APPROVAL REPORT

LD301 SERIES LEVEL AND PRESSURE TRANSMITTERS (PRODUCT REVISION) FOR HAZARDOUS (CLASSIFIED) LOCATIONS

Prepared For:

Smar Equipamentos Industriais LTDA.
AV. DR. Antonio Furlan JR. 1028
Sertaozinho - SP CEP 14.160 BRAZIL

J.I. 0X3A8.AE
(3615)
June 2, 1994

Factory Mutual System

Factory Mutual Research

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

Factory Mutual System

Factory Mutual Research

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

J. I. 0X3A8.AE **June 2, 1994**

(3615)

LD301 SERIES LEVEL AND PRESSURE TRANSMITTERS (PRODUCT REVISION) 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 Factory Mutual Research Corporation (FMRC) Approval of their revised LD301 Series Level and Pressure Transmitters as explosionproof for Class I, Division 1, Groups A, B, C, and D; dust-ignitionproof for Class II/III, Division 1, Groups E, F, and G, hazardous (classified) locations, indoor and outdoor (NEMA Types 4X & 6).

1.2 The model numbers as listed in the FMRC Approval Guide remain unchanged by this revision, the only listing change is the addition of Group A to the explosionproof hazardous location rating.

1.3 Approval of the subject equipment is based on the applicable requirements of the following standards.

TITLE	AUTHOR-NUMBER	DATE
Electrical Equipment For Use In Hazardous (Classified) Locations General Requirements	FMRC-3600*	1989
Explosionproof Electrical Equipment	FMRC-3615*	1989

TITLE	AUTHOR-NUMBER	DATE
Electrical and Electronic Test, Measuring and Process Control Equipment	FMRC-3810*	1989
Enclosures for Electrical Equipment	ANSI/NEMA-250	1991

* These standards are based in large part on standards recognized by the American National Standards Institute (ANSI).

1.4 This report is a supplement to Approval report 0W4A9.AE, dated October 19, 1992 which describes the original Approval of the LD301 Series. The addition of Group A, and a change in the cover to housing threads required an additional evaluation.

1.5 As described in this report, the construction of these units provides the degree of protection against electrical shock, fire, and injury required for hazardous (classified) locations.

II DESCRIPTION

2.1 The LD301 Series are electronic Level and Pressure Transmitters which convert a pressure or level indication to a 4-20 mA output signal. They are available in differential, gage, absolute, and level measurement types. The transmitter consists of an electronics and field wiring compartment, the pressure or level sensor, and the sensing electronics. The LD301 Series are rated for ambient temperatures up to 60 °C.

2.1.1 The electronics compartment is constructed of aluminum alloy and consists of a base and a cover. There is an o-ring seal on the cover to protect against the ingress of dust and water. The electronics housing is separated from the field wiring housing by a solid aluminum wall. There is a provision in the electronics housing for the entrance of the sensor assembly.

2.1.2 The field wiring compartment is constructed of aluminum alloy and consists of a base and a cover. There are two 1/2 " NPT conduit entries provided in the base of the field wiring housing. There is an o-ring seal on the cover to protect against the ingress of dust and water.

2.1.3 The pressure and level sensors are constructed of either stainless steel, hastelloy, monel 400, or tantalum and are of a totally welded design. The sensor connects to the electronics housing via a threaded flamepath. This flame path has an o-ring seal to protect against the ingress of dust and water. The sensors are rated for working pressures up to 3,600 psi.

2.2 For further descriptive information of the LD301 Series Level and Pressure Transmitters refer to the attached product specifications and sales literature.

III MARKING

Each model is provided with a stainless steel, permanently attached, nameplate. The nameplate drawing 096A0131 Rev. 04 is included as an attachment to this report.

IV EXAMINATION AND TESTS

4.1 A sample LD301 Housing with one window cover and Differential Pressure Cell attached, which was considered to be representative of production models was examined, tested, and compared to the manufacturers drawings and FMRC Approval requirements. All data is on file at FMRC along with other documents and correspondence applicable to this program.

4.2 EXPLOSIONPROOF TESTS - The following tests verify the suitability of the LD301 Series Level and Pressure Transmitters as explosionproof for Class I, Division 1, Groups A, B, C, and D hazardous (classified) locations.

The window cover flamepath does not meet FMRC requirements, therefore an additional factor of safety was added by increasing the maximum design gap by 50%.

