Intrinsic Safety Barriers are devices which limit the power (energy) that can be delivered from a safe area into a hazardous area. Explosions are therefore prevented, not just contained, as in expansion proof conduit and heavy cast housings. Not only is electrical energy (voltage and current) held within safe limits, but also total energy, eliminating the possibility of an explosion due to excessive heat. The use of barriers and a total intrinsically safe design philosophy offers considerable advantages from both cost and safety standpoints.

The following features indicate the clear benefits of choosing an intrinsically safe design instead of an explosion-proof design, and reflect the unique features of the Series X57 family of barriers.

- All system components are immediately accessible — no time consuming opening of explosion proof housings.
- Personnel safety is assured because of low voltage operation.
- Standard wiring techniques in open cable trays or light gauge conduit save on material and labor cost during initial installation.
- Calibration and maintenance can be performed with the system in operation.
- Special skill levels are not needed to open heavy housings, to test for gas, or to shut down the process in order to service or operate the instrumentation.
- Barrier replacement is accomplished by simple exchange of plug-in modules. There is no need to disconnect wiring or to remove ground bars.
- Barriers are manufactured and stocked in the U.S.A. in Woodland Hills, California. (Los Angeles area)
- Multiple channels in one barrier minimize the total number of barrier modules needed and space required.

The Ronan I.S. Barriers are plug-in modules containing one to four channels. Up to twenty barrier modules can be installed in a 20 position surface mounted chassis. Single barrier surface or DIN rail chassis are also available. Each module has eight screw terminals. The terminals are arranged in the chassis so that four are located in the safe area and four are located in a protected compartment for the wiring to the hazardous area. The safe area terminals are numbered 1 through 4 and the protected terminals are numbered 5 through 8. These compression type screw terminals accept up to 12 AWG wire. The safe area terminals are connected to equipment in a location where the sources of potential with respect to each other or to ground do not exceed 250 Vdc or RMS. The I.S. grounding connection for the barriers is provided by an integral, fixed, #8 stud with self-locking nuts. Optional ground bus bars and multi-pin cable connectors are also available.
Ronan’s Zener Barriers, especially the multi-channel versions, are a logical choice when space and cost are the major considerations. They do not require their own power supply, but rather provide protection passively. Most likely, there is a barrier that will work, and a detailed analysis of the application will usually identify a zener barrier that is right for the application. However, zener barriers do require a high integrity I.S. ground. This may present a problem, especially in older plant installations. When the quality or availability of an I.S. ground is questionable, the designer should consider using active barriers.

- Lowest Cost Barrier Option
- 1, 2, 3, and 4 Channel Barriers
- Negative, Positive, or AC Voltage Versions
- Highly Reliable Fast Acting Fuses
- Power Supply is Not Required
- NO FAULT “Blown Fuse” Barrier Replacement Policy
- DIN Rail or Multi-Barrier Surface Mount Chassis

Replaceable Fuses and Circuit Breakers vs. Non-Replaceable Fuses

- With replaceable fuses, the chance exists that the wrong type or rating of fuse could be installed, or that the fuses could be defeated (bypassed with a short circuit).
- Circuit breakers are mechanical, and they are therefore more susceptible to aging, corrosion, and damage. Also, they typically have lower accuracy specifications.
- Both the replaceable fuse and the circuit breaker designs are harder and more expensive to manufacture. Therefore, they cost you more money. Ronan’s zener barriers are potted solid. This means that if a fuse is blown, the barrier has done its job and protected the hazardous area as it was designed to do. It’s true the barrier can not be field repaired. However, if you do “blow” a barrier fuse (even if it’s your fault), just contact the Ronan factory for a rush replacement at 1/2 price. Also, for most applications, Ronan can provide an easily installed in-line fuse device which can protect the barrier’s internal fuse (See accessory #X57-FUSE).

Specifications:

<table>
<thead>
<tr>
<th>Type</th>
<th>Shunt diode zener diode with non-replaceable fuses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td>Plug-in (chassis required) with gold plated connections</td>
</tr>
<tr>
<td>Wiring</td>
<td>All wiring and grounding is attached to the chassis to simplify installation and maintenance</td>
</tr>
<tr>
<td>Wire Size</td>
<td>Up to #12 AWG</td>
</tr>
<tr>
<td>Size (chassis not included)</td>
<td>3.60” H x .88” W x 2.50” D (up to four (4) channels per barrier)</td>
</tr>
<tr>
<td>Weight (chassis not included)</td>
<td>5.6 ounces</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-20˚C to +50˚C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40˚C to +80˚C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>95% non-condensing</td>
</tr>
</tbody>
</table>

