max} = 22 mA	U_N = 10.4 ... 48 V dc[2)] U_m = 250 V I_N = 112 mA I_{max} = 300 mA P_N = 1328 mW
IC, IE, IF, IG, IL, I3	**K**	4-wire AC + 4..20mA HART (IO411)	09	Ex d [ia] IIC Ex ta IIIC Ex nA IIC Ex nA [ia Ga] IIC	U_N = 22 V dc[2)] U_m = 250 V I_{max} = 22 mA	U_N = 90 ...253 V ac[2)] 50/60 Hz; U_m = 250 V I_N = 25 mA I_{max} = 160 mA P_N = 1540 mW

Note:
1) Multiple marking; type of protection selected for first installation must be indicated and shall not be changed
2) Specifies maximum value, which includes 10% tolerance in mains voltage
3) Different Pi values are applicable resulting in different maximum surface temperatures, refer to thermal data.

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 TRC02 and TRC03 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 TRC21 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 MB 10 [TRC11] or Type MB20 [TRC12]
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 FMR5x-...
If the interface is used in type of protection Intrinsic Safety Ex ia IIC/IIIC, the following maximum values are valid:

U_o = 7.3 V
I_o = 100 mA
P_o = 160 mW
C_i = 0 nF
L_i = 0 mH

The permissible external inductance and capacitance values are listed in the table below:

L_o (mH)	5,00	2,00	1,00	0,50	0,20	0,10	0,05	0,02	0,01	0,005	0,002	0,001
C_o (µF)	0,73	1,20	1,60	2,00	2,60	3,20	4,00	5,50	7,30	10,00	12,70	12,70

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or

for connection to an intrinsically safe circuit
maximum value:

U_i = 7.3 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 V;
U_i = 7.3 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 V

Interface of the display of the Mainboards Type MB 10 [TRC11] or Typ MB20 [TRC12]

The type of protection for the interface of the display depends on the "Approval Code" of the micro-wave units Micropilot type series FMR5x-... .

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

U_o = 7.3V
I_o = 327 mA
P_o = 800 mW
I_{opeak} = 1.65 A
U_i = 7.3 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 [ia] IIC, the following maximum values are valid:

U_o = 7.3V
I_o = 327 mA
P_o = 800 mW
I_{opeak} = 1.65 A
U_i = 7.3 V
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]“ or in application for non sparking devices „Ex nA [ia] IIC“, the following maximum values are valid:

U_o =7.3V
I_o = 327 mA
P_o = 800 mW
I_{opeak} = 1.65 A
U_i = 7.3 V
The rules for the interconnection of intrinsically safe circuits shall be observed.

Special conditions for safe use

1) **Electrostatic charging of plastic surfaces of the microwave units Micropilot type series FMR5x-…**

   a. The microwave units Micropilot type series FMR5x-... in the version with a plastic enclosure (enclosure-ordercode GT19) contain plastic surfaces that may be electrostatically charged. During operation of the mentioned microwave units Micropilot type series FMR5x-... 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 FMR50-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 FMR50/56-aabcB/CeBNgghhh*+#... and FMR50/56-aabcB/CeBRgghhh*+#... in the version with a stainless steel enclosure (enclosure-ordercode GT18) or aluminum enclosure (enclosure-ordercode 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 FMR51/54/57-… in the version with a stainless steel enclosure (enclosure-ordercode) GT18 or aluminum enclosure (enclosure-ordercode 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 FMR53-… in the version with a stainless steel enclosure (enclosure-ordercode GT18) or aluminum enclosure (enclosure-ordercode GT20) and non-conductive rod, tube, screw in adapter and cladding and microwave units Micropilot types FMR52-... in the version with stainless steel enclosure (enclosure-ordercode GT18) or aluminum enclosure (enclosure-ordercode 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 FMR53-… 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 FMR54-… 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 FMR54-… 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 (warn-

ing 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 FMR5x-..., even in the presence of strong charge-generating processes, if all conductive parts of the microwave unit Micropilot types FMR5x-... are connected electrically to the equipotential bonding.

2) **Isolated installation**
If the conductive enclosure / antenna parts of the microwave units Micropilot type series FMR5x-... in an application as a EPL Ga- or Ga/Gb-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 MΩ).