4.2.1 **Ignition Tests-Conduit Compartment -** A series of ten tests were performed on the sample with 18 inches of 1/2" rigid metal conduit installed in the provided conduit entry. The test gas used was acetylene, representative of Group A, ranging in concentrations from 5.9% to 12.4% by volume, in air. Prior to the ignition tests a 30% mixture of acetylene in air was ignited inside the enclosure to produce carbon deposits in the sample. Ignition was initiated by a spark plug located at the far end of the conduit length. Ignition internal to the enclosure did not result in propagation to an identical external atmosphere surrounding the enclosure during any of these tests, nor was any visible permanent deformation of the enclosure observed. The highest ignition pressure was 245 psi (1689 kPa) at a gas concentration of 7.3%. This is satisfactory.

4.2.2 **Ignition Tests-Electronics Compartment -** A series of ten tests were performed on the sample using acetylene, representative of Group A, ranging in concentrations from 5.9% to 12.4% by volume, in air. Prior to the ignition tests a 30% mixture of acetylene in air was ignited inside the enclosure to produce carbon deposits in the sample. Ignition was initiated by a spark plug located at the far end of the conduit length. Ignition internal to the enclosure did not result in propagation to an identical external atmosphere surrounding the enclosure during any of these tests, nor was any visible permanent deformation of the enclosure observed. The highest ignition pressure was 115 psi (793 kPa) at a gas concentration of 10.3%. This is satisfactory.

4.2.3 **Hydrostatic Test-** A hydrostatic test was conducted on the entire sample at a pressure equal to 400% of the maximum ignition pressure recorded on the conduit side. The pressure was increased gradually and held at the test pressure 980 psi (6757 kPa) for one minute. No visible permanent deformation occurred. This is satisfactory.

4.3 All other tests as described by Approval report 0W4A9.AE, dated October 19, 1992 remain applicable and further testing was not considered necessary.

V REMARKS

Installation shall be in accordance with the manufacturer's instructions and the National Electrical Code ANSI/NFPA-70.

VI FACILITIES AND PROCEDURES AUDIT

The manufacturers design and manufacturing facilities in Sertaozinho, Brazil are subject to follow-up audits. The facilities and quality control procedures in place were found satisfactory to manufacture a product identical to that tested and Approved.

VII MANUFACTURER'S RESPONSIBILITIES

7.1 The manufacturer shall advise FMRC of all proposed changes to the documents listed in Section IX via form 797, Approved Product Revision Report.

7.2 On 100% of production, the LD301 Series Level and Pressure Transmitters shall be dielectric tested. The power input connections shall withstand for one minute, with no insulation breakdown, the application of 500 Vac with respect to the protective ground terminal. Alternatively, test potentials 20% higher may be applied for at least one second.

WARNING: The dielectric test required may present a hazard of injury to personnel and/or property and should only be performed under controlled conditions, and by persons knowledgeable of the potential hazards of such testing to minimize the likelihood of shock and/or fire.

7.3 On 100% of production, the manufacturer shall inspect the protective grounding system of the LD301.

VIII CONCLUSION

Smar Equipamentos Industriais LTDA. LD301 Series Level and Pressure Transmitters, as herein described, meet FMRC Approval requirements. Approval is effective when the Approval Agreement is signed and received by FMRC.

IX DOCUMENTATION FILE

The following documentation has been added to file 0W4A9.AE.

DOCUMENT NUMBER	DOCUMENT TITLE	REVISION
096A0131	NAMEPLATE	04
096B0027	BLANK COVER	04
096B0028	WINDOW COVER	06
096D0004	DIMENSIONAL DRAWING	08

TESTS AND EXAMINATION BY: -M. J. Morrow
-J. J. Woolley

ATTACHMENTS:	Nameplate drawing	096A0131 Rev. 04
	Product Specification	9/93

ORIGINAL DATA: Project Data Record 0X3A8.AE

REPORT BY:

Michael J. Morrow
Electrical Engineer, Electrical Section

REPORT REVIEWED BY:

Roger P. Lutfy
Electrical Section Manager

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

Factory Mutual System

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

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

Attention: Mr. Andrew Lozinski

Date: February 19, 2002

FORWARD BY: Ricardo Leite

TITLE: Electronic Engineer

SIGNATURE: Ricardo Leite

MODEL(S) AFFECTED: LD301 - Pressure Transmitter

PRODUCT(S): LD301 - 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

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

INDICATE FACTORY MUTUAL RESEARCH JOB IDENTIFICATION(S) AFFECTED
J.I. OX3A8.AE
J.I. 3V1A6. AX

REVISION DETAILS	DWG. NO. AFFECTED	REV.	NEW DWG. NO.	REV.
- Main Board Model GLL1071 include the LCD assembly into bill of material, DSP1	102-B- 0513	05	102-B-0513	06 - OK
- The Lay-out PCB Model GLL1071, include the LCD holes fixation into PCB Drawing	102-A-0692	00	102-A-0692	01 - OK
- Main Board Model GLL1071, change the LCD to 3,3V type, DSP1 Include R33A Exclude R33 and C1 Change CN2 to another with lock system	102-B-0513	06	102-B-0513	07 - OK
- PCB Drawing (GLL1071) Apply the changes above	102-A-0692	01	102-A-0692	02 - OK

REASON FOR CHANGE(S)/COMMENTS:
- This LCD was not include in bill of material of approval report.

