

APPROVAL REPORT

**MODEL LD290 and LD291 PRESSURE TRANSMITTERS
for
HAZARDOUS (CLASSIFIED) LOCATIONS**

Prepared For:

**Smar Equipamentos Industriais LTDA
Avenue Dr. Antonio Furlan Jr. 1028
Sertaozinho - SP CEP 14.160
Brazil**

**J.I. 4B9A4.AX
(3610,3611,3615)**

September 11, 1997

FACTORY MUTUAL



1151 Boston-Providence Turnpike
P.O. Box 9102
Norwood, Massachusetts 02062

Factory Mutual Research Corporation
 1151 Boston-Providence Turnpike
 P.O. Box 9102
 Norwood, Massachusetts 02062

4B9A4.AX
 (3610, 3611, 3615)

September 11, 1997

MODELS LD290 and LD291 PRESSURE TRANSMITTERS
 FOR
 HAZARDOUS (CLASSIFIED) LOCATIONS
 from
 SMAR EQUIPAMENTOS INDUSTRIAIS LTDA
 AV. DR. ANTONIO FURLAN JR. 1028
 SERTAOZINHO - SP CEP 14.160, BRAZIL

I. INTRODUCTION

1.1 Smar Equipamentos Industriais LTDA requested Approval of the apparatus listed in Section 1.2 to be in compliance with the applicable requirements of the following standards:

Title	FMRC No.	Issue Date
Electrical Equipment for Use in Hazardous (Classified) Locations General Requirements	Class No. 3600	March 1989
Intrinsically Safe Apparatus for Use in Class I, II and III, Division 1 Hazardous (Classified) Locations. <i>Note: 1.5 factor applied to voltage and current rather than energy.</i>	Class No. 3610	October 1988
Electrical Equipment for Use in Class I, Division 2, Class II, Division 2 and Class III, Division 1 and 2 Hazardous Locations	Class No. 3611	April 1986
Explosionproof Electrical Equipment, General Requirements	Class No. 3615	March 1989
Electrical and Electronic Test, Measuring, and Process Control Equipment	Class No. 3810	March 1989
Enclosures for Electrical Equipment (1000V max)	NEMA Pub. 250	1991

1.2 This report supplements FMRC Approval Reports 2Q6A3.AX, 3V1A6.AX and 4Y3A4.AX which covered process pressure, explosionproof, corrosion, and NEMA 4X testing of the LD300, LD301 and LD302 Transmitters which have materials of construction, process interfacing hardware and a metallic housing similar to the LD290 and LD291 Pressure Transmitters covered under this project.

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Job Identification 4B9A4.AX

1.3 The following was evaluated as intrinsically safe apparatus for Class I, II and III, Division 1, Groups A,B,C,D,E,F and G hazardous (Classified) locations in accordance with Entity requirements and Control Drawing 38A-2075, Rev. 3; explosionproof for Class I, Division 1, Groups A,B,C and D; dust-ignitionproof for Class II and III, Division 1, Groups E, F and G; nonincendive for Class I, Division 2, Groups A, B, C and D hazardous (Classified) indoor and outdoor (NEMA Types 4X and 6P) locations will appear in the Approval Guide as follows:

XP/I/1/ABCD; DIP/II,III/1/EFG
IS/I,II,III/1/ABCDEFG - 38A-2075/3 - Entity
NI/I/2/ABCD

Maximum Entity parameters: $V_{max} = 30 \text{ V}$, $I_{max} = 110 \text{ mA}$, $C_i = 8 \text{ nF}$, $L_i = 0.24 \text{ mH}$

Low Cost Pressure Transmitter. Model LD290ab-cd-ef/g

- a = Range M2,M3, M4 or M5.
- b = Diaphragm material 1I,2I,3H or 4H.
- c = Local indicator 0 or 1.
- d = Process connection 1, G or M.
- e = Electrical connection 0, A or B (I.S. version only).
- f = Mounting bracket 0,1,2,7 or Z.
- g = Option H1.

Intelligent Pressure Transmitter. Model LD291ab-cd-ef/g

- a = Range M2,M3, M4 or M5.
- b = Diaphragm material 1I,2I,3H or 4H.
- c = Local indicator 0 or 1.
- d = Process connection 1, G or M.
- e = Electrical connection 0, A or B (I.S. version only).
- f = Mounting bracket 0,1,2,7 or Z.
- g = Option H1.

