

CERTIFICATE OF CONFORMITY



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

2. **Certificate No:** FM16US0285X

3. **Equipment:** MS Series Control Amplifiers & Proximity Sensors
(Type Reference and Name)

4. **Name of Listing Company:** Turck Inc.

5. **Address of Listing Company:** 3000 Campus Drive
Plymouth, Minnesota 55441
USA

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

1F1A3.AX dated 18th May 1983

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

FM Class 3600:2011, FM Class 3610:2010, FM Class 3810:2005,
ANSI/ISA 60079-0:2013, ANSI/ISA 60079-11:2012

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:**

Intrinsically Safe for Class I, II, & III, Division 1, Groups A, B, C, D, E, F, & G hazardous (classified) locations, Intrinsically Safe for Class I, Zone 0, AEx ia Group IIC hazardous in accordance with Control Drawing 1.118.

11. The marking of the equipment shall include:

Certificate issued by:

J.E. Marquedant
Manager, Electrical Systems

1 November 2016

Date

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

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FM Approvals LLC. 1151 Boston-Providence Turnpike, Norwood, MA 02062 USA
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US Certificate Of Conformity No: FM16US0285X

Intrinsically Safe for Class I, II, & III, Division 1, Groups A, B, C, D, E, F, & G hazardous (classified) locations,
 Intrinsically Safe for Class I, Zone 0, AEx ia Group IIC hazardous T5 Ta = -25°C to +70°C or T4 Ta = -25°C to +85°C.

12. Description of Equipment:

General – The control amplifiers provide intrinsically safe outputs which connect to the proximity sensors by switching signals back to controlling circuitry in Nonhazardous locations. The proximity sensors are encapsulated solid state electronic controls. The sensors detect metallic objects within proximity of the sensors, which varies the internal impedance. This change provides a useable signal output to drive the control amplifiers.

Ratings - The ambient operating temperature range is -25°C to +70°C with a T-Code of T5, or -25°C to +85°C with a T-Code of T4.

The energy limitation parameters of the proximity sensors are:

Inductive Proximity Sensor, standard NAMUR Output

- Group 1: Vmax (Ui) = 20VDC, Imax = 60mA, Ci = 150nF, Li = 150µH
- Group 2: Vmax (Ui) = 20VDC, Imax = 40mA or 50mA, Ci = 150nF, Li = 150µH
- Group 3: Vmax (Ui) = 20VDC, Imax = 60mA, Ci = 250nF, Li = 350µH
- Group 4: Vmax (Ui) = 20VDC, Imax = 40mA, Ci = 250nF, Li = 350µH
- Group 5: Vmax (Ui) = 20VDC, Imax = 60mA, Ci = 150nF, Li = 150µH
- Group 6: Vmax (Ui) = 20VDC, Imax = 60mA, Ci = 250nF, Li = 350µH
- Group 7: Vmax (Ui) = 20VDC, Imax = 40mA, Ci = 150nF, Li = 150µH

Inductive Proximity Sensor, digital NAMUR Output

- Group 1: Vmax (Ui) = 20VDC, Imax = 60mA, Ci = 180nF, Li = 350µH
- Group 2: Vmax (Ui) = 20VDC, Imax = 20mA or 50mA, Ci = 180nF, Li = 350µH
- Group 3: Vmax (Ui) = 20VDC, Imax = 60mA, Ci = 180nF, Li = 350µH
- Group 4: Vmax (Ui) = 20VDC, Imax = 60mA, Ci = 180nF, Li = 350µH
- Group 5: Vmax (Ui) = 17.2VDC, Imax = 60mA, Ci = 360nF, Li = 700µH

Inductive Proximity Sensor, standard NAMUR Output. 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*

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

Max Entity Parameters:

Mechanical Construction Model Code	V _{max} /U _i (V)	I _{max} /I _i (mA)	P (mW)	C _i (nF)	L _i (µH)
Sensors with Group 1 mechanical construction code	20	60	200	150	150
Sensors with Group 2 mechanical construction code	20	40(T5),50(T4)	200	150	150
Sensors with Group 3 mechanical construction code	20	60	200	250	350
Sensors with Group 4 mechanical construction code	20	40	200	250	350
Sensors with Group 5 mechanical construction code	20	60	130	150	150

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Sensors with Group 6 mechanical construction code	20	60	130	250	350
Sensors with Group 7 mechanical construction code	20	40	130	150	150

a = Sensing distance in millimeters.