- This changes improvement electrical and production features.

BELOW FOR FACTORY MUTUAL RESEARCH USE

COMMENTS:
- changes do not affect safety.
- updated CDL

REVISION REPORT J. I.

REVISION NOTICE NO. E01058-283-2

CLASS NO. 3610/3611/361

FORWARD APPROVAL/SPECIFICATION TESTED AGREEMENT ☐ Yes ☒ No

REVISION ACCEPTED ☒ Yes ☐ No

EXAMINED BY DATE May 3, 2002

REVIEWED BY DATE May 28, 2002

REC'D FEB 26 2008

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

Page 1 of 2

Manufacturer's Tracking Number:

FM Approvals
An FM Global Enterprise

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

Additional forms may be obtained by sending a written request to the attention of the **FM Approvals stock room**.

customer # 1000003548

FORWARD TO:
FM Approvals
1151 Boston-Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: **+1 (1)781 762 4300** F: +1 (1)781 762 9375
www.fmglobal.com/approvals

Please provide the following information below: Attention of, Company Name, Address, State & Zip Code.

FM Approvals Representative: Di Maria, Richard

Att: Ricardo Leite
Smar Equipamentos Industriais Ltda
Av Dr Antonio Furlan Jr. 1028
14160-000
Sertaozinho SP Brasil

Phone: +55 16 3946-3516 **Fax: +55 16 3946-3577**

DATE: February 25, 2008
SENDER: Ricardo Leite
TITLE: Electronic Engineer
SIGNATURE:

MODEL(S) AFFECTED: LD301/302/303

PRODUCT(S) LD301/302/303 (Doc Number 01250208)

DOES THIS REVISION RESULT IN MODEL/TYPE NUMBER CHANGE TO THE CURRENT *APPROVAL GUIDE* LISTING? IF YES, EXPLAIN BELOW OR USE SEPARATE SHEET IF REQUIRED: ☐ YES ☒ NO

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

INDICATE ORIGINAL FM APPROVALS PROJECT IDENTIFICATION: 3024465

REASON FOR CHANGE(S)/COMMENTS:
Correct typographical error in 797T project ID 3024465, actual test pressure was 10,650psi not 16,650psi as stated in the 797T. The projects impacted by the 797T are 0D7A9.AX, 4B9A4.AX, and 4Y3A4.AX

REVISION DETAILS	AFFECTED DRAWING NUMBER	REVISION	NEW DRAWING NUMBER	REVISION

Correction!
Test: Process Pressure test

"The unit was tested at 10,650 psi (74 Mpa)" for a duration of one minut with no visible signs of leakage.

attachments: NO

FOR FM APPROVALS USE ONLY

COMMENTS:
No testing required to qualify changes.

CDL UPDATED

Master Agreement Implementation Date: 11/14/02

REVISION REPORT J. I.	ACCESS IDENTIFICATION	CLASS NUMBER
	797-20316-283	3615

REVISION ACCEPTED ☑ Yes ☐ No ☐ Third Signature Required

	DATE
EXAMINED BY: K. DiMaria	2-28-08
REVIEWED BY: C. Lozinski	2/28/08
APPROVED BY (Third signature required for listing changes only)	DATE

The original 797T referenced the incorrect test pressure value of 16,650psi; a review of the test data indicated the actual test pressure value is 10,650psi. Below is the corrected "Results" section of the 797T for project ID 3024465. The correction is underlined in the second paragraph.

> "The Standard requires the test sample be subjected to 1.75 x Pressure rating + 3.5 MPa, for a duration of one minute with no leakage. The Standard also requires the test sample be subjected to 2.5 x Pressure rating + 7 MPa for a duration of one minute without any rupture or failure which results in fragments flying outside equipment.
>
> The unit was tested at 10,650 psi (74 MPa) for a duration of one minute with no visible signs of leakage. Additionally, the sample was tested at 15,500 psi (107 MPa) for a duration of one minute without any rupture or failure which results in fragments flying outside equipment. This is satisfactory"