# CERTIFICATE OF CONFORMITY

1. **HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT PER US REQUIREMENTS**

2. **Certificate No:** **FM20US0068X**

3. **Equipment:**
   **(Type Reference and Name)** **MIAD9ab, MI9Eb, Q45AD9ab, Q45AD9FQ, Q459Eb, SMI30a, T30AD9FF150, T30AD9FF150Q Photoelectric Sensor.**

4. **Name of Listing Company:** **Banner Engineering Corp**

5. **Address of Listing Company:** **9714 Tenth Ave N, Minneapolis, Minnesota 55441, USA**

6. The examination and test results are recorded in confidential report number:

   3046293 dated 21st August 2014

7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

   FM 3600:2022, FM 3610:2021, FM 3611:2021, FM 3810:2021, FM 7745:2021, ANSI/UL 121201:2018, ANSI/UL 60079-0:2020, ANSI/UL 60079-11:2011, ANSI/UL 61010-1:2012

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:

    See Annex.

11. The marking of the equipment shall include:

    See Annex.

12. **Description of Equipment:**

**Certificate issued by:**

J.E. Marquedant
VP, Manager - Electrical Systems

May 12, 2023
Date

BANNER P/N
1837 REV. C

To verify the availability of the Approved product, please refer to www.approvalguide.com

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ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

See Annex.

13. **Specific Conditions of Use:**

Parts of the enclosure are non-conducting and may generate an ignition-capable level of ESD. Cleaning of the equipment shall be done only with a damp cloth.

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 |
|---|---|
| 21 August 2014 | Original Issue. |
| 7 December 2020 | Supplement 1:<br>Report Reference: – RR223900 dated 7th December 2020.<br>Description of the Change: Corrected errors in Model codes. Added missing Specific Conditions of use. Updated Certificate with new format and unique certificate number. Updated to FM3600:2018, FM3610:2018, FM3810:2018. ANSI/UL 60079-0:2020, ANS/ISA 61010-1:2012. Added missing FM3611 standard and updated to 2018. Added ANSI/UL 121201:2018. |
| 27 January 2022 | Supplement 2:<br>Report Reference: – RR229362 dated 27th January 2022.<br>Description of the Change: Partial Delist of obsolete models SMI91a and SMI912a. FM 3610, FM3611, FM3810 standards were updated to the 2021 editions. |
| 12 May 2023 | Supplement 3:<br>Report Reference: PR462994 dated12 May 2023..<br>Description of the Change(s): Approval for Liquid Leak Detection added for Q45AD9FQ. |



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# ANNEX

## MIAD9ab Photoelectric Sensor

### Equipment Ratings

Intrinsically Safe for Class I, II, III, Division 1, Groups A, B, C, D, E, F, and G using Entity parameters in accordance with drawing 39616
Intrinsically Safe for Class I, Zone 0, AEx ia IIC Ga using Entity parameters in accordance with drawing 39616
Non-Incendive for Class I, Division 2, Groups A, B, C, D
Suitable for Class II and III, Division 2, Groups F and G*
T code of T5 and an ambient temperature rating of -40°C to +70°C

*Class II and III Division 2 applies only to model numbers ending in a Q suffix.

### Markings

IS, CL I, II, III, Div 1, ABCDEFG; T5 -40°C ≤ Ta ≤ +70°C; Entity 39616
CL I, Zn 0 AEx ia IIC T5 Ga -40°C ≤ Ta ≤ +70°C; Entity 39616
NI, CL I, Div 2, ABCD; T5 -40°C ≤ Ta ≤ +70°C
S, CL II, III, Div 2, FG*; T5 -40°C ≤ Ta ≤ +70°C;

*Class II and III Division 2 applies only to model numbers ending in a Q suffix.

### Description of Equipment

The MIAD9 Series Photoelectric sensors either emit or receive a light signal depending on the sensor type (emitter, receiver or combined emitter/receiver unit). The sensors consist of one circuit board, fully encapsulated in a molded plastic case equipped with either a connector or a cable. The case measures approximately 2.25 in. (57mm) x 1.25 in. (32mm) x 0.5 in. (12.5mm). The sensors use a cable/connector assembly which threads onto the sensor connector or are provided with an attached cable. The operating temperature range is -40°C to +70°C.

Entity Parameters:
$V_{Max}$= 15 V dc, $I_{Max}$= 60 mA, $P_i$= 225 mW, $C_i$= 0.3 µF, $L_i$= 0 mH.

