



Certificate of Compliance

Certificate: 1141880 (LR 53988)

Master Contract: 151079

Project: 2365444

Date Issued: January 25, 2011

Issued to: Endress + Hauser GmbH + Co. KG
Hauptstrasse 1
Maulburg, Baden-Wurttemberg 79690
Germany
Attention: Karlheinz Kienberger

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.



Edward Foo

Issued by: Edward Foo, C.E.T.

PRODUCTS

CLASS 2258 04 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe, Entity - For Hazardous Locations

CLASS 2258 84 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe, Entity - - For Hazardous Locations - Certified to US Standards

Class I, Zone 0; Ex ia IIC:

Class I, Zone 0; AEx ia IIC:

Class I, Division 1, Groups A, B, C and D; Class II, Division 1, Groups E, F and G; Class III; Type 4X/6P:

- Micropilot S Level Transmitter Models FMR530-UbccccCfgh (Horn Antenna), MWP 64 bar (928 psi) or 160 bar (2320 psi); FMR531-UbccccCfgh (Rod Antenna), MWP 16 bar (232 psi) or 40 bar (580 psi); FMR532-UbccccCfgh (Planar Antenna), MWP 40 bar (580 psi); and FMR533-UbccccCfgh (Parabolic Antenna), MWP 16 bar (232 psi); rated 4-20mA, 30V; Intrinsically Safe with Temperature Codes and Maximum Ambient Temperatures with Entity Parameters per Control Drawing No. 960397-2045; Dual Seal.

- Micropilot S Level Transmitter Models FMR540-U5cdddCghi (Horn Antenna), MWP 40 bar (580 psi); and FMR540-U6cdddCghi (Parabolic Antenna), MWP 40 bar (580 psi); rated 4-20mA, 30V; Intrinsically Safe



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with Temperature Codes, Maximum Ambient Temperatures and Entity Parameters per Control Drawing No. 960007205; Dual Seal.

CLASS 2258 02 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations

CLASS 2258 82 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations – Certified to U.S. Standards

Class I, Zone 2; Ex nA IIC:

Class I, Zone 2; AEx nA IIC:

Class I, Division 2, Groups A, B, C and D; Class II, Division 1, Groups E, F and G; Class III; Type 4X/6P:

- Micropilot S Level Transmitter Models FMR530-UbccccCfgh (Horn Antenna), MWP 64 bar (928 psi) or 160 bar (2320 psi); FMR531-UbccccCfgh (Rod Antenna), MWP 16 bar (232 psi) or 40 bar (580 psi); FMR532-UbccccCfgh (Planar Antenna), MWP 40 bar (580 psi); and FMR533-UbccccCfgh (Parabolic Antenna), MWP 16 bar (232 psi); rated 4-20mA, 30V. Suitable for Div. 2 / Zone 2 with Temperature Codes and Maximum Ambient Temperatures per Control Drawing No. 960397-2045; Dual Seal.

- Micropilot S Level Transmitter Models FMR540-U5cdddeCghi (Horn Antenna) MWP 40 bar (580 psi); FMR540-UEcdddeCghi (Horn Antenna) MWP 40 bar (580 psi); FMR540-U6cdddeCghi (Parabolic Antenna) MWP 40 bar (580 psi); FMR540-UGcdddeCghi (Parabolic Antenna) MWP 40 bar (580 psi) and FMR540-UHcdddeCghi (Parabolic Antenna) MWP 40 bar (580 psi); rated 4-20mA, 30V. Suitable for Div. 2 / Zone 2 with Temperature Codes and Maximum Ambient Temperatures per Control Drawing No. 960007205; Dual Seal.

APPLICABLE REQUIREMENTS

CAN/CSA C22.2 No. 0-M91 (R2001)- General Requirements - Canadian Electrical Code, Part II

CSA Std C22.2 No. 25-1966- Enclosures for Use in Class II, Groups E, F and G Hazardous Locations

CAN/CSA-C22.2 No. 94-M91- Special Purpose Enclosures

CSA Std C22.2 No. 142-M1987- Process Control Equipment

CAN/CSA-C22.2 No. 157-92 - Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations

CSA Std C22.2 No. 213-M1987 - Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations

CAN/CSA-E60079-0:02 - Electrical Apparatus for Explosive Gas Atmospheres □ Part 0: General Requirements



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CAN/CSA-E60079-11:02 - Electrical Apparatus for Explosive Gas Atmospheres □ Part 11: Intrinsic Safety "i"

CAN/CSA-E60079-15:02 - Electrical Apparatus for Explosive Gas Atmospheres □ Part 15: Electrical Apparatus with Type of Protection "n"

FMRC 3600 – 1998- Electrical Equipment for Use in Hazardous (Classified) Locations, General Requirements

FMRC3610 – 1999- Intrinsically Safe Apparatus for Use in Class I, II & III, Division 1, and Class I, Zone 0 & 1 Hazardous (Classified) Locations

FMRC 3611 – 1999 - Nonincendive Electrical Equipment for Use in Class I and Class II, Division 2, and Class III, Division 1 and 2 Hazardous (Classified) Locations

FMRC 3810 – 1995- Electrical and Electronic Test, Measuring, and Process Control Equipment

ANSI/NEMA 250 – 1997- Enclosures for Electrical Equipment

ANSI/ISA 12.27.01-2003 - Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids



Supplement to Certificate of Compliance

Certificate: 1141880

Master Contract: 151079

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description
2365444	January 25, 2011	Update to cover minor alternative constructions and drawings revision.
2039825	September 24, 2008	Update to Cover addition of "Dual Seal" Rating, and addition of C US Coverage for the Micropilot S FMR5xx Series.
1938887	August 2, 2007	Update to Cover Minor PCB's Revision
1878781	February 21, 2007	Update to cover alt. Model FMR 540 Series and minor changes to FMR 53x
1699965	September 21, 2005	Update to cover alternate LCD display Ver. 2

History

1172875 Mar. 6, 2001 Update to include alt. coating material for the F12 /T12 enclosure.

1141990 Jan. 17, 2001 Original certification

MASTER CONTRACT: 151079 (LR 53988)

REPORT: 1141880

PROJECT: 2365444

Edition 1: January 17, 2001; Project 1141880 – Toronto
Issued by G. Lewis, CET

Edition 4: February 21, 2007; Project 1878781 – Toronto
Issued by E. Foo, C.E.T.