3) **Impact and friction sparks**
In the application as EPL Ga-1 equipment the microwave units Micropilot type series FMR5x-… 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) or OVP20 (TRC17) 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 FMR5x ... the details of the temperature tables in the respective safety instructions XA … of the microwave units Micropilot FMR5x-... are to be considered.

5) **Chemical resistance**
For applications in areas with gas atmosphere requiring equipment of EPL Ga or EPL Ga/Gb all parts of the microwave units Micropilot type series FMR5x-... 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 FMR57-… with scavenge junction are used in explosion hazardous areas with gas atmosphere, requiring EPL Ga/Gb-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 FMR57-... 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 FMR5x-... 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) **Microwave units Micropilot type series FMR5x-… with approval code ID und IL**
The microwave units Micropilot type series FMR5x-... with approval code ID and IL are qualified for installation in the partition wall, which separates the explosion hazardous areas for equipment of EPL Ga and Gc, since by construction measures within the enclosure of the microwave units guarantee the necessary separation between the zones. For the process fitting, a degree of protection of at least IP 67 according to EN/IEC 60529 is to be fulfilled. In the area of the process connection outside of the equipment it is to guarantee by suitable measures that the explosion hazardous area complies with Zone 2, e.g. by natural ventilation.

10) **Remote Display FHX 50**
The regulations for installation in the safety instructions XA01053F-x or XA001055F-x of the Remote Display FHX50 (IECEx DEK12.0046X) and in the safety instructions XA ... to the respective microwave units Micropilot type series FMR5x-… 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 FMR5x-…, 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 FMR5x-… . For short-term service and control activities it is allowed to operate the remote displays FHX50 with the level transmitters Micropilot type series FMR5x-... .
When operating the Remote Display FHX50 with microwave units Micropilot type series FMR5x-… with the plastic enclosure enclosure-ordercode GT19 the temperature tables in the safety instruction s XA ... of the microwave units Micropilot FMR5x-… types are to be considered.

11) **CDI / Interface Service / CDI**
For normal operation of the microwave units Micropilot type series FMR5x-..., 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 only after a risk assessment has been carried out. For short-term service and control activities the operation of additional equipment at the service interface / CDI interface is allowed.

12) **Module with screw terminals TRM10 or TRM20**
When operating the modules with screw terminals TRM10 or TRM20 in enclosures of the microwave units Micropilot type series FMR5x-... the details of the temperature tables of the respective safety instructions XA… of the microwave units Micropilot FMR5x-... are to be considered.

13) **Microwave units Micropilot type series FMR5x-I4aabcdeffgghhh*+#…**
When the microwave units Micropilot type series **FMR5x-I4aabcdeffgghhh*+#…** (marking Ex [ia] IIC T6 Ga/Gb and Ex d [ia] 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 d [ia] IIC T6 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".

14) **Microwave units Micropilot type series FMR5x-… with enclosure enclosure-ordercode B (GT18) und C (GT20)**
If the enclosures of the microwave units Micropilot type series FMR5x-… with enclosure-ordercodes B (GT18) and C (GT20) are used in microwave units Micropilot type series FMR5x-… with approval codes IC, IE, IF, IG, IL, IK, I2, I3 and I4 , separately certified accessories, such as cable glands and seals are to be used, appropriate for the applied type of protection.

Applicant: Endress+Hauser GmbH + Co. KG,
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Electrical Apparatus: Microwave unit Micropilot type series FMR5x-...

Manufacturing locations

1.	Endress+Hauser GmbH+Co. KG Hauptstraße 1 79689 Maulburg Germany
2.	Endress+Hauser GmbH+Co. KG Miramstraße 87 34123 Kassel Germany
3.	Endress+Hauser (Suzhou) Automation Instrumentation Co. Ltd. China – Singapore Industrial Park (SIP) Su-Hong-Zhong-Lu, No. 491 Jiangsu Province, 215021 Suzhou P.R. China
4.	Endress+Hauser (India) Automation Instrumentation Pvt. Ltd. M-192, Waluj MIDC, Aurangabad – 431 136 Maharashtra State India
5.	Endress+Hauser (USA) Automation Instrumentation Inc. 2340 Endress Place Greenwood, Indiana 46143 USA
6.	Endress+Hauser Yamanashi Co. Ltd. 862-1, Sakaigawa-cho, Fuefuki-shi 406 0846 Yamanashi Japan

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