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 15.0034X**	Page 1 of 4	Certificate history:
Status:	**Current**	Issue No: 1	Issue 0 (2015-12-16)
Date of Issue:	2021-06-02		
Applicant:	**Endress+Hauser SE+Co. KG** Hauptstraße 1 79689 Maulburg **Germany**		
Equipment:	**Level meters Micropilot S FMR/OMR 532-... FMR/OMR 540-...**		
Optional accessory:			
Type of Protection:	**General Requirements, Intrinsic Safety, Equipment with equipment protection level (EPL) Ga**		
Marking:	Ex ia IIC T6...T1 Ga/Gb, Ex ia IIC T6...T1 Gb		

Approved for issue on behalf of the IECEx Certification Body: **Dr. Ing. Frank Lienesch**

Position: **Head of department "Explosion Protection in Sensor Technology and Instrumentation"**

Signature: (for printed version)

Date:

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 www.iecex.com or use of this QR Code.

Certificate issued by:

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

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

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Certificate No.: **IECEx PTB 15.0034X**

Date of issue: 2021-06-02 Issue No: 1

Manufacturer: **Endress+Hauser SE+Co. KG**
Hauptstraße 1
79689 Maulburg
Germany

Additional 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 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 60079-11:2011 Edition:6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
IEC 60079-26:2014-10 Edition:3.0	Explosive atmospheres – Part 26: Equipment with Equipment Protection Level (EPL) Ga

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/ExTR15.0039/01

Quality Assessment Report:

DE/TUN/QAR06.0003/08

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

The level meters MICROPILOT S type FMR/OMR 53.-... and FMR/OMR 54.-... are used for the continuous non-contact measurement of liquids in explosion hazardous areas in which apparatus of EPL “Ga/Gb” and “Gb” have to be used. The unit emits electromagnetic waves within the GHz range. The propagation delay of the signals reflected by the medium surface is used to calculate the distance from that surface. The level meters comprise an electronics housing, the process connectors as well as the associated aerials. They may optionally be operated (in conjunction) with the LCD display and monitoring unit of type VU331.

Further details see annex.

SPECIFIC CONDITIONS OF USE: YES as shown below:
Further details see annex.

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DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)
The modifications concern the used standards, the marking and modifications of the type series. All other data and the special conditions remain without changes.

Annex:

Annex IECEx PTB 15.0034X Issue 1.pdf

Applicant: Endress+Hauser SE+Co. KG
Hauptstrasse 1
79689 Maulburg/Germany

Electrical Apparatus: **Level meters Micropilot S**
FMR/OMR 532-…, FMR540-…

Description:

The Micropilot S level transmitters FMR/OMR 532 and FMR/OMR 540 are mainly used for continuous non-contact level measurement of liquids. The types OMR532 and OMR540 are Endress + Hauser internal codes for the Micropilot S level transmitters. The level transmitters utilizes microwave measurement techniques. Short microwave pulses transmitted by an antenna are reflected from the liquid surface back to the antenna. The time between the transmitted and reflected pulse is evaluated and converted to the level information of the liquid measured. The Micropilot S is a 4-wire transmitter. One circuit is the 4..20 mA signal output carrying digital HART communication. The other one provides additional power to the device.