Edition 5: August 2, 2007; Project 1938887 – Toronto
Issued by E. Foo, C.E.T.

Edition 6: September 24, 2008; Project 2039825 – Toronto
Issued by R. Wildish

Edition 7: January 25, 2011; Project 2365444 – Toronto
Issued by Edward Foo, C.E.T.

Report Reissued

Contents: Certificate of Compliance – Pages 1 to 3
Supplement to Certificate of Compliance – Page 1
Description and Tests – Pages 1 to 22
Descriptive Document – *CSA Engineering File Only*

PRODUCTS

- CLASS 2258 04** - PROCESS CONTROL EQUIPMENT - Intrinsically Safe Entity – For Hazardous Locations
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Class I, Zone 0; Ex ia IIC:

Class I, Zone 0; AExia IIC:

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Telephone: 416.747.4000 1.800.463.6727 Fax: 416.747.4149 www.csa-international.org

- Micropilot S Level Transmitter Models FMR540-U5cdddeCghi (Horn Antenna), MWP 40 bar (580 psi); and FMR540-U6cdddeCghi (Parabolic Antenna), MWP 40 bar (580 psi); rated 4-20mA, 30V; Intrinsically Safe with Temperature Codes, Maximum Ambient Temperatures and Entity Parameters per Control Drawing No. 960007205; Dual Seal.

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- CAN/CSA-C22.2 No. 94-M91 - Special Purpose Enclosures
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- CAN/CSA-C22.2 No. 157-92 - Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations
- CSA Std C22.2 No. 213-M1987 - Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations
- CAN/CSA-E60079-0:02 - Electrical Apparatus for Explosive Gas Atmospheres - Part 0: General Requirements
- CAN/CSA-E60079-11:02 - Electrical Apparatus for Explosive Gas Atmospheres - Part 11: Intrinsic Safety "i"
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- FMRC 3611 – 1999 - Nonincendive Electrical Equipment for Use in Class I and Class II, Division 2, and Class III, Division 1 and 2 Hazardous (Classified) Locations
- FMRC 3810 – 1995 - Electrical and Electronic Test, Measuring, and Process Control Equipment
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- ANSI/ISA 12.27.01-2003 - Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids

MARKINGS

Refer to Descriptive Documents Package (CSA Engineering File Only) for label drawing.

The warning re “KEEP COVER TIGHT WHILE CIRCUITS ARE KNOWN TO BE HAZARDOUS” (for Class II/III applications) is cast into the cover of the enclosure.

METHOD OF MARKINGS

Stainless-steel plate secured by 2 drive pins, rivets or screws.

ALTERATIONS

Markings as above per Descriptive Documents Package (CSA Engineering File Only).

CONTROL DRAWING

Refer to Descriptive Documents Package (CSA Engineering File Only) for Control Drawing Nos. 960397-2045 and 960007205 as referenced in Markings.

FACTORY TESTS

Factory Dielectric Strength test waived based on the apparatus always being connected to a Class 2 power source (Intrinsic Safety barrier for Intrinsically Safe configurations and a Class 2 power supply for Div. 2 / Zone 2 configurations) as noted on Control Drawing Nos. 960397-2045 and 960007205.

SPECIAL INSTRUCTIONS FOR FIELD SERVICES

1. Component Substitution
 - a) Critical components (those identified by mfr name, cat no) are not eligible for substitution without evaluation and report updating.
 - b) Component descriptions marked with the identifier “(CT)” are subject to annual pickup and Conformity Testing.
 - c) Component descriptions marked with the identifier “(INT)” are the only components that are eligible for substitution at the factory.
 - d) Substitution of a CSA Certified component with a component “Certified” or “Listed” by another organization may result in annual sample pickup and Conformity Testing.
 - e) Substitution of a “Certified” or “Listed” component with a component that is “Recognized” or “Accepted” is not permitted without evaluation and report updating.

2. This report contains reference to certain construction and engineering documents that have been deemed critical to ensuring continued compliance with applicable construction and performance requirements. A list of these documents, with drawing numbers and the appropriate revision levels is summarized in this report. Documents detailed herein are subject to inspection by CSA International personnel and shall be made available in the manufacturing location upon request. Failure to produce these documents in a timely manner constitutes noncompliance and is subject to the actions outlined in the CSA Product Service Agreement.

COMPONENT SPECIAL PICKUP

N.A.

DESCRIPTIVE DOCUMENTS

Note: Documents detailed herein are subject to inspection by CSA International personnel and shall be made available in the manufacturing location upon request. (Note: The following Descriptive Documents are retained electronically in CSA Documentum Bin only):

<u>Subject</u>	<u>Drawing</u>	<u>Rev</u>
Micropilot S FMR 53x Nameplate CSA	960005361	D
Micropilot S FMR 540 Nameplate CSA	960007330	A
Warning Label	960397-2049	A
CSA Control Drawing, Micropilot S FMR53X	960397-2045	C
FMR540 CSA Control Drawing IS Cl. I,II,III Div. 1 A-G	960007205	C
Choking coil, annular type	960384-0040	A
Assembly, HT-module 2	960384-0060	A
Schematic, Radar module 2	960384-0061	F
Schematic, Radar module 2 Standard	960384-0062	C
Schematic, Radar module 2 FCC	960384-0063	E
Trace layout HF-module 2	960384-0064	C
Trace layout, HF-module 2 FCC	960384-0065	E
Component diagram, HF-module	960384-0066	D
Component diagram, HF-module 2 FCC	960384-0067	E
Glass feed through	960391-0000	B
Cladding conductive	960391-0005	A
High Temperature Antenna	960391-0007	B
Micropilot S FMR 53x Overall Appearance	960397-0000	B
Micropilot S FMR 53x antenna	960397-0001	A
Micropilot S FMR 53x parabolic antenna	960397-0002	B
Planar antenna assy.	960008917	-
Ex Limiter module.	960397-0004	B
T500 Load characteristic WI + WII AVA	960397-0016	A
T500 Load characteristic WII DVA	960397-0017	A
T500 Load characteristic W IV Vsup	960397-0018	A
Transformer EF12,6 (A1166nH)	960397-0019	A
Schematic, FMR53x Application Board (Power Supply)	960397-0020	C
Schematic, FMR53x Application Board (CPU)	960397-0021	B
Schematic, FMR53x Application Board (Sample Unit)	960397-0022	B
Assembly plan ss, FMR53x Application Board	960397-0023	B
Assembly plan cs, FMR53x Application Board	960397-0024	B
Conductive pattern cs, FMR53x Application Board	960397-0025	B
Conductive pattern ss, FMR53x Application Board	960397-0026	B

