



## IECEx TEST REPORT COVER

ExTR Reference Number..... :	US/FMG/ExTR14.0015/03
ExTR Free Reference Number ..... :	3051174 – RR210916
Compiled by + signature (ExTL) .... :	Richard Boucher <i>Richard Boucher</i>
Reviewed by + signature (ExTL)..... :	Cheryl Gagliardi <i>Cheryl A. Gagliardi</i>
	Andrew Lozinski <i>Andrew Lozinski</i>
Approved by + signature (ExCB) ... :	James Marquedant <i>J.E. Marquedant</i>
Date of issue ..... :	27 October 2017
Ex Testing Laboratory (ExTL) ..... :	FM Approvals LLC
Address ..... :	PO Box 9102, 1151 Boston-Providence Turnpike, Norwood, MA, 02062-9102
Ex Certification Body (ExCB) ..... :	As above
Address ..... :	As above
Applicant's name..... :	ABB, Inc. – BU Measurement Products
Address ..... :	125 East County Line Road Warminster, PA 18974 USA
Standards associated with this ExTR package ..... :	IEC 60079-0:2011, 6th Edition. IEC 60079-1:2014, 7th Edition. IEC 60079-11:2011, 6th Edition. IEC 60079-15:2010, 4th Edition. IEC 60079-31:2013, 2nd Edition.
Clauses considered ..... :	All clauses considered
Related Amendments, Corrigenda or ISHs ..... :	N/A
Test item description..... :	Magnetic Level Gauge Switch
Model/type reference ..... :	LMS100.a.b.c.d Magnetic Level Gauge Switch
Code (e.g. Ex _ II_ T_)..... :	Ex db IIC T6...T1 Gb -40°C ≤Ta≤70°C Ex tb IIIC T85°C...T450°C Db -40°C ≤Ta≤70°C; Ex ia IIC T6...T1 Ga -40°C ≤Ta≤70°C Ex ia IIIC T85°C...T450°C Da -40°C ≤Ta≤70°C Ex nC IIC T6...T1 Gc -40 °C ≤ Ta ≤ 70 °C IP66 / 67
Rating..... :	Flameproof 'db' and Protection by Enclosure 'tb': 250Vac/dc, 1A, 60W/VA IS and Type n Electrical Ratings: Ui = 14 V, li = 1200 mA, Pi = 4.20 W Ui = 30 V, li = 101 mA, Pi = 757 mW Ui = 18 V, li = 440 mA, Pi = 1.98 W Ui = 60 V, li = 29 mA, Pi = 435 mW Ui = 24 V, li = 174 mA, Pi = 1.044 W

### ExTR Package Contents

Assembled ExTR documents and Additional reference material:
IECEx Test Report Cover
ExTR_Addendum_LMS100_60079-1
ExTR_Addendum_LMS100_60079-31

Manufacturer's name .....: ABB, Inc. – BU Measurement Products

Address .....: 125 East County Line Road  
Warminster, PA 18974  
USA

Trademark .....:



Certificate No. (optional) .....: IECEx FMG 14.0015X

#### Particulars: Test item vs. Test requirements

Classification of installation and use ..... : Stationary

Ingress protection ..... : IP66, IP67

Rated ambient temperature range (°C).....: -40°C to +70°C

#### General remarks:

The test results presented in this ExTR package relate only to the item or product tested.

- "(See Attachment #)" refers to additional information appended to the ExTR package.
- "(See appended table)" refers to a table appended to the ExTR package.
- Throughout this ExTR package, a point is used as the decimal separator.
- *Where the term "N/A" appears in any part of an ExTR package, it indicates that the associated issue was considered "Not applicable" to the involved evaluation.*
- *In accordance with IECEx 02, a Receiving ExCB may request a sample of the Ex equipment and copies of the documentation referred to in an ExTR Cover.*

The technical content of this ExTR package shall not be reproduced except in full without the written approval of the Issuing ExCB and ExTL.

#### General product information:

The LMS100 Magnetic Level Gauge Switch enclosure is made from 316 Stainless Steel. The enclosure body is less than 100cm<sup>3</sup>. The enclosure body has one ½"-14 NPT entry and one cover with M42-1.5 6g/6H thread. The cover contains one O-ring made from nitrile that seats into the retention groove. The enclosure body also contains two screws used for the rotational mounting bracket. Earth Grounding is made through internal and external grounding terminals made from 316 Stainless Steel. The enclosure ½"-14 NPT entry has one M20 316SS Adapter 1/2" X 20MM thread adapter, one 1/2" MNPT X 1/2" FNPT Nickel Brass Elbow thread adapter and one 1/2" MNPT X M20F Nickel Brass Elbow thread adapter.



