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# CERTIFICATE OF COMPLIANCE

## HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

### MK-Series. Isolator Barriers.

AIS/I,II,III/1/ABCDEF; - IS-1.000 / V; Entity  
Entity Parameters:

|                                  | V <sub>OC</sub><br>(V) | I <sub>SC</sub><br>(mA) | C <sub>a</sub><br>(μF)<br>Group A,B / C / D | L <sub>a</sub><br>(mH)<br>Group A,B / C / D |
|----------------------------------|------------------------|-------------------------|---------------------------------------------|---------------------------------------------|
| <b>Rotational Speed Monitors</b> |                        |                         |                                             |                                             |
| <b>MK21-121Ex0-R / a</b>         |                        |                         |                                             |                                             |
| <b>MK21-12Ex0-RI / a</b>         |                        |                         |                                             |                                             |
| Terminals 5-6, 7-8               | 12.4                   | 14.4                    | 1.46 / 4.38 / 11.7                          | 157 / 551 / 1H                              |

a = Power supply 24VDC, 120VAC, or 230VAC

### Special conditions of use:

1. Must be installed in suitable equipment enclosure in accordance with ANSI/ISA S82.01 and S82.03

### MK-Series. Isolator Barriers.

AIS/I,II,III/1/ABCDEF; - IS-1.500 / E; Entity  
NI/II/2/ABCD/T5 Ta = 60°C  
Entity Parameters

|                                 | V <sub>I</sub><br>(V) | I <sub>I</sub><br>(mA) | C <sub>a</sub><br>(μF)<br>Group A,B / C / D | L <sub>a</sub><br>(mH)<br>Group A,B / C / D |
|---------------------------------|-----------------------|------------------------|---------------------------------------------|---------------------------------------------|
| <b>Analog Isolator Barriers</b> |                       |                        |                                             |                                             |
| <b>MK36-11Ex0- a / 24VDC</b>    |                       |                        |                                             |                                             |
| Terminals 1-2-3-4-6             | 13.8                  | 34.1                   | 1.02 / 3.08 / 8.21                          | 29.4 / 106 / 251                            |

a = Output LI or LU

### Special conditions of use:

1. Must be installed in suitable equipment enclosure in accordance with ANSI/ISA S82.01 and S82.03

3005567  
Page 1 of 5

FM

### MK-Series. Isolator Barriers.

AIS/I,II,III/1/ABCDEF; - IS-1.500 / E; Entity  
NI/II/2/ABCD/T4A Ta = 60°C  
Entity Parameters

|                         | V <sub>OC</sub> | I <sub>SC</sub> | C <sub>a</sub><br>(μF) | L <sub>a</sub><br>(mH) |
|-------------------------|-----------------|-----------------|------------------------|------------------------|
| <b>Solenoid Drivers</b> |                 |                 |                        |                        |
| <b>MK72-S09-Ex0 / a</b> | 23.3            | 108             | 0.048 / 0.17 / 0.17    | 2 / 5 / 5              |
| <b>MK72-S11-Ex0 / a</b> | 13.1            | 73.4            | 0.26 / 0.8 / 0.8       | 2 / 10 / 10            |
| <b>MK72-S12-Ex0 / a</b> | 17.4            | 131             | 0.1 / 0.33 / 0.33      | 1 / 5 / 5              |
| <b>MK72-S13-Ex0 / a</b> | 17.4            | 191             | 0.13 / 0.55 / 0.55     | 0.15 / 1 / 1           |
| <b>MK72-S15-Ex0 / a</b> | 17.4            | 111             | 0.105 / 0.35 / 0.35    | 1 / 5 / 5              |
| <b>MK72-S17-Ex0 / a</b> | 19.3            | 30.4            | 0.1 / 0.43 / 0.43      | 2 / 10 / 10            |
| <b>MK72-S18-Ex0 / a</b> | 19.3            | 112             | 0.095 / 0.46 / 0.46    | 0.5 / 1 / 1            |
| <b>MK72-S21-Ex0 / a</b> | 27.6            | 82.0            | 0.002 / 0.14 / 0.14    | 0.15 / 10 / 10         |

a = Power supply: 12VDC or 24VDC

### Special conditions of use:

1. Must be installed in suitable equipment enclosure in accordance with ANSI/ISA S82.01 and S82.03

### MK-Series. Isolator Barriers.

AIS/I,II,III/1/CDEF; - IS-1.500 / E; Entity  
NI/II/2/ABCD/T4A Ta = 60°C  
Entity Parameters

|                         | V <sub>OC</sub><br>(V) | I <sub>SC</sub><br>(mA) | C <sub>a</sub><br>(μF)<br>Group CD | L <sub>a</sub><br>(mH)<br>Group CD |
|-------------------------|------------------------|-------------------------|------------------------------------|------------------------------------|
| <b>Solenoid Drivers</b> |                        |                         |                                    |                                    |
| <b>MK72-S10-Ex0 / a</b> | 14.5                   | 165                     | 0.8                                | 1                                  |
| <b>MK72-S14-Ex0 / a</b> | 17.4                   | 177                     | 0.54                               | 1                                  |
| <b>MK72-S16-Ex0 / a</b> | 18.3                   | 136                     | 0.26                               | 5                                  |
| <b>MK72-S19-Ex0 / a</b> | 27.6                   | 131                     | 0.118                              | 5                                  |
| <b>MK72-S20-Ex0 / a</b> | 27.6                   | 111                     | 0.12                               | 5                                  |
| <b>MK72-S22-Ex0 / a</b> | 27.6                   | 110                     | 0.12                               | 5                                  |

a = Power supply: 12VDC or 24VDC

### Special conditions of use:

1. Must be installed in suitable equipment enclosure in accordance with ANSI/ISA S82.01 and S82.03

### MK31-aEx0-b/24VDC. MK-Series. Isolator Barriers.

NI/II/2/ABCD/T6 Ta=60°C

a = Input/output conversions 11, 111, 112, 113, 114, 115, 116, 117, 119, 120, 121 or 122

b = Output type LI or LU

### Special conditions of use:

1. Must be installed in suitable equipment enclosure in accordance with ANSI/ISA S82.01 and S82.03

3005567  
Page 2 of 5

FM

Equipment Ratings:

**MK21-121Ex0-R / a and MK21-12Ex0-RI / a. Rotational Speed Monitors**

Intrinsically Safe connections with entity parameters for  
Class I, Division 1, Groups A, B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1;  
in accordance with TURCK Inc. Control Drawing No. IS-1.000, Rev. V  
indoor hazardous (classified) locations