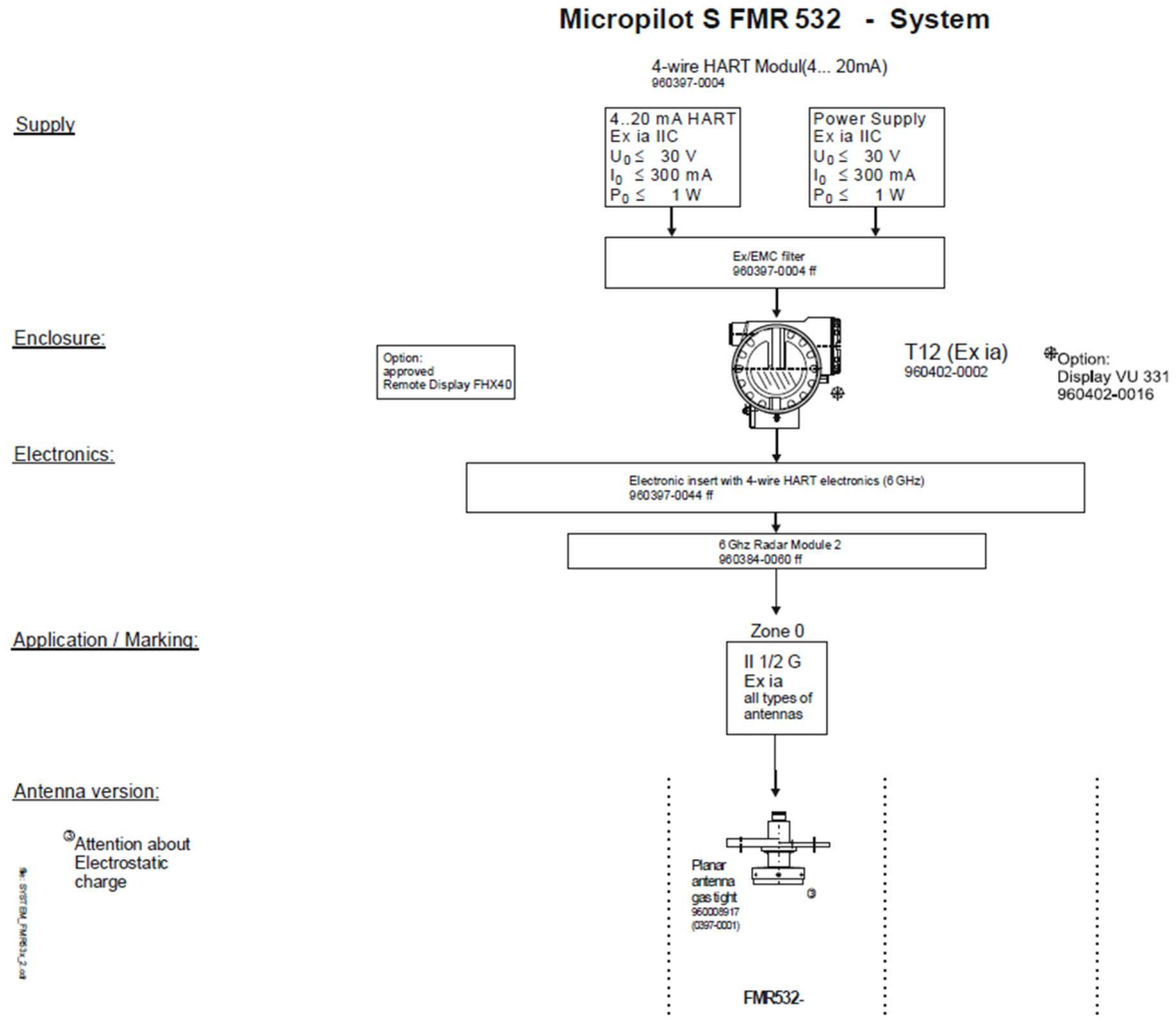
The transmitter uses 6 GHz or 26 GHz microwave pulses which are transmitted via horn, rod, planar or parabolic antennas.