The LMS100 is a magnetically actuated single pole double-throw switch. When the LMS100 is mounted on a KM26 Magnetic liquid level indicator, LS Series Cage Level switch or an external chamber that contains a magnetic float, it can sense high or low levels within a vessel. The unique magnetic coupling action eliminates the need for seals, diaphragms, springs, or torque tubes. There is no physical contact between the switch and the process. Magnetic coupling eliminates the necessity of process connections and insures total isolation from the process. The LMS100 consists of a form C reed switch actuated by a rotating permanent magnet. The reed switch uses precious metal contacts in an inert gas atmosphere sealed by glass to metal bond. A magnetic float travelling within the chamber, relative to the LMS100 causes the reed switch to change state. After the float has passed, the reed switch will maintain it's state until the float reverses direction and passes the switch in the opposite direction. The action of the switch is break before

make. The hermetically sealed contacts serve to insure a high degree of hazardous area safety, weather resistance and general reliability of the product. The LMS100 will provide either a normally open or normally closed dry contact which may be used to activate external devices such as alarms or annunciating device. Its main application is to sense the passing of a magnetic float in a KM26 level gauge, or similar chamber, attached to a vessel containing a fluid. These trip points can be used for alarms to activate a pump motor starter.

#### Details of change (applicable only when revising an existing ExTR package):

Transfer of the product and related certificates to a different division of ABB. Update related documentation.

#### Copy of Marking Plate:

 <b>K-TEK PRODUCTS</b> WARMINSTER, PA. 18974, USA SEE MANUAL O/LMS100	LMS100.XX.XX.XX.XX SN: 3K650000000000 MAGNETIC SWITCH  250V MAX 1A MAX 60VA MAX (NON-IS/NI)	 2460 -40°C ≤ T <sub>A</sub> ≤ 70°C	<input type="checkbox"/> II 2 G, Ex db IIC T6...T1 Gb II 2 D, Ex tb IIIC T85°C...T450°C Db FM14ATEX0029X, IECEx FMG 14.0015X <input type="checkbox"/> II 1 G, Ex ia IIC T6...T1 Ga II 1 D, Ex ia IIIC T85°C...T450°C Da FM14ATEX0030X, IECEx FMG 14.0015X <input type="checkbox"/> II 3 G, Ex nC IIC T6...T1 Gc FM14ATEX0031X, IECEx FMG 14.0015X	IP66/IP67
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#### Details regarding 'trade agent' / 'local assembler' application in accordance with OD 203:

N/A

#### In accordance with OD 024, testing not fully performed by ExTL staff at the above ExTL address:

N/A

#### National differences considered as part of this evaluation:

N/A

#### "Specific Conditions of Use" / "Schedule of Limitations":

1. Consult the manufacturer if dimensional information on the flameproof joints is necessary.
2. When the manufacturer of the equipment has not identified the type of protection on the label, the user shall, on installation, mark the label with the type of protection used.
3. The non-metallic label may store an electrostatic charge and become a source of ignition in Group III environments. Clean with a damp cloth.
4. The relationship between the temperature class, the maximum surface temperature, the ambient temperature and the process temperature is as follows:

#### For Gases and Vapours:

Max Process Temp	Temp Temperature Class
75°C	T6
90°C	T5
125°C	T4
190°C	T3
290°C	T2
416°C	T1

#### For Dusts and Fibres:

Max Process Temp	Temperature Class
80°C	T85°C
95°C	T100°C
130°C	T135°C
195°C	T200°C
295°C	T305°C
416°C	T426°C

#### Routine tests:

A dielectric strength test shall be carried out in accordance with 6.5.1 of IEC 60079-15 at 500 Vrms. Alternatively, the test shall be carried out at 1.2 times the test voltage, but shall be maintained for at

least 100 ms.