Entity Parameters:

|                    | $V_{OC}$<br>(V) | $I_{SC}$<br>(mA) | $C_a$<br>( $\mu F$ )<br>Group A,B / C / D | $L_a$<br>(mH)<br>Group A,B / C / D |
|--------------------|-----------------|------------------|-------------------------------------------|------------------------------------|
| Terminals 5-6, 7-8 | 12.4            | 14.4             | 1.46 / 4.38 / 11.7                        | 157 / 551 / 1H                     |

**MK36-11Ex0- a / 24VDC. Analog Isolator Barriers**

Intrinsically Safe connections with entity parameters for  
Class I, Division 1, Groups A, B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1;  
applicable Groups in accordance with TURCK Inc. Control Drawing No. IS-1.500, Rev. E  
NonIncendive for Class I, Division 2, Groups A, B, C and D  
T5 at Ta = 60°C  
indoor hazardous (classified) locations

Entity Parameters

|                     | $V_T$<br>(V) | $I_T$<br>(mA) | $C_a$<br>( $\mu F$ )<br>Group A,B / C / D | $L_a$<br>(mH)<br>Group A,B / C / D |
|---------------------|--------------|---------------|-------------------------------------------|------------------------------------|
| Terminals 1-2-3-4-6 | 13.8         | 34.1          | 1.02 / 3.08 / 8.21                        | 29.4 / 106 / 251                   |

**Solenoid Drivers. Isolator Barriers.**

Intrinsically Safe connections with entity parameters for  
Class I, Division 1, Groups A, B, C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1;  
applicable Groups in accordance with TURCK Inc. Control Drawing No. IS-1.500, Rev. E  
NonIncendive for Class I, Division 2, Groups A, B, C and D  
T4A at Ta = 60°C  
indoor hazardous (classified) location,

Entity Parameters

|                         | $V_{OC}$ | $I_{SC}$ | $C_a$<br>( $\mu F$ ) | $L_a$<br>(mH)  |
|-------------------------|----------|----------|----------------------|----------------|
| <b>Solenoid Drivers</b> |          |          |                      |                |
| <b>MK72-S09-Ex0 / a</b> | 23.3     | 108      | 0.048 / 0.17 / 0.17  | 2 / 5 / 5      |
| <b>MK72-S11-Ex0 / a</b> | 13.1     | 73.4     | 0.26 / 0.8 / 0.8     | 2 / 10 / 10    |
| <b>MK72-S12-Ex0 / a</b> | 17.4     | 131      | 0.1 / 0.33 / 0.33    | 1 / 5 / 5      |
| <b>MK72-S13-Ex0 / a</b> | 17.4     | 191      | 0.13 / 0.55 / 0.55   | 0.15 / 1 / 1   |
| <b>MK72-S15-Ex0 / a</b> | 17.4     | 111      | 0.105 / 0.35 / 0.35  | 1 / 5 / 5      |
| <b>MK72-S17-Ex0 / a</b> | 19.3     | 30.4     | 0.1 / 0.43 / 0.43    | 2 / 10 / 10    |
| <b>MK72-S18-Ex0 / a</b> | 19.3     | 112      | 0.095 / 0.46 / 0.46  | 0.5 / 1 / 1    |
| <b>MK72-S21-Ex0 / a</b> | 27.6     | 82.0     | 0.002 / 0.14 / 0.14  | 0.15 / 10 / 10 |

**Solenoid Drivers. Isolator Barriers.**

Intrinsically Safe connections with entity parameters for  
Class I, Division 1, Groups C and D; Class II, Division 1, Groups E, F and G; Class III, Division 1;  
applicable Groups in accordance with TURCK Inc. Control Drawing No. IS-1.500, Rev. E  
NonIncendive for Class I, Division 2, Groups A, B, C and D  
T4A at Ta = 60°C  
indoor hazardous (classified) location,

Entity Parameters

|                         | $V_{OC}$<br>(V) | $I_{SC}$<br>(mA) | $C_a$<br>( $\mu F$ )<br>Group CD | $L_a$<br>(mH)<br>Group CD |
|-------------------------|-----------------|------------------|----------------------------------|---------------------------|
| <b>Solenoid Drivers</b> |                 |                  |                                  |                           |
| <b>MK72-S10-Ex0 / a</b> | 14.5            | 165              | 0.8                              | 1                         |
| <b>MK72-S14-Ex0 / a</b> | 17.4            | 177              | 0.54                             | 1                         |
| <b>MK72-S16-Ex0 / a</b> | 18.3            | 136              | 0.26                             | 5                         |
| <b>MK72-S19-Ex0 / a</b> | 27.6            | 131              | 0.118                            | 5                         |
| <b>MK72-S20-Ex0 / a</b> | 27.6            | 111              | 0.12                             | 5                         |
| <b>MK72-S22-Ex0 / a</b> | 27.6            | 110              | 0.12                             | 5                         |

**MK31-aEx0-b/24VDC. MK-Series. Isolator Barriers.**

Nonincendive for Class I, Division 2, Groups A, B, C and D;  
T6 at Ta = 60°C  
indoor hazardous (classified) locations

Special conditions of use:

1. Must be installed in suitable equipment enclosure in accordance with ANSI/ISA S82.01 and S82.03

Approved for:

TURCK INCORPORATED  
3000 CAMPUS DRIVE  
PLYMOUTH, MINNESOTA 55441

# Factory Mutual Research

This certifies that the equipment described has been found to comply with the following Factory Mutual Research Approval Standards and other documents:

|            |      |
|------------|------|
| Class 3600 | 1999 |
| Class 3610 | 1988 |
| Class 3611 | 1986 |
| Class 3810 | 1989 |

Original Approval Job Identification: 3005567 Approval Granted: March 27, 2000

Subsequent Revision Reports / Date Approval Amended

Factory Mutual Research Corporation

*Frank J. McGowan*  
Frank J. McGowan, Instrumentation Section Manager  
Approvals Division

*4/4/2000*  
Date

3005567  
Page 5 of 5

## TURCK

Installation of Intrinsically Safe Systems  
Drawing IS 1.000, Sht 1, Factory Mutual Approved Systems