II DESCRIPTION

2.1 **LD290 and LD291 Pressure Transmitters** - These are pressure transmitters for gauge measurement. They both have a capacitive sensor, and are pure 4-20mA process measurement loop transmitters. Besides their analog output, their microprocessor-based electronics allow for total interchangeability with Smar capacitive sensors and automatically corrects sensor characteristic changes caused by temperature fluctuations. They have an optional 4 ½ digit, 5 character alphanumeric LCD digital display for local indication. Switches located beneath the identification plate, actuated by a magnetic tool, enables local programming of process control parameters. The only difference between models is in the program memory (firmware). The LD291 firmware offers digital HART based communications for calibration and remote diagnostics, while the LD290 firmware does not have this feature.

2.2 Functional Specifications

Output: 4-20mA

Power Supply range = 12 to 45 Vdc

Operating Ambient: -40°C to +60°C

Overpressure Limits: 2000psi for ranges 2,3,4
4500psi for range 5

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2.3 Physical Specifications:

Electrical Connection: ½-14 NPT or G ½ DIN 16288
Wetted parts: Isolating Diaphragms and Process Connection: 316SST, Hastelloy C276
Electronic Housing: The housing is cast aluminum alloy with polyester paint. An optional 316 stainless steel housing is available. It has two compartments, one for the electronics and one for the field wiring. A threaded (M76 X 1.27) aluminum alloy blank cover threads onto the field wiring compartment and a cover with a window threads onto the electronic compartment. The glass window forms a spigot type joint with the cover. The field wiring compartment portion of the enclosure body contains two ½ inch, 14 NPT conduit openings for power supply connections. The electronics compartment portion of the enclosure body contains a threaded opening (M46 X 1.27) that is used for connection of a pressure sensor. O-rings are provided between the covers and the enclosure body, between the glass window and cover, and between the enclosure body and pressure sensor to provide a seal for outdoor protection. Switches located beneath the identification plate and sealed by rubber boots and are actuated by a magnetic tool enabling local adjustment of process control parameters. The internal wall between compartments contains threaded RFI feedthroughs. The pressure sensors have an operating pressure range up to 3600 psi. Weight is less than 2 lbs.

Identification plate: 316 SST

2.4 **Electronics** - The electronic components are implemented on four circuit board assemblies as indicated in the table below. The circuit boards are conformally coated. The material is epoxy-glass with a Comparative Tracking Index (CTI) of 140 and a flammability rating of ANSI/UL94 V-0.

Product	Terminal Block	Main Board	Cap. Sense Bd.	Display Board
Both LD290 and LD291 Transmitters	GLL748 102B0215	GLL852 102B0122	GLL910 102B0073	GLL802 102B0043

III EXAMINATION AND TESTS

Representative samples of the transmitters, circuit board assemblies and components were examined and tested by FMRC to determine their acceptability for use in the specified hazardous locations. Examination parameters are described in this section, with details contained in Project Data Record 4B9A4.AX. Also included was a review of the manufacturers documentation and the physical construction of the apparatus. All were satisfactory and are summarized below.

3.1 **Intrinsic Safety Examination - Entity**

Entity - Under "Entity" requirements, the concept allows interconnection of intrinsically safe apparatus to associated apparatus, not specifically examined in such combination. The criteria for interconnection is that the voltage (V_{max}) and current (I_{max}) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal to or greater than the voltage (V_{oc} or V_t) and current (I_{sc} or I_t) levels which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance (C_i) and inductance (L_i) of the intrinsically safe apparatus, including interconnecting wiring, must be equal or less than the capacitance (C_a) and inductance (L_a) which can be safely connected to the associated apparatus. If these criteria are met the combination may be connected.

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3.1.1 Capacitance Assessment, Both Models - Internal capacitors were found to be satisfactorily clamped by an infallible connection of triplicated transient suppression zener diodes (Z1,Z2,Z3, SMBJ6.5A, 6.5V), with some also including series connected current limiting resistors. There are no combinations of capacitors, under both normal and fault conditions, which are capable of causing spark ignition of a GP A,B test gas mixture of hydrogen-and- air. The internal capacitance, C_i , results only from the capacitance of the EMI filters (Murata Type 1202-005 or Tusonix Type 4202-016) in the input circuit. The value of $C_i = 8 \text{ nF}$, as specified by the manufacturer, combined with the maximum specified voltage, $V_{\text{max}} = 30\text{V}$, is acceptable.

$$V_{\text{max}} = 30 \text{ V}$$

$$C_i = 8 \text{ nF}$$

3.1.1.1 LD290 and LD291 Capacitance Sensor - The capacitive sensor has a maximum capacitance of 400 pF. The sensor circuit is galvanically isolated by Optoisolators U5 and U6, SMAR P# ICMOC205, and Isolation Transformers T1 and T2. The maximum voltage applied to the sensor under fault conditions is 8.4V. At this energy level the capacitance sensor is incapable of igniting a GP A,B mixture of hydrogen-and-air.