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#### Technical Documents

Title:	Drawing No.:	Revision:
<b>* LMS100 ATEX_IECEX NAMEPLATE</b>	<b>3KXL000391U0109</b>	<b>B</b>
LMS100 BARE PCB	3KXL000405U0101	NC
TERMINAL PLUG RIGHT ANGLE 5.08MM 3POS	3KXL000406U0101	NC
TERMINAL HEADER 5.08MM 3POS	3KXL000407U0101	NC
LMS100 GENERAL ASSEMBLY	3KXL130100G0001	B
LMS100 IS_NI CONTROL DRAWING	3KXL130100G0122	NC
LMS100 FLAMEPATH DRAWING	3KXL130100L0009	NC
LMS100 DATASHEET	3KXL130100R1001	A
INSULATION PAD	MIS0661	NC
<b>* LMS100 OPERATING INSTRUCTIONS</b>	<b>OI_LMS100-EN</b>	<b>B</b>

*Note: An \* is included before the title of documents that are new or revised.*



## IECEx TEST REPORT ADDENDUM

ExTR Reference Number .....	US/FMG/ExTR14.0015/03
ExTR Free Reference Number .....	3051174-RR210916
Compiled by + signature (ExTL) ....	Richard Boucher <i>Richard Boucher</i>
Reviewed by + signature (ExTL) ...	Cheryl Gagliardi <i>Cheryl A. Gagliardi</i>
Date of issue .....	2017-10-06
Ex Testing Laboratory (ExTL) .....	FM Approvals LLC
Address .....	1151 Boston-Providence Turnpike, Norwood, MA 02062, USA
Applicant's name .....	ABB Inc
Address .....	125 East County Line Road Warminster, PA 18974 United States
Standards .....	IEC 60079-31:2013
Test procedure .....	IECEx System
Test Report Form Number .....	ExTR Addendum_2 (released 2010-08)

### **Instructions for Intended Use of ExTR Addendum:**

An ExTR Addendum is to supplement a previously issued ExTR package. Only those clauses applicable to the supplemental issue being addressed are to be tabulated and remarked upon as part of this document. An ExTR of National Differences may also supplement this document. An ExTR Addendum is to be compiled and reviewed by the ExTL. The Issuing ExCB indicates final approval of the ExTR Addendum as part of the overall ExTR package on the associated ExTR Cover.

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### **Possible test case verdicts:**

- test case does not apply to the test item ..... :N / A
- test item does meet the requirement ..... :Pass

### **General remarks:**

The test results presented in this ExTR Addendum relate only to the item or product tested, and are only valid when considered together with the related Ex Test Report that was previously issued, along with any previously issued ExTR Addendums for the same item or product.

Only clauses and manufacturer's documents impacted by this document are detailed.

- "(see Attachment #)" refers to additional information appended to this document.
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**For the LMS100 the significant changes in IEC 60079-31:2013 with respect to IEC 60079-31:2008 are as follows:**

Changes	Clause	Type of Change			Determination
		Minor and editorial	Extension	Major technical	
Document has been restructured from the first edition.	Numerous	X			No new requirement.
The marked maximum surface temperature shall be measured on the external surfaces of the enclosure and the surfaces of the internal components for equipment with types of protection “ta”.	4.3.2			C1	Product does not utilize type of protection “ta”.
Additional protection for arcing and sparking parts for “ta”.	4.3.6			C2	Product does not utilize type of protection “ta”.
Limiting the internal pressure test to enclosures where the seal is not physically constrained from moving.	4.4.2		X		No new requirement.
Requirements for tapered threaded joints without an additional seal or gasket added.	5.1.2		X		No new requirement.
Requirements for cable gland aligned for all levels and Groups the only difference is now the required IP protection	5.2	X			The product does not utilize cable glands.
Requirements for plain entries added	5.3.1		X		No new requirement.
5 threads for parallel threads only required when no seal is used	5.3.2		X		No new requirement.
Test for internal enclosure for level “ta” added.	6.1.1.2			C3	Product does not utilize type of protection “ta”.
Eliminating of the “fault” table and reduction of the dust layer depth for the thermal test for type of protection “ta”.	6.1.2		X		No new requirement.

C1 – A requirement was added for “ta” to require the temperature marking to be based on the highest of either the temperature produced by the internal components or the external surface temperature.

C2 – Requirements were added for “ta” equipment that contains a normally arcing part to require a supplementary internal enclosure around the arcing part.

C3 – Requires an impact test on the supplementary enclosure for “ta” equipment.



## IECEx TEST REPORT ADDENDUM

ExTR Reference Number ..... : US/FMG/ExTR14.0015/03

ExTR Free Reference Number ..... : 3051174-RR210916

Compiled by + signature (ExTL) .... : John F. Crossen

Reviewed by + signature (ExTL) ... : Andrew Lozinski

Date of issue ..... : 23<sup>rd</sup> October 2017

Ex Testing Laboratory (ExTL) ..... : FM Approvals LLC

Address ..... : 1151 Boston-Providence Turnpike, Norwood, MA 02062, USA

Applicant's name ..... : ABB Inc

Address ..... : 125 East County Line Road  
Warminster, PA 18974  
United States

Standards ..... : IEC 60079-1:2014 (7<sup>th</sup> Ed.)