3000 CAMPUS DRIVE  
MINNEAPOLIS, MN 55441  
APPLICATION ASSISTANCE: 1-800-TURCK-IS

NON-HAZARDOUS LOCATION

HAZARDOUS (CLASSIFIED) LOCATION: CLASS I, DIVISION 1, GROUPS A,B,C,D  
CLASS II, DIVISION 1, GROUPS E,F,G  
CLASS III, DIVISION 1

Any FMRC Approved associated apparatus with Entity Concept parameters as follows:

$$V_{oc} \text{ or } V_L \leq 15V$$

$$I_{sc} \text{ or } I_L \leq 60mA$$

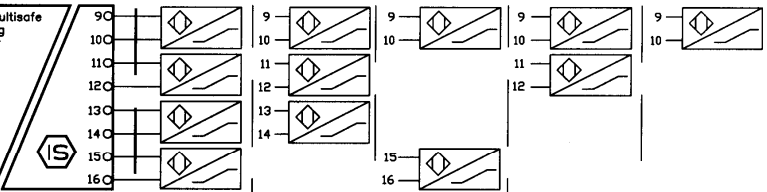
$$C_0 \geq C_{cable} + 220nF$$

$$L_0 \geq L_{cable} + 280\mu H$$

Turck Proximity Sensor Models: BCa-b-cdef Bia-b-cdef\*  
BIM-b-cdef\* MP-aD-cdef Nia-b-cdef\* Sia-b-cdf  
a = Sensing distance in millimeters b = Mechanical form  
c = Output Y0, Y1 or Z0 d = LED, X or blank  
e = Connector style -H1141, -H1341, -V1331, -B1221 or blank  
f = Options /S87, /S100 or blank  
\* Sensors with integral cable may include molded connector option.  
Add suffix: -g-hjk-4.21T  
g = Cable length in meters  
h = Connector angle, W (right angle) or R (straight)  
j = Connector gender K (female) or S (male)  
k = Material K (nylon), V (SST) or blank (chrome-plated brass)  
 $V_{max} = 15V$ ,  $I_{max} = 60mA$ ,  $C_1 = 220nF$ ,  $L_1 = 280\mu H$

MSa-bEx0-cde  
a = 1, 13, 14, 21, 22, 23 or 41  
b = 11, 12, 21, 22, 23, 33, 42, 121 or 231  
c = R, T or RT  
d = /12VAC, /24VAC, /42VAC, /48VAC, /115VAC, /230VAC, /12VDC, /24VDC, /36VDC, /42VDC or 60VDC  
e = /M18 or blank

Turck Multisafe Switching Amplifier

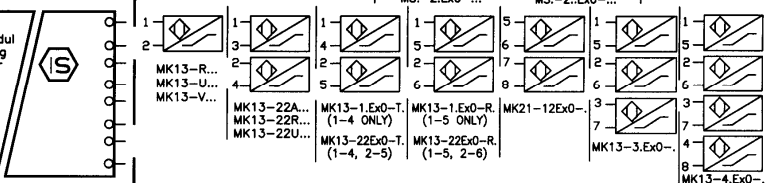


Entity Parameters (per channel)

| V <sub>oc</sub> (V) | I <sub>sc</sub> (mA) | C <sub>0</sub> (uF) | L <sub>0</sub> (mH) |
|---------------------|----------------------|---------------------|---------------------|
| 10.8                | 13.8                 | 2.5/7.5/20          | 185/650/1H          |

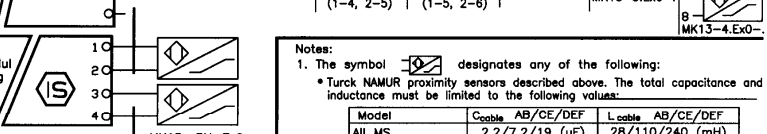
MK13-aNb-Ex0/24VDCd  
MK13-aPb-Ex0/24VDCd  
MK13-aR-Ex0/cd  
MK13-aPN-Ex0/24VDCf  
a = A, R, U or V  
b = F or blank  
c = /12VDC, /24VDC, /115VAC or /230VAC  
d = /K08, /K15 or blank  
e = A, R or U  
f = /K11 or blank

Turck Multimodal Switching Amplifier



MK1-22a-Ex0/24VDCb  
MK13-22a-Ex0/24VDCb  
a = AN, AP, RN, RP, UN or UP  
b = K07 or blank  
MK13-aEx0-b/c  
a = 11, 12, 21, 22, 33 or 451  
b = R or T  
c = /24VDC, /115VAC or /230VAC

Turck Multimodal Switching Amplifier



Entity Parameters

| Model          | Terminals          | V <sub>oc</sub> (V) | I <sub>sc</sub> (mA) | C <sub>0</sub> (uF) | L <sub>0</sub> (mH) |
|----------------|--------------------|---------------------|----------------------|---------------------|---------------------|
| MK1-22-Ex0/-   | 1-3, 2-4           | 11.8                | 18.0                 | 1.7/5.2/13          | 101/358/898         |
| MK13-22-Ex0/-  | 1-3, 2-4           | 11.8                | 18.0                 | 1.7/5.2/13          | 101/358/898         |
| MK13-Ex0/-     | 1-2                | 11.0                | 32.7                 | 2.2/6.6/17.6        | 32/358/898          |
| MK13-1Ex0/-    | 1-4                | 11.9                | 18.0                 | 1.88/5.06/13.5      | 102/358/898         |
| MK13-22Ex0-R/- | 1-5, 2-6           | 11.9                | 18.0                 | 1.88/5.06/13.5      | 102/358/898         |
| MK13-22Ex0-T/- | 1-4, 2-5           | 11.9                | 18.0                 | 1.88/5.06/13.5      | 102/358/898         |
| MK13-3Ex0/-    | 1-5, 2-6, 3-7      | 13.3                | 14.8                 | 1.15/3.46/9.23      | 149/524/1H          |
| MK13-4Ex0/-    | 1-5, 2-6, 3-7, 4-8 | 13.3                | 14.8                 | 1.15/3.46/9.23      | 149/524/1H          |
| MK15-PN-Ex0/-  | 1-2, 3-4           | 14.1                | 21.7                 | 1.0/3.0/8.0         | 75/275/600          |
| MK21-12Ex0/-   | 5-6, 7-8           | 12.4                | 14.4                 | 1.46/4.38/11.7      | 157/551/1H          |

MK15-PN-Ex0...  
1-2: Static  
OR  
3-4: Dynamic

Notes:

- The symbol designates any of the following:  
\* Turck NAMUR proximity sensors described above. The total capacitance and inductance must be limited to the following values:

| Model    | Cable AB/CE/DEF    | L cable AB/CE/DEF |
|----------|--------------------|-------------------|
| All MS   | 2.2/7.2/19 (uF)    | 28/110/240 (mH)   |
| MK1-...  | 0.9/3.2/9.0 (uF)   | 31/124/274 (mH)   |
| MK13-... | 0.78/2.7/7.7 (uF)  | 74/274/599 (mH)   |
| MK21-... | 1.24/4.1/11.4 (uF) | 156/550/1000 (mH) |

- \* Any FMRC-approved intrinsically safe apparatus with Entity Concept parameters:  $V_{max} \geq V_{oc}$  or  $V_L$ ,  $I_{max} \geq I_{sc}$  or  $I_L$ ,  $C_1 + C_{cable} \leq C_0$ ,  $L_1 + L_{cable} \leq L_0$ . The Entity Concept allows interconnection of intrinsically safe apparatus and associated apparatus not specifically examined in such combination as a system when the conditions above are met.  
\* Any simple apparatus. A simple apparatus is defined as a device that will neither generate nor store more than 1.2V, 0.1A, 20uJ or 25mW.

- When the field device is a contact closure, the connection should be made as shown below for proper performance.

MK13-... and MS13-... models R1 must be 1k to 22k, R2 must be 10k to 22k. All other models

- Any combination of up to 10 channels of the associated apparatus described above may be connected to simple apparatus in a hazardous (classified) location using a common return. R1, if used, must be rated 0.25W minimum if 3-10 channels are connected with a common return. If 2 or more channels are connected with a common return, the total cable inductance must be limited to the values in the table to the left. If 2 or more channels are connected with a common return, the total cable capacitance must be limited to 1.0uF/3.0uF/8.0uF (Groups AB/CE/DEF).

| Groups   |            | Channels |    |     |    |    |     |     |     |     |  |
|----------|------------|----------|----|-----|----|----|-----|-----|-----|-----|--|
|          |            | 2        | 3  | 4   | 5  | 6  | 7   | 8   | 9   | 10  |  |
| A,B (mH) | C,E (mH)   | 18       | 8  | 4.7 | 3  | 2  | 1.1 | 0.7 | 0.5 | 0.3 |  |
|          | D,F,G (mH) | 67       | 32 | 18  | 12 | 9  | 6.8 | 5.3 | 4.2 | 3.4 |  |
|          |            | 155      | 69 | 39  | 25 | 17 | 12  | 9.8 | 7.8 | 6.3 |  |

- Wiring methods must be in accordance with the National Electrical Code, ANSI/NFPA 70, Article 504, and ANSI/ISA RP12.6.
- Associated apparatus must not be connected to any device that uses or generates in excess of 250Vrms unless it has been determined that the voltage is adequately isolated from the associated apparatus.

- If the electrical parameters of the cable are unknown, the following values may be used: Capacitance - 60pF/foot  
Inductance - 0.2uH/foot

IS-1.000, Rev. U  
Sheet 1 of 2



NON-HAZARDOUS LOCATION

HAZARDOUS (CLASSIFIED) LOCATION: CLASS I, DIVISION 1, GROUPS A,B,C,D  
CLASS II, DIVISION 1, GROUPS E,F,G (See Note 7)  
CLASS III, DIVISION 1

Any CSA Certified  
associated apparatus  
with Entity Concept  
parameters as follows:

$$V_{oc} \leq 15V$$

$$I_{sc} \leq 60mA$$

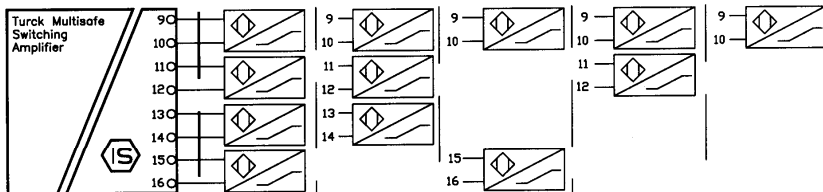
$$C_o \geq C_{cable} + 220nF$$

$$L_o \geq L_{cable} + 280\mu H$$

Turck Proximity Sensor Models: BCa-b-cdef Bia-b-cdef\*  
BIM-b-cdef\* MP-aD-cdef Nia-b-cdef\* Sia-b-cdf  
a = Sensing distance in millimeters b = Mechanical form  
c = Output Y0, Y1 or 2Y0 d = LED, X or blank  
e = Connector style -H1141,-H1341,-V1331,-B1221 or blank  
f = Options /S97, /S100 or blank  
\* Sensors with integral cable may include molded connector option.  
Add suffix: -g-hjk-4.21T  
g = Cable length in meters  
h = Connector angle, W (right angle) or R (straight)  
j = Connector gender K (female) or S (male)  
k = Material K (nylon), V (SST) or blank (chrome-plated brass)  
 $V_{max} = 15V, I_{max} = 60mA, C_i = 220nF, L_i = 280\mu H$

MSa-bEx0-cde  
a = 1, 13, 14, 21, 22, 23 or 41  
b = 11, 12, 21, 22, 23, 33, 42,  
121 or 231  
c = R, T or RT  
d = /12VAC, /24VAC, /42VAC,  
/48VAC, /115VAC, /230VAC,  
/12VDC, /24VDC, /36VDC,  
/42VDC or 50VDC  
e = /N18 or blank

Turck Multisafe  
Switching  
Amplifier

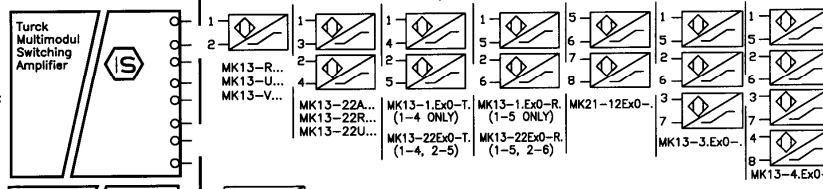


Entity Parameters (per channel)

| V <sub>oc</sub><br>(V) | I <sub>sc</sub><br>(mA) | C <sub>o</sub> (uF)<br>AB/CE/DEF | L <sub>o</sub> (mH)<br>AB/CE/DEF |
|------------------------|-------------------------|----------------------------------|----------------------------------|
| 10.8                   | 13.8                    | 2.5/7.5/20                       | 185/650/1H                       |