3.1.2 Inductance Assessment, Both Models - The only inductive components are Transformers T1 and T2. These are fully encapsulated within the GLL 910 Capacitive Sense Board, and are not a source of spark ignition. Internal protective components prevent the transformers from discharging into the field wiring. The unprotected inductance at the field wiring terminals is zero ($L_i = 0$). The manufacturer specifies $L_i = 0.24 \mu\text{H}$. This value, when combined with the maximum specified current $I_{\text{max}} = 110 \text{ mA}$, is acceptable.

$$I_{\text{max}} = 110 \text{ mA}$$

$$L_i = 0.24 \mu\text{H}$$

3.1.2.1 T1 and T2 Dielectric Strength Testing - These transformers provide isolated power to the sensor electronics. Three samples each of similarly constructed transformers were dielectric strength under J.I. 4Y3A4.AX by applying 1600 Vrms between the primary winding and secondary winding. There was no leakage or breakdown, verifying acceptable insulation characteristics.

3.1.3 Optoisolator Dielectric Strength Testing - Optoisolators, Motorola Type MOC205, galvanically isolate sensor circuitry from the remainder of the electronics on the transmitters. Samples of the optoisolator were tested under J.I. 4Y3A4.AX by applying a test voltage of 1500 Vrms, 60 Hz between all emitter inputs connected together, and all detector outputs connected together. There was no leakage or electrical breakdown of the insulation, confirming the acceptability of this device as an isolator between intrinsically safe (secondary) circuits.

3.1.4 Temperature Evaluation - Temperature evaluation revealed that under normal conditions the transmitter contains no components which generate a significant amount of heat. Under the most unfavorable fault conditions the hottest component is Transistor Q1 (SMD SOT223, Zetec FZT757 on GLL852) which can reach a temperature of 128°C (including 5°C uncertainty) referred to the maximum operating ambient temperature of 60°C . A Temperature Identification Number of T4 is required to be marked on the product label.

$$T_{\text{amb}} = 60^\circ\text{C} \quad \text{Temperature Identification Number} = \text{T4} (135^\circ\text{C})$$

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3.1.5 Protective Components - The protective components are listed below. All were found to be properly derated under both normal and fault conditions.

Assembly	Component Designation	Type and Rating
Display Board GLL802	None	
Main Board GLL852	Z1,Z2,Z3	Transient Suppression Zener Diode, 6.5V, 7.98Vzmax, 75W@Tamb=60°C, General Instrument SMBJ6.5A, Smar P# DI SMBJ6.5A
	R12	Resistor, 49.9Ω, 1%,1W,Dale WSC1
	R1	20kΩ, 1%, 0.125W, SMD1206
	R2	374kΩ, 1%, 0.125W, SMD1206
	D3,D4	Diode, Rectifier, Smar P# DI RLS4148 , SMD1406, Vr=75V
	R3	Resistor, 10Ω, 1%.0.125W,SMD1206
GLL 748 Terminal Block	None	
Cap Sense Board GLL910	T1	P# 102B030800, Transformer, Isolation
	T2	P# 102B030700, Transformer. Isolation
	U5,U6	Optoisolator, Motorola MOC205, 2500Vrms Isolation

3.1.6 Construction/Creepage and Clearance - Creepage and clearance distances measured between conductive parts of circuits affecting intrinsic safety meet minimum requirements for the applicable voltage in accordance with Table 6.1 of FMRC Class Standard 3610 for coated circuit boards. The printed circuit board laminate Comparative Tracking Index (CTI) is satisfactorily rated at 140.