<u>Subject</u>	<u>Drawing</u>	<u>Rev</u>
Conductive pattern inner layer cs, FMR53x Application Board	960397-0027	B
Conductive pattern inner layer ss, FMR53x Application Board	960397-0028	B
Schematic, FMR53x Main Board (Power Supply, Hart)	960397-0029	C
Schematic, FMR53x Main Board, CPU	960397-0030	B
Assembly plan ss, FMR53x Main Board	960397-0031	B
Assembly plan cs, FMR53x Main Board	960397-0032	B
Conductive pattern cs, FMR53x Main Board	960397-0033	C
Conductive pattern ss, FMR53x Main Board	960397-0034	B
Conductive pattern inner layer cs, FMR53x Main Board	960397-0035	B
Conductive pattern inner layer ss, FMR53x Main Board	960397-0036	B
Fin Coupling 26 GHz with glass feed-through	960004852	-
FMR250/540 Parabolic antenna (RD) with fin	960008922	-
FMR250/540 horn antenna (RD) with fin	960008933	-
Schematic, Display VU 331	960397-0040	C
Assembly plan cs, Display VU 331	960397-0041	A
Assembly plan ss/cs, Display VU 331 Version 2	960397-1041	A
Conductive pattern cs, ss, Display VU 331	960397-0042	B
Electric corrosion protection	960397-0043	A
Electronics insert	960397-0044	A
Rod Antenna Conductive and Gas-tight PTFE	960397-0046	A
Horn antenna	960397-0047	B
FMR 53x main Board (LIPS)	960397-0048	A
SMP-Glass feed through	960402-0018	B
Levelflex gasket materials	960409-0081	B
FHX 40 / Remote display, Enclosure T12	960409-0088	A
Connection line, Enclosure T12	960409-0089	A
Trip Line (cable between VU331 & FMR 53x)	960004639	B
Rod antenna PTFE conductive gas tight	960005357	B
Horn antenna	960005358	C
Display Module VU331	960005433	C
FMR 250 Horn antenna	960006704	B
FMR 250 Parabolic antenna	960006719	B
Coupling FMR 250	960006720	B
Ball positioner	960006721	-
Pressure disk	960006722	-
Flange adapter	960006723	-
Feed matching cone parabolic antenna	960006724	-

<u>Subject</u>	<u>Drawing</u>	<u>Rev</u>
Feed matching cone horn antenna	960006725	B
Overview FMR 540	960007209	-
Assembly plan side A FMR 54x Power supply	960007960	B
Assembly plan side B FMR 54x Power supply	960007961	C
Cond. pattern layer A1 FMR 54x Power supply HART	960007962	C
Cond. pattern layer A2 FMR 54x Power supply HART	960007963	C
Cond. pattern layer B2 FMR 54x Power supply HART	960007964	C
Cond. pattern layer B1 FMR 54x Power supply HART	960007965	C
Circuit diagram FMR 54x PSU_HART BOARD Power Supply	960007966	C
Circuit diagram FMR 54x PSU_HART BOARD Current Output	960007967	B
Circuit diagram FMR 54x PSU_HART BOARD HART	960007968	B
Assembly plan side A FMR 54x Ex i Limiter (Filter)	960007969	A
Assembly plan side B FMR 54x Ex i Limiter (Filter)	960007970	A
Cond. pattern layer A1 FMR 54x Ex i Limiter (Filter)	960007971	A
Cond. pattern layer B1 FMR 54x Ex i Limiter (Filter)	960007972	A
Circuit diagram Schematic FMR 54x Ex i Limiter (Filter)	960007973	A
Assembly plan side A FMR 54x CPU board	960007974	C
Assembly plan side B FMR 54x CPU board	960007975	C
Conductive pattern layer A1 FMR 54x CPU Board	960007976	C
Conductive pattern layer A2 FMR 54x CPU Board	960007977	C
Conductive pattern layer B2 FMR 54x CPU Board	960007978	C
Conductive pattern layer B1 FMR 54x CPU Board	960007979	C
Circuit diagram FMR 54x CPU BOARD Main CPU	960007980	B
Circuit diagram FMR 54x CPU BOARD Application CPU	960007981	B
Circuit diagram FMR 54x CPU BOARD Sampling unit	960007982	B
FMR 540 bent tube versions	960007998	-
Micropilot S FMR 53Xa Technical Description (Project 1141880)	-	23.11.1999
FM Report J.I. 3009393 (Project 1141880)	J.I. 3009393	14.12.2000
Revision Report (Project 1172875)	-	FEB 2001
Micropilot S FMR 53x/540 Technical Description (Project 1878781)	-	17.07.2006
Micropilot S FMR 54x Maximum Transformed Power Test (Project 1878781)	54x_T0016_01_050321_1 720.doc	21.03.2005
Micropilot S FMR 54x Temperature Test (Ex i Limiter) (Project 1878781)	54x_T0056_01_060612_0 901.doc	12.06.2006
Micropilot S FMR 54x Temperature Test (Hart Board) (Project 1878781)	54x_T0056_01_060613_1 200.doc	27.06.2006
<u>Project 2039825</u>		
Cover M120 + EMC Glass	960009017	-

<u>Subject</u>	<u>Drawing</u>	<u>Rev</u>
Cover M120	960009018	-
Cable feedthrough	960009019	-
Primary Seal Leakage and Burst Pressure Tests	970000540	a
PressureTesting T12 Enclosure (Dual Seal Venting Pressure Determination)	970000538	05.02.08
Secondary Seal Leakage Test	970000539	18.02.08
FM Approvals Report	3005776	Feb. 2, 2000
FM Approvals Report	3028517	May 17, 2001
FM 797 Revision Report	797-26823-283	17 Nov 2010

DESCRIPTION

1. Micropilot S Level Transmitters Model FMR53x

The subject level transmitters were evaluated and tested to CSA requirements by Factory Mutual Research under FM Report J.I. 3009393, in accordance with the FM/CSA Agreement. The FM Report was reviewed in conjunction with the Endress + Hauser Engineering drawings and is considered representative and acceptable for CSA Certification of the subject equipment. Refer to Descriptive Document Package (CSA Engineering File only) for FM Report J.I. 3009393 and E+H GmbH Technical Description.

