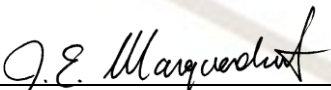


CERTIFICATE OF CONFORMITY



- HAZARDOUS LOCATION ELECTRICAL EQUIPMENT PER CANADIAN REQUIREMENTS**
- Certificate No:** FM16CA0006X
- Equipment:** Tank Gauge Radar Micropilot NMR8x
(Type Reference and Name)
- Name of Listing Company:** Endress+Hauser SE+Co KG
- Address of Listing Company:** Hauptstrasse 1
Postfach 1261
Maulburg
D79689
Germany
- The examination and test results are recorded in confidential report number:
3057382 dated 11th July 2016
- FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:
CSA-C22.2 No. 0:2015, CSA-C22.2 No. 0.4:2013, CSA-C22.2 No. 0.5:2012, CSA-C22.2 No. 30:2012,
CSA-C22.2 No. 94.2:2012, CSA-C22.2 No. 213:2017, CAN/CSA-C22.2 No. 60079-0:2019,
CAN/CSA-C22.2 No. 60079-1:2016, CAN/CSA-C22.2 No. 60079-11:2014,
CAN/CSA-C22.2 No. 60079-26:2016, CSA-C22.2 No. 60529:2015, CAN/CSA-C22.2 No. 61010-1:2012
- If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.
- This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.

Certificate issued by:



J.E. Marquedant
VP, Manager - Electrical Systems

19 October 2020

Date

To verify the availability of the Approved product, please refer to www.approvalguide.com

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10. Equipment Ratings:

Explosionproof for Class I, Division 1, Groups B, C, D with Intrinsically Safe Antenna for Class I, Division 1, Groups A, B, C, D; also providing Intrinsically Safe Connections to Class I, II, III, Division 1, Groups A, B, C, D, E, F, G or Nonincendive Field Wiring Connections to Class I, II, III, Division 2, Groups A, B, C, D, E, F, G; Flameproof for Class I, Zone 1, Group IIC with Intrinsically Safe Antenna for Class I, Zone 0, Group IIC; also providing Intrinsically Safe Connections to Class I, Zone 0, Group IIC Hazardous Locations. Indoor and Outdoor Type 4X, Type 6P, IP66 & IP68.

11. The marking of the equipment shall include:

NMR81, NMR84

XP CL I DIV 1 GP BCD T*

IS CL I DIV 1 GP ABCD

AIS CL I,II,III DIV 1 GP ABCDEFG

ANI CL I,II,III DIV 2 GP ABCDEFG

Ex ia/db IIC T* Ga/Gb

Ex db [ja Ga] IIC T* Gb

Ta = -40°C to +60°C

IP66/IP68, Type 4X/6P, Single Seal, Dual Seal Without Annunciation

Entity and NIFW Parameters – refer to drawing XA01436G

T* – refer to drawing XA01436G

12. **Description of Equipment:**

General - The Tank Gauge Radar Micropilot NMR8x is used for the contactless, continuous measurement of liquids in hazardous areas with gas atmosphere. Two different types of transmitters are available, the NMR81 and NMR84, each with a different transmitter, antenna and working frequencies for different applications. Short microwave impulses 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 Tank Gauge Radar Micropilot NMR8x is comprised of certified Tank Gauge Platform Enclosures (FM16CA0075U) and certified Tank Gauge Platform Electronic Modules (FM16CA0007U). The following enclosures and electronic modules may be used:

Enclosure TRC[01-10-11] ALU C-Band

Enclosure TRC[01-20-11] ALU E-Band

Enclosure TRC[02-10-12] SS C-Band

Enclosure TRC[02-20-12] SS E- Band

Module TRC[00] FP Front Plane Board

Module TRC[01] PS_HV Power Supply, High Voltage

Module TRC[02] PS_LV_AC Power Supply, Low Voltage, AC

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- Module TRC[03] PS_LV_DC Power Supply, Low Voltage, DC
- Module TRC[10] MB Main Board,
- Module TRC[20] IOM_A IO Module Analog
- Module TRC[21] IOM_A IO Module Analog
- Module TRC[31] IOM_D IO Module Digital
- Module TRC[32] IOM_Mod_FF IO Module Modbus/FF
- Module TRC[33] IOM_V1_WM550 IO Module V1/WM550

Construction - The Tank Gauge Radar Micropilot NMR8x comprises a single compartment explosionproof/flameproof enclosure with a thread-on window cover —housing the display module, electronics assembly, radar module— along with a feedthrough and a process connector with antenna. NMR81 and NMR84 have a unique radar box, feedthrough, connection cable and antenna while they share the same enclosure, display and electronics assembly. The enclosure for NMR81 and NMR84 can be Aluminum or Stainless Steel, with 7 integral M20 sized field wiring entries. Integral threaded inserts allow for optional field wiring entry options including M25, ½ NPT or ¾ NPT.

Ratings - The Tank Gauge Radar Micropilot NMR8x operates at 85-264 Vac (28.8 Volt-Amperes), 52-75Vac (21.6 Volt-Amperes) and 19-64Vdc (13.4 Watts). The transmitters are rated for use in an ambient temperature range of -40°C to +60°C. The transmitter probes are rated for use in a process temperature range of -40°C to +200°C. For further information regarding the Temperature Class and Ambient Temperature Ranges, refer to the temperature and configuration tables.

NMR81 (E-Band Radar with Aluminum enclosure):

Temperature Class	Maximum ambient temperature / °C	Maximum allowed ambient temperature at maximum process temperature / °C	Maximum process temperature / °C
Configuration 1			
T6	55	51	85
T5	55	46	100
T4	55	50	135
T3, T2, T1	55	47	200
Configuration 2			
T6	60	51	85
T5	60	46	100
T4	60	58	135
T3, T2, T1	60	54	200
Configuration 3			
T6	58	51	85
T5	58	46	100
T4	58	54	135
T3, T2, T1	58	51	200
Configuration 4			
T6	60	51	85
T5	60	46	100
T4	60	56	135
T3, T2, T1	60	53	200

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Configuration 5			
T6	55	51	85
T5	55	46	100
T4	55	52	135
T3, T2, T1	55	49	200

NMR81 (E-Band Radar with Stainless Steel enclosure):

Temperature Class	Maximum ambient temperature / °C	Maximum allowed ambient temperature at maximum process temperature / °C	Maximum process temperature / °C
Configuration 1			
T6	43	40	85
T5	43	37	100
T4	43	37	135
T3, T2, T1	43	32	200
Configuration 2			
T6	55	46	85
T5	55	38	100
T4	55	52	135
T3, T2, T1	55	46	200
Configuration 3			
T6	50	45	85
T5	50	38	100
T4	50	45	135
T3, T2, T1	50	40	200
Configuration 4			
T6	53	46	85
T5	53	38	100
T4	53	46	135
T3, T2, T1	53	43	200
Configuration 5			
T6	45	44	85
T5	45	38	100
T4	45	40	135
T3, T2, T1	45	36	200

NMR84 (C-Band Radar with Aluminum enclosure):

Temperature Class	Maximum ambient temperature / °C	Maximum allowed ambient temperature at maximum process temperature / °C	Maximum process temperature / °C
Configuration 1			
T6	55	52	85
T5	55	52	100
T4	55	49	135

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T3, T2, T1	55	49	150
Configuration 2			
T6	60	60	85
T5	60	59	100
T4	60	56	135
T3, T2, T1	60	56	150
Configuration 3			
T6	58	55	85
T5	58	55	100
T4	58	53	135
T3, T2, T1	58	53	150
Configuration 4			
T6	60	57	85
T5	60	57	100
T4	60	54	135
T3, T2, T1	60	54	150
Configuration 5			
T6	55	55	85
T5	55	54	100
T4	55	51	135
T3, T2, T1	55	51	150

NMR84 (C-Band Radar with Stainless Steel enclosure):

Temperature Class	Maximum ambient temperature / °C	Maximum allowed ambient temperature at maximum process temperature / °C	Maximum process temperature / °C
Configuration 1			
T6	43	39	85
T5	43	39	100
T4	43	36	135
T3, T2, T1	43	36	150
Configuration 2			
T6	55	55	85
T5	55	54	100
T4	55	51	135
T3, T2, T1	55	51	150
Configuration 3			
T6	50	47	85
T5	50	47	100
T4	50	44	135
T3, T2, T1	50	44	150
Configuration 4			
T6	53	50	85

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T5	53	50	100
T4	53	46	135
T3, T2, T1	53	46	150
Configuration 5			
T6	45	43	85
T5	45	43	100
T4	45	39	135
T3, T2, T1	45	39	150

Configuration of Electronics					
	1	2	3	4	5
	(worst case)	(best case)			
Enclosure (Alu)	X	X	X	X	X
Slot A - IOM_D	X		X	X	X
Slot B - IOM_D	X				
Slot B - IOM_A(Ex ia)	✗		X		X
Slot C - IOM_A(Ex ia)	X				
Slot D - IOM_D	X				X
PS_HV PS_LV_DC	X	X	X	X	X
MB	X	X	X	X	X
ExLi	X	X	X	X	X

Tank Gauge Radar Micropilot NMR81-aabcddeeffgghijjkklll + (options)

aa	Approval: FE - FMc T4 FC - FMc T6
b	Terminal Type: 1 - Spring Terminals 2 - Screw Terminals 9 - Special version, TSP (not relevant for safety)
c	Power Supply: B - 85-264VAC, LCD + operation D - 52-75VAC, LCD + operation E - 19-64VDC, LCD + operation Y - Special Version (not relevant for safety)
dd	Primary Output: A1 - Modbus – RS485 B1 - V1 C1 - WM550 E1 - 4-20mA HART Exd H1 - 4-20mA HART Ex i Y9 - Special Version (not relevant for safety)
ee	Secondary I/O Analog: A1 - Ex d – 1 x 4-20mA HART; 1 x RTD Input A2 - Ex d – 2 x 4-20mA HART; 2 x RTD Input B1 - Ex i – 1 x 4-20mA HART; 1 x RTD Input B2 - Ex i – 2 x 4-20mA HART; 2 x RTD Input

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	C2 - Ex i – 1 x 4-20mA HART; 2 x RTD Input + 1 x Ex d 4-20mA HART X0 - Prepared for I/O Analog RTD input Y9 - Special Version (not relevant for safety)
ff	Secondary I/O Digital Ex d: A1 - 2 x relay + 2 x module discrete A2 - 4 x relay + 4 x module discrete A3 - 6 x relay + 6 x module discrete B1 - Modusbus RS485 B2 - Modusbus RS485 + 2 x relay + 2 x module discrete B3 - Modusbus RS485 + 4 x relay + 4 x module discrete C1 - V1 C2 - V1 + 2x relay + 2x discrete module C3 - V1 + 4x relay + 4x discrete module E1 - W550 E2 - W550 + 2 x relay + 2 x module discrete E3 - W550 + 4 x relay + 4 x module discrete X0 - Prepared for I/O digital Ex d Y9 - Special Version (not relevant for safety)
gg	Housing: AC - Transmitter Housing Aluminum coated process 316/316L BC - Transmitter + Process 316/316L Y9 - Transmitter Housing 316/316L special coating for e.g. marine applications
h	Electrical Connection: A - Thread M20 B - Thread M25 E - Thread NPT1/2" F - Thread NPT3/4" Y - Special Version (not relevant for safety)
ii	Antenna: AB - 50mm/2" AC - 80mm/3" AD - 100mm/4" YY - Special Version (not relevant for safety)
jj	Process Sealing: A1 - HNBR – -30...150°C / -22...302°F B1 - FKM GLT – -40...200°C / -40...392°F B2 - FFKM – -20...200°C / -4...392°F B3 - FKM, -10...160°C/-14...340°F YY - Special Version (not relevant for safety)
kkk	Process Connection: Any 3 characters combinations (not relevant for safety)
lll	Accuracy, Weight + Measure Approval: Any 3 characters combinations (not relevant for safety)
(options)	Options: not relevant for safety

Tank Gauge Radar Micropilot NMR84-abcdddeeffghiijjkklll + (options)

aa	Approval: FC - FMc T6
b	Terminal Type:

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	1 - Spring Terminals 2 - Screw Terminals 9 - Special version, TSP (not relevant for safety)
c	Power Supply: B - 85-264VAC, LCD + operation D - 52-75VAC, LCD + operation E - 19-64VDC, LCD + operation operation Y - Special Version (not relevant for safety)
dd	Primary Output: A1 - Modbus – RS485 B1 - V1 C1 - WM550 E1 - 4-20mA HART Exd H1 - 4-20mA HART Ex i Y9 - Special Version (not relevant for safety)
ee	Secondary I/O Analog: A1 - Ex d – 1 x 4-20mA HART; 1 x RTD Input A2 - Ex d – 2 x 4-20mA HART; 2 x RTD Input B1 - Ex i – 1 x 4-20mA HART; 1 x RTD Input B2 - Ex i – 2 x 4-20mA HART; 2 x RTD Input C2 - Ex i – 1 x 4-20mA HART; 2 x RTD Input + 1 x Ex d 4-20mA HART X0 - Prepared for I/O Analog RTD input Y9 - Special Version (not relevant for safety)
ff	Secondary I/O Digital Ex d: A1 - 2 x relay + 2 x module discrete A2 - 4 x relay + 4 x module discrete A3 - 6 x relay + 6 x module discrete B1 - Modusbus RS485 B2 - Modusbus RS485 + 2 x relay + 2 x module discrete B3 - Modusbus RS485 + 4 x relay + 4 x module discrete C1 - V1 C2 - V1 + 2x relay + 2x discrete module C3 - V1 + 4x relay + 4x discrete module E1 - W550 E2 - W550 + 2 x relay + 2 x module discrete E3 - W550 + 4 x relay + 4 x module discrete X0 - Prepared for I/O digital Ex d Y9 - Special Version (not relevant for safety)
gg	Housing: AC - Transmitter Housing Aluminum coated process 316/316L BC - Transmitter + Process 316/316L Y9 - Transmitter Housing 316/316L special coating for e.g. marine applications
h	Electrical Connection: A - Thread M20 B - Thread M25 E - Thread NPT1/2" F - Thread NPT3/4" operation Y - Special Version (not relevant for safety)
ii	Antenna:

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	BD - Planar 100mm/4" BF - Planar 150mm/6" BG - Planar 200mm/8" BH - Planar 250mm/10" BJ - Planar 300mm/12" YY - Special Version (not relevant for safety)
jj	Process Sealing: A1 - HNBR – -30...150°C / -22...302°F B1 - FKM GLT – -40...150°C / -40...392°F B2 - FFKM, -20...150°C/-4...392°F YY - Special Version (not relevant for safety)
kkk	Process Connection: Any 3 characters combinations (not relevant for safety)
lll	Accuracy, Weight + Measure Approval: Any 3 characters combinations (not relevant for safety)
(options)	Options: not relevant for safety

13. Specific Conditions of Use:

1. This is boundary wall equipment: The XP ratings are applicable to the transmitter portion and the IS ratings are applicable to the radar antenna portion.
2. For Ambient and Process Temperature Range refer to drawing XA01436G-x.
3. Flamepath joints are not for repair. Contact the manufacturer.
4. Use heat resisting cables rated $\geq 85^{\circ}\text{C}$ for $T_a > 50^{\circ}\text{C}$.
5. Precautions shall be taken to minimize the risk from electrostatic discharge of non-metallic labels, varnishes/coatings on the stainless steel 316L, and isolated metal tags applied to the enclosure.
6. To maintain the ingress protection ratings (IP66/68), teflon tape or pipe dope is required for blanking plugs.
7. Explosionproof certified seals are required within 50mm (2") on all used housing entries.

14. Test and Assessment Procedure and Conditions:

This Certificate has been issued in accordance with FM Approvals Canadian Certification Scheme.

15. Schedule Drawings

A copy of the technical documentation has been kept by FM Approvals.

16. Certificate History

Details of the supplements to this certificate are described below:

Date	Description
11 th July 2016	Original Issue.
2 nd July 2018	<u>Supplement 1:</u> Report Reference: PR450190 dated 2 nd July 2018.

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	<p>Description of the Change:</p> <ol style="list-style-type: none">1) Qualification of a new, alternate process seal option and associated documentation update.2) Change in company name from “Endress+Hauser GmbH+Co KG” to “Endress+Hauser SE+Co KG”.
1 st February 2019	<p>Supplement 2: Report Reference: PR450370 dated 1st February 2019.</p> <p>Description of the Change:</p> <ol style="list-style-type: none">1) Updated model code.<ol style="list-style-type: none">a) Add T6 model code option aa = “FC” to NMR81b) Add alternative process sealing option jj = “B3” to NMR81c) Add alternative process sealing option jj = “B2” to NMR842) Corrected errors in model codes3) Introduce Stainless Steel enclosure4) Introduce Dual Seal
19 th October 2020	<p>Supplement 3: Report Reference: PR458124 dated 19th October 2020.</p> <p>Description of the Change:</p> <ol style="list-style-type: none">1) CSA C22.2 No. 60079-0 updated to Edition 7, 20192) CAN/CSA C22.2 No. 213 updated to latest edition (2017)3) Model code amendments due to Tank Gauge Platform electronic module updates and enclosure updates to add special coating for marine applications4) Specific Condition of Use 5) revised due to updated enclosure option5) Modifications to inner antenna construction6) Specific Condition of Use 1) revised

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