

INTRINSICALLY SAFE PRODUCTS



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.

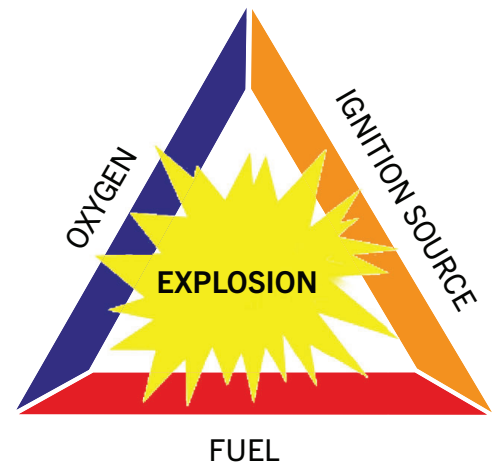
How is the Explosion Controlled?

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 Trystar 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		Hazardous Location Characteristics
		NEC500	NEC505	
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 Trystar 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 Trystar 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 Trystar 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.

60 MM INTRINSICALLY SAFE BARRIER RELAYS

ISD Series

The ISD Series of Intrinsically Safe Barrier Relays provide a safe and reliable method to control up to four loads (motor starters, relays, etc.) with up to four input devices (switches, sensors, etc.) located in a hazardous area.

The ISD Series relays utilize a compact 60mm wide enclosure that can be both mounted on 35mm DIN rail or panel-mounted with two screws. Terminals for the input devices from the hazardous area are on the bottom of the unit for easy access in the enclosure to incoming field wiring from the hazardous area. Pluggable terminal blocks on both the input and output sides allow for easy initial wiring of the unit as well as replacement without having to remove any wires.

Each input has two terminals supporting direct connection of 2-wire input devices eliminating the need to mount a separate terminal block. Each output relay is isolated with two wiring terminals providing a true normally-open contact. This allows the output contacts to be used in complex control circuits and allows for each output to switch different voltages with respect to other outputs and the input voltage. A universal input voltage of 102-132V AC & 10-125V DC covers a variety of applications with one device.

Operation

Each ISD Series product consists of 4 intrinsically safe inputs and four corresponding normally-open relay outputs. With input voltage applied, the V LED will be ON (GREEN) to indicate power is applied. When the input device is closed, the input LED is ON (GREEN). When the output relay is closed, the output LED is ON (ORANGE). The ISD series offers four user-selectable configurations built in.

ISDUR4 has a two-position DIP-switch that selects a single configuration for all channels.

ISDUM4 has an eight-position DIP-switch that selects a configuration for each channel, independently.

Configurations

Standard Logic (DIP Switch set to “STD”):

When the input device is closed, the corresponding output contact is closed. When the input device is open, the corresponding output contact is open.

Inverse Logic (DIP Switch set to “INV”):

When the input device is open, the corresponding output contact is closed. When the input device is closed, the corresponding output contact is open.

No Time Delay (DIP Switch set to “0 S”):

The output contact changes state immediately in response to a change in input device state.

2 Second Delay (DIP Switch set to “2 S”):

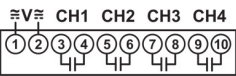
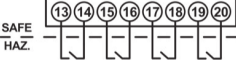
The output contact will delay 2 seconds before changing state in response to a change in input device state.



- Approved for use in these Hazardous Locations:
Class I, Div 1 (Zones 0 and 1 Canada), Groups A, B, C, D
Class II, Div 1 (Zones 20 and 21 Canada), Group E, F, G
Class III, Div 1
- 4-Channel
- Terminals support 2-wire inputs
- Isolated 5A relay outputs
- Pluggable terminals offer easy installation & replacement
- Universal input voltage of 102-132V AC & 10-125V DC
- Compact 60mm wide enclosure for both DIN-rail or panel-mount
- Standard & inverse logic
- Instantaneous & delayed response times
- LED status indicator