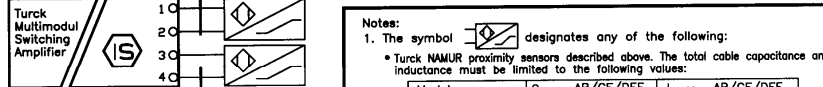
MK13-aNb-Ex0/24VDCd  
MK13-aPb-Ex0/24VDCd  
MK13-aPN-Ex0/24VDCd  
MK13-aR-Ex0/cd  
MK15-ePN-Ex0/24VDCf  
a = A, R, U or V  
b = F or blank  
c = /12VDC, /24VDC, /115VAC  
or /230VAC  
d = /N06, /K15 or blank  
e = A, R or U  
f = /K11 or blank

Turck Multimodul  
Switching  
Amplifier



MK13-22a-Ex0/24VDCb  
MK13-22a-Ex0/24VDCb  
a = AN, AP, RN, RP, UN or UP  
b = K07 or blank  
MK13-aEx0-b/c  
MK21-12Ex0-b/c  
a = 11, 12, 121, 22, 33 or 421  
b = R or T  
c = /24VDC, /115VAC or /230VAC

Turck Multimodul  
Switching  
Amplifier



Entity Parameters

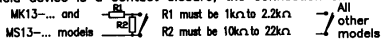
| Model         | Terminals | V <sub>oc</sub><br>(V) | I <sub>sc</sub><br>(mA) | C <sub>o</sub> (uF)<br>AB/CE/DEF | L <sub>o</sub> (mH)<br>AB/CE/DEF |
|---------------|-----------|------------------------|-------------------------|----------------------------------|----------------------------------|
| MK1-22-Ex0/   | 1-3, 2-4  | 11.8                   | 18                      | 1.7/5.2/13                       | 101/358/898                      |
| MK13-22-Ex0/  | 1-3, 2-4  | 11.8                   | 18                      | 1.7/5.2/13                       | 101/358/898                      |
| MK13-Ex0/     | 1-2       | 11.0                   | 32.7                    | 2.2/6.6/17.8                     | 32/358/898                       |
| MK13-1-Ex0-/  | 1-4       | 11.9                   | 18.0                    | 1.88/5.06/13.5                   | 102/358/898                      |
| MK13-22Ex0-R/ | 1-5, 2-6  | 11.9                   | 18.0                    | 1.88/5.06/13.5                   | 102/358/898                      |
| MK13-22Ex0-1/ | 1-4, 2-5  | 11.9                   | 18.0                    | 1.88/5.06/13.5                   | 102/358/898                      |
| MK13-3-Ex0-/  | 1-5, 4-7  | 13.3                   | 14.8                    | 1.15/3.46/9.23                   | 149/524/1H                       |
| MK13-4-Ex0-/  | 1-5, 4-7  | 13.3                   | 14.8                    | 1.15/3.46/9.23                   | 149/524/1H                       |
| MK15-PN-Ex0/  | 1-2, 3-4  | 14.1                   | 21.7                    | 1.0/3.0/8.0                      | 75/275/600                       |
| MK21-12Ex0-/  | 5-6, 7-8  | 12.4                   | 14.4                    | 1.46/4.38/11.7                   | 157/551/1H                       |

Notes:

- The symbol designates any of the following:  
\* Turck NAMUR proximity sensors described above. The total cable capacitance and inductance must be limited to the following values:  

| Model    | Cable AB/CE/DEF    | L cable AB/CE/DEF |
|----------|--------------------|-------------------|
| All MS   | 2.2/7.2/19 (uF)    | 28/110/240 (mH)   |
| MK1-...  | 0.9/3.2/9.0 (uF)   | 31/124/274 (mH)   |
| MK13-... | 0.78/2.7/7.7 (uF)  | 74/274/599 (mH)   |
| MK21-... | 1.24/4.1/11.4 (uF) | 156/550/1000 (mH) |
- \* Any CSA-certified intrinsically safe apparatus with Entity Concept parameters:  
 $V_{max} \geq V_{oc}$   
 $C_i + C_{cable} \leq C_o$   
 $L_i + L_{cable} \leq L_o$   
 The Entity Concept allows interconnection of intrinsically safe apparatus and associated apparatus not specifically intended in such combination as a system when the conditions above are met.
- \* Any passive resistive switch device. The total cable inductance and capacitance in each such field circuit must be limited to the values in the tables to the left.

2. When the field device is a contact closure, the connection should be made as shown below for proper performance.



3. Wiring methods must be in accordance with the Canadian Electrical Code, CSA 22.1, Appendix F.

4. Associated apparatus must not be connected to any device that uses or generates in excess of 250Vrms unless it has been determined that the voltage is adequately isolated from the associated apparatus.

5. If the electrical parameters of the cable are unknown, the following values may be used: Capacitance - 60pF/foot  
Inductance - 0.2uH/foot

6. WARNING: Substitution of components may impair intrinsic safety. AVERTISSEMENT: La substitution de composants peut compromettre la sécurité intrinsèque.  
7. Proximity sensors with integral connectors, model code e = -H1141, -V1331, or -H1341, or with cable and molded connector, model suffix -4.21T may not be installed in Class II, Group E or F hazardous (classified) locations.

IS-1.000, Rev. U  
Sheet 2 of 2



CSA INTERNATIONAL

# Certificate of Compliance

Certificate: 157759 - 2500003741 (LR 82245-4)

Project: 2500003741

Date Issued: October 27, 1999

Issued To: **Turck Inc.**  
3000 Campus Dr.  
Plymouth, MN 55441-2656  
Attention: Mr. Paul Harms

*The products listed below are eligible to bear the CSA Mark shown, with adjacent indicator NRTL/C.*



Issued by: R. Wildish

Signature:

## PRODUCTS

CLASS 2258 04 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe Entity - For Hazardous Locations  
CLASS 2258 84 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe Entity - For Hazardous Locations

Class I Groups A, B, C and D; Class II Groups E, F and G; Class III:

- "Multisafe" Transformer Isolated Switching Amplifier Models MS 1-a Ex0-b/c/d, MS 13-a Ex0-b/c/d, MS 14-a Ex0-b/c/d, MS 21-a Ex0-b/c/d, MS 23-a Ex0-b/c/d and MS 41-a Ex0-b/c/d; supply rated 12/24/42/48/110/115/120/230 Vac or 12/24/48/60 Vdc, 3.5VA; relay outputs rated 250 Vac, 4A (p.f. 0.7) or 60 Vdc, 0.5A; transistor (opto-coupler) outputs rated 30V dc, 50mA.

