

Intrinsic Safety Guide

Document No. 9203-2030099

AeroMate™ WSC
(Wireless Sensors and Controls)



Nonincendive, Intrinsically Safe
for use in
Class 1, Division 1 and 2, Group C and D
Hazardous Locations

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What is Intrinsic Safety?

Intrinsic Safety requires an apparatus be electrically designed to preclude its generating or storing enough energy to ignite a hazardous atmosphere. It is used in circuits that, under normal operating conditions will allow the apparatus to operate normally, but under a fault condition limits the voltage and current delivered to the circuit to safe levels. It can be used in Division 1 and 2 and in Zone 0, 1, and 2 locations, and is considered the safest protection method.

Intrinsic Safety Division and Zone relationships.

Method of Protection	Division	Zone
Intrinsic Safety	1 or 2	0, 1 or 2

CSA defines Intrinsic Safety as "limiting the electrical energy at potential sources of ignition in electrical circuits (hot components and spark sources) to such low levels that-even under abnormal (fault) conditions-there no possibility of the electrical energy igniting an explosive atmosphere". This method of protection may be used for a wide range of low power equipment, including pagers, process control equipment, tank level transmitters, and portable gas detectors.

Ref: http://www.csa-international.org/product_areas/hazloc equip/technical_information_and_requirements/

Class, Division and Zone

A **Class 1, Division 1** location is a location where ignitable concentrations of flammable gasses, vapors or liquids:

- can exist under normal operating conditions;
- may exist frequently because of repair or maintenance operations or because of leakage; or
- may exist because of equipment breakdown that simultaneously causes the equipment to become a source of ignition.

Equipment intended for use in a Class 1, Division 1 area is usually of the explosionproof, intrinsically safe, or purged/pressurized type.

A **Class 1, Division 2** location is a location:

- where volatile flammable liquids or flammable gasses or vapors exist, but are normally confined within enclosed containers;
- where ignitable concentrations of gasses, vapors or liquids are normally prevented by positive mechanical ventilation; or
- adjacent to a Class 1, Division 1 location, where ignitable concentrations might be occasionally communicated.

Equipment intended for use in a Class 1, Division 2 area is usually of the nonincendive, non-sparking, purged/pressurized, hermetically sealed, or sealed device type.

A **Class 1, Zone 0** location is a location where ignitable concentrations of flammable gasses, vapors or liquids:

- are present continuously; or
- are present for long periods of time.

Equipment intended for use in a Class 1, Zone 0 area is usually of the intrinsically safe, "ia" type.

Classification Terminology

Temperature Class. Auto-ignition temperature is the temperature at which a particular gas will ignite without a spark. The surface temperature of an apparatus should not be higher than the auto-ignition temperature of the gas it might encounter. Temperature classes take this into account by assigning codes ranging from T1 = 450°C (842°F) to T6 = 85°C (185°F). The temperature code refers to the maximum degrees the surface of the apparatus may attain due to heating of the internal electrical components. Surface temperature classes are based on a maximum ambient of 40°C (104°F) unless otherwise specified.

Nonincendive. Similar to the Zone's Nonsparking method. It does allow contacts, but only if they are "constructed so they are incapable of igniting the hazardous atmosphere." It's suitable for Division 2 locations only, and very useful for circuits that contain only passive apparatus such as RTDs or thermocouples since they can be used in nonincendive circuits with standard enclosures.

Simple Apparatus. This concept applies to RTDs and other passive devices, and low-power-generators such as thermocouples. Because these units are inherently incapable of generating or storing enough electrical energy to ignite a hazardous atmosphere, when used in an intrinsic safety circuit they require neither approval nor special marking. The Simple Apparatus concept is recognized by all the approval authorities, and may allow you to use relatively inexpensive standard components.

Product Certification Listing

CSA File No. 188214

Class 1, Division 1, Groups C and D; T2C; $-30^{\circ}\text{C} \leq T_a \leq +65^{\circ}\text{C}$
 Class 1, Division 2, Groups C and D; T2C; $-30^{\circ}\text{C} \leq T_a \leq +65^{\circ}\text{C}$

AeroMate WSC products (AM Series) consisting of a common Power Module with application modules. The application modules provide connections with Entity Parameters as per their individual control drawings. Powered by three NiMH "AA" cells (Energizer NH15-2500-VP, Sanyo HR-3U2500, PowerEx MHRAA4-B). May be provided with external pressure transducer - Measurement Specialties Inc P/N MSP-300-xxK-P-3-N-1 (xxpsig Series). May be provided with external DP flow transmitter - Measurement Specialties Inc P/N PROTO-E1847-0x-4JL (xpsid Series). May be charged externally by one of the following solar panels manufactured by SunWize:

P/N 1022W8V.28A Voc = 8.67, Isc = 0.30A, P = 2.00W
 P/N 1025W5V1.35A Voc = 4.94, Isc = 1.35A, P = 5.00W
 P/N 1022W5V.52A Voc = 4.94, Isc = 0.56A, P = 2.14W

Power Module (AM4100) for use with application modules:

<u>Order Number</u>	<u>Description</u>	<u>Module No.</u>
9203-2031050	2X Valve Controller	AM5100
9203-2031051	1X Valve Controller	AM5200
9203-2031060	2X Transducer	AM6100
9203-2031061	1X Transducer	AM6200
9203-2031062	1X Flow	AM6300
9203-2031070	4X4 Switch Router	AM7100
9203-2031080	2X4 Analog Router	AM8100
9203-2031081	4X Sensor Router	AM8200
9203-2031082	3X Counter	AM8300
9203-2031083	4X1 Sensor/Counter	AM8400
9203-2031090	Uplink Manager	AM9100

CSA Approved Accessories

<i>Part Number</i>	<i>Accessory Description</i>
1980-2032400	Wireless XBee Kit. Maxstream 2.4 GHz Module. 300 ft. (100m) Line of Sight range.
1980-2032401	Wireless XBee-Pro Kit. Maxstream 2.4 GHz Module. 2000 ft. (2 km) Line of Sight range.
4008-0122500	NiMH "AA" Battery 1.2Vdc @ 2500 mAh Energizer NH15-2500-VP
5510-0502000	External Pressure Transducer. 2000psig, Non-Ratiometric MSI MSP-300-xxK-P-3-N-1 series
5520-5500138	External DP Flow Transmitter 5psid (138 InW) Non-Ratiometric MSI PROTO-E1847-0x-4JL series
9200-0490560	Ext. 2 W Solar Panel w/ stand. 4.94 Vdc @ 560 mA charging. SunWize 1022W5V.52A
9200-0501200	Ext. 6 Watt Solar Panel w/ stand. 4.94 Vdc @ 1350 mA charging SunWize 1025W5V1.35A

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