3.1.7 Class II and Class III Evaluation - Intrinsic safety Approval for Classes II and III, Division 1 is based on satisfactory spark ignition characteristics for Class I, Division 1, Group C as described above, and the dust-exclusion testing described in Section 3.4. These tests verify the suitability of the LD290 and LD291 Pressure Transmitters for use in Class II, Division 1, Group E, F and G and Class III, Division 1 hazardous locations.

3.2 Nonincendive Examination - Nonincendive equipment acceptability is based on the inability of the apparatus to release sufficient electrical or thermal energy under normal operating conditions to cause ignition of specific hazardous atmospheres. The following examination verified the suitability of the LD290 and LD291 Transmitters as nonincendive for Class I, Division 2, Group A, B,C and D hazardous (classified) locations.

3.2.1 Make/Break Evaluation - The Main Board GLL852 has local adjust reed switches RS1, RS2 that operate at the nonincendive level of 5 Volts and 5 Microamperes.

3.2.2 Connectors - All connectors (between boards) operate at nonincendive energy levels and are mechanically secured.

3.2.3 Fuses - There are no fuses in this equipment.

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3.2.4 Temperature Evaluation - The temperature marking of the intrinsically safe version also applies to the nonincendive version.

Tamb = 60°C Temperature Identification Number = T4 (135°C)

3.3 Explosionproof Testing - The LD290 and LD291 Transmitter housings are similar to the housings used in the Model LD302 Differential Pressure Transmitter tested and Approved as explosionproof for Class I, Division 1, Groups A,B,C and D hazardous (classified) locations under J.I. 4Y3A4.AX. No further testing was required for this examination.

3.4 Dust-Ignitionproof Tests - Testing of the Model LD302 under J.I. 4Y3A4.AX verified the suitability of the LD290 and LD291 Transmitters as dust-ignitionproof for Class II and III, Division 1, Group E, F and G hazardous (classified) locations. No further testing was required for this examination.

3.5 Environmental Tests - Testing of the Model LD302 under J.I. 4Y3A4.AX verified the NEMA 4X and NEMA 6P rating of the Model LD290 and LD291 Transmitters. No further testing was required for this examination.

3.6 Protection From Shock, Fire, and Injury - Protection against shock, fire and injury is based upon the ability of the equipment to minimize the risk of electrical shock, injury, or fire.

3.6.1 Accessible Parts - There are no accessible (or live) parts. The metallic enclosure offers protection against contact with the internal circuitry.

3.6.2 Grounding and Bonding - The enclosure contains an internal grounding terminal threaded directly into the enclosure. It is suitably identified by the IEC417 Symbol #5017. There is also a suitably identified grounding terminal located on the outside of the enclosure. All parts of the enclosure are bonded to the grounding terminal by a resistance less than 0.1Ω.

3.6.3 Flammability Testing - Insulating materials used in the transmitters were not subjected to flammability testing because the enclosure, circuit board and other materials within it are made from flame retardant materials. All printed wiring board laminates are FR-4 epoxy resin with ANSI/UL-94 V-0 flammability classification. The transmitter affords the required degree of protection against fire.

3.6.4 Dielectric Strength Test - A representative sample transmitter was subjected to the application of 500 Vrms, 60 Hz, between the power supply circuit terminals connected together and the protective ground terminal (enclosure). There was no leakage or breakdown, verifying satisfactory insulation characteristics.

3.6.5 Temperature Testing - The power dissipation of the apparatus is incapable of raising the enclosure surface temperature more than the allowable limit of 35°C.

3.6.6 Hydrostatic (Process Pressure) Tests - Testing of the pressure sensors used in the models LD290 and LD291 was waived based on satisfactory process pressure test results obtained for identical pressure sensors that are used in the Model LD300 and LD301 Transmitters as described in FMRC Approval Report J.I. Nos. 3V1A6.AX and 2Q6A3.AX.

IV MARKING

Marking meets standard requirements as illustrated by the attachments.

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V REMARKS

- 5.1 System installation instructions and the National Electrical Code (ANSI/NFPA 70) shall be followed when installing this equipment.
- 5.2 Control room equipment connected to associated apparatus shall not use or generate more than 250 Vrms.
- 5.3 Tampering or replacement with nonfactory components may adversely affect the safe use of the system.
- 5.4 For guidance on installation, see ANSI/ISA RP12.6, "Wiring Practices for Hazardous (Classified) Locations. Instrumentation Part I: Intrinsic Safety."