Units provide Intrinsically Safe circuits for thermocouples, switches, non-inductive resistive devices or CSA Certified Intrinsically Safe Equipment with Entity Parameters per Control Drawing No. CSA-1.000 as follows:

The "NRTL/C" indicator adjacent to the CSA Mark signifies that the product has been evaluated to the applicable ANSI/UL and CSA Standards, for use in the U.S. and Canada. NRTL, i.e. Nationally Recognized Testing Laboratory, is a designation granted by the U.S. Occupational Safety and Health Administration (OSHA) to laboratories which have been recognized to perform certification to U.S. Standards.

DQD 507WP 99/05/01

Page 1



Certificate: 157759 - 2500003741 (LR 82245-4) **CSA INTERNATIONAL**

Date: October 27, 1999

Project: 2500003741

| Parameter | A.B | Groups |       |
|-----------|-----|--------|-------|
|           |     | C.E    | D.E.G |
| Voc (V)   | 13  | 13     |       |
|           | 13  |        |       |
| Isc (mA)  | 16  | 16     | 16    |
| La (mH)   | 130 | 450    | 1000  |
| Ca (uF)   | 1.4 | 4.2    | 11.2  |

Notes:

(1) The suffix "a" in the Model No. may be a two or three digit number representing the number of inputs and outputs. The suffix "b" in the Model No. may be a "R" representing relay outputs, a "T" representing transistor (opto-coupler) outputs or a "RT" representing mixed-transistor/relay outputs, which may be followed by optional suffixes X,X2,X3,X4 indicating the number of LED's. The suffix "c" in the Model No. indicates the supply voltage. The suffix "d" in the Model No. may be Blank or "Mxx" or "Sxx" where "xx" is a two digit number, representing modification of amplifier function.

(2) The amplifiers are for installation in suitable enclosures acceptable to the local inspection authority having jurisdiction.

- Inductive Sensors Series Bi, Ni, Si and MP, Inductive Magnet Sensors Series BIM and Capacitive Sensors Series BC. Intrinsically Safe with Entity Parameters per Control Drawing No. CSA-1.000 as follows: Vmax = 15V, Imax = 60mA, Li = 280 uH, Ci = 220 nF.

Notes:

- (1) Model Numbers are followed by suffixes indicating minor differences in construction.
- (2) Sensors with the Model No. suffix "V1331", "V1131" or "H1141" are suitable for Class I Group A,B,C,D and Class II Group G only.

**APPLICABLE REQUIREMENTS**

|                   |           |                                                                                                                         |
|-------------------|-----------|-------------------------------------------------------------------------------------------------------------------------|
| CAN/CSA-C22.2 No. | 14-M91    | - Industrial Control Equipment                                                                                          |
| CSA Std C22.2 No. | 25-1966   | - Enclosures for Use in Class II, Groups E, F and G Hazardous Locations                                                 |
| CAN/CSA-C22.2 No. | 94-M91    | - Special Purpose Enclosures                                                                                            |
| CSA Std C22.2 No. | 142-M1987 | - Process Control Equipment                                                                                             |
| CAN/CSA-C22.2 No. | 157-92    | - Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations                                         |
| UL Std No.        | 913       | - Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations |
| UL Std No.        | 916       | - Energy Management Equipment                                                                                           |



Certificate: 157759 - 2500003741 (LR 82245-4) **CSA INTERNATIONAL**

Date: October 27, 1999

Project: 2500003741

**MARKINGS**

Amplifiers

- CSA Monogram with NRTL/C indicator;
- Submitter Identification;
- Model number;
- Serial Number, Date Code or Month and Year of Manufacture;
- Electrical Rating;
- Hazardous Location Designation;
- Entity Parameters;
- The words ASSOCIATED EQUIPMENT/APPAREILLAGE CONNEXE;
- The Symbol [Exia];
- Reference to Installation Instructions;

Sensors

- CSA Monogram with NRTL/C indicator;
- Submitter Identification;
- Model number;
- Hazardous Location Designation;
- Entity Parameters;
- Temperature Code;
- The words "INTRINSICALLY SAFE/SECURITE INTRINSEQUE";
- The Symbol Exia;
- Reference to Installation Instructions



CSA INTERNATIONAL

# Supplement to Certificate of Compliance

Certificate: 157759 - 2500003741 (LR 82245)

Project: 2500003741

Issued to: **Turck Inc.**  
3000 Campus Dr.  
Plymouth, MN 55441-2656  
Attention: Mr. Paul Harms

The products listed, including the latest revision described below,  
are eligible to be marked in accordance with the referenced Certificate.

Issued By: R. Wildish

Signature:

## Product Certification History

| Project    | Date              | Description                                                   |
|------------|-------------------|---------------------------------------------------------------|
| 2500003741 | Oct. 27/99        | Update to cover Private Label for Sensors.                    |
| -7         | September 1, 1994 | Update to cover S90 and S235 suffixes on CSA-1.000 Inst. Dwg. |
| -4         | February 25, 1994 | Original Certification.                                       |

DQD 507WP 99/05/01

Page 1

## FM Approved NAMUR Proximity Sensors

NONHAZARDOUS LOCATION

HAZARDOUS (CLASSIFIED) LOCATION

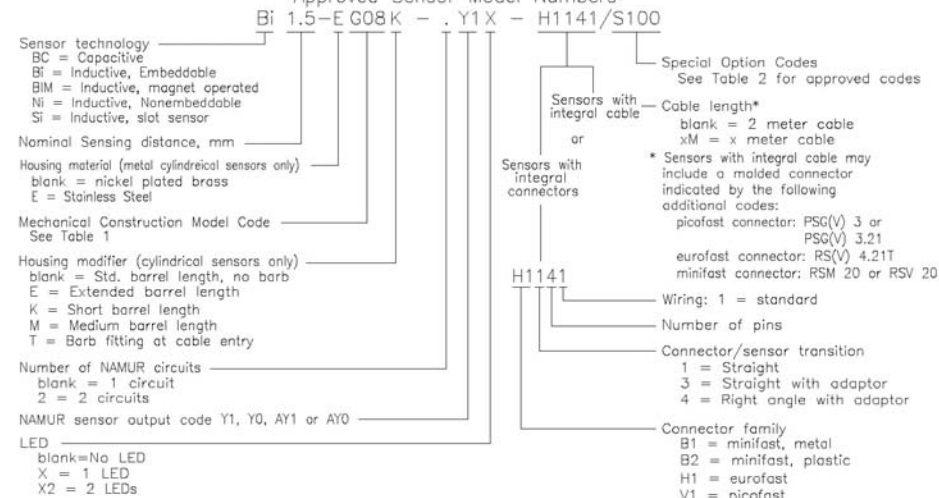
Class I, Division 1, Group A, B, C or D  
Class II, Division 1, Group E, F or G  
Class III, Division 1  
Class I, Zone 0, Group IIC, IIB or IIA



Associated apparatus with  
linear circuit Entity  
Parameters compatible with  
the sensor Entity Parameters  
listed in Table 1.

