

Intrinsic Safety Barriers

X57



ISO 9001
REGISTERED



X57 Intrinsic Safety Barriers

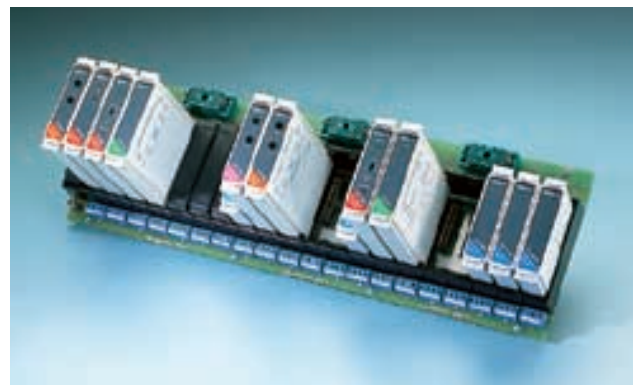


Intrinsic Safety Barriers are devices which limit the power (energy) that can be delivered from a safe area into a hazardous area. Explosions are therefore prevented, not just contained, as in expansion proof conduit and heavy cast housings. Not only is electrical energy (voltage and current) held within 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,



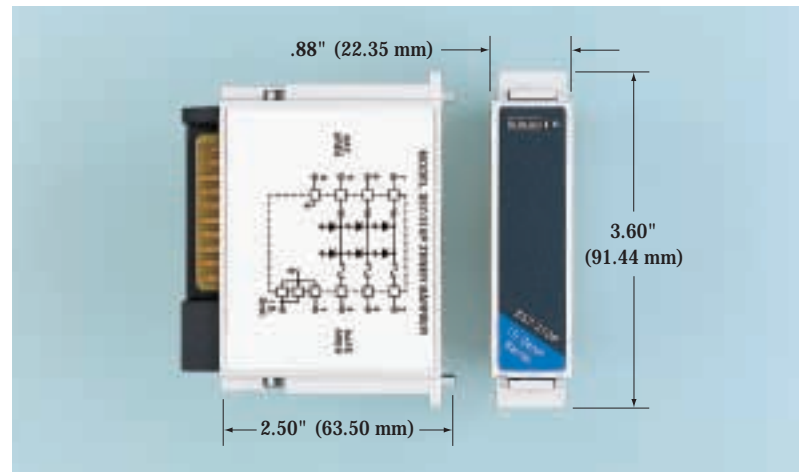
fixed, #8 stud with self-locking nuts. Optional ground bus bars and multi-pin cable connectors are also available.

X57 Shunt Diode Zener (Passive) I.S. Barriers

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

- ▶ *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*

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.



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 its 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:

Type: Shunt zener diode with non-replaceable fuses
Mounting: Plug-in (chassis required) with gold plated connections
Wiring: All wiring and grounding 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 2.50" D (up to four (4) channels per barrier)
Weight: (chassis not included): 5.6 ounces
Operating Temperature: -20°C to +50°C
Storage Temperature: -40°C to +80°C
Relative Humidity: 95% non-condensing

Typical Barrier Choices:

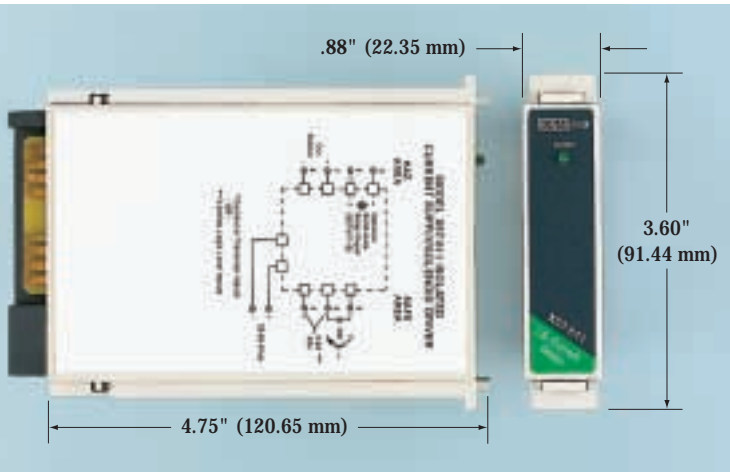
Field Devices	Barrier Choices*
Switches (dry contact)	X57-128P, X57-228P, X57-228PD, X57-228PCL, X57-328P, X57-428P
Thermocouples (ungrounded only)	X57-205S
RTDs and Potentiometers	X57-305P, X57-405P
2-Wire Transmitters	X57-128N, X57-228PD, X57-228P-209P
Solenoids/Relays/LEDs	X57-128P, X57-228PD
I/P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

* Some European applications require an "EN" designator within the part number (i.e. X57EN-600). Contact your local Ronan sales office for details.

Galvanic Isolation (Active) Barriers

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.