This version uses the T12 Enclosure (Dwg 960409-0088), previously Certified under Report 151079-1039154 (Model FMR 230). Enclosure constructed of cast aluminum containing less than 6% magnesium with an overcoat of epoxy paint or with polyester coating.

General: The Micropilot S Level Transmitters Models FMR 53x and FMR 540 are used mainly for continuous non-contact level measurement of liquids utilizing microwave measurement techniques. Short microwave pulses transmitted by the antenna are reflected from the liquid surface back to the antenna with the time measured between transmission and reflection pulse evaluated and converted to the level of the liquid measured. The Micropilot S is a 4-wire transmitter where one circuit is a 4...20mA signal output carrying digital HART communication and the other provides additional power to the device.

These circuits can be powered by either two galvanically separated intrinsic safe circuits via intrinsic safe barriers or by an intrinsic safe associated apparatus outside the hazardous location in a safe area.

The above transmitters use 6 GHz microwave pulses transmitted via horn, rod, planer or parabolic antennae.

2. Micropilot S Level Transmitters Model FMR 540

2.1 General

Micropilot S Level Transmitters Model FMR540 is a new 4-Wire HART (4-20mA) version of the Certified Micropilot S FMR 53x (covered by this report). It operates at a higher operating frequency at 26 GHz (for enhanced performance) than the Micropilot S FMR 53x which has an operating frequency of 6 GHz. It is Intrinsically Safe and Suitable for Division 2/Zone 2. Refer to Descriptive to documents for complete details.

The common components used in the FMR 540 with other submittor's tested and accepted components are as follows:

- Same antennae as in the Micropilot M FMR 250 in CSA Project 151079-1039154 are used;
- Radar module μ P III.4a certified as component in CSA Report 151079-1784608 is used and the display module from Micropilot M in CSA Project 151079-1039154);
- Many of the same mechanical parts used as in Model FMR 53x version, including the T12 enclosure, all metal and plastic parts fastening and covering of the PCB's and the cables between PCBs are used.

2.2 FMR 540 Electronics (4-Wire HART (4-20mA))

The main difference with FMR 540 compared to previously Certified FMR 53x is that it contains the following new electronics:

- EEx i terminal module (4-wire EEx i filter module, version 2)
- PSU Board located in electronic insert
- CPU Board located in electronic insert

3. Protective Components (Models in items 1 and 2 above)

3.1 Terminal Modules

Ex/EMC-Filter 4-Wire

Component	Position	Data / Type / Manufacturer
960007973-A, ...	C1, C3, C4, C8, C50 ...C59	Ceramic chip capacitor: 4n7 ± 10%; 250 V AC Type Y2, e.g. Murata
	C2, C7	Ceramic chip capacitor: 10n0 ± 10%; 1500 V AC, 1800 V AC test
	C5, C6	220n ± 20%; 25 V AC
	F2, F50	T40 mA size S8045 acc. IEC 60127, e.g. SIBA type 160000
	F4, F5, F53, F54	Electrode arrestors 600 V
	L1	current compensated coil: 1 mH, e.g. type B82793, EPCOS, S+M comp., Vogt
	L50	current compensated coil: 51 µH, e.g. type B82790, EPCOS, Siemens Matsushita, S+M comp.
	R3, R4, R5	10K0 3%, 0.21 W
	R1, R2, R6	22K6 3%, 0.21 W
	V1, V5, V51	Diode: I _F ≥ 1 A; V _{RRM} ≥ 45 V; SS16, e.g. Fairchild, ON, Vishay
	V2	Transistor BSP149, e.g. Infineon
	V3	Zener diode: BZX284-C15 15V 7% 0.4 W, e.g. PHILIPS

3.2 Electronic Inserts

3.2.1 Application Board (6 GHz; FMR 53x)

Component	Position	Data / Type / Manufacturer
960397-0020, ...	C555, C556	100pF, 50V
	R500	1M000 3%, 0.21 W
	R501, R513, R621, R622	1K000 3%, 0.21 W
	R509, R552, R557	48K70 3%, 0.21 W
	R550, R555	4K870 3%, 0.21 W
	R551, R556	487R0 3%, 0.21 W
	R554, R558	100K0 3%, 0.21 W
	R620	154R0 3%, 0.21 W

R736, R737, R739	1K870 3%, 0.21 W
R738, R740	100R0 3%, 1 W
T500	Transformer EF13
U500, U501	Opto-coupler HCNW139
V500	Diode: TMMBAT46, 150 mA, e.g. SGS-Thomson
V501, V503, V704, V709	Zener diode: BZV55, 5.1 V, 250 mA, 0.4 W, e.g. Philips
V502, V504	Zener diode: 1SMC5356B, 19 V, 5 W, e.g. Philips
V552, V555, V556, V559	Diode: $I_F \geq 1$ A; SM4007, 1N4007, e.g. Infineon, ON, Vishay
V553, V557	Reference-diode: ZR431 or SC431, 2.5 V, 150 mA, 0.33 W, e.g. Zetex, Semtech
V554, V558	Transistor BCP53-16, 1.5 W, e.g. ZETEX
V700...V703, V705...V708	Diode: TMMBAT48, 150 mA, e.g. SGS-Thomson

3.2.2 Main Board (6GHz; FMR 53x)

Component	Position	Data / Type / Manufacturer
960397-0029, ...	C185, C186	100pF, 50V
	C300, C301	Ceramic capacitor: 1.0 nF \pm 20%; \geq 500 V AC, e.g. Yageo
	R101, R115, R116, R166...R169, R314...R317	10K00 3%, 0.21 W
	R106	24R90 1%, 0.6 W, M-Film
	R117	12K10 3%, 0.21 W
	R118, R119	2K260 3%, 0.21 W
	R150	10K0 3%, 0.21 W
	R188, R193, R197	100K0 3%, 0.21 W
	R190, R194	4K870 3%, 0.21 W
	R191, R195	487R0 3%, 0.21 W
	R192, R196	68K10 3%, 0.21 W
	V100, V116*, V117*	Diode: TMMBAT46, 150 mA, e.g. SGS-Thomson
	V101, V103	Zener diode: BZV55, 5.1 V, 250 mA, 0.4 W, e.g. Philips
	V102, V104	Zener diode: BZV55, 39 V, 250 mA, 0.4 W, e.g. Philips
	V108, V110, V114, V115, V195, V197	Diode: BAS216, MCL4148, e.g. Philips, Vishay, Lite-On
	V109, V111, V185...V188	Zener diode: BZG05C6V2 6.2 V 7% 3 W e.g. Temic or Vishay
	V151, V152	Diode: BAV99 or identical, 125 mA, e.g. Philips
	V182, V193	Transistor BCP53-16, 1.5 W, e.g. ZETEX
	V183, V194	Reference-diode: ZR431 or SC431, 2.5 V, 150 mA, 0.33 W, e.g. Zetex, Semtech
	V196, V198	Zener diode: BZG05C3V9 3.9 V 7% 3 W e.g. Temic or Vishay
	R211...R214	1K870 3%, 0.21 W
	R252, R256	48R70 3%, 0.21 W
	R257	56R20 3%, 0.21 W
	R253, R255	1K540 3%, 0.21 W
	R310	1M000 3%, 0.21 W