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

c = Mechanical construction code:

Group 1: AKT, DS20, DSU26, DSU35, DSU35TC, G05, G12, G12SK, G14, G18, G18SK, G180, G182, G19, G28, G30, G30SK, H04, H6.5, HS540, IKE, IKT, INT, ISM, K11, K20, K30, M12, M18, M30, P12, P12SK, P18, P18SK, P30, P30SK, PSM, PST, PT30, Q5.5, Q10, Q10S, Q11S, Q12, Q14, Q6.5, Q20, QF5.5, S12, S18, S30

Group 2: G12_X, G12SK_X, G18_X, G18SK_X, G19_X, G30_X, G30SK_X, K20_X, M12_X, M18_X, M30_X, P30_X, S18_X, S30_X,

Group 3: CA25, CA40, CK40, CP40, CP80, G47, G47SR, K33, K34, K34SR, K40, K40SR, K90SR, Q25, Q30, Q80

Group 4: K90_X

Group 5: G08, GS880, H08, HS865, NST, PSM, PST, Q06, Q08, Q11, QST, DSU26, FST

Group 6: K08, K09, K10

Group 7: UNT

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

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

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, /S1236, /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

Inductive Proximity Sensor, digital NAMUR Output. 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*

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

Max Entity Parameters:

Mechanical Construction Model Code	V_{max}/U_i (V)	I_{max}/I_i (mA)	P (mW)	C_i (nF)	L_i (μH)
Group 1	20	60	200	180	350
Group 2	20	20 (T5), 50 (T4)	200	180	350
Group 3	20	60	80	180	350
Group 4	20	60	130	180	350
Group 5	17.2	60	200	360	700

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a = Sensing distance in millimeters.

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

c = Mechanical construction code:

Group 1: AKT, CA25, CA40, CK40, CP40, CP80, DS13.5, DS20, DSU26, DSU35, DSU35TC, G12, G12SK, G14, G18, G18SK, G180, G182, G19, G28, G30, G30SK, G47, G47SR, H12, H14, IKE, IKT, INT, ISM, K11, K20, K30, K33, K34, K34SR, K40, K90, M12, M18, M30, P12, P12SK, P18, P18SK, P30, P30SK, Q10, Q10S, Q11S, Q12, Q14, Q20, Q25, Q30, Q42, Q80, S12, S18, S30.

Group 2: G12_X, G12SK_X, G18_X, G18SK_X, G19_X, G30_X, G30SK_X, K20_X, K90_X, M12_X, M18_X, M30_X, P12_X, P18_X, P30_X, S12_X, S18_X, S30_X.

Group 3: G05, H04, H6.5, HS540, IST, Q5.5, Q6.5, QF5.5, UNT.

Group 4: DSC26, FST, G08, G10, GS880, H08, HS865, K08, K09, K10, NST, PSM, PST, Q06, Q08, Q11, QST.

Group 5: 3-wire variations of 2AY sensor models DS13.5, DS20, DSU26, DSU35, DSU35TC

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

e = Output: AY0, AY1, RY0, RY1, 2AY0, 2AY1, 2RY0, or 2RY1.

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, /S1236, /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

13. Specific Conditions of 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.

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:

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Date	Description
18 th May 1983	Original Issue.
1 st November 2016	<u>Supplement 4:</u> Report Reference: – 3059906 dated 1 st November 2016 Description of the Change: Updated certificate to new format. Added new sensors and new outputs. Adjusted entity parameter groups.

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