- ▶ 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

Entity Approvals vs. Loop Approval

The concept of "Intrinsic Safety" originated in the European markets but is gaining in popularity all over the world. Originally, and still the case with some equipment, manufacturers had their field instruments tested and approved with a specific I.S. barrier (Loop Approvals). This limited the user's choices of field instruments and

barriers. The Entity Approval concept is now becoming the standard because it allows the user to select field instruments and I.S. barriers from any approved supplier. The only stipulation is that the entity numbers of both devices are properly matched and that the equipment is properly installed per the approved installation drawings.

It is important to remember that an I.S. barrier does not make a field device safe. The field instrument must be either a "simple apparatus" or an I.S. device which was certified under the entity concept in order for it to be compatible with Ronan I.S. barriers. If you have a question or concern about your application, contact Ronan for assistance.

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 +50°C
Storage Temperature: -40°C to +80°C
Relative Humidity: 95% non-condensing

Typical Barrier Choices:

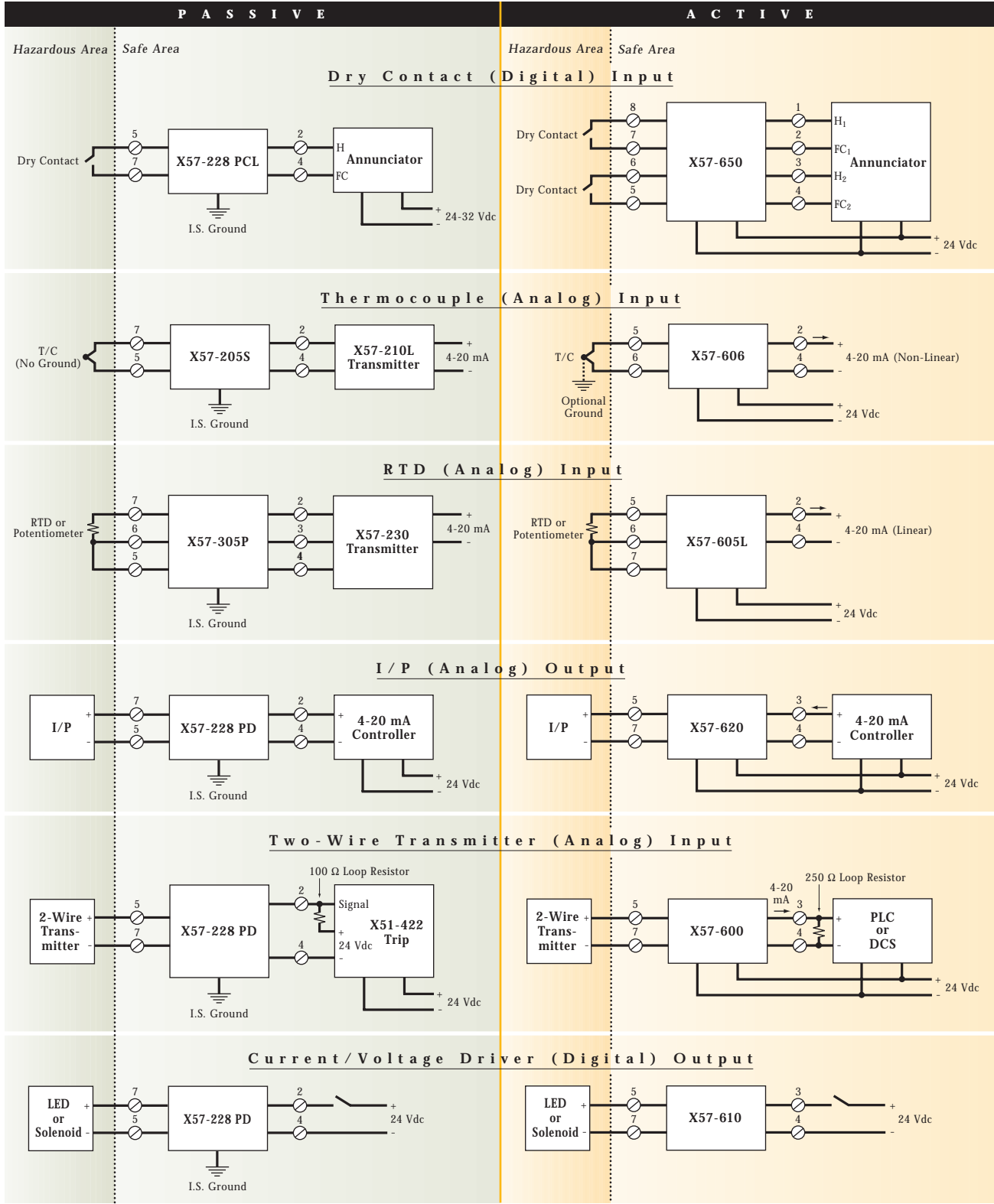
Field Devices	Barrier Choices*
Switches (dry contact)	X57-650 (dual channel)
Proximity Sensors	X57-653
Thermocouples (grounded or ungrounded)	X57-606
RTDs and Potentiometers	X57-605
2-Wire