UL913 8th Edition

CONTROL VOLTAGE	NUMBER OF CHANNELS	CONFIGURATION	CATALOG NUMBER	WIRING
102-132V AC (50/60Hz) and 10-125V DC	4	SELECTED FOR ALL CHANNELS	ISDUR4	
		SELECTED FOR EACH CHANNEL	ISDUM4	 DIAGRAM 814

60 MM INTRINSICALLY SAFE BARRIER RELAYS

ISD Series

Application Data

Input Voltage: 102-132V AC (50/60Hz.) & 10-125V DC

Load (Burden): 5VA Maximum

Input Switch Open Circuit Voltage: 10V DC

Output Contacts:

SPST-NO (Form A) 3A Resistive @ 125V AC @60°C & 30V DC Resistive, Pilot Duty Rating D300

SPST-NO (Form A) 5A Resistive @ 125V AC @40°C & 30V DC Resistive, Pilot Duty Rating D300

Life:

Electrical: 50,000 Closures @ Full Load AC

Mechanical: 5 Million Closures @ No Load

Response Times:

Standard (DIP Switch set to "0S"): < 50ms

Delay (DIP Switch set to "2S"): Fixed 2 Seconds

Temperature:

Operating: -28° to + 60° C (-18° F to +140° F)

Storage: -55° to +85° C (-67° to 185° F)

LED Indication:

V: ON (Green); Inputs: ON (Green); Outputs: ON (Orange)

Accessories

Terminal Kit Part # 70700: Replacement kit for Intrinsically Safe Barrier Relay plugable terminals, includes 1 black and 1 blue block.

Input Voltage: 102-132V AC and 10-125V DC

Output: 5A

Dimensions

Insulation Voltage:

1500 V AC between coil & contacts

750 V AC between open contacts

1500 V AC between contacts of different output channels

1500 V AC between hazardous and safe circuits

Wire Sizes:

One #14-24 AWG Conductor or

Two #16 or 18 AWG Conductors

Mounting:

Mounts on 35mm DIN-rail or panel-mounted with two #8 screws when DIN-rail clips are fully extended from under the enclosure.

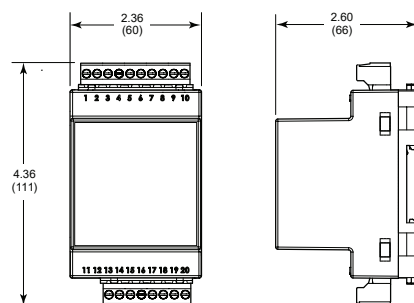
Control Drawing:

See Instruction Sheet 901-0000-328, which includes Control Drawing ISD1A04.

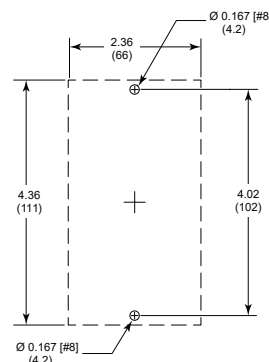
Approvals:



Kit Part # 70700



All Dimensions in Inches (Millimeters)



Panel Mount Template

17.5 MM INTRINSICALLY SAFE BARRIER RELAYS

ISD Series

The ISE Series of Intrinsically Safe Barrier 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.

The compact 17.5mm wide enclosure can be both mounted on 35mm DIN rail or panel-mounted with two screws. Terminals for the input devices from the Hazardous area are on the bottom for easy access in the enclosure to incoming field wiring from the hazardous area.

Operation

Each ISE Series relay consists of an intrinsically safe input, a corresponding normally-open relay output, and a bi-color LED for status indication. With input voltage applied, the LED will be ON (GREEN) to indicate power is applied. When the output contact is closed, the LED is ON (ORANGE). The ISE series comes in Standard and Inverted configurations.

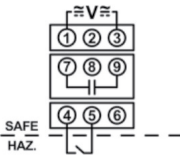
Configurations

Standard Logic (ISEUR1):

When the input device is closed, the corresponding output contact is closed. When the input device is open, the corresponding output contact is open.