Typical Barrier Choices:

<table>
<thead>
<tr>
<th>Field Devices</th>
<th>Barrier Choices*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switches (dry contact)</td>
<td>X57-128P, X57-228P, X57-228PD, X57-228PCL, X57-328P, X57-428P</td>
</tr>
<tr>
<td>Thermocouples (ungrounded only)</td>
<td>X57-205S</td>
</tr>
<tr>
<td>RTDs and Potentiometers</td>
<td>X57-305P, X57-405P</td>
</tr>
<tr>
<td>2-Wire Transmitters</td>
<td>X57-128N, X57-228PD, X57-228PD, X57-209P</td>
</tr>
<tr>
<td>Solenoids/ Relays/ LEDs</td>
<td>X57-128P, X57-228PD</td>
</tr>
<tr>
<td>I/P Transducers</td>
<td>X57-228PD</td>
</tr>
<tr>
<td>Strain Gauges</td>
<td>X57-210A</td>
</tr>
<tr>
<td>Magnetic Flow Sensors and AC Sensors</td>
<td>X57-110A, X57-210S</td>
</tr>
</tbody>
</table>

* Some European applications require an “EN” designator within the part number (i.e. X57EN-600). Contact your local Ronan sales office for details.
In numerous applications, zener diode barriers will either not work, or they impose constraints that complicate system design. The series resistance, fuse rating and maximum working voltage of a zener diode barrier, can cause the design engineer hours of frustrating analysis to confirm both safety and proper system operation. Ronan’s line of active I.S. barriers eliminates much of the tedious analysis required. In some cases, the active barrier can actually double as a signal conditioner and eliminate other devices from the loop. These considerations, along with the fact that no I.S. ground is required, and the fact that most circuits are short circuit proof, has caused the active barriers to gain popularity.

Specifications:
- **Type:** Active isolation
- **Power:** Nominal 24 Vdc @ 50 to 100 mA (see individual barriers specifications)
- **Mounting:** Plug-in (chassis required) with gold plated connections
- **Wiring:** All wiring is attached to the chassis, to simplify installation and maintenance
- **Wire Size:** Up to #12 AWG
- **Size:** (chassis not included): 3.60” H x .88” W x 4.75” D (1 to 2 channels; see individual data sheets)
- **Weight:** (chassis not included): Approximately 6 ounces
- **Operating Temperature:** -20°C to +60°C
- **Storage Temperature:** -40°C to +80°C
- **Relative Humidity:** 95% non-condensing

**Entity Approvals vs. Loop Approval**

- Full Input, Output and Power Isolation (Eliminates ground loops)
- Short Circuit Proof (Most models) or Fuse Protected
- No I.S. Ground Required
- Less Critical Circuit Design Constraints
- Eliminates Other Signal Conditioning, thereby Lowering Installed Cost
- Discrete or Analog Input and Output Barrier Options

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**Field Devices**
- **Barrier Choices**
  - Switches (dry contact)
  - Proximity Sensors
  - Thermocouples
  - RTDs and Potentiometers
  - 2-Wire Transmitters
  - Honeywell Protocol
  - Ronan, Hart, Rosemount
  - I.S. Ground Required
  - Solenoids/Relays/LEDs
  - I/P Transducers

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Common Applications

These applications are intended as an aid in selecting possible barrier options. As with any I.S. installation, variables such as area classification, make and model of field device, required approval agency certification, and total loop design can all affect safety and operation. Therefore, care should be exercised when selecting a barrier to assure compliance with approved installation drawings and to assure proper circuit operations. Ronan engineers are available to help in your barrier selection.

### Passive

<table>
<thead>
<tr>
<th>Hazardous Area</th>
<th>Safe Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Contact</td>
<td>X57-228 PCL</td>
</tr>
<tr>
<td></td>
<td>I.S. Ground</td>
</tr>
<tr>
<td>T/C (No Ground)</td>
<td>X57-205S</td>
</tr>
<tr>
<td></td>
<td>I.S. Ground</td>
</tr>
<tr>
<td>I/P</td>
<td>X57-230</td>
</tr>
<tr>
<td></td>
<td>Transmitter</td>
</tr>
<tr>
<td></td>
<td>I.S. Ground</td>
</tr>
</tbody>
</table>

