

CERTIFICATE OF CONFORMITY



1. **HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT PER US REQUIREMENTS**

2. **Certificate No:** FM19US0110X

3. **Equipment:** FMT SensyMaster Thermal Mass Flowmeter
(Type Reference and Name)

4. **Name of Listing Company:** ABB AG

5. **Address of Listing Company:** Anna-Vandenhoeck-Ring 5
Gottingen D37081
Germany

6. The examination and test results are recorded in confidential report number:

3059713 dated 13th July 2020

7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

FM 3600:2022, FM 3610:2018, FM 3611:2018, FM 3615:2022, FM 3616:2022, FM 3810:2021, ANSI/UL 60079-0:2020, ANSI/UL 60079-1:2015, ANSI/UL 60079-7:2017, ANSI/UL 60079-11:2014, ANSI/UL 60079-18:2015, ANSI/UL 60079-26:2017, ANSI/ISA 60079-31:2015, ANSI/NEMA 250:2008, ANSI/IEC 60529:2004, ANSI/ISA 12.27.01:2011, ANSI/UL121201:2017 and ANSI/UL 61010-1:2012

8. 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.

9. 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.

10. Equipment Ratings:

Explosionproof and special protection with intrinsically safe sensor and communication options for Class I, Division 1, Groups A, B, C and D (or B, C and D); Class II, III, Division 1, Groups E, F and G; Nonincendive for Class I, II or III, Division 2, Groups A, B, C, D, E, F and G; suitable for Class I, Zone 1 Group IIB+H₂; suitable for installation in Zone 21 Group IIIC with a sensor in Zone 0 Group IIC; suitable for Class I, Zone 2, Group IIC; suitable for Zone 21, Group IIIC; indoor and outdoor hazardous (classified) locations.

Certificate issued by:

J.E. Marquedant
VP, Manager - Electrical Systems

10 August 2022

Date

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

THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE

FM Approvals LLC, 1151 Boston-Providence Turnpike, Norwood, MA 02062 USA

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US Certificate Of Conformity No: FM19US0110X

11. The marking of the equipment shall include:

FMT4*0F2efghikl.m.n.L2.p SensyMaster Thermal Mass Flowmeter - Integral

Class I, Division 2, Groups A, B, C, D; T6...T1 Ta = -40°C to +70°C; Type 4X, IP65, IP67

Class II, Division 2, Groups E, F G; Class III, Division 2; T6...T3B Ta = -40°C to +70°C; Type 4X, IP65, IP67

Class I, Zone 2, AEx ec IIC T6...T1 Gc Ta = -40°C to +70°C; Type 4X, IP65, IP67

Zone 21, AEx tb IIIC T80°C...T165°C Db; Ta = -40°C to +70°C; Type 4X, IP65, IP67

Dual Seal

FMT4*0F2efghY0jY0Y.p SensyMaster Thermal Mass Flowmeter - Remote sensor

Class I, Division 2, Groups A, B, C, D; T6...T1 Ta = -40°C to +70°C; Type 4X, IP65, IP67, IP68

Class II, Division 2, Groups E, F G; Class III, Division 2; T6...T3B Ta = -40°C to +70°C; Type 4X, IP65, IP67, IP68

Class I, Zone 2, AEx ec IIC T6...T1 Gc Ta = -40°C to +70°C; Type 4X, IP65, IP67, IP68

Zone 21, AEx tb IIIC T80°C...T165°C Db; Ta = -40°C to +70°C; Type 4X, IP65, IP67, IP68

Dual Seal

FMT4*2F2ikl.m.n.L2.p SensyMaster Thermal Mass Flowmeter - Transmitter

Class I, Division 2, Groups A, B, C, D; T6; Ta = -40°C to +70°C; Type 4X, IP65, IP67

Class II, Division 2, Groups E, F G; Class III, Division 2; T6 Ta = -40°C to +70°C; Type 4X, IP65, IP67

Class I, Zone 2, AEx ec IIC T6 Gc Ta = -40°C to +70°C; Type 4X, IP65, IP67

Zone 21, AEx tb IIIC T80°C Db; Ta = -40°C to +70°C; Type 4X, IP65, IP67

FMT2*0F2efghiM2B.I SensyMaster Thermal Mass Flowmeter - MinT

Class I, Division 2, Groups A, B, C, D; T6...T2 Ta = -40°C to +70°C; Type 4X, IP65, IP67, IP68

