

CERTIFICATE OF CONFORMITY



1. **HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT PER US REQUIREMENTS**
2. **Certificate No:** FM19US0197X
3. **Equipment:** MicroFlow, MicroFlow-i Measuring Sensors
(Type Reference and Name)
4. **Name of Listing Company:** Pulsar Process Measurement Ltd.
5. **Address of Listing Company:** Cardinal Building, Enigma Commercial Centre
Sandy's Road
Malvern, Worcestershire
WR14 1JJ
United Kingdom
6. The examination and test results are recorded in confidential report number:
PR452863 dated 12th December 2019
7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:
FM 3600:2018, FM 3610:2018, FM 3615:2018, FM Class 3810:2018, ANSI/ISA 61010-1:2012,
ANSI/ISA 60079-0:2013, ANSI/ISA 60079-11:2014, ANSI/ISA 60079-18:2015,
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.

Certificate issued by:

J.E. Marquedant
VP, Manager - Electrical Systems

12 December 2019

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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10. Equipment Ratings:

Intrinsically safe model (k = 1)

Intrinsically safe for Class I, II, III, Division 1, Groups A, B, C, D, E, F, G; AEx ia for Class I, Zone 0, Group IIC; T4; $-20^{\circ}\text{C} \leq T_a \leq +60^{\circ}\text{C}$; AEx ia for Class 1, Zone 20, Group IIIC; T135°C; $-20^{\circ}\text{C} \leq T_a \leq +60^{\circ}\text{C}$; IP68.

Special Protection Model (k = 0)

Special protection for Class I, II, III, Division 1, Groups A, B, C, D, E, F, G; AEx mb for Class I, Zone 1, Group IIC; T4; $-20^{\circ}\text{C} \leq T_a \leq +60^{\circ}\text{C}$; AEx mb for Class 1, Zone 21, Group IIIC; T135°C; $-20^{\circ}\text{C} \leq T_a \leq +60^{\circ}\text{C}$; IP68.

11. The marking of the equipment shall include:

Intrinsically safe model (k = 1)

Intrinsically safe for:

Class I, Div 1, Group A, B, C & D

Class II, Div 1, Group E, F & G

Class III; T4

T4; $T_a = 20^{\circ}\text{C} \leq T_a \leq +60^{\circ}\text{C}$

Class I, Zone 0, AEx ia IIC T4 Ga

Zone 20, AEx ia IIIC T135°C Da

$T_a = 20^{\circ}\text{C} \leq T_a \leq +60^{\circ}\text{C}$

Drawing D-804-1329-A

IP68.

Special Protection Model (k = 0)

Suitable for:

Class I, Div 1, Group A, B, C & D

Class II, Div 1, Group E, F & G

Class III

T4; $T_a = 20^{\circ}\text{C} \leq T_a \leq +60^{\circ}\text{C}$

Class I, Zone 1, AEx mb IIC T4 Gb

Zone 21, AEx mb IIIC T135°C Db

$T_a = 20^{\circ}\text{C} \leq T_a \leq +60^{\circ}\text{C}$

Drawing D-804-1329-A

IP68.

12. Description of Equipment:

The MicroFlow (k = 0) is a non-invasive flow-measuring device utilizing radar technology. The sensor is housed in a non-metallic enclosure with an integral cable which connects to control equipment. The equipment is powered from a 24 VDC supply. The output of the sensor is sent via an RS485 data link to external control equipment. The enclosure incorporates a threaded cap which allows the equipment to be mounted on a suitable bracket.

The equipment comprises a non-metallic enclosure, in which are located three PCBs and the radar module. It uses RS485 digital signaling to communicate with control equipment. The interior of the enclosure is

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encapsulated.

The MicroFlow-i (k = 1) is a DC-powered process flow measurement sensor utilizing radar technology. The equipment comprises a non-metallic enclosure, in which are located three PCBs and the radar module. It has an integral cable which connects to the power source and control equipment. It uses a 4-20mA loop and HART digital signaling to communicate with the control equipment located in the safe area. The interior of the enclosure is encapsulated.

Ratings:

MicroFlow-i: $U_i = 28V$, $I_i = 162\text{ mA}$, $P_i = 1.03W$, $C_i = 0$, $L_i = 0$.

MicroFlow: Voltage = 28V maximum, current = 170 mA maximum.

MicroFLOW DR-abcdefghijklmn. Measuring Sensor.

a = F = MicroFLOW.

b = Type;

I = Intelligent (2-wire);

S = Standard (3-wire);

T = Technolog Variant.

cde = Cable length;

010 = 10m;

020 = 20m;

030 = 30m;

C10 = 10m c/w Point Connector;

Other lengths can be entered in the range of 010 to 999 meters.

f = Options;

0 = standard.

g = Reserved for future use;

0 = standard.

h = Reserved for future use;

0 = standard.

i = Reserved for future use;

0 = standard.

j = Frequency band (Regulations);

0 = standard;

J = JAP - Japan;

k = Approval classification;

X = No hazardous approvals;

0 = AEx mb;

1 = AEx ia.

l = Output communications;

H = HART (2-wire);

S = Standard (3-wire RS485 – Modbus);

P = Profibus V1;

T = Technolog Protocol.

m = Thread type;

B = BSP (ATEX/IECEX);

N = NPT FM (FM).

n = Customer ID (Overlay/Labelling);

P = Default;

H = IMHI V_{rad} ;

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T = Technolog.

13. Specific Conditions of Use:

Intrinsically Safe model (k = 1)

1. The enclosure of the transducer is considered to constitute an electrostatic discharge hazard. Clean only with a damp cloth.
2. When installed in Zone 20, Zone 21, or Zone 22 locations, the transducer shall be routinely inspected to avoid the buildup of a dust layer.

Special Protection model (k = 0)

1. The enclosure of the transducer is considered to constitute an electrostatic discharge hazard. Clean only with a damp cloth.
2. The transducer shall be connected to a source incorporating a 100 mA fuse which provides a minimum interrupt capacity of at least 1500A.
3. When installed in Zone 21 or Zone 22 locations, the transducer shall be routinely inspected to avoid the buildup of a dust layer.
4. The transducer is not suitable for use in the presence of Ketones, Aliphatic Hydrocarbons, Alcohols, Esters and Acids.

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
12 th December 2019	Original Issue.

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