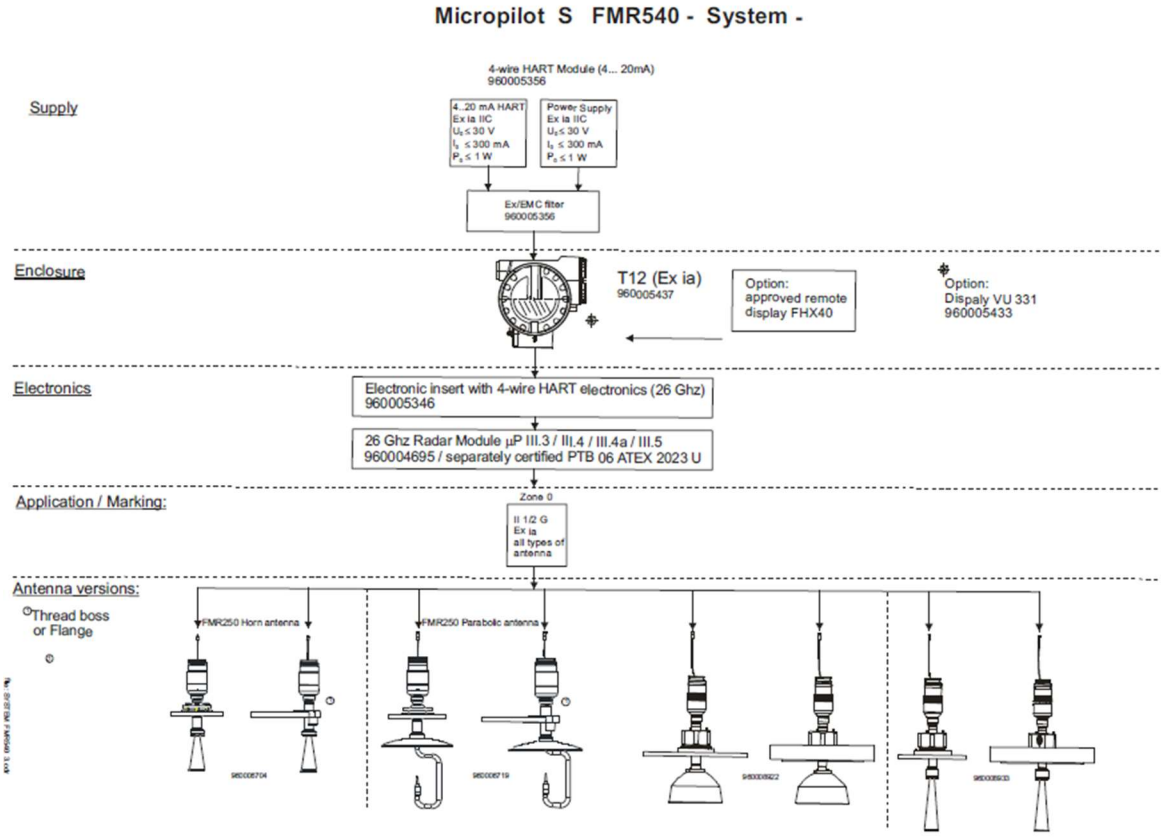
As a test specification was applied at the Micropilot S level transmitters FMR/OMR 532 and FMR/OMR 540 the standards IEC 60079-0 Ed.6.0 (EN 60079-0:2012+AMD11:2013, IEC 60079-11 Ed. 6.0 (EN 60079-11:2012) and IEC 60079-26 Ed.3.0 (EN 60079-26:2015)

They are applied at the Micropilot S level transmitters FMR/OMR 532 and FMR/OMR 540 in the versions EN60079-0:2017, EN60079-11:2012 and EN60079-26:2015 certified with an EC-Type-Examination Certificate EUB PTB 00 ATEX 2067 X issue 1 (Test Report PTB Ex 21-20216) also.