Class II, Division 2, Groups E, F, G; Class III, Division 2, T6...T3B; Ta = -40°C to +70°C; Type 4X, IP65, IP67, IP68

Class II, Division 1, Groups E, F, G, Class III, Division 1; T6...T3B Ta = -40°C to +70°C; Type 4X, IP65, IP67, IP68

Class I, Zone 2, AEx ec IIC T6...T2 Gc; Zone 21, AEx tb IIIC T85°C...T165°C Db; Ta = -40°C to +70°C; Type 4X, IP65, IP67, IP68

FMT4*0F1efghikl.m.n.L2.p SensyMaster Thermal Mass Flowmeter - Integral

Class I, Division 1, Groups A, B, C, D; T6...T1 Ta = -40°C to +70°C; Type 4X, IP65, IP67

Class II, Division 1, Groups E, F G; Class III, Division 1; T6...T3B Ta = -40°C to +70°C; Type 4X, IP65, IP67

Class I, Zone 1, AEx db eb ia mb IIB + H2 T6...T1 Gb Ta = -40°C to +70°C; Type 4X, IP65, IP67

Zone 21, AEx ia tb IIIC T80°C...T165°C Db; Ta = -40°C to +70°C; Type 4X, IP65, IP67

Dual Seal

FMT4*0F1efghY0jY0Y.p SensyMaster Thermal Mass Flowmeter - Remote sensor

Class I, Division 1, Groups A, B, C, D; T6...T1 Ta = -40°C to +70°C; Type 4X, IP65, IP67, IP68

Class II, Division 1, Groups E, F G; Class III, Division 1; T6...T3B Ta = -40°C to +70°C; Type 4X, IP65, IP67, IP68

Class I, Zone 1, AEx db eb mb IIB + H2 T6...T1 Gb Ta = -40°C to +70°C; Type 4X, IP65, IP67, IP68

Zone 21, AEx tb IIIC T80°C...T165°C Db; Ta = -40°C to +70°C; Type 4X, IP65, IP67, IP68

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FMT4*2F1ikl.m.n.L2.p SensyMaster Thermal Mass Flowmeter –Transmitter

Class I, Division 1, Groups B, C, D; T6 Ta = -40°C to +70°C; Type 4X, IP65, IP67

Class II, Division 1, Groups E, F G; Class III, Division 1; T6 Ta = -40°C to +70°C; Type 4X, IP65, IP67

Class I, Zone 1, AEx db ia IIB + H2 T6 Gb Ta = -40°C to +70°C; Type 4X, IP65, IP67

Zone 21, AEx ia tb IIIC T80°C Db; Ta = -40°C to +70°C; Type 4X, IP65, IP67

FMT2*0F1efghiM2B.I SensyMaster Thermal Mass Flowmeter - MinT

Class I, Division 1, Groups B, C, D; T6...T2 Ta = -40°C to +70°C; Type 4X, IP65, IP67, IP68

Class II, Division 1, Groups E, F G; Class III, Division 1; T6...T3B Ta = -40°C to +70°C; Type 4X, IP65, IP67, IP68

Class I, Zone 1, AEx db ia IIB + H2 T6...T2 Ga/Gb Ta = -40°C to +70°C; Type 4X, IP65, IP67, IP68

Zone 21, AEx ia tb IIIC T80°C...T165°C Db; Ta = -40°C to +70°C; Type 4X, IP65, IP67, IP68

Dual Seal

12. Description of Equipment:

General - The FMT SensyMaster are a series of thermal mass flowmeters.

Construction - The electronics enclosure is a cylindrical enclosure identified as a Type 3 or a single compartment rectangular housing identified as a Type 4. The remote sensor and the MinT design use an enclosure identified as a T-Box. The ambient temperature range for the transmitters and sensors is either -20°C to +70°C or -40°C to +70°C depending on the options chosen.

The FMT SensyMaster is available as integral and remote designs.

Enclosure rating Type 4X, IP65, IP67, or IP68 depending on the option selected.

Ratings - The ambient operating temperature range of the FMT flowmeters is -40°C to 70°C. Process temperature range is -40°C to 280°C. See ABB Instruction manual 3kxf000095G0009 for details on the relationship between ambient temperature, process temperature and temperature class.

The FMT has the following supply parameters;

FMT2*

24 V DC $\pm$ 20% (ripple: $\leq$ 5%) $P_{max} \leq 10$ W

FMT4*

Power Supply (Terminals L and N)

$U_{DC} = 24$ V $\pm$ 20 % power supply ($=U_{Low}$); $P_{max} \leq 20$ W; C, Ripple: < 5 %.