VI FACILITIES AND PROCEDURES AUDIT

The manufacturing site in Sertaozinho, Brazil is examined on a periodic basis with regard to facilities and quality control procedures. Results are satisfactory in that the level of performance assures continued product quality as originally Approved herein.

VII MANUFACTURER'S RESPONSIBILITIES

- 7.1 The documentation listed in Section VIII is applicable to this Approval and is on file at Factory Mutual Research Corporation. No changes of any nature shall be made unless notice of the proposed change has been given and written authorization obtained from FMRC. The Approved Product - Revision Report, FMRC Form 797 shall be forwarded to Factory Mutual Research Corporation as notice of proposed changes.
- 7.2 The manufacturer is required to supply all users with Control Drawing 38A-2075.
- 7.3 On 100% of production, as a routine production line test, the transmitters shall be subjected, without electrical breakdown, to the application of a test voltage between the power supply circuit terminals connected together and accessible conductive parts. The test potential shall be 600 Vrms, 45 to 60 Hz, or 860 Vdc, applied for one second. Alternatively, the test potential shall be 500 Vrms, at a frequency between 45 to 65 Hz, or 707 Vdc applied for one minute.

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VIII DOCUMENTATION

The following documentation is applicable to this Approval and is on file at Factory Mutual Research Corporation.

<u>Document No.</u>	<u>Rev.</u>	<u>Title</u>
<u>LD290 DRAWINGS:</u>		
101A2778	00	LABEL, FM, LD290
101E005500	01	LD290 DIMENSIONAL DWG. w/INDICATOR
102B027400	27/03/97	LD290 PRINTED CIRCUIT BOARDS LIST
<u>LD291 DRAWINGS:</u>		
101A2779	00	LABEL, FM, LD291
101E005800	10/12/96	LD291 DIMENSIONAL DWG. w/INDICATOR
102B027700	27/03/97	LD291 PRINTED CIRCUIT BOARDS LIST
<u>DRAWINGS COMMON TO BOTH LD290 AND LD291:</u>		
102A022600	01/05/97	GLL910 PWB TOP SILK+TRACE DIAGRAM
102A022701	1	GLL802 PWB TOP SILK+TRACE DIAGRAM
102A024200	18/04/97	GLL748 TOP SILK+PWB TRACE DIAGRAM
102A024300	18/04/97	GLL852 PWB TOP SILK+TRACE DIAGRAM
102B004304	4	SCHEM., FIELD DEVICES DISPLAY, GLL802+BOM
102B007306	06	SCHEM., FIELD DEV. CAP. SENSE BOARD, GLL910+BOM
102B012202	2	SCHEM., FIELD DEVICES MAIN BOARD, GLL852 + BOM
102B021501	01	SCHEM., FIELD DEVICES TERMINAL BLOCK, GLL748 + BOM
102B030700	21/01/97	TRANSFORMER, GENERAL INFORMATION
102B030800	21/01/97	TRANSFORMER, GENERAL INFORMATION
38A-2075	3	LD301,LD290,LD291 CONTROL DRAWING

IX CONCLUSION

The apparatus described in Section 1.2 meets Factory Mutual Research Corporation requirements. Approval is effective when the Approval Agreement is signed and received by FMRC.

EXAMINATION AND TESTS BY: Ralph Masi and Andy Lozinski

ATTACHMENTS: Control Drawing 38A-2075, Rev. 3
LD290 Label Dwg. 101A2778, Rev. 00
LD291 Label Dwg. 101A2779, Rev. 00

ORIGINAL TEST DATA: Project Data Record 4B9A4.AX

WRITTEN BY:

REVIEWED BY:



Ralph V. Masi, P.E.
Instrumentation Section
Approvals Division



R. H. Lelievre, Assistant Manager
Instrumentation Section
Approvals Division

**APPROVED PRODUCT/SPECIFICATION TESTED - REVISION REPORT
OR ADDRESS/CONTACT CHANGE REPORT**



SENDER: Forward with updated drawings or other appropriate change information to the attention of the **Approvals Division**. Original will be returned showing course of action taken.

Additional forms may be requested by writing to the attention of the **Factory Mutual Stock Room**.

FORWARD TO:
FACTORY MUTUAL RESEARCH
1151 Boston-Providence Turnpike
P.O. Box 9102
Norwood MA 02062

Please type below: Attention of, Company Name, Address, City, State & Zip Code.