* Rev. B only

3.2.3 PSU Board (26 GHz; FMR 540)

Component	Position	Data / Type / Manufacturer
960007966-B, ...	R104	1M000 3%, 0.21 W
	R110, R111	1K000 3%, 0.21 W
	R119, R126, R206, R215	10K00 3%, 0.10 W
	R120, R127, R208, R217	464R0 3%, 0.10 W
	R123	48K70 3%, 0.21 W
	R124, R128, R211, R219	38K30 3%, 0.10 W
	R125, R129	68K10 3%, 0.10 W
	R201	10K00 3%, 0.21 W
	R211, R219	22K60 3%, 0.10 W
	R212, R220	332K0 3%, 0.10 W
	R233	3K320 3%, 0.21 W
	R234	1K210 3%, 0.21 W
	R235	187R0 3%, 0.21 W
	R300	82K00 3%, 1 W
	R316...R319, R326...R330, R333	1K540 3%, 0.21 W
	R322...R325	330K0 3%, 0.21 W
	R331, R332	154R0 3% 1 W
	T100	Transformer EF13
	V101, V200, V201, 202	Diode: BAV103, 250 mA, $V_{RRM} \geq 45$ V, e.g. Micronas, Philips
	V102, V104	Zener diode: BZV55, 5.1 V, 250 mA, 0.4 W, e.g. Philips or ON
	V103, V105	Zener diode: 1SMC5356B, 19 V, 5 W, e.g. Philips
	V106, V108	Zener diode: BZG05C5V6 5.6 V 7% 3 W e.g. Temic or Vishay
	V107, V130	Zener diode: BZG05C3V9 3.9 V 7% 3 W e.g. Temic or Vishay
	V116, V123, V209, V213	Reference-diode: ZR431 or SC431, 2.5 V, 150 mA, 0.33 W, e.g. Zetex, Semtech
	V117, V124, V211, V215	Transistor BCP53-16, 1.3 W, e.g. ZETEX or Philips
	V118, V120	Zener diode: BZV55, 2.7 V, 250 mA, 0.4 W, e.g. Philips or ON
	V119, V121	Zener diode: BZG05C6V2 6.2 V 7% 3 W e.g. Temic or Vishay
	V203, V205, V210, V212, V214, V216	Zener diode: BZV55, 5.6 V, 250 mA, 0.4 W, e.g. Philips or ON
	V204, V206	Zener diode: BZV55, 39 V, 250 mA, 0.4 W, e.g. Philips or ON
	V300, V303	Diode: BAS216, MCL4148, e.g. Philips, Vishay, Lite-On

3.2.4 CPU Board (26 GHz; FMR 540)

Component	Position	Data / Type / Manufacturer
960007980-B, ...	R100, R101, R117, R118	1K870 3%, 0.21 W
	R130, R131	1K540 3%, 0.21 W
	R132	154R0 3%, 1 W
	R133, R140, R339, R340	38K30 3%, 0.1 W
	R134, R141, R337, R338	68K10 3%, 0.1 W
	R136, R137, R301, R312, R317	6R80 7%, 1 W
	R138, R142, R335, R336	464R0 3%, 0.1 W
	R139, R143, R341, R342	10K00 3%, 0.1 W
	R144, R302	3R30 7%, 1 W
	R303, R331	1K50 3%, 1 W
	R311	10K0 7%, 0.21 W
	R314	33R20 3%, 1 W
	R318	18K70 3%, 0.21 W
	R319, R320	3K320 3%, 0.21 W
	R344	100K0 3%, 0.21 W
	V106, V108, V303, V304	Transistor BCP53-16, 1.3 W, e.g. ZETEX or Philips
	V107, V109, V301, V302	Reference-diode: ZR431 or SC431, 2.5 V, 150 mA, 0.33 W, e.g. Zetex, Semtech
	V305...V308	Zener diode: BZV55, 2.7 V, 250 mA, 0.4 W, e.g. Philips or ON

3.3 Display VU331

3.3.1 Version 1

Component	Position	Data / Type / Manufacturer
960397-0040-A/B, ...	R17, R18	40K20 3%, 0.21 W
	R19, R20	100K0 3%, 0.21 W
	V4, V5	Reference-diode: ZR431 or SC431, 2.5 V, 150 mA, 0.33 W, e.g. Zetex, Semtech

3.3.2 Version 2

Component	Position	Data / Type / Manufacturer
960397-0040-C, ...	C107...C111, C115	47 nF 10% 50 V
	C112, C113, C114, C116	47 nF 10% 16 V
	R117, R132, R146	33R00 3%, 0.1 W or 0.125 W
	R119...R131, R133...R145, R147...R159	154R0 3%, 0.1 W or 0.125 W
	V102, V103	Zener diode: BZX284 13V 7% 0.4 W, e.g. PHILIPS
	V104...V107	Diode: BAT254 or BAT54, 200 mA, e.g. Philips or ST

4. Encapsulant:

- i. SilGel, 2-component silicone elastomer, by Wacker-Chemie GmbH, Types 612A and 612B, operating temperature -40°C ...+180°C, CTI >600, Dielectric strength \geq 23 kV/min.
- ii. Sylgard, 2-component silicone elastomer, by Dow Corning Europe, Types 170A and 170B, operating temperature -60°C ...+200°C, CTI >400, Dielectric strength \geq 18 kV/min.

Project 2039825: Under Project 2039825, the “Dual Seal” rating and marking was added to the FMR 530, 531, 532, 533 and 540 Series. Consequently, various drawings were updated to address the changes necessary to meet the Dual Seal requirements of ANSI/ISA-12.27.01. In addition the C US Certification coverage was added.