Test procedure ..... : IECEx System

Test Report Form Number ..... : ExTR Addendum\_2 (released 2010-08)

### **Instructions for Intended Use of ExTR Addendum:**

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Clause	Requirement – Test	Result – Remark	Verdict
4.2	Requirements for level of protection “da”	The equipment is not for level protection “da”, but for level of protection “db”.	N/A
4.4.1	General	The equipment is not for level protection “dc”, but for level of protection “db”.	N/A
4.4.2.1	General	Refer to 4.4.1	N/A
4.4.2.2	Free internal volume	Refer to 4.4.1	N/A
4.4.2.3	Seal protection	Refer to 4.4.1	N/A
4.4.2.4	Continuous operating temperature (COT) requirements	Refer to 4.4.1	N/A
4.4.2.5	Ratings	Refer to 4.4.1	N/A
4.4.3	Tests for “dc” devices	Refer to 4.4.1	N/A
5.1	General requirements	The flameproof joints continue to comply with the requirements of Clause 5 as outlined in Clause 5.2.	Pass
5.2.2	Gap (i)	The Subject product has no non-threaded joints. Therefore this requirement does not apply.	N/A
5.2.8	Serrated joints	The equipment does not include any serrated joints.	N/A
5.2.9	Multi-step joints	The equipment does not include any Multi-step joints.	N/A
6.1.2	Mechanical strength	The equipment does not include any cemented joints.	N/A
6.2.1	General	The equipment does not include any fused glass joints.	N/A
6.2.2	Width of fused glass joints	Refer to 6.2.1.	N/A
10.9.3.2.1	General	The equipment does not include any breathing and draining devices.	N/A
10.9.3.2.2	Test procedure	Refer to 10.9.3.2.1.	N/A
10.9.3.2.3	Acceptance criteria	Refer to 10.9.3.2.1.	N/A
10.9.3.4.1	Test procedure	Refer to 10.9.3.2.1.	N/A
10.9.3.4.2	Acceptance criteria	Refer to 10.9.3.2.1.	N/A
10.9.4	Ex component certificate	The equipment is not an Ex component.	N/A
11.3	Yield stress	The equipment does not employ fasteners necessary for the assembly of parts of the apparatus flameproof enclosure.	N/A
11.8	Closing of through holes	The equipment does not contain any holes which were used for ease of manufacturing.	N/A
12.8	Copper or copper alloys in explosive gas atmospheres containing acetylene	The equipment is not constructed of copper or copper alloys.	N/A
13.1	General	The entries for the flameproof enclosure continue to be in compliance as they all have at least 8mm of thread length assuring compliance to Table 4 and 5 as they are applicable. This is acceptable.	Pass
13.3	Non-threaded holes (for Group I only)	The equipment is not for Group I.	N/A
13.4	Cable glands	Cable glands are not included with the apparatus.	N/A
13.5.1	Conduit sealing devices, whether integral or separate,	The equipment does not include conduit sealing devices.	N/A
13.5.2	Permitted for Group II only	Refer to 13.5.1	N/A



