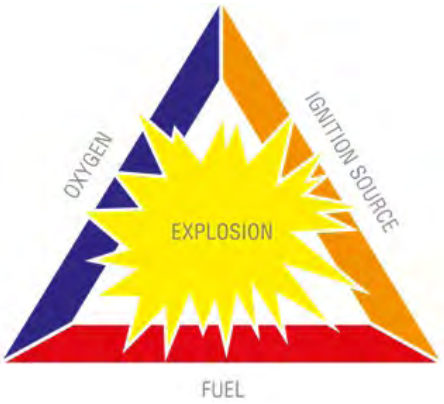
HAZARDOUS LOCATIONS OVERVIEW

When electrical equipment is used in, around, or near an atmosphere that has flammable gases or vapors, flammable liquids, combustible dusts, ignitable fibers or flyings, there is always a possibility or risk that a fire or explosion might occur. Those areas where the possibility or risk of fire or explosion might occur, due to an explosive atmosphere and/or mixture, are often called hazardous (or classified) locations. Currently, there are two systems used to classify these hazardous locations: the Class/Division system, used predominately in the United States, and the Zone system, generally used in the rest of the world.

What's Needed for An Explosion?
The most common types of reaction are between flammable gases, vapors or dust with oxygen in the surrounding air. As a rule, three basic requirements must be met for an explosion to take place in atmospheric air:



1. Flammable substance
2. Oxygen
3. Source of Ignition (a spark or high heat)

Note: both the flammable substance and the oxygen must be present in the correct mixture for the explosion to happen.

How is the Explosion Controlled?
The objective of selecting electrical equipment and the means of installation is to reduce the hazard of the electrical equipment to an acceptable level. The most certain method of preventing an explosion is to locate electrical equipment outside of hazardous (classified) areas whenever possible. In situations where this is not practical, installation techniques and enclosures are available which meet the requirements for locating electrical equipment in such areas. These methods of reducing hazards are based on the elimination of one or more of the elements of the ignition triangle discussed earlier.

Three principles ensure that electrical equipment does not become a source of ignition:

1. **Contain the explosion:** measures must be taken to ensure the explosion cannot spread to the surrounding atmosphere (explosion-proof enclosures or conduit & cable seals)
2. **Isolate the hazard:** the surrounding atmosphere is prevented from entering the enclosure by maintaining a positive pressure of inert gas or clean air within the unit (pressurization and purging, oil immersion & hermetic sealing
3. **Limit the energy:** potentially explosive mixtures can penetrate the enclosure but must not be ignited. Sparks and raised temperatures must only occur within certain limits (intrinsic safety)

All Macromatic IS Series Intrinsically Safe Relays follow the third principal: **limit the energy utilizing an intrinsically safe circuit.**

HAZARDOUS LOCATION CLASSIFICATIONS

Standard classification systems provide a concise description of the hazardous material that may be present along with the probability of it being present so that the appropriate equipment may be used and safe installation practices followed. In North America, the classification system most widely used is defined by the NFPA Publication 70, NEC and CEC. They define the type of hazardous substances that is or may be present in the air in sufficient quantities to produce an explosion. The NFPA establishes area classifications based on Classes, Divisions and Groups which are factors combined to define the hazardous conditions of a specific area.

The table below summarizes the various hazardous (classified) locations:

Substance	Substance Class	Area Classification NEC500	Area Classification NEC505	Hazardous Location Characteristics
Gases/ Vapors	Class I (NEC 501)	Division 1	Zone 0	Explosion hazard present continuously or occasionally under normal operating conditions
			Zone 1	
		Division 2	Zone 2	Ignitable concentrations of flammable gases or vapors are not normally present, but could be present in the case of a fault
Dusts	Class II (NEC 502)	Division 1	Zone 20	Combustible dusts are present in quantities sufficient to produce explosive and ignitable
			Zone 21	
		Division 2	Zone 22	Combustible dust due to abnormal operations may be present in quantities sufficient to produce explosive or ignitable mixtures
Fibers	Class III (NEC 503)	Division 1	Not equivalent	Easily ignitable fibers/flyings are handled or manufactured
		Division 2		Easily ignitable fibers/flyings are stored or handled

The Macromatic ISD & ISE Series of Intrinsically Safe Relays are certified Class I, Division 1 in the United States and Class I, Zones 0 and 1 in Canada.