$U_{AC} = 100$ V(-15%) to 240V (+10%) power supply ($=U_{High}$); $S_{max} \leq 20$ VA

See 3kxf000094G0009 and ABB Instruction Manual for the parameters for the Current Output, Digital Output, and Digital Input connections.

FMT430F2efghikl.m.n.L2.p SensyMaster Thermal Mass Flowmeter - Integral

FMT450F2efghikl.m.n.L2.p SensyMaster Thermal Mass Flowmeter - Integral

NI / I / 2 / ABCD / T6...T1

DIP / II, III / 2 / EFG T6...T3B

I / 2 / AEx ec / IIC / T6...T1 Gc

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US Certificate Of Conformity No: FM19US0110X

21 / AEx tb / IIIC / T80°C...T165°C Db
Ta = -20°C to +70°C (p = TA3) or Ta = -40°C to +70°C (p = TA9)
Type 4X, IP65, IP67
Dual Seal

e = Measuring medium. Any two digits.
f = Sensor element type/Temperature range of measuring medium: A, B, or E
g = Mounting length/Flowmeter sensor material: Any single digit
h = Sensor connection: D3, G2 or F1
i = Connection design, transmitter housing type, transmitter housing material, entry: S1 or S2.
k = Outputs: G0, G1, G2, G3, G4, G5, G6, G7, G8, G9, M1 or D1
l = Power supply: A or B
Additional information
m = Additional output 1: DRN, DRG, DRA, DRT, DRM or DRD
n = Additional output 2: DSN, DSG, or DSA
p = Ambient temperature range: TA3 or TA9

FMT430F2efghikl.m.n.L2.p SensyMaster Thermal Mass Flowmeter - Integral

FMT450F2efghikl.m.n.L2.p SensyMaster Thermal Mass Flowmeter - Integral

NI / I / 2 / ABCD / T6...T1
DIP / II, III / 2 / EFG T6...T3B
I / 2 / AEx ec / IIC / T6...T1 Gc
21 / AEx tb / IIIC / T80°C...T165°C Db
Ta = -20°C to +70°C (p = TA3) or Ta = -40°C to +70°C (p = TA9)
Type 4X, IP65, IP67
Dual Seal

e = Measuring medium. Any two digits.
f = Sensor element type/Temperature range of measuring medium: A, B, or E
g = Mounting length/Flowmeter sensor material: Any single digit
h = Sensor connection: D3, G2 or F1
i = Connection design, transmitter housing type, transmitter housing material, entry: D1, D2, D3, D4, D5, D6, D7 or D8.
k = Outputs: G0, G1, G2, G3, G4, G5, G6, G7, G8, G9, M1 or D1
l = Power supply: A or B
Additional information
m = Additional output 1: DRN, DRG, DRA, DRT, DRM or DRD
n = Additional output 2: DSN, DSG, or DSA
p = Ambient temperature range: TA3 or TA9

FMT430F2efghY0jY0Y.p SensyMaster Thermal Mass Flowmeter – Remote sensor

FMT450F2efghY0jY0Y.p SensyMaster Thermal Mass Flowmeter – Remote sensor

NI / I / 2 / ABCD / T6...T1
DIP / II, III / 2 / EFG T6...T3B
I / 2 / AEx ec / IIC / T6...T1 Gc
21 / AEx tb / IIIC / T80°C...T165°C Db
Ta = -20°C to +70°C (p = TA3) or Ta = -40°C to +70°C (p = TA9)
Type 4X, IP65, IP67, IP68
Dual Seal

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e = Measuring medium. Any two digits.
f = Sensor element type/Temperature range of measuring medium: A, B, or E
g = Mounting length/Flowmeter sensor material: Any single digit
h = Sensor connection: D3, G2 or F1
j = Connection design/Sensor housing material: A1, A2, U1 or U2
Additional information
p = Ambient temperature range: TA3 or TA9

FMT432F2ikl.m.n.L2.p SensyMaster Thermal Mass Flowmeter - Transmitter

FMT452F2ikl.m.n.L2.p SensyMaster Thermal Mass Flowmeter - Transmitter

NI / I / 2 / ABCD / T6

DIP / II, III / 2 / EFG T6

I / 2 / AEx ec / IIC / T6 Gc

21 / AEx tb / IIIC / T80°C Db

Ta = -20°C to +70°C (p = TA3) or Ta = -40°C to +70°C (p = TA9)

Type 4X, IP65, IP67

i = Connection design, transmitter housing type, transmitter housing material, entry: W1 or W2

k = Outputs: G0, G1, G2, G3, G4, G5, G6, G7, G8, G9, M1 or D1

l = Power supply: A or B

Additional information

m = Additional output 1: DRN, DRG, DRA, DRT, DRM or DRD

n = Additional output 2: DSN, DSG, or DSA

p = Ambient temperature range: TA3 or TA9

FMT432F2ikl.m.n.L2.p SensyMaster Thermal Mass Flowmeter - Transmitter

FMT452F2ikl.m.n.L2.p SensyMaster Thermal Mass Flowmeter - Transmitter

NI / I / 2 / ABCD / T6

DIP / II, III / 2 / EFG T6

I / 2 / AEx ec / IIC / T6 Gc

21 / AEx tb / IIIC / T80°C Db

Ta = -20°C to +70°C (p = TA3) or Ta = -40°C to +70°C (p = TA9)

Type 4X, IP65, IP67

i = Connection design, transmitter housing type, transmitter housing material, entry: R1, R2, R3, R4, R5, R6, R7 or R8

k = Outputs: G0, G1, G2, G3, G4, G5, G6, G7, G8, G9, M1 or D1

l = Power supply: A or B

Additional information

m = Additional output 1: DRN, DRG, DRA, DRT, DRM or DRD

n = Additional output 2: DSN, DSG, or DSA

p = Ambient temperature range: TA3 or TA9

FMT230F2efghiM2B.I SensyMaster Thermal Mass Flowmeter - MinT

FMT250F2efghiM2B.I SensyMaster Thermal Mass Flowmeter - MinT

NI / I / 2 / ABCD / T6...T2

NI / II, III / 2 / EFG / T6...T3B

DIP / II / 1 / EFG T6...T3B

DIP / III / 1,2 / EFG T6...T3B

I / 2 / AEx ec / IIC / T6...T2 Gc

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US Certificate Of Conformity No: FM19US0110X

21 / AEx tb / IIIC / T80°C...T165°C Db

Ta = -20°C to +70°C (I = TA3) or Ta = -40°C to +70°C (I = TA9)

Type 4X, IP65, IP67, IP68

Dual Seal

e = Measuring medium. Any two digits.

f = Sensor element type/Temperature range of measuring medium: A, B, or E

g = Mounting length/Flowmeter sensor material: Any single digit

h = Sensor connection: D3, G2 or F1

i = Connection design, transmitter housing type, transmitter housing material, entry: B1, B2, T1 or T2

Additional information

I = Ambient temperature range: A or B

FMT430F1efghikl.m.n.L2.p SensyMaster Thermal Mass Flowmeter - Integral

FMT450F1efghikl.m.n.L2.p SensyMaster Thermal Mass Flowmeter - Integral

S-XP-IS / I / 1 / ABCD / T6...T1 - 3kxf000094G0009

DIP / II, III / 1 / EFG T6...T3B

I / 1 / AEx db eb ia mb / IIB + H2 / T6...T1 Gb - 3kxf000094G0009

21 / AEx ia tb / IIIC / T80°C...T165°C Db - 3kxf000094G0009

Ta = -20°C to +70°C (p = TA3) or Ta = -40°C to +70°C (p = TA9)

Type 4X, IP65, IP67

Dual Seal

e = Measuring medium. Any two digits.

f = Sensor element type/Temperature range of measuring medium: A, B, or E

g = Mounting length/Flowmeter sensor material: Any single digit

h = Sensor connection: D3, G2 or F1

i = Connection design, transmitter housing type, transmitter housing material, entry: D1, D2, D3, D4, D5, D6, D7 or D8.

k = Outputs: G0, G1, G2, G3, G4, G5, G6, G7, G8, G9, M1 or D1

l = Power supply: A or B

Additional information

m = Additional output 1: DRN, DRG, DRA, DRT, DRM or DRD

n = Additional output 2: DSN, DSG, or DSA

p = Ambient temperature range: TA3 or TA9

FMT430F1efghY0jY0Y.p SensyMaster Thermal Mass Flowmeter – Remote sensor

FMT450 F1efghY0jY0Y.p SensyMaster Thermal Mass Flowmeter – Remote sensor

S-XP / I / 1 / ABCD / T6...T1

DIP / II, III / 1 / EFG T6...T3B

I / 1 / AEx db eb mb / IIB + H2 / T6...T1 Gb

21 / AEx tb / IIIC / T80°C...T165°C Db

Ta = -20°C to +70°C (p = TA3) or Ta = -40°C to +70°C (p = TA9)

Type 4X, IP65, IP67, IP68

Dual Seal

e = Measuring medium. Any two digits.

f = Sensor element type/Temperature range of measuring medium: A, B, or E

g = Mounting length/Flowmeter sensor material: Any single digit

h = Sensor connection: D3, G2 or F1

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US Certificate Of Conformity No: FM19US0110X

j = Connection design/Sensor housing material: A1, A2, U1 or U2

Additional information

p = Ambient temperature range: TA3 or TA9

FMT432F1ikl.m.n.L2.p SensyMaster Thermal Mass Flowmeter – Transmitter

FMT452F1ikl.m.n.L2.p SensyMaster Thermal Mass Flowmeter – Transmitter

XP-IS / I / 1 / BCD / T6 - 3kxf000094G0009

DIP / II, III / 1 / EFG T6

I / 1 / AEx db ia / IIB + H2 / T6 Gb - 3kxf000094G0009

21 / AEx ia tb / IIIC / T80°C Db - 3kxf000094G0009

Ta = -20°C to +70°C (p = TA3) or Ta = -40°C to +70°C (p = TA9)

Type 4X, IP65, IP67

i = Connection design, transmitter housing type, transmitter housing material, entry: R1, R2, R3, R4, R5, R6, R7 or R8

k = Outputs: G0, G1, G2, G3, G4, G5, G6, G7, G8, G9, M1 or D1

l = Power supply: A or B

Additional information

m = Additional output 1: DRN, DRG, DRA, DRT, DRM or DRD

n = Additional output 2: DSN, DSG, or DSA

p = Ambient temperature range: TA3 or TA9

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FMT250F1efghiM2B.I SensyMaster Thermal Mass Flowmeter - MinT

XP-IS / I / 1 / BCD / T6...T2 - 3kxf000094G0009

DIP / II, III / 1 / EFG / T6...T3B

I / 1 / AEx db ia IIB+H2 T6...T2 Ga/Gb - 3kxf000094G0009

21 / AEx ia tb IIIC T85°C ... T165°C Db - 3kxf000094G0009

Ta = -20°C to +70°C (l = TA3) or Ta = -40°C to +70°C (l = TA9)

Type 4X, IP65, IP67, IP68

Dual Seal

e = Measuring medium. Any two digits.

f = Sensor element type/Temperature range of measuring medium: A, B, or E

g = Mounting length/Flowmeter sensor material: Any single digit

h = Sensor connection: D3, G2 or F1

i = Connection design, transmitter housing type, transmitter housing material, entry: B1, B2, T1 or T2

Additional information

l = Ambient temperature range: TA3 or TA9

13. Specific Conditions of Use:

1. The screws used to connect the Type 3 enclosure to the sensor shall be M5 x 20 A2 DIN7964. These shall have a yield stress of at least 210 Nm².
2. Contact the manufacturer for specific flamepath joint details during repair of flameproof Ex d or Explosionproof apparatus.
3. When used for a Class II, a Class III or a Group III application, the painted surface of the enclosures may store electrostatic charge and become a source of ignition in applications with a low relative humidity <~30% relative humidity where the painted surface is relatively free of surface contamination

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such as dirt, dust, or oil. Guidance on protection against the risk of ignition due to electrostatic discharge can be found in IEC 60079-32-1. Cleaning of the painted surface should only be done with a damp cloth.

4. The ambient temperature range, process temperature and applicable temperature class of the FMT SensyMaster is detailed in the manufacturer's Instruction Manual.

14. **Test and Assessment Procedure and Conditions:**

This Certificate has been issued in accordance with FM Approvals US Certification Requirements.

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
13 th July 2020	Original Issue.
18 th August 2020	<u>Supplement 1:</u> Report Reference: RR224557, dated 18 th August 2020. Description of the Change: Update to model code and electrical ratings.
21 st September 2020	<u>Supplement 2:</u> Report Reference: RR225090, dated 21 st September 2020. Description of the Change: Removed duplicated model code and ratings.
10 th August 2022	<u>Supplement 3:</u> Report Reference: PR461155 dated 10 th August 2022. Description of the Change: Update to O-ring material to a -40°C Temperature. Revised certificate Company Name and Address from ABB Automation Products GmbH Dransfelder Strasse 2 to ABB AG Anna-Vandenhoeck-Ring 5

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