Clause	Requirement – Test	Result – Remark	Verdict
13.5.3	Sealing device such as a stopping box with setting compound	Refer to 13.5.1	N/A
13.6.4	Not connected to an interlocking switch	The equipment does not include plugs and sockets and cable couplers.	N/A
13.7	Bushings	The equipment does not include bushings.	N/A
13.8	Blanking elements	The equipment does not include electrical entries. Blanking elements are not used.	N/A
15.1	General	These requirements were addressed in US/FMG/ExTR14.0015/01. They continue to be applicable.	Pass
15.2.2.2	Test procedure	These requirements were addressed in US/FMG/ExTR14.0015/01. They continue to be applicable.	Pass
15.2.2.4	Pressure-piling	These requirements were addressed in US/FMG/ExTR14.0015/01. They continue to be applicable.	Pass
15.2.2.5	Apparatus intended for use in a single gas	The equipment is not intended for use in a single gas.	N/A
15.2.3.2	Overpressure test - First method (static)	This was covered in US/FMG/ExTR12.013/00.	Pass
15.2.3.3	Overpressure test - Second method (dynamic)	The testing was performed under US/FMG/ExTR12.013/00 as per the first method. Refer to 15.2.3.2	N/A
15.3.2.3	Number of tests and acceptance criterion	These requirements were addressed in US/FMG/ExTR14.0015/01. They continue to be applicable.	Pass
15.3.3.2	First method – Testing by increased test gap	The product was originally constructed with no Non-threaded flamepaths this construction has not changed.	N/A
15.3.3.4	Third method – Testing by oxygen enrichment of test gases	Refer to 15.3.3.2	N/A
15.4.3.1	Test procedure	As per US/FMG/ExTR14.015/01, the equipment does not contain any breathing and draining devices.	N/A
15.5.1	General	The equipment is not with level of protection “dc”.	N/A
15.5.2	Preparation of “dc” samples	Refer to 15.5.1.	N/A
15.5.3.2	Test procedure	Refer to 15.5.1.	N/A
16.1.2	Routine overpressure test – first method	No routine tests are required as the equipment satisfactorily passed the four times the ignition pressure overpressure test for exemption of the routine test.	N/A
16.1.3	Routine test – second method	Refer to 16.1.1	N/A
16.3	Enclosures incorporating a welded construction	Refer to 16.1.1. No routine tests are required on the enclosure housing	N/A
17.2.2	Fitted inside Ex d enclosure	The equipment is not switchgear and not for Group I.	N/A
17.2.3	Fitted inside another enclosure	Refer to 17.2	N/A
19.1	General	This clause does not apply to the equipment because the equipment does not include any cemented joints.	N/A
19.2	Resistance to tracking and creepage distances on internal surfaces of the enclosure walls	Refer to 19.1	N/A
19.3	Requirements for type tests	Refer to 19.1	N/A
21	Instructions	Flamepath not intended for repair included as a condition of use.	Pass

Clause	Requirement – Test	Result – Remark	Verdict
C.2.1.4	Bushings	The equipment does not include any flameproof entry devices.	N/A
C.2.2.1	Threaded joints	Refer to C.2.1.4	N/A
C.2.2.2	Non-threaded joints (Group I only)	Refer to C.2.1.4	N/A
C.2.3.1	General requirements	Refer to C.2.1.4	N/A
C.2.3.2	Metric Ex blanking elements	Refer to C.2.1.4	N/A
C.2.3.3	NPT Ex blanking elements	Refer to C.2.1.4	N/A
C.2.3.4	Non-threaded Ex blanking elements (Group I only)	The equipment is not for Group I.	N/A
C.3.1.1	General	Refer to C.2.1.4	N/A
C.3.1.2	Cable glands and conduit sealing devices with sealing ring	Refer to C.2.1.4	N/A
C.3.3.1	Torque test	Refer to C.2.1.4	N/A
D.3.8	Marking internally	The equipment is not an Ex component.	N/A
D.3.10	Information in certificate	Refer to D.3.8	
D.4.1	Procedure	Refer to D.3.8	N/A
E.4.1.1	Short circuit condition	Not applicable as the equipment contains no cells or batteries.	N/A
E.4.1.2	Infallible components	Refer to E.4.1.1	N/A
E.4.2.1	Additional protection	Refer to E.4.1.1	N/A
E.4.2.2	Protection against polarity reversal or reverse charging	Refer to E.4.1.1	N/A
E.4.3	Prevention of inadvertent charging of a battery by other voltage sources in the enclosure	Refer to E.4.1.1	N/A
E.5.1	Allowable cell type	Refer to E.4.1.1	N/A
G.1	General	The equipment does not include an internal source of release.	N/A
G.2.1	No release	Refer to G.1	N/A
G.2.2	Limited release of a gas or vapour	Refer to G.1	N/A
G.2.3	Limited release of a liquid	Refer to G.1	N/A
G.3.1	General design requirements	Refer to G.1	N/A
G.3.2	Infallible containment system	Refer to G.1	N/A
G.3.3	Containment system with a limited release	Refer to G.1	N/A
G.4.1	Overpressure test	Refer to G.1	N/A
G.4.2	Leakage test for an infallible containment system	Refer to G.1	N/A
G.4.3	Leakage test for a containment system with a limited release	Refer to G.1	N/A
H.1	General	The equipment does not include machines with flameproof “d” enclosures fed from converters.	N/A
H.2	Construction requirements for bearings	Refer to H.1	N/A
H.3	Temperature requirements	Refer to H.1	N/A

**Measurement Section, including Additional Narrative Remarks (as deemed applicable)**