All other protection techniques, the electronic connection has the following values:
5 ≤ U ≤ 15 V dc; I = 60 mA

**Model Code Options:**
a = Sensing mode D, W, F, LV, LVAG, CV, CV2 or R.
b = Connection method Q or blank.



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## MI9Eb Photoelectric Sensor

### Equipment Ratings

Intrinsically Safe for Class I, II, III, Division 1, Groups A, B, C, D, E, F, and G using Entity parameters in accordance with drawing 39616
Intrinsically Safe for Class I, Zone 0, AEx ia IIC Ga using Entity parameters in accordance with drawing 39616
Non-Incendive for Class I, Division 2, Groups A, B, C, D
Suitable for Class II and III, Division 2, Groups F and G*
T code of T5 and an ambient temperature rating of -40°C to +70°C

*Class II and III Division 2 applies only to model numbers ending in a Q suffix.

### Markings

IS, CL I, II, III, Div 1, ABCDEFG; T5 -40°C ≤ Ta ≤ +70°C; Entity 39616
CL I, Zn 0 AEx ia IIC T5 Ga -40°C ≤ Ta ≤ +70°C; Entity 39616
NI, CL I, Div 2, ABCD; T5 -40°C ≤ Ta ≤ +70°C
S, CL II, III, Div 2, FG*; T5 -40°C ≤ Ta ≤ +70°C;

*Class II and III Division 2 applies only to model numbers ending in a Q suffix.

### Description of Equipment

The MIAD9 Series Photoelectric sensors either emit or receive a light signal depending on the sensor type (emitter, receiver or combined emitter/receiver unit). The sensors consist of one circuit board, fully encapsulated in a molded plastic case equipped with either a connector or a cable. The case measures approximately 2.25 in. (57mm) x 1.25 in. (32mm) x 0.5 in. (12.5mm). The sensors use a cable/connector assembly which threads onto the sensor connector or are provided with an attached cable. The operating temperature range is -40°C to +70°C.

Entity Parameters:
$V_{Max}$= 15 V dc, $I_{Max}$= 60 mA, $P_i$= 225 mW, $C_i$= 0.3 µF, $L_i$= 0 mH.

All other protection techniques, the electronic connection has the following values:
5 ≤ U ≤ 15 V dc; I = 60 mA

**Model Code Options:**
b = Connection method Q or blank.

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## Q45AD9Fb Photoelectric Sensor

### Equipment Ratings

Intrinsically Safe for Class I, II, III, Division 1, Groups A, B, C, D, E, F, and G using Entity parameters in accordance with drawing 38343
Intrinsically Safe for Class I, Zone 0, AEx ia IIC Ga using Entity parameters in accordance with drawing 38343
Non-Incendive for Class I, Division 2, Groups A, B, C, D
Suitable for Class II and III, Division 2, Groups F and G
T code of T5 and an ambient temperature rating of -40°C to +70°C

Performance compliant as a Hydrocarbon Leak Detector and as a Water Leak Detector when used with BTxxxSM900 glass fiberoptic accessory.

Application Notes:

- the installation must comply with all installation instruction contained in drawing 38343.
- the liquid to be detected must have an index of refraction different from that of air (i.e., clear),
- it must be non-viscous (so that it does not cling to the probe tip) for the optical principle of the probe to function correctly.
- the probe must be mounted a minimum of 50 mm (2.0") from a light-colored (e.g., white) or shiny (e.g., stainless steel)background to prevent false proxing in the presence of the fluid.
- the Q45AD9F(Q) gain adjustment must be used to set the excess gain to an acceptable level to ensure that the amount of internal probe reflection will reliably drop below the threshold level when fluid is present.
- when properly configured, liquid contacting the tip causes the Q45 LED light to scatter into the liquid, this allows sensor to detect the liquid and cause a “Dark” condition.
- scheduled maintenance must include inspecting and cleaning the probe tip to prevent contamination (e.g. dust) from building up on the probe tip. Any damage to the probe tip or the fiber optic cable must be immediately replaced.

**Markings**

IS CL I, II, III, Div 1, ABCDEFG; T5 -40°C ≤ Ta ≤ +70°C; Entity 38343
CL I, Zn 0 AEx ia IIC T5 Ga -40°C ≤ Ta ≤ +70°C; Entity 38343
NI, CL I, Div 2, ABCD; T5 -40°C ≤ Ta ≤ +70°C
S, CL II, III, Div 2, FG*; T5 -40°C ≤ Ta ≤ +70°C;

**Description of Equipment**

The Q45AD9FQ NAMUR Sensor is a rugged, self-contained two-wire sensor designed for use with certified intrinsically safe switching amplifiers and barriers (Approved Apparatus) with intrinsically safe circuits. They emit and receive a light signal within the same unit.