Turck NAMUR sensor, model numbers  
listed below, with Entity Parameters  
as listed in Table 1.

### Approved Sensor Model Numbers



Drawing No.:  
IS-1.118

**TURCK**  
3000 Campus Drive  
Plymouth, MN 55441  
Phone: (763) 553-7300

Title: Control Drawing for FM Approved  
NAMUR Proximity Sensors

| A   | Release     | BVL  | 4/23/12 |
|-----|-------------|------|---------|
| Rev | Description | Drft | Date    |

Scale: None Sheet 1 of 3

Table 1: Entity Parameters by Mechanical Construction Model Codes

| Mechanical Construction Model Code                                                                                                                                                                                                                                                                                                                                                 | Class I, II, III, Div 1, Grp A, B, C, D, E, F, G T5<br>Class I, Zone 0, AEx ia IIC T5<br>T <sub>a</sub> = 70°C |                        |                                          |                                           |           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|------------------------|------------------------------------------|-------------------------------------------|-----------|
|                                                                                                                                                                                                                                                                                                                                                                                    | Class I, Div 1, Grp A, B, C, D T4<br>Class I, Zone 0, AEx ia IIC T4<br>T <sub>a</sub> = 85°C                   |                        |                                          |                                           |           |
|                                                                                                                                                                                                                                                                                                                                                                                    | C <sub>i</sub><br>(nF)                                                                                         | L <sub>i</sub><br>(uH) | U <sub>i</sub> / V <sub>max</sub><br>(V) | I <sub>i</sub> / I <sub>max</sub><br>(mA) | P<br>(mW) |
| AKT, DS20, DSC26, DSU26, DSU35, DSU35TC, FST, .G05, .G08, .G12, .G12SK, .G14, .G18, .G18SK, .G180, .G182, .G19, .G28, .G30, .G30SK, H04, .H6.5, HS540, INT, ISM, Q5.5, QF5.5, GS880, .H08, HS665, IKE, IKT, K11, K20, K30, .M12, .M18, .M30, NST, P12, P12SK, P18, P18SK, P30, P30SK, PSM, PST, PT30, PT30SK, Q06, Q08, Q10, Q10S, Q11, Q11SQ12, Q14, Q20, QST, S12, S18, S30, UNT | 150                                                                                                            |                        | 20                                       | 40                                        | 130       |
| CA25, CA40, CK40, CP40, CP80, .G47, G47SR, K09, K10, K33, K34, K34SR, K40, K40SR, K90SR, Q25, Q30, Q80                                                                                                                                                                                                                                                                             | 250                                                                                                            | 350                    | 20                                       | 40                                        | 130       |
| K08                                                                                                                                                                                                                                                                                                                                                                                | 250                                                                                                            | 350                    | 20                                       | 20                                        | 130       |

## Notes:

The Entity concept allows interconnection of intrinsically safe apparatus and associated apparatus not specifically examined in such combination as a system when the conditions below are met:

$$\begin{aligned} V_{\max} &\geq V_{oc} & I_{\max} &\geq I_{sc} \\ C_i + C_{\text{cable}} &\leq C_a & L_i + L_{\text{cable}} &\leq L_a \\ U_i &\geq U_o & I_i &\geq I_o \\ C_i + C_{\text{cable}} &\leq C_o & L_i + L_{\text{cable}} &\leq L_o \\ P_i &\geq P_o \end{aligned}$$

L<sub>i</sub> for capacitive sensors (BC.. ...-Y..) is negligibly small.

Standard T<sub>a</sub> is -25°C - +70°C. Extended T<sub>a</sub> is valid for models with special option codes as follows:

$$\begin{aligned} S80 &= T_a -25^\circ\text{C} - +80^\circ\text{C} \\ S85 &= T_a -25^\circ\text{C} - +85^\circ\text{C} \\ S97 &= T_a -40^\circ\text{C} - +70^\circ\text{C} \end{aligned}$$

- For dual sensors (Mechanical Construction Model Codes DS20, DSC26, DSU26, DSU35, DSU35TC) the Entity Parameters apply per sensor circuit.
- Wiring methods must be in accordance with the National Electrical Code, ANSI/NFPA 70, Article 504 (for Division installations) or Article 505 (for Zone applications), and ANSI/ISA RP12.06.01.
- Associated apparatus must not be connected to any device that uses or generates in excess of 250Vrms.
- If the electrical parameters of the cable are unknown, the following default values may be used:  
Capacitance - 60pF/foot,  
Inductance - 0.2uH/foot.
- WARNING: Part of the enclosure is constructed of plastic. To prevent the risk of electrostatic sparking, the plastic surface should only be cleaned with a damp cloth.
- Sensors that are too small to fit the full intrinsic safety approval marking and also do not have an integral cord, will have an adhesive label included in their packaging. This label should be affixed to an adjacent surface such that it is visible after installation. Wrapped around the cord ultimately used to connect the sensor is suggested as a generally location, though other smooth clean dry locations may also be suitable.