Inverse Logic (ISEUR1V):

When the input device is open, the corresponding output contact is closed. When the input device is closed, the corresponding output contact is open.

CONTROL VOLTAGE	NUMBER OF CHANNELS	CONFIGURATION	CATALOG NUMBER	WIRING
102-132V AC (50/60Hz) and 10-125V DC	1	STANDARD LOGIC	ISEUR1	 SAFE HAZ. DIAGRAM 811
		INVERSE LOGIC	ISEUR1V	



- Approved for use in these Hazardous Locations:
Class I, Div 1 (Zones 0 and 1 Canada), Groups A, B, C, D
Class II, Div 1 (Zones 20 and 21 Canada), Group E, F, G
Class III, Div 1
- 1-Channel
- Terminals support 2-wire inputs
- Isolated 5A relay outputs
- Universal input voltage of 102 132V AC & 10-125V DC
- Universal input voltage of 102-132V AC & 10-125V DC
- Compact 17.5mm wide enclosure for both DIN-rail or panel-mount
- Standard and Inverse Logic
- LED status indicator



UL913 8th Edition

17.5 MM INTRINSICALLY SAFE BARRIER RELAYS

ISP Series

Application Data

Input Voltage: 102-132V AC (50/60Hz.) & 10-125V DC

Load (Burden): 2VA Maximum

Input Switch Open Circuit Voltage: 10V DC

Output Contacts:

SPST-NO (Form A) 3A Resistive @ 125V AC @ 60°C & 30V DC Resistive, Pilot Duty Rating D300

SPST-NO (Form A) 5A Resistive @ 125V AC @ 40°C & 30V DC Resistive, Pilot Duty Rating D300

Life:

Electrical: 50,000 Closures @ Full Load AC

Mechanical: 5 Million Closures @ No Load

Response Times: < 50ms

Temperature:

Operating: -28°C to +60°C (-18°F to +140°F)

Storage: -55°C to +85°C (-67°F to 185°F)

LED Indication:

Standard Logic, ON (Green) - Input voltage; ON (Orange) - Input closed and output contact closed;

Inverse Logic (V-suffi x), ON (Green) - Input voltage; ON (Orange) - Input open and output contact closed

Insulation Voltage:

1500 V AC between coil & contacts

750 V AC between open contacts

1500 V AC between hazardous and safe circuits

Wire Sizes:

One #14-24 AWG Conductor or

Two #16 or 18 AWG Conductors

Mounting:

Mounts on 35mm DIN-rail or panel-mounted with two #8 screws when DIN-rail clips are fully extended from under the enclosure.

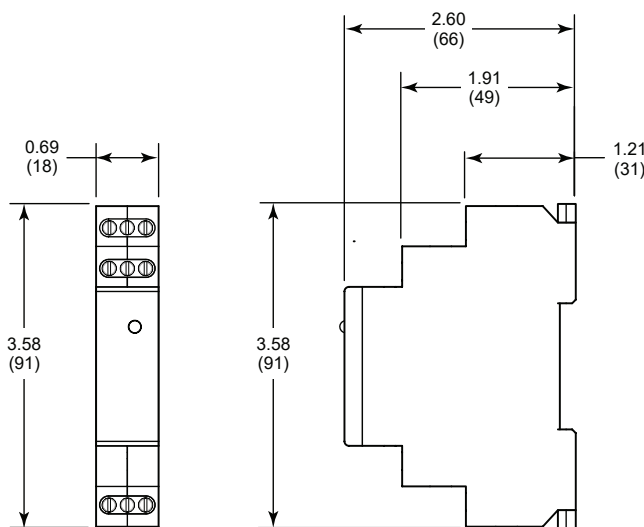
Control Drawing:

See Instruction Sheet 901-0000-329, which includes Control Drawing ISD2A01.