The Dual Seal requirements are met through the presence of a primary seal (existing probe diaphragm), visible or audible annunciation method (enclosure cover glass window (Refer to Dwg. 960009017) or blind enclosure cover (Refer to Dwg. 960009018) and Secondary Seal (metallic enclosure wall w/feedthrough, separating Electronics and Terminal compartments (Refer to Dwg. 960009019)).

As a result of the addition of the Dual Seal rating and the C US coverage, the following drawings were modified/added.

Subject	Existing Drawing		New Drawing		Description of Revision
	Number	Rev.	Number	Rev.	
Micropilot S FMR 53x Nameplate CSA	960005361	C	960005361	D	Revised to added Dual Seal marking and comments and C US marking and comments.
Micropilot S FMR 540 Nameplate CSA	960007330	-	960007330	A	
CSA Control Drawing, Micropilot S FMR53X	960397-2045	A	960397-2045	B	
FMR540 CSA Control Drawing IS Cl. I,II,III Div. 1 A-G	960007205	A	960007205	B	
Cover M120 + EMV glass	-	-	960009017	-	The parts described limit the maximum pressure in case of failure of the primary seal.
Cover M120	-	-	960009018	-	
Cable feedthrough	-	-	960009019	-	

TESTS

The following tests were conducted in: FM Approval, Boston, U.S.A.

Project 1141880

Representative tests were conducted by Factory Mutual under Report J.I. 3009393 in consideration of the subject Level Instrument, in accordance with the FM/CSA Agreement. Refer to Descriptive Documents Package (CSA Engineering File Only) for FM Report J.I. 3009393.

Project 1172875

The F12/T12 Enclosure coating material covered under this Project was previously tested under LR 53988-23 (Corrosion Resistance Test).

Project 1699965

Update to report to include Display VU331 Version 2. Same display is previously accepted under submittor's projects 1579137 and 1650643.

Due to a change in the LCD module, the circuitry was redesigned. This version is an alternative to Version 1. Drawings 960397-0040 C, 960397-1041 A, 960397-0042 B, 960004639 B and 960005433 C are added to this report.

Total circuit capacitance in the Display VU331 Version 2 is lower than those in Version 1.

No spark ignition tests were deemed necessary considering protective components which do not dissipate more than two-thirds of their rated power under fault conditions.

No further testing was deemed necessary.

Project 1878781: Update to include similar transmitter model FMR 540. Refer to the Micropilot S FMR 53x/540 Technical Description dated July 17, 2006 for complete details and rationale.

Subject #	Existing Drawing		New Drawing		Description of Revision
	Number	Rev.	Number	Rev.	
Micropilot S FMR 53x Nameplate CSA	960397-2046	A	960005361	C	The Type 4X enclosure rating was changed to Type 6P marking only. The enclosure was previously tested for Type 4X and 6P. The layout of the label was changed with the information remained unchanged. The model codes of the previously Certified FMR53x Micropilot S were changed slightly as described below.
Micropilot S FMR 540 Nameplate CSA	-	-	960007330	-	New nameplate drawing for the new Micropilot S Level Instrument Model FMR540.
FMR540 CSA Control Drawing IS Cl. I,II,III Div. 1 A-G	-	-	960007205	A	New control drawing is for the new Micropilot S Level Instrument Model FMR540.
Schematic, Radar module 2	960384-0061	D	960384-0061	F	Minor circuitry changes were made with no effect on Intrinsic Safety.
Schematic, Radar module 2 FCC	960384-0063	B	960384-0063	E	
Trace layout, HF-module 2 FCC	960384-0065	C	960384-0065	E	
Component diagram, HF-module 2 FCC	960384-0067	C	960384-0067	E	
Schematic, FMR53x Application Board (Power Supply)	960397-0020	B	960397-0020	C	The rated voltage of capacitor C552 is decreased to 10V. The maximum voltage on this component remains less than 2/3 of the rated value.
Schematic, FMR53x Main Board (Power Supply, Hart)	960397-0029	B	960397-0029	C	The value of R117 is decreased from 22.6KΩ to 12.1KΩ to improve precision of the current output. This has no effect on Intrinsic Safety and the calculated power dissipation of this component remains less than 2/3 of the rated value.
Schematic, FMR53x Ex	-	-	960397-0037	A	Drawing added to have the option of building the circuit board to previously

Subject	Existing Drawing		New Drawing		Description of Revision
	Number	Rev.	Number	Rev.	
					certified Revision A dwg.
Schematic, FMR53x Ex	-	-	960397-0037	B	Drawing added to have the option of building the circuit board to previously certified Revision B dwg.
Electric corrosion protection	-	-	960397-0043	A	Drawing added to show electric corrosion protection for FMR 53x and FMR 540 versions.
Electronics insert	-	-	960397-0044	A	Drawing added to show assembly details of FMR 53x and FMR 54x Electronic Inserts.
SMP-Glass feed through	-	-	960402-0018	B	Drawings depict mechanical parts for new Model FMR540.
Levelflex gasket materials	-	-	960409-0081	B	
FHX 40 / Remote display, Enclosure T12	-	-	960409-0088	A	Drawing shows FMR 53x and FMR 54x enclosure modifications for Remote Display.
Connection line, Enclosure T12	-	-	960409-0089	A	Drawing shows assembly details of the Remote Display cable.
Rod antenna PTFE conductive gas tight	-	-	960005357	B	Antenna drawings were added for the previously Certified FMR53x Micropilot S versions. The design of these antennae is different compared to the previously Certified versions where some parts may be threaded before they are welded. After welding, they are essentially identical to previous unthreaded versions.
Horn antenna	-	-	960005358	C	Same as above.
FMR 250 Horn antenna	-	-	960006704	B	Drawings depict the new antenna types added for new Model FMR540.
FMR 250 Parabolic antenna	-	-	960006719	B	
Coupling FMR 250	-	-	960006720	-	Drawings depict the mechanical parts for
Ball positioner	-	-	960006721	-	
Pressure disk	-	-	960006722	-	