The Macromatic ISD & ISE Series of Intrinsically Safe Relays have been tested and approved for listing under Underwriters Laboratory (UL) 913 Intrinsically Safe Apparatus and Associated Apparatus 8th Edition. The Macromatic ISP Series of Intrinsically Safe Relays have been tested and approved for listing under Underwriters Laboratory (UL) 913 Intrinsically Safe Apparatus and Associated Apparatus 6th Edition. The input or inputs to these devices have been approved for use in all Classes, Groups and Divisions.

1-CHANNEL INTRINSICALLY SAFE RELAYS

ISP SERIES

- Approved for use in Class I, Class II, and Class III Hazardous Locations
- 1-Channel
- Input voltage of 120V AC
- 10A relay output
- Plug-in enclosure
- LED status indicator

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UL913

The ISP Series of Intrinsically Safe Relays provide a safe and reliable method to control a single load (motor starters, relays, etc.) with a single input device (switches, sensors, etc.) located in a hazardous area. These products are approved for use in Class I Groups A, B, C, D, Class II Groups E, F, G, and Class III Hazardous Locations. The ISP Series relay must be mounted in a non-hazardous area, following Macromatic Control Drawing Number ISR2A01D as shown in Instruction Sheet 901-0000-260.

The ISP Series relays utilize an 8 pin plug-in enclosure (included) that can be both mounted on 35mm DIN rail or panel-mounted with two screws.

Operation

Each ISP Series relay consists of an intrinsically safe input and a corresponding electromechanical relay output. There is one LED for status indication. With input voltage applied, the LED will be OFF. When the input device from the hazardous area is closed, the output relay is energized and the LED is ON (Green). When the input device opens, the output relay will de-energize and the LED will be OFF.

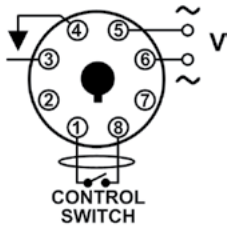
INPUT VOLTAGE 50/60Hz	NUMBER OF CHANNELS	CATALOG NUMBER	WIRING/ SOCKETS ■
120V AC	Single	ISP120A	

DIAGRAM 160

■ Both an integral spring mating clip and the appropriate 8 pin socket are included with the plug-in relay.

Sockets & Accessories available

MACROMATIC

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SINGLE CHANNEL INTRINSICALLY SAFE RELAYS

ISP SERIES

APPLICATION DATA

Input Voltage:
120V AC, ±10%, 50/60Hz

Load (Burden):
1.25 VA

Output Contacts:
SPST-NO 10A @ 120V AC Resistive

Life:
Mechanical: 10,000,000 operations
Full Load: 100,000 operations

Response Times:
Operate: 11 ms
Release: 4 ms

Temperature:
Operate: -20° to 60°C (-4° to 140°F)
Storage: -45° to 85°C (-49° to 185°F)

Insulation Voltage:
2,000 volts

LED Indicator:
Green ON when relay is energized & OFF when relay is de-energized.

Mounting:
Both an integral spring mating clip and the appropriate 8 pin socket are included with the plug-in relay. The socket can be both mounted on 35mm DIN rail or panel-mounted with two screws.

Control Drawing: See Instruction Sheet 901-0000-260, which includes Control Drawing ISR2A01D.

Approvals: c UL us File #E318075
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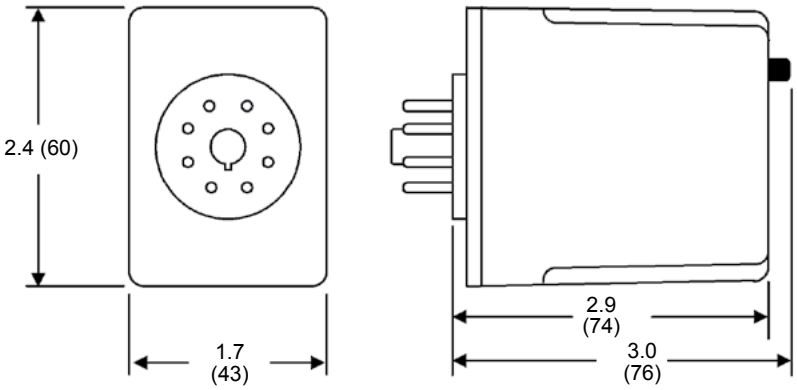
DIMENSIONS



All Dimensions in Inches (Millimeters)