The sensors consist of one circuit board, fully encapsulated in a molded plastic case equipped with a 4-Pin threaded M12/Euro-Style connector for use with a MQD9-4 mating cable. The sensor varies the impedance across the sensor output, which passes 1 mA or less in the "dark" condition and 2 mA or more in the "light" condition.

Entity Parameters:
$V_{Max}$= 15 V dc, $I_{Max}$= 60 mA, $P_i$= 225 mW, $C_i$= 0.3 µF, $L_i$= 0 mH.



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All other protection techniques, the electronic connection has the following values:
5 ≤ U ≤ 15 V dc; I = 60 mA

**Model Code Options:**
b = Connection method Q or blank.

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## Q45AD9ab Photoelectric Sensor

### Equipment Ratings

Intrinsically Safe for Class I, II, III, Division 1, Groups A, B, C, D, E, F, and G using Entity parameters in accordance with drawing 38343
Intrinsically Safe for Class I, Zone 0, AEx ia IIC Ga using Entity parameters in accordance with drawing 38343
Non-Incendive for Class I, Division 2, Groups A, B, C, D
Suitable for Class II and III, Division 2, Groups F and G*
T code of T5 and an ambient temperature rating of -40°C to +70°C

*Class II and III Division 2 applies only to model numbers ending in a Q suffix.

### Markings

IS CL I, II, III, Div 1, ABCDEFG; T5 -40°C ≤ Ta ≤ +70°C; Entity 38343
CL I, Zn 0 AEx ia IIC T5 Ga -40°C ≤ Ta ≤ +70°C; Entity 38343
NI, CL I, Div 2, ABCD; T5 -40°C ≤ Ta ≤ +70°C
S, CL II, III, Div 2, FG*; T5 -40°C ≤ Ta ≤ +70°C;
*Class II and III Division 2 applies only to model numbers ending in a Q suffix.

### Description of Equipment

The Q45AD9ab Photoelectric sensors either emit and receive a light signal with the same unit The sensors consist of one circuit board, fully encapsulated in a molded plastic case equipped with either a connector or a cable. The case measures approximately 2.5 in. (63.5mm) x 1.75 in. (44mm) x 1.75 in. (44mm). The sensors use a cable/connector assembly which threads onto the sensor connector or are provided with an attached cable. The operating temperature range is -40°C to +70°C.

Entity Parameters:
$V_{Max}$= 15 V dc, $I_{Max}$= 60 mA, $P_i$= 225 mW, $C_i$= 0.3 µF, $L_i$= 0 mH.

All other protection technics, the electronic connection has the following values:
5 ≤ U ≤ 15 V dc; I = 60 mA

**Model Code Options:**
a = Sensing mode D, DL, F, FP, FV, LV, LP, CV, CV4 or R.
b = Connection method Q or blank.



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## Q459Eb Photoelectric Sensor

### Equipment Ratings

Intrinsically Safe for Class I, II, III, Division 1, Groups A, B, C, D, E, F, and G using Entity parameters in accordance with drawing 38343
Intrinsically Safe for Class I, Zone 0, AEx ia IIC Ga using Entity parameters in accordance with drawing 38343
Non-Incendive for Class I, Division 2, Groups A, B, C, D
Suitable for Class II and III, Division 2, Groups F and G*
T code of T5 and an ambient temperature rating of -40°C to +70°C

*Class II and III Division 2 applies only to model numbers ending in a Q suffix.

### Markings

IS CL I, II, III, Div 1, ABCDEFG; T5 -40°C ≤ Ta ≤ +70°C; Entity 38343
CL I, Zn 0 AEx ia IIC T5 Ga -40°C ≤ Ta ≤ +70°C; Entity 38343
NI, CL I, Div 2, ABCD; T5 -40°C ≤ Ta ≤ +70°C
S, CL II, III, Div 2, FG*; T5 -40°C ≤ Ta ≤ +70°C;

*Class II and III Division 2 applies only to model numbers ending in a Q suffix.

### Description of Equipment

The photoelectric sensors either emit and receive a light signal with the same unit The sensors consist of one circuit board, fully encapsulated in a molded plastic case equipped with either a connector or a cable. The case measures approximately 2.5 in. (63.5mm) x 1.75 in. (44mm) x 1.75 in. (44mm). The sensors use a cable/connector assembly which threads onto the sensor connector or are provided with an attached cable. The operating temperature range is -40°C to +70°C.

Entity Parameters:
$V_{Max}$= 15 V dc, $I_{Max}$= 60 mA, $P_i$= 225 mW, $C_i$= 0.3 µF, $L_i$= 0 mH.

b = Connection method Q or blank.