Subject	Existing Drawing		New Drawing		Description of Revision
	Number	Rev.	Number	Rev.	
Flange adapter	-	-	960006723	-	new Model FMR540.
Feed matching cone parabolic antenna	-	-	960006724	-	
Feed matching cone horn antenna	-	-	960006725	B	
Overview FMR 540	-	-	960007209	-	Drawings for the new Micropilot S Level Instrument Model FMR540.
Assembly plan side A FMR 54x Power supply	-	-	960007960	B	
Assembly plan side B FMR 54x Power supply	-	-	960007961	B	
Cond. pattern layer A1 FMR 54x Power supply HART	-	-	960007962	B	
Cond. pattern layer A2 FMR 54x Power supply HART	-	-	960007963	B	
Cond. pattern layer B2 FMR 54x Power supply HART	-	-	960007964	B	
Cond. pattern layer B1 FMR 54x Power supply HART	-	-	960007965	B	
Circuit diagram FMR 54x PSU HART BOARD Power Supply	-	-	960007966	B	
Circuit diagram FMR 54x PSU HART BOARD Current Output	-	-	960007967	B	
Circuit diagram FMR 54x PSU HART BOARD HART	-	-	960007968	B	
Assembly plan side A FMR 54x Ex i Limiter (Filter)	-	-	960007969	A	
Assembly plan side B FMR 54x Ex i Limiter (Filter)	-	-	960007970	A	
Cond. pattern layer A1 FMR 54x Ex i Limiter (Filter)	-	-	960007971	A	
Cond. pattern layer B1 FMR 54x Ex i Limiter (Filter)	-	-	960007972	A	
Circuit diagram FMR 54x Ex i Limiter (Filter)	-	-	960007973	A	
Assembly plan side A FMR 54x CPU board	-	-	960007974	B	
Assembly plan side B FMR 54x CPU board	-	-	960007975	B	
Conductive pattern layer A1 FMR 54x CPU Board	-	-	960007976	B	
Conductive pattern layer A2 FMR 54x CPU Board	-	-	960007977	B	
Conductive pattern layer B2 FMR 54x CPU Board	-	-	960007978	B	
Conductive pattern layer B1 FMR 54x CPU Board	-	-	960007979	B	
Circuit diagram FMR 54x CPU BOARD Main CPU	-	-	960007980	B	
Circuit diagram FMR 54x CPU BOARD Application CPU	-	-	960007981	B	
Circuit diagram FMR 54x CPU BOARD Sampling unit	-	-	960007982	B	
FMR 540 bent tube versions	-	-	960007998	-	

1. Addition of Micropilot S Level Instruments Model FMR540

1.1 General

Micropilot S Level Instruments Model FMR540 is a new 4-Wire HART (4-20mA) version of existing Certified Micropilot S FMR 53x (covered by this report). It has a higher operating frequency of 26GHz (for enhanced performance) than the Micropilot S FMR 53x which operate at 6GHz. It is evaluated as Intrinsically Safe and is Suitable for Division 2/Zone 2.

The parts which FMR 540 has in common with previously Certified apparatus are as follows:

- Same antennae as in Micropilot M FMR 250 (CSA Project 151079-1039154) are used.
- Radar module μ P III.4a (approved as component under CSA Project 151079-1784608) and display module from Micropilot M (CSA Project 151079-1039154).
- Many of the same mechanical parts as Micropilot S FMR 53x version including the T12 enclosure, all metal and plastic parts fastening and covering the PCBs and the cables between PCBs are used.

- As the enclosure parts, sealing methods and gaskets are identical with the existing Certifications, no additional ingress protection testing was conducted (refer to existing Certifications of Micropilot S FMR 53x (CSA Project 151079-1141880), Levelflex M (CSA Project 151079-1234621), Micropilot M (CSA Project 151079-1039154) and Prosonic M (CSA Project 151079-1251617).

1.2 New Electronics (4-Wire HART (4-20mA))

The main difference between FMR 540 and the previously Certified FMR 53x is that the former contains the following new electronics:

- EEx i terminal module (4-wire EEx i filter module, version 2)
- PSU Board located in electronic insert
- CPU Board located in electronic insert

The new electronic is evaluated to be acceptable as the same intrinsic safety protection techniques are used as for existing Certifications of Micropilot S FMR 53x (CSA Project 151079-1141880), Levelflex M (CSA Project 151079-1234621), Micropilot M (CSA Project 151079-1039154) and Prosonic M (CSA Project 151079-1251617). The output of the PSU board to the radar module matches the radar module μP III.4a parameters (the protective components on the output of the PSU board are the same as Micropilot M covered under CSA Project 151079-1039154). The output to the display module is also the same as Micropilot M (CSA Project 151079-1039154).

1.3 Entity Parameters (EEx i Terminal Module)

1.3.1 Supply Circuit

$U_i = 30V$, as specified by E+H

$I_i = 300mA$, as specified by E+H

$P_i = 1W$, as specified by E+H

$C_i = 18.5nF$, based on the unprotected capacitance at the terminals as follows:

Capacitor	Tolerance	Subtotal
C1 (4.7nF)	10	5.17nF
C2 (10nF) in series with C7 (10nF) \rightarrow 5nF	10	5.5nF
C3 (4.7nF) in series with C8 (4.7nF) \rightarrow 2.35nF	10	2.59nF
C4 (4.7nF)	10	5.17nF
Total		18.43nF

$L_i = 13\mu H$ based on ΔL of current compensated choke L1.

1.3.2 Signal Circuit

$U_i = 30V$, as specified by E+H

$I_i = 300mA$, as specified by E+H

$P_i = 1W$, as specified by E+H

$C_i = 20.7nF$, based on the unprotected capacitance at the terminals as follows:

Capacitor	Tolerance	Subtotal
C51 (4.7nF)	10	5.17nF
C50 (4.7nF) in series with C56 (4.7nF) → 2.35nF	10	2.59nF
C52 (4.7nF) in series with C57 (4.7nF) → 2.35nF	10	2.59nF
C53 (4.7nF) in series with C58 (4.7nF) → 2.35nF	10	2.59nF
C54 (4.7nF) in series with C59 (4.7nF) → 2.35nF	10	2.59nF
C55 (4.7nF)	10	5.17nF
	Total	20.70nF

$L_i = 0$, based on ΔL of current compensated choke L50 (2 μH) which is considered to be negligible

1.4 Tests

Based on the similarity, only the following tests were deemed necessary:

- 1.4.1 Maximum Transformed Power Testing was conducted by E+H on the Micropilot S FMR 54x under CSA Category Certification Program as per attached Test Report 54x_T0016_01_050321_1720.doc. The results of the test were used in the protective component power calculations. The protective components power calculations are verified in the Micropilot S FMR 53x/540 Technical Description.
- 1.4.2 Temperature Testing was conducted by E+H on Micropilot S FMR 54x Ex i Limiter under CSA Category Certification Program as per attached Test Report 54x_T0056_01_060612_0901.doc. The maximum temperature rise on the surface of the encapsulated module was found to be less than 11K measured on component V2.
- 1.4.3 Temperature Testing conducted by E+H on Micropilot S FMR 54x Hart Board under CSA Category Certification Program as per attached Test Report 54x_T0056_01_060613_1200.doc. The maximum temperature rise on the surface of the encapsulated module was found to be less than 19K measured on component V105.

