

# CERTIFICATE OF CONFORMITY



1. **HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT PER US REQUIREMENTS**
2. **Certificate No:** FM16US0357X
3. **Equipment:** Jupiter JM4 Magnetostrictive Level Transmitter  
**(Type Reference and Name)**
4. **Name of Listing Company:** Magnetrol International Inc.
5. **Address of Listing Company:** 705 Enterprise Street  
Aurora, IL 60504 USA
6. The examination and test results are recorded in confidential report number:  
3051963 dated 30<sup>th</sup> October 2015
7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:  
FM Class 3600: 2018, FM Class 3610: 2010, FM Class 3611: 2018, FM Class 3615: 2018,  
FM Class 3616: 2011, FM Class 3810: 2018, ANSI/ISA 60079-0: 2013, ANSI/UL 60079-1: 2015,  
ANSI/ISA 60079-11: 2014, ANSI/ISA 60079-15: 2013, ANSI/UL 60079-26: 2017,  
ANSI/UL 60079-31: 2015, ANSI/NEMA 250: 2003, ANSI/IEC 60529: 2004
8. If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.
9. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.
10. Equipment Ratings:  
**JM4-51ab-cde / 2fg-hij-klm-n-o. Jupiter JM4 Magnetostrictive Level Transmitter / JM4 Probe:**  
Intrinsically Safe (Entity) for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F and G;  
Temperature Class T4 Ta = -40°C to +70°C in accordance with Control Drawing No. 099-5074;  
Intrinsically Safe (Entity) for use in Class I, Zone 0 AEx ia IIC T4 Ga Ta = -40°C to +70°C in

**Certificate issued by:**

J.E. Marquedant  
VP, Manager, Electrical Systems

21 December 2018

Date

To verify the availability of the Approved product, please refer to [www.approvalguide.com](http://www.approvalguide.com)

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US Certificate Of Conformity No: FM16US0357X

accordance with Control Drawing No. 099-5074; Explosionproof for use in Class I, Division 1, Groups B, C and D; Temperature Class T4 Ta = -40°C to +70°C; Flameproof for Class I, Zone 0/1 AEx db IIB+H<sub>2</sub> T6...T1 Ga/Gb Ta = -40°C to 70°C; Dust-ignitionproof for Class II/III, Division 1, Groups E, F and G; Temperature Class T4A Ta = -40°C to +70°C; Protection By Enclosure for Zone 21, AEx tb IIIC T85°C...T120°C Db Ta = -15°C to +70°C; Nonincendive for use in Class I, II, III, Division 2, Groups A, B, C, D, E, F and G, Temperature Class T4 Ta = -40°C to +70°C; for use in Class I, Zone 2 AEx nA IIC Gc; Temperature Class T4 Ta = -15°C to +70°C hazardous (classified) locations, indoors and outdoors (Type 4X and IP67).

**JM4-52ab-cde / 2fg-hij-klm-n-o. Jupiter JM4 Magnetostrictive Level Transmitter / JM4**

**Probe:** Intrinsically Safe (FISCO) for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F and G; Temperature Class T4 Ta = -40°C to +70°C in accordance with Control Drawing No. 099-5074; Intrinsically Safe (FISCO) for use in Class I, Zone 0 AEx ia IIC T4 Ga Ta = -40°C to +70°C in accordance with Control Drawing No. 099-5074; Explosionproof for use in Class I, Division 1, Groups B, C and D; Temperature Class T4 Ta = -40°C to +70°C; Flameproof for Class I, Zone 0/1 AEx db IIB+H<sub>2</sub> T6...T1 Ga/Gb Ta = -40°C to 70°C; Protection By Enclosure for Zone 21, AEx tb IIIC T85 °C...T120°C Db Ta = -15°C to +70°C; Dust-ignitionproof for Class II/III, Division 1, Groups E, F and G; Temperature Class T4A Ta = -40°C to +70°C; Nonincendive for use in Class I, II, III, Division 2, Groups A, B, C, D, E, F, and G, Temperature Class T4 Ta = -40°C to +70°C; for use in Class I, Zone 2 AEx nA IIC Gc, Temperature Class T4 Ta = -15°C to +70°C hazardous (classified) locations, indoors and outdoors (Type 4X and IP67).