## SMI30a Photoelectric Sensor

### Equipment Ratings

Intrinsically Safe for Class I, Zone 1, AEx ib IIC Gb using Entity parameters in accordance with drawing 35331,
Non-Incendive for Class I, II, III, Division 2, Groups A, B, C, D, and G.
T code of T5 and an ambient temperature rating of -40°C to +70°C:



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### Markings

CL I, Zn 1 AEx ib IIC T5 Gb -40°C ≤ Ta ≤ +70°C; Entity 35331
NI, CL I, II, III, Div 2, ABCDG; T5 -40°C ≤ Ta ≤ +70°C;

### Description of Equipment

The SMI30 Series Photoelectric sensors either emit or receive a light signal depending on the sensor type (emitter or receiver). The sensors consist of one or two circuit boards, fully encapsulated in a threaded plastic case (barrel) which is equipped with a connector. The case measures approximately 3.87 in. (100mm) long and 1.16 in. (30mm) diameter. The sensors use a cable/connector assembly which threads onto the sensor connector. The operating temperature range is -40°C to +70°C.

Entity Parameters:
$V_{Max}$= 30 V, $I_{Max}$= 350 mA, $P_i$= 750 mW, $C_i$= 0, $L_i$= 0.

All other protection technics, the electronic connection has the following values:
10 ≤ U ≤ 30 V dc; I = 25 mA

**Model Code Options:**
a = 6EQ, 6EBQ, 6ECQ, 6EYCQ, AN6RQ, AN6RBQ, AN6RCQ, RN6RQ, RN6RBQ, RN6RCQ, 6EYQ, N6RYQ, AN6RYCQ, RN6RYQ, RN6RYCQ.

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## T30AD9FF150 Photoelectric Sensor

### Equipment Ratings

Intrinsically Safe for Class I, II, III, Division 1, Groups A, B, C, D, E, F, and G using Entity parameters in accordance with drawing 41685,
Intrinsically Safe for Class I, Zone 0, AEx ia IIC Ga using Entity parameters in accordance with drawing 41685

T code of T6 and an ambient temperature rating of -40°C to +70°C

### Markings

IS, CL I, II, III, Div 1, ABCDEFG; T6 -40°C ≤ Ta ≤ +70°C; Entity 41685
CL I, Zn 0 AEx ia IIC T6 Ga -40°C ≤ Ta ≤ +70°C; Entity 41685

### Description of Equipment

The T30 Series Photoelectric sensors either emit and receive a light signal with the same unit The sensors consist of one circuit board, fully encapsulated in a molded plastic case equipped with either a connector or a cable. The case measures approximately 1.5 in. (38mm) diameter x 1.75 in. (44mm) long. The sensors use a cable/connector assembly

which threads onto the sensor connector or are provided with an attached cable. The operating temperature range is -40°C to +70°C.

Entity Parameters:
$V_{Max}$= 30 V, $I_{Max}$= 35 mA, $C_i$= 0, $L_i$= 0.

All other protection techniques, the electronic connection has the following values:
5 ≤ U ≤ 15 V dc; I = 35 mA

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## T30AD9FF150Q Photoelectric Sensor

### Equipment Ratings

Intrinsically Safe for Class I, II, III, Division 1, Groups A, B, C, D, E, F, and G using Entity parameters in accordance with drawing 41685,
Intrinsically Safe for Class I, Zone 0, AEx ia IIC Ga using Entity parameters in accordance with drawing 41685

T code of T6 and an ambient temperature rating of -40°C to +70°C

### Markings

IS, CL I, II, III, Div 1, ABCDEFG; T6 -40°C ≤ Ta ≤ +70°C; Entity 41685
CL I, Zn 0 AEx ia IIC T6 Ga -40°C ≤ Ta ≤ +70°C; Entity 41685

### Description of Equipment

The T30 Series Photoelectric sensors either emit and receive a light signal with the same unit The sensors consist of one circuit board, fully encapsulated in a molded plastic case equipped with either a connector or a cable. The case measures approximately 1.5 in. (38mm) diameter x 1.75 in. (44mm) long. The sensors use a cable/connector assembly which threads onto the sensor connector or are provided with an attached cable. The operating temperature range is -40°C to +70°C.

Entity Parameters:
$V_{Max}$= 30 V, $I_{Max}$= 35 mA, $C_i$= 0, $L_i$= 0.

All other protection techniques, the electronic connection has the following values:
5 ≤ U ≤ 15 V dc; I = 35 mA



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