### Active

<table>
<thead>
<tr>
<th>Hazardous Area</th>
<th>Safe Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Contact</td>
<td>X57-650</td>
</tr>
<tr>
<td></td>
<td>I.S. Ground</td>
</tr>
<tr>
<td>T/C</td>
<td>X57-606</td>
</tr>
<tr>
<td></td>
<td>Optional Ground</td>
</tr>
<tr>
<td>I/P</td>
<td>X57-605L</td>
</tr>
<tr>
<td></td>
<td>I.S. Ground</td>
</tr>
<tr>
<td>Two-Wire Transmitter</td>
<td>X57-228 PD</td>
</tr>
<tr>
<td></td>
<td>I.S. Ground</td>
</tr>
<tr>
<td>Current/Voltage Driver</td>
<td>X57-228 PD</td>
</tr>
<tr>
<td></td>
<td>I.S. Ground</td>
</tr>
</tbody>
</table>

### Diagrams

- **Hazardous Area Safe Area**: Passive/Active options with diagrams for different signal types.
- **Binary Signal**: Dry Contact, LED/Solenoid inputs.
- **Current/Voltage Signal**: I/P (Analog) Output.
- **Analog Signal**: RTD (Analog) Input, Thermocouple (Analog) Input.
- **Transmitter Input**: 2-Wire Transmitter (Analog) Input.
- **Driver Output**: PLC or DCS, LED or Solenoid outputs.
**Chassis Options (Surface Mount)**

**Surface Mount for Active and Zener Barriers**

- **X57SM-1**
  - .61 in. (15.60 mm)
  - 4 Places
  - 1.71 in. (43.43 mm)
  - 1.11 in. (28.21 mm)

- **X57SM-10**
  - 4.00 in. (101.60 mm)
  - 5.82 in. (147.32 mm)

**MODEL NO.**
- X57SM-4
- X57SM-10
- X57SM-16
- X57SM-20
- X57SM-4EG
- X57SM-10EG
- X57SM-16EG
- X57SM-20EG

**DIMENSION A**
- 6.12 in. (155.46 mm)
- 6.12 in. (155.46 mm)
- 6.12 in. (155.46 mm)
- 6.12 in. (155.46 mm)

**DIMENSION B**
- 6.12 in. (155.46 mm)
- 6.12 in. (155.46 mm)
- 6.12 in. (155.46 mm)
- 6.12 in. (155.46 mm)

**DIMENSION C**
- 6.12 in. (155.46 mm)
- 6.12 in. (155.46 mm)
- 6.12 in. (155.46 mm)
- 6.12 in. (155.46 mm)

**DIMENSION D**
- 6.12 in. (155.46 mm)
- 6.12 in. (155.46 mm)
- 6.12 in. (155.46 mm)
- 6.12 in. (155.46 mm)

**Extended Ground Connection (Contact Renan for complete model numbers)**

**Maximum Number of Modules (Position)**

- Ground Bar
- Hazardous Area
- Safe Area
- Ground Bar
- Hazardous Area
- Safe Area
- Ground Bar
Chassis Options (DIN Rail Mount)

DIN Rail Mount for Active and Zener Barriers

The DIN rail chassis options are an ideal choice to save on panel space. Order one chassis for each barrier module. With the X57-DIN chassis (for zener barriers) each chassis requires its own ground wire. On multiple chassis installations, the optional ground bars “buss” together the individual chassis grounds allowing one ground connection for the entire group. These ground bars and the ground bar clamps also provide a convenient spot to terminate cable shields. Contact Ronan for assistance in specifying ground bars for your installation. On larger systems, consider using the surface mount chassis to simplify ground wiring.

Note: The X57-DIN-32 and X57-PDIN-32 use 32mm “G” style rails. These chassis are also available for the 35 x 7.5 mm and 35 x 15 mm “U” style rails. Order X57-DIN-35 or X57-PDIN-35. Contact Ronan for availability.

Optional Fuse Protection Device

The X57-FUSE device attaches to the existing terminal blocks of any X57 chassis, and it provides a duplicator alternate set of terminals for connecting the field wiring. The X57-FUSE device contains up to 4 additional fuses that are electronically placed in series with a barrier’s internal fuses. By sizing the fuses on the X57-FUSE device to values less than the barrier’s fuse you will protect the barrier’s fuses. The smaller value fuses on the X57-FUSE device will “blow” first, in the event of over-voltage or short circuits.
Ronan warrants equipment of its own manufacture to be free from defects in material and workmanship, under normal conditions of use and service, and will replace any component found to be defective, on its return, transportation charges prepaid, within one year of its original purchase. This warranty carries no liability, either expressed or implied, beyond our obligations to replace the unit which carries the warranty.