2. Minor Model Code Changes for Micropilot S Level Instruments Model FMR53x

The model codes of the previously Certified FMR53x Micropilot S were changed slightly as shown below to add a variable “h” which represents additional options not related to safety.

Version	Old Model Code	New Model Code
Horn Antenna Version	FMR530-UbccccCfg	FMR530-UbccccCfgh
Rod Antenna Version	FMR531-UbccccCfg	FMR531-UbccccCfgh
Planar Antenna Version	FMR532-UbccccCfg	FMR532-UbccccCfgh
Parabolic Antenna Version	FMR533-UbccccCfg	FMR533-UbccccCfgh

3. Upgrade of E79 Series of Standards to E60079 Series of Standards

Upgraded E79 Series standards to the E60079 Series standards. The evaluation and tests according to E79 Series standards are considered to be representative to the E60079 Series standards.

Project 1938887: Update to cover minor manufacturing improvement on the CPU printed circuit boards in the table below.

Subject	Existing Drawing		New Drawing		Description of Revision
	Number	Rev.	Number	Rev.	
Assembly plan side A FMR 54x CPU board	960007974	B	960007974	C	The FMR540 CPU Board layout was updated to cover minor solder pad adjustments. The minimum distances between circuits were not changed. No further evaluation or testing was deemed necessary.
Assembly plan side B FMR 54x CPU board	960007975	B	960007975	C	
Conductive pattern layer A1 FMR 54x CPU Board	960007976	B	960007976	C	
Conductive pattern layer A2 FMR 54x CPU Board	960007977	B	960007977	C	
Conductive pattern layer B2 FMR 54x CPU Board	960007978	B	960007978	C	
Conductive pattern layer B1 FMR 54x CPU Board	960007979	B	960007979	C	

Changes made to the printed circuit boards do not affect any testing or evaluation conducted in this report. All testing remained valid and representative. No further testing was deemed necessary.

Project 2039825: The following was considered to evaluate the changes covered by this project.

Addition of US Certification: All the products covered by this Certificate are already approved for use in the US by Factory Mutual. The manufacturer provided a copy of the Approval report 3005776 (for IS, DIP and Div. 2) which was reviewed and found acceptable. Refer to Descriptive Documents Package for FM report.

Addition of Dual Seal device rating per ANSI/ISA-12.27.01-2003:

The Micropilot S FMR5xx was evaluated and tested to ANSI/ISA 12.27.01 as “Dual Seal” devices for the full rated pressure range. The following Ordinary (Non-hazardous) Locations tests were conducted by Endress+Hauser GmbH+Co. KG under the CSA Category Certification Program. Refer to E + H Test Reports 970000538, 970000539 and 970000540 in the Descriptive Documents, for complete test results:

Primary Seal Leakage Test: ANSI/ISA 12.27.01, Cl. 6.3.1

Refer to the Descriptive Documents Package for the Endress + Hauser Test Report # 970000540.

A test pressure equal to twice the value of the rated MWP was applied to the various versions of Micropilot S primary seals for a period of one minute; results showed that there was no visible leakage observed; results were acceptable.

Primary Seal Burst Pressure Test: ANSI/ISA 12.27.01, Cl. 6.3.2

Refer to the Descriptive Documents Package for the Endress + Hauser Test Report # 970000540.

A test pressure equal to three-times the value of the rated MWP was applied to the various versions of Micropilot S primary seals for a period of one minute; results showed that there was no rupture observed; results were acceptable.

Venting Pressure Determination: ANSI/ISA 12.27.01, Cl. 6.3.3

Verification of Annunciation Effectiveness: ANSI/ISA 12.27.01, Cl. 6.3.4

Refer to the Descriptive Documents Package for the Endress + Hauser Test Report # 970000538.

A sample (with primary seal removed/disabled) was tested such that the test pressure was applied until visible leakage (and/or rupture) was observed exiting from the enclosure cover of the Electronics Compartment with windowed cover and blind cover. The pressure at leakage point (and/or rupture) was recorded.

Results: Glass cover shattered and blind cover cracks; Leakage and/or rupture pressure: 20 bar (290 psi)

Secondary Seal Leakage Test: ANSI/ISA 12.27.01, Cl. 6.3.5

Equipment Incorporating Venting: ANSI/ISA 12.27.01, Cl. 6.3.5.1

Refer to the Descriptive Documents Package for the Endress + Hauser Test Report # 970000539.

A test pressure of 30 bar (435 psi) (150% of the highest venting pressure determination recorded as per Cl. 6.3.3) was applied to the secondary seal for a period of one minute. There was no visible leakage observed through the electrical connection (conduit) side. Results were acceptable.

Project 2365444 – Edition 7: Update to cover minor improvement, alternative construction and drawings revision as follows:

- Control drawings revision on the permissible medium temperature;
- Planar antenna assembly drawing 960397-0003_C replaced with 960008917;
- FMR53x Ex Limiter Ex ia drawings 960397-0037_A/B/C; -0038_C; and -0039_B deleted and replaced with existing module FMR54x Ex i Limiter (Filter) drawing 960007973_A;
- Included alternative antenna of Fin Coupling 26 GHz with glass feed-through dwg 960004852, FMR250/540 Parabolic antenna (RD) with fin dwg 960008922, and FMR250/540 horn antenna (RD) with fin dwg 960008933 (these three drawings have been accepted in Report 1039154 under Project 2204376); and
- FMR54x Power Supply circuitry with C122, rated 1nF, added;

The above alternative constructions and drawings revision were reviewed to be acceptable in conjunction with FM Revision Report 797-26823-283 dated Nov. 17th, 2010 provided by the submittor.

Tests and/or evaluation conducted in this report remained representative. No further testing was deemed necessary.

End of report.