11. The marking of the equipment shall include:

**JM4-51ab-cde / 2fg-hij-klm-n-o. Jupiter JM4 Magnetostrictive Level Transmitter / JM4 Probe:**

Intrinsically Safe (Entity) in accordance with Control Drawing No. 099-5074  
Class I, II, III Division 1, Groups A, B, C, D, E, F and G; T4 Ta = -40°C to +70°C; Type 4X, IP67

Class I, Zone 0 AEx ia IIC T4 Ga Ta = -40°C to +70°C; Type 4X, IP67

Explosionproof:

Class I, Division 1, Groups B, C, D; T4 Ta = -40°C to +70°C; Type 4X, IP67

Flameproof:

Class I, Zone 0/1, AEX db IIB +H<sub>2</sub> T6...T1 Ga/Gb Ta = -40°C to +70°C; Type 4X, IP67

Dust-Ignitionproof:

Class II, III, Division 1, Groups E, F and G; T4A Ta = -40°C to +70°C; Type 4X, IP67

Protection by Enclosure:

Zone 21, AEx tb IIIC T85...T120C Db Ta = -15°C to +70°C; Type 4X, IP67

Nonincendive:

Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T4 Ta = -40°C to +70°C; Type 4X, IP67

Non-Sparking:

Class I, Zone 2, AEx nA IIC Gc; T4 Ta = -15°C to +70°C; Type 4X, IP67

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Intrinsically Safe (FISCO) in accordance with Control Drawing No. 099-5074

Class I, II, III Division 1, Groups A, B, C, D, E, F and G; T4 Ta = -40°C to +70°C; Type 4X, IP67

Class I, Zone 0 AEx ia IIC; T4 Ga Ta = -40°C to +70°C; Type 4X, IP67

Explosionproof:

Class I, Division 1, Groups B, C, D; T4 Ta = -40°C to +70°C; Type 4X, IP67

Flameproof:

Class I, Zone 0/1, AEX db IIB +H2 T6...T1 Ga/Gb Ta = -40°C to +70°C; Type 4X, IP67

Dust-Ignitionproof:

Class II, III, Division 1, Groups E, F and G; T4A Ta = -40°C to +70°C; Type 4X, IP67

Protection by Enclosure:

Zone 21, AEx tb IIIC T85...T120C Db Ta = -15°C to +70°C; Type 4X, IP67

Nonincendive:

Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T4 Ta = -40°C to +70°C; Type 4X, IP67

Non-Sparking:

Class I, Zone 2, AEx nA IIC Gc; T4 Ta = -15°C to +70°C; Type 4X, IP67

## 12. **Description of Equipment:**

The Jupiter Model JM4 is a continuous level transmitter for liquid level control, utilizing the engineering principle of magnetostriction and the effect of a magnetic field on the magnetostrictive wire as the basis for operation of the instrument. The primary components are the probe assembly, containing the wire and Preamp PC Board assembly, and the electronics assembly containing all other PC Boards. The Jupiter JM4 Transmitter is available as the Model JM4-51 normal mode (Entity input version) or JM4-52 Fieldbus mode (FISCO input version) and only differs in the Digital PC Board and Wiring PC Board.

A low energy pulse which is generated by the Preamp travels the length of the magnetostrictive wire. A return signal is generated from the location where the magnetic field of the MLI float intersects the wire. A timer measures the elapsed time between the generation of the pulse and the return of the mechanical or acoustic signal. This is detected by the acoustic sensor located in the end of the probe. The software is set up to interpret the time-of-flight data and to display and transmit the process variable data resulting from the measurement.

The Jupiter Model JM4 is a level transmitter with Fieldbus digital communication. The Jupiter Model JM4 uses a nominal input voltage of 24VDC and it provides Fieldbus digital communication. With the FISCO concept the input voltage is limited to 17.5V. A digital display and keypad are optional.

The Jupiter Model JM4 is housed in a dual compartment (die-cast aluminum or investment cast 316SS) enclosure with separate wiring and electronics compartments. The wiring compartment at the top of the transmitter isolates the power/signal conductors from the electronics compartment beneath it by way of an environmentally sealed feed-through. A quick disconnect probe coupling allows probes to be installed without concern for their orientation to the transmitter head. Probe mounting can be provided integrally, directly to the electronics housing, or can be remotely mounted up to 12 feet from the

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electronics housing.

## **Model Code Structure and Parameters:**

### ***JM4-51ab-cde / 2fg-hij-klm-n-o. Jupiter JM4 Magnetostrictive Level Transmitter / JM4 Probe.***

Entity Parameters:

Ui = 28.6V, Ii = 140mA, Pi = 1W, Ci = 4.4nF, Li = 2.7μH

a = Safety Option: 0, 1 or 2.

b = Accessories/Mounting: A, B, C, 0, 1 or 2.

c = Area Classification: A or D. (If c = D, b = A or 0 only)

d = Housing Material: 1 or 2.

e = Conduit Connection: 0, 1, 2 or 3.

f = Measurement System: A or C.

g = Probe Configuration: 1, 2, 8, E, F, H, K, L, M, R, S or T.

h = Process Connection: 00, 01, 11, 22, 41, 42, 43, 44, 45, 46, 47, 53, 54, 55, 56, 57, 63, 64, 65, 66, 67, CA, CB, CC, DA, DB, DD, DE, EA, EB, ED, EE, FA, FB, FD, FE, FF or FG.

i = Material of Construction: A, B, C, D, F, L, P or 1.

j = Probe Options: F, G, N or V.

k = Installation Considerations: 0, 1, 2, 3, 4, 5, C, E, F, G, H, J or N.

l = Construction Code: 0, K, L, M or N.

m = Level/Interface Measurement: 1, 2 or 3.

n = Float: 00, 11, 12, 13, 21, 22, 23, 31, 32, 41, 42, 51, 52, 61, 62, 99, AA, AB, AC, BA, BB, CA, CB, DA, DB, DC, FA, FB, FC, MA, MB, NA, NB, PA, PB, QA, QB, RA or RB

o = Probe Length: (3 digit max) in: inches (f = A) or centimeters (f = C).