Table 2: Additional Special Option Codes

| Special Option | Description                                   | Special Option | Description                                    |
|----------------|-----------------------------------------------|----------------|------------------------------------------------|
| F1             | Alternate oscillator frequency                | S328           | Special calibration                            |
| F2             | Alternate oscillator frequency                | S346           | Special calibration                            |
| F3             | Alternate oscillator frequency                | S557           | Potted terminal chamber, CP80                  |
| F4             | Alternate oscillator frequency                | S561           | Special pin-out                                |
| F5             | Alternate oscillator frequency                | S580           | Special pin-out                                |
| S15            | Special switch point calibration              | S595           | Bulk packaging                                 |
| S56            | Special housing length                        | S665           | Special pin-out                                |
| S74            | Magnetic field resistant/T <sub>a</sub> 100°C | S918           | Special calibration                            |
| S80            | T <sub>a</sub> = 80°C                         | S947           | Special barrel length                          |
| S85            | T <sub>a</sub> = 85°C                         | S1019          | Special mounting bracket                       |
| S90            | PUR cable                                     | S1128          | 3-pin connector molded on integral cable       |
| S97            | T <sub>a</sub> = -40°C - +70°C                | S1139          | Wider sensing range, BIM sensor                |
| S101           | Hi-flex cable                                 | S1589          | Weld-Guard coating                             |
| S105           | Shielded cable                                | S1631          | Red LED                                        |
| S139           | Submersible (polyoxymethylene Housing)        | S1674          | Special strip length                           |
| S213           | Special calibration                           | S1687          | Special pin-out                                |
| S235           | Special calibration                           | S1764          | Weld-Guard coating, Viton sleeve over cable    |
| S250           | Fixed calibration capacitive Sensor           | S1765          | Weld-Guard coating, Silicone sleeve over cable |
| S326           | Special calibration                           | S1775          | "Wet-suit" (sensor potted in plastic endosure) |

|              |             |      |         |                       |
|--------------|-------------|------|---------|-----------------------|
| A            | Release     | BVL  | 4/23/12 | Drawing No.: IS-1.118 |
| Rev          | Description | Drft | Date    | Scale: None           |
| Sheet 2 of 3 |             |      |         |                       |

|              |             |      |         |                       |
|--------------|-------------|------|---------|-----------------------|
| A            | Release     | BVL  | 4/23/12 | Drawing No.: IS-1.118 |
| Rev          | Description | Drft | Date    | Scale: None           |
| Sheet 3 of 3 |             |      |         |                       |

# CERTIFICATE OF COMPLIANCE

## HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

**Inductive Proximity Sensor. Bia-bcd-ef-gjk\*; Nia-bcd-ef-ghjk\*; Sia-c-efk\***

**Inductive Magnet Operated Proximity Sensor. BIM-c-ef-ghjk\***

**Capacitive Proximity Sensor. BCa-c-efk\***

IS / I, II, III / 1 / ABCDEFG T\*\*, T<sub>a</sub> \*\*, IS-1.118A; Entity; I / O / AEx ia / IIC T\*\*, T<sub>a</sub> \*\*, IS-1.118; Entity;

\*\* T-Class is T5 when Ta = 70°C max, or T4 when Ta = 85°C max

Max Entity Parameters:

|                                                      | $V_{max}/U_i$<br>(V) | $I_{max}/I_i$<br>(mA) | P<br>(mW) | $C_i$<br>(nF) | $L_i$<br>(μH) |
|------------------------------------------------------|----------------------|-----------------------|-----------|---------------|---------------|
| Sensors with Group 1<br>mechanical construction code | 20                   | 40                    | 130       | 150           | 150           |
| Sensors with Group 2<br>mechanical construction code | 20                   | 40                    | 130       | 250           | 350           |
| Sensors with Group 3<br>mechanical construction code | 20                   | 20                    | 130       | 250           | 350           |

a = Sensing distance in millimeters.

b = Housing material (cylindrical sensors only): E or blank

c = Mechanical construction code:

Group 1: AKT, DS20, DSC26, DSU26, DSU35, DSU35TC, FST, G05, G08, G12, G12SK, G14, G18, G18SK, G180, G182, G19, G28, G30, G30SK, GS880, H04, H6.5, H08, HS540, HS865, IKE, IKT, INT, K11, K20, K30, M12, M18, M30, NST, P12, P12SK, P18, P18SK, P30, P30SK, PSM, PST, PT30, QF5.5, Q5.5, Q06, Q08, Q10, Q10S, Q11, Q11S, Q12, Q14, Q20, Q14, Q20, QST, S12, S18, S30, UNT

Group 2: CA25, CA40, CK40, CP40, CP80, G47, G47SR, K09, K10, K33, K34, K34SR, K40, K40SR, Q25, Q30, Q80

### Group 3: K08

d = Housing modifier (cylindrical sensors only): E, K, M, T or blank

e = Output Y0, Y1, 2Y0, 2Y1, AY1 or AY0.

f = LED X, X2, X4 or blank.

g = Connector style B1, B2, H1, V1, or blank. (blank in this case is a 2 meter cord; or xM, where x is the cable length in meters \*)

h = Connector/sensor transition 1, 3, 4 or blank

j = Wiring code 21, 31, 40, 41, 51, 60 or blank

k = Option /F1, /F2, /F3, /F4, /F5, /S15, /S56, /S74, /S80, /S85, /S90, /S97, /S101, /S105, /S139, /S213, /S235, /S250, /S326, /S328, /S346, /S557, /S561, /S580, /S595, /S665, /S901, /S918, /S947, /S1019, /S1128, /S1139, /S1589, /S1631, /S1674, /S1687, /S1764, /S1765, /S1775 or blank.

\* Sensors with integral cable may include a molded connector indicated by the added suffix:

picofast connector PSG 3, PSGV 3, PSG 3.21, PSGV 3.21

eurofast connector RS 4.21T, RSV 4.21T, WS 4.21T, WSE 4.21T

minifast connector RSM 20, RSV 20, WSM 20, WSV 20

Specific Condition for use:

Parts of some of the enclosures are constructed from plastic. To prevent the risk of electrostatic sparking, the plastic surface should only be cleaned with a damp cloth.

### Equipment Ratings:

Intrinsically Safe for Class I, II, and III, Division 1, Groups A, B, C, D, E, F and G; and Class I Zone 0 Group IIC; Temperature Class T-Class is T5 when Ta = 70°C max, or T4 when Ta = 85°C max, Entity, in accordance with control drawing IS-1.118.

### FM Approved for:

Turck Inc  
3000 Campus Drive  
Plymouth, MN 55441



This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

|            |      |
|------------|------|
| Class 3600 | 2011 |
| Class 3610 | 2010 |
| Class 3810 | 2005 |

Original Project ID: 1F1A3.AX      Approval Granted: May 18, 1983

Subsequent Revision Reports / Date Approval Amended

| Report Number | Date              | Report Number | Date |
|---------------|-------------------|---------------|------|
| 0T3H6.AX      | September 3, 1992 |               |      |
| 3044899       | June 14, 2012     |               |      |

FM Approvals LLC

  
J. E. Marquedant  
Group Manager, Electrical

14 June 2012  
Date