Attn: Ricardo Leite
Smar Research Corp.
4250 Veterans Memorial HWY
Holbrook - NY
ZIP 11741

Attention: Mr. Andrew Lozinski

Date
April 15, 2002

FORWARD BY
Ricardo Leite

TITLE
Electronic Engineer

SIGNATURE
Ricardo Leite

MODEL(S) AFFECTED
LD290/LD291
Pressure Transmitter

Phone: 631-737-3111 Fax: 631-737-3892

PRODUCT(S)
LD290/LD291 - Pressure Transmitter

DOES THIS REVISION RESULT IN MODEL/TYPE NO. CHANGE TO THE CURRENT APPROVAL GUIDE LISTING? IF YES, EXPLAIN (USE SEPARATE SHEET IF REQUIRED): YES NO

INDICATE FACTORY MUTUAL RESEARCH JOB IDENTIFICATION(S) AFFECTED
J.I. 4B9A4.AX

HAS THE MANUFACTURING LOCATION, LISTING ADDRESS, TELEPHONE NUMBER OR CONTACT PERSON CHANGED? IF YES, EXPLAIN BELOW: YES NO

REVISION DETAILS	DWG. NO. AFFECTED	REV.	NEW DWG. NO.	REV.
- The Terminal Block A new option was included into item Filter 2nF 1000V 25A	102B-0506	01	102B-0506	02 - 0
The bill of material annex to schematic drawing was excluded and general components and Term Assembl list was included			LM102-0415 LM102-0161	00 - 0 04 - 0

REASON FOR CHANGE(S)/COMMENTS:

- * This new option of filter is more inexpensive.
The material control system was changed to comply with production process.

BELOW FOR FACTORY MUTUAL RESEARCH USE

COMMENTS:
- change does not affect safety, 2nF is ^{same as} less than the total 4.8nF previously approved on terminal block.
- updated CDL

REVISION REPORT J. I.	REVISION NOTICE NO. E01061-283-9	CLASS NO. 3610/3611/3615
FORWARD APPROVAL/SPECIFICATION TESTED AGREEMENT <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
REVISION ACCEPTED <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
EXAMINED BY <i>Ricardo Leite</i>	DATE May 3, 2002	
REVIEWED BY <i>[Signature]</i>	DATE May 28, 2002	



FM Approvals
1151 Boston-Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: 781 762 4300 F: 781 762 9375 www.fmglobal.com

June 22, 2004

Mr. Graziela Castro
Smar Equipamentos Industriais Ltda.
Av: Dr. Antonio Furlan Jr. 1028
Sertaozinho, SP, Brazil CEP: 14170-480

Subject: **Re-Examination of Various Products as Nonincendive for use in Class I, Division 2, Groups A, B, C and D Hazardous (Classified) Locations**

Project ID: 3020638

Re: 4Y3A4.AX, 4B9A4.AX, 3W0A4.AX, 0D7A9.AX, 3V1A6.AX

Dear Mr. Castro,

Per your request, we have conducted the re-examination of the products identified below to the relevant requirements of FM Class 3611 Standard, issue date 1999. The products were found to be in compliance with the latest edition of FM Class 3611 Standard and therefore you may continue to mark the products as FM Approved as Nonincendive for use in Class I, Division 2, Groups A, B, C and D Hazardous (Classified) Locations.

BT302 Fieldbus Terminator
DT302 Density Transmitter
DT303 Density Transmitter
FI302 Fieldbus to Current Converter
FI303 Fieldbus to Current Converter Profibus PA
IF302 Current to Fieldbus Converter
IF303 Current to Fieldbus Converter Profibus PA
LD290 Low Cost Pressure Transmitter
LD291 Intelligent Pressure Transmitter
LD292 Smart Pressure Transmitter
LD293 Smart Pressure Transmitter
LD301 Pressure Transmitter
LD302 Level Transmitter
LD303 Pressure Transmitter Profibus PA
TT301 Intelligent Temperature Transmitter
TT302 Temperature Transmitter
TT303 Temperature Transmitter Profibus PA

The issuance of this report is considered to be the completion of this program. You will be billed for work performed to date.

Should you have any questions, or wish to pursue this activity in the future, please do not hesitate to contact the undersigned.

REPORT BY:

Brad A. Bombardier
Brad A. Bombardier
Engineer
Hazardous Locations

REPORT REVIEWED BY:

David Styrula
David Styrula
Technical Team Manager
Hazardous Locations