### ***JM4-52ab-cde / 2fg-hij-klm-n-o. Jupiter JM4 Magnetostrictive Level Transmitter / JM4 Probe.***

FISCO Parameters:

Ui = 17.5V, Ii = 380mA, Pi = 5.32W, Ci = 440pF, Li = 2.7μH

a = Safety Option: 0, 1 or 2.

b = Accessories/Mounting: A, B, C, 0, 1 or 2.

c = Area Classification: A or D. (If c = D, b = A or 0 only)

d = Housing Material: 1 or 2.

e = Conduit Connection: 0, 1, 2 or 3.

f = Measurement System: A or C.

g = Probe Configuration: 1, 2, 8, E, F, H, K, L, M, R, S or T.

h = Process Connection: 00, 01, 11, 22, 41, 42, 43, 44, 45, 46, 47, 53, 54, 55, 56, 57, 63, 64, 65, 66, 67, CA, CB, CC, DA, DB, DD, DE, EA, EB, ED, EE, FA, FB, FD, FE, FF or FG.

i = Material of Construction: A, B, C, D, F, L, P or 1.

j = Probe Options: N or V.

k = Installation Considerations: 0, 1, 2, 3, 4, 5, C, E, F, G, H, J or N.

l = Construction Code: 0, K, L, M or N.

m = Level/Interface Measurement: 1, 2 or 3.

n = Float: 00, 11, 12, 13, 21, 22, 23, 31, 32, 41, 42, 51, 52, 61, 62, 99, AA, AB, AC, BA, BB, CA, CB, DA, DB, DC, FA, FB, FC, MA, MB, NA, NB, PA, PB, QA, QB, RA or RB

o = Probe Length: (3 digit max) in: inches (f = A) or centimeters (f = C).

## **13. Specific Conditions of Use:**

1. *The enclosure contains aluminum and is considered to present a potential risk of ignition by impact or friction. Care must be taken during installation and use to prevent impact or friction.*

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2. To maintain the T4 temperature code care shall be taken to ensure the enclosure temperature does not exceed 70°C.
3. The risk of electrostatic discharge shall be minimized at installation, following the direction given in the instruction.
4. When equipment is used in explosive dust atmospheres, the end user shall take precautions so that the thermal effects of the process temperature shall limit the equipment enclosure and probe surface temperatures to not exceed the required installation location temperature and shall be between 85°C and 120°C.
5. For Installation with ambient temperature of 70°C, refer to the manufacturer's instructions for guidance on proper selection of conductors.
6. Provisions shall be made to provide transient overvoltage protection to a level not to exceed 119Vdc.
7. For the AEx db rated Jupiter JM4, consult the manufacturer for dimensional information on the flameproof joints for repair.
8. All Unused device openings must be closed using a suitably certified plug.
9. Temperature codes for the ratings AEx db IIB+H<sub>2</sub>, are defined by the following table

Maximum Process Temperature(PT)	Temperature Class
From 0°C to 70°C	T6
From 71°C to 90°C	T5
From 91°C to 125°C	T4
From 126°C to 190°C	T3
From 191 °C to 290 °C	T2
From 291 °C to 440 °C	T1

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

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

#### 15. Schedule Drawings

A copy of the technical documentation has been kept by FM Approvals.

#### 16. Certificate History

Details of the supplements to this certificate are described below:

Date	Description
30 <sup>th</sup> October 2015	Original Issue.
5 <sup>th</sup> December 2016	Supplement 1: Report Reference: Revision Report RR206919 dated 5 <sup>th</sup> December 2016 Description of change: Update documentation due to change of components on Analog board, added sheet to fieldbus wiring board, added C of C requirement for Fabrication wiring board and addition of specific conditions of use on system drawing. Update certificate to new format.
21 <sup>st</sup> December 2018	Supplement 2: Report Reference: Project ID 3063537 dated 21 <sup>st</sup> December 2018 Description of change: Addition of rating Class I, Zone 0/1, AEx db IIB +H <sub>2</sub> T6...T1

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	Ga/Gb and Zone 21 AEx tb IIIC T85°C...T120°C Db, as well as updating of FM Standards and associated documentation.
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