Overview of the Micropilot S level transmitters FMR/OMR 532 and FMR/OMR 540 system:

See description clause 4.1 and 4.2 also


Micropilot S FMR 532 - System
4-wire HART Modul(4... 20mA)
960397-0004
Supply
4..20 mA HART
Ex ia IIC
U0 ≤ 30 V
I0 ≤ 300 mA
P0 ≤ 1 W
Power Supply
Ex ia IIC
U0 ≤ 30 V
I0 ≤ 300 mA
P0 ≤ 1 W
Ex/EMC filter
960397-0004 ff
Enclosure:
Option:
approved
Remote Display FHX40
T12 (Ex ia)
960402-0002
Option:
Display VU 331
960402-0016
Electronics:
Electronic insert with 4-wire HART electronics (6 GHz)
960397-0044 ff
6 Ghz Radar Module 2
960384-0060 ff
Application / Marking:
Zone 0
II 1/2 G
Ex ia
all types of
antennas
Antenna version:
Attention about
Electrostatic
charge
Planar
antenna
gas tight
960008917
(0397-0001)
FMR532-



For assignment of the temperature class to the maximum permissible medium and ambient temperatures when using the level meters MICROPILOT S in hazardous areas where an apparatus of category 1/2 is required, reference is made to the following table:

Temperature class	Medium temperature	Ambient temperature FMR/OMR532-***	Ambient temperature FMR/OMR540-*** Ex ia
T6	+60 °C	+55 °C	60 °C
T5	+60 °C	+65 °C	75 °C
T4	+60 °C	+80 °C	80 °C

For applications requiring category 1-apparatus, the process pressure and the temperature of the media shall range from 0.8 bar to 1.1 bar, and from -20 °C to +60 °C. For operating conditions when operating the apparatus without the existence of explosive mixtures, reference is made to the manufacturer's specifications.

For assignment of the temperature class to the maximum permissible medium and ambient temperatures when using the level meters MICROPILOT S in hazardous areas where an apparatus of category 2 is required, reference is made to the following table:

Temperature class	Max. permissible aerial temperature	Max. permissible ambient temperature at the housing for the electronics

		FMR/OMR532-***	FMR/OMR 540-*** Ex ia
T6	+80 °C	+50 °C	+55 °C
T6	+60 °C	+55 °C	+60 °C
T5	+95 °C	+65 °C	+70 °C
T5	+70 / +75 °C[1]	+70 °C	+75 °C
T4	+130 °C	+70 °C	+75 °C
T4	+80 °C	+80 °C	+80 °C
T3	+195 °C	---	+70 °C
T3	+140 °C	---	+75 °C
T3	+150 °C	+70 °C	---
T2	+295 °C	---	---
T2	+200 °C	---	+70 °C
T1	+400 °C	---	---
T1	+350 °C	---	---

[1] limited to permissible ambient temperature at the housing for the electronics

Electrical data

Supply circuit (terminal 1 and 2 in the terminal compartment)

Type of protection Intrinsic Safety Ex ia IIC
Only for connection to a certified intrinsically safe circuit.
Maximum values:

U_i = 30 V
I_i = 300 mA
P_i = 1 W
L_i = 13 µH
C_i = 18.5 nF

Signal circuit (terminal 3 and 4 in the terminal compartment)

Type of protection Intrinsic Safety Ex ia IIC
Only for connection to a certified intrinsically safe circuit.
Maximum values:

U_i = 30 V
I_i = 300 mA
P_i = 1 W
L_i negligibly low
C_i = 20.7 nF

Indicating circuit (Electronic compartment)

Type of protection Intrinsic Safety Ex ia IIC
Maximum values:

	FMR/OMR532-* **	**FMR/OMR540-*** **
U_o	5.4 V	4.2 V
I_o	44 mA	34 mA
P_o	59.4 mW	35.3 mW
L_o	15 µH	50 µH
C_o	11.5 µF	12 µF
L_i	negligibly low	negligibly low
C_i	negligibly low	negligibly low
characteristic	linear	linear

or

For connection to a certified intrinsically safe circuit.
(e.g. output circuit of the commubox).[3]
Maximum values:
U_i = 3.74 V
I_i = 9.9 mA
P_i = 9.2 mW

from the

For values of the permissible external inductances and capacitances resulting interconnection, reference is made to the table following below:

	L_o	0.15 mH	0.5 mH	1 mH	2 mH	5 mH
FMR/OMR 532-*** Ex ia IIC	C_o	5.0 µF	3.5 µF	3.0 µF	2.6 µF	2 µF
FMR/OMR 540-*** Ex ia IIC	C_o	8.0 µF	7.0 µF	5.5 µF	5.0 µF	4.0 µF
Ex ia IIB	C_o	10 µF				

[3] permissible only for the purpose of service or adjustment (no permanent installation).