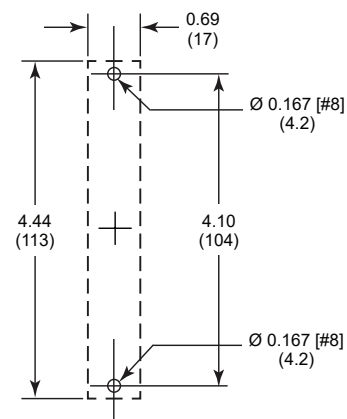
Approvals:



Dimensions



All Dimensions in Inches (Millimeters)



Panel Mount Template

PLUG-IN INTRINSICALLY SAFE BARRIER RELAYS

ISP Series

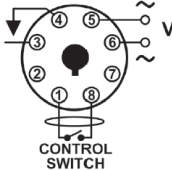
The ISP Series of Intrinsically Safe Barrier Relays provide a safe and reliable method to control a single load (motor starters, relays, etc.) with a single input device (switches, sensors, etc.) located in a hazardous area.

The ISP Series relay must be installed following Macromatic Control Drawing Number ISR2A01D as shown in Instruction Sheet 901-0000-260.

The ISP Series relays utilize an 8 pin plug-in design with socket (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 normally-open relay output. There is one LED for status indication. With input voltage applied, the LED will be OFF. When the input device is closed, the output contact is closed and the LED is ON (Green). When the input device is open, the output contact is open and the LED will be OFF.

CONTROL VOLT- AGE 50/60Hz	NUMBER OF CHANNELS	CATALOG NUM- BER	WIRING/ SOCK- ETS ■
120V AC	SINGLE	ISP120A	 DIAGRAM 160

■ The appropriate 8 pin socket is included with the plug-in relay.



- Approved for use in these Hazardous Locations: Class III, Div 1
- 1-Channel
- Terminals support 2-wire inputs
- Input voltage of 120V AC
- Isolated 10A relay output
- Plug-in design for easy installation and replacement
- LED status indicator



PLUG-IN INTRINSICALLY SAFE BARRIER RELAYS

ISP Series

Application data

Input Voltage:

120V AC, +10%, 50/60Hz

Load (Burden):

1.25 VA

Input Switch Open Circuit Voltage:

6V DC

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: -20o to 60oC (-4o to 140oF)

Storage: -45o to 85oC (-49o to 185oF)

Insulation Voltage: 2,000 volts (between coil and contacts)

LED Indicator:

Green ON when output contact is closed and OFF when output contact is open.

Mounting:

The socket can be both mounted on 35 mm DIN rail or panel mounted with two #8 screws.

Control Drawing:

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

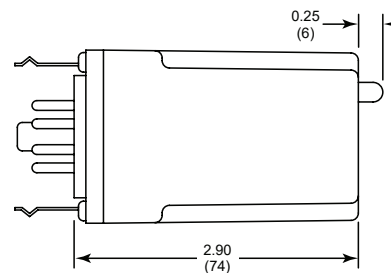
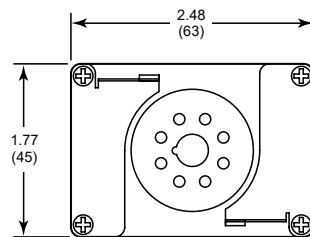
Approvals:



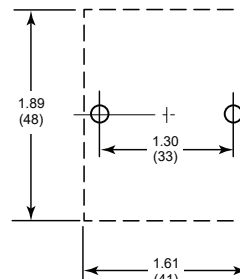
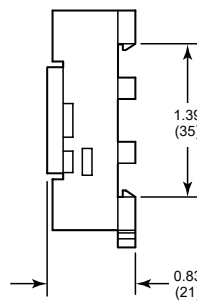
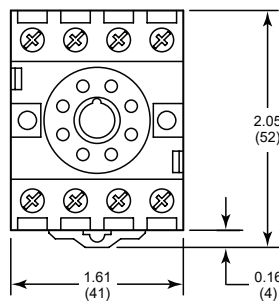
UL913

E318075

Dimensions



ISP Series



. Socket Provided with Relay

. Panel Mount Template

All Dimensions in Inches (Millimeters)



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