Development Interface
(Electronic compartment)

FMR/OMR532-***
Type of protection Intrinsic Safety Ex ia IIC
Maximum values:

U_o = 5 V
I_o = 43.8 mA
P_o = 54.7 mW
L_o = 15 µH
C_o = 14 µF
L_i = negligibly low
C_i = negligibly low
characteristic linear

or

For connection to a certified intrinsically safe circuit.
(e.g. output circuit of the commubox).[3]
Maximum values:
U_i = 3.74 V
I_i = 9.9 mA
P_i = 9.2 mW

resulting from the

For values of the permissible external inductances and capacitances

interconnection, reference is made to the table following below:

	L_o	0,15 mH	0,5 mH	1 mH	2 mH	5 mH
FMR/OMR 532-*** Ex ia IIC	C_o	5,0 µF	3,5 µF	3,0 µF	2,6 µF	2 µF
Ex ia IIB	C_o	10 µF				

[3] permissible only for the purpose of service or adjustment (no permanent installation).

The intrinsically safe supply and signal circuit is safely electrically isolated from the housing by means of capacitors and surge voltage protectors.

Extract from the type key

FMR532-abcccdefgh

a	=	Certificate[4]	A = No explosive area D = IECEx Ex ia IIC T6...T1 Ga/Gb I = NEPSI Ex ia IIC T6 P = No explosive area + EAC marking Q = EAC Ex ia IIC T6 Ga/Gb S = FM IS Cl.I Div.1 Gr.A-D U = CSA IS Cl.I Div.1 Gr.A-D 1 = ATEX II 1/2 G Ex ia IIC T6 Ga/Gb or II 2 G Ex ia IIC T6 Gb 6 = ATEX II 1/2 G Ex ia IIC T6 Ga/Gb or II 2 G Ex ia IIC T6 Gb, WHG x = *special version not relevant for safety (e.g. in combination with other certificates)*
b	=	Antenna size, gasket material	1 (Planar antenna DN150 / 6", PTFE surface, FKM inside) or 2 (Planar antenna DN200 / 8", PTFE surface, FKM inside) or 3 (Planar antenna DN250 / 10", PTFE surface, FKM inside) or 4 (Planar antenna DN300 / 12", PTFE surface, FKM inside) or x (any single letter or number))
c c c	=	Process connection	xxx (Any three letter/number combination representing industrial process connections, threaded boss or flanges, e.g. ANSI, EN, JIS, 316Ti/L)
d	=	Output and operation	A (4-20 mA HART w. Display VU 331) or x (any other single letter or number)
e	=	Housing	C (T12 Aluminium, coated, IP65/68 NEMA Type 4X/6P, Ex ia) or x (any other single letter or number)
f	=	Cable entry	2 (Cable gland M20 × 1.5) or 3 (Cable entry G ½") or 4 (Cable entry ½" NPT) or x (any other single letter or number)
g	=	Custody transfer approvals (weights + measures)	A (NMI + PTB (<1 mm) type approval) or F (NMI witnessed initial verificat. (<1 mm)) or G (PTB witnessed initial verificat. (<1 mm)) or R (Not selected; Inventory control version (3 mm) or x (any other single letter or number)
h	=	Additional options	A (no option) or E EN10204-3.1 material, NACE MR0103/0175 (316L wetted parts), inspection certificate F Product documentation on paper, EN10204-3.1 material, NACE MR0103/0175 (316L wetted parts) H EN10204-3.1 material, (316L wetted parts), inspection certificate I Product documentation on paper, EN10204 -3.1 material, (316L wetted parts), inspection certificate S (German Lloyd (GL) / ABS marine certificate) or x (additional options, any other single letter or number)

x = not determined; any other not used single letter or number

[4] *= alternative number / letter possible if not relevant for safety*

FMR540-abcdddefghi

a	=	Certificate[4]	A = No explosive area D = IECEx Ex ia IIC T6...T1 Ga/Gb I = NEPSI Ex ia IIC T6 Ga/Gb M = JPN Ex ia IIC Tx Ga/Gb S = FM IS Cl.I Div.1 Gr.A-D U = CSA IS Cl.I Div.1 Gr.A-D 1 = ATEX II 1/2 G Ex ia IIC T6 Ga/Gb or II 2 G Ex ia IIC T6 Gb 6 = ATEX II 1/2 G Ex ia IIC T6 Ga/Gb or II 2 G Ex ia IIC T6 Gb, WHG x = *special version not relevant for safety (e.g. in combination with other certificates)*
b	=	Antenna size, gasket material	E (Horn antenna 100 mm / 4", Alignment device, FKM GLT) or G (Parabolic antenna 200 mm / 8", Alignment device, FKM GLT) or H (Parabolic antenna 250 mm / 10", Alignment device, FKM GLT) or x (any other single letter or number)
c	=	Antenna extension	1 (No extension) or 2 (150 mm / 6") or 3 (250 mm / 10") or 4 (450 mm / 18") or x (any other single letter or number)
d d d	=	Process connection	xxx (Any three letter/number combination representing industrial process connections, threaded boss, top target positioner or flanges, e.g. ANSI, EN, JIS, 316Ti/L)
e	=	Output and operation	A (4-20 mA HART w. Display VU 331) or x (any other single letter or number)
f	=	Housing	C (T12 Aluminium, coated, IP65/68 NEMA Type 4X/6P, Ex ia) or x (any other single letter or number)
g	=	Cable entry	1 (Cable entry M20 × 1.5) or 2 (Cable gland M20 × 1.5) or 3 (Cable entry G ½") or 4 (Cable entry ½" NPT) or x (any other single letter or number)
h	=	Custody transfer approvals (weights + measures)	A (NMI + PTB (<1 mm) type approval) or F (NMI witnessed initial verificat. (<1 mm)) or G (PTB witnessed initial verificat. (<1 mm)) or R (Not selected; Inventory control version (3 mm) or x (any other single letter or number)
i	=	Additional options	A (no option) or G (German Lloyd (GL) / marine certificate) or x (additional options, any other single letter or number)

x = not determined; any other not used single letter or number

[4] *= alternative number / letter possible if not relevant for safety*

All transmitters may be used with accessories like hoods for sun protection, flanges, mounting brackets or other parts for mounting purpose. In general, these parts are made of conducting material like stainless steel.

Protective cover for FMR 532, 540

Special conditions for safe use

1. Some of the surfaces of the aerials of the MICROPILOT S level meter of types FMR/OMR532-*** and FMR/OMR540-*** (parabolic aerial version with wave guide) are made of plastic material and may hence be charged electrostatically. When using these aerials in areas requiring Ga-equipment, the apparatus shall be provided with a warning label making reference to the risk of electrostatic charging.
2. When the MICROPILOT S level meter of types FMR/OMR532-*** and FMR/OMR540-*** with purging connector are used in areas where equipment of Ga/Gb are required, the installation shall provide a minimum degree of protection of IP67 according to EN 60529 when being in a closed state. (cf. drawing Nos. 960 006704-B and 960 006719-B)
3. If the MICROPILOT S level meter of types FMR/OMR532-*** and FMR/OMR540-*** are used with an alignment unit with center nut, it has to be guaranteed, that the thightening torque of the center nut is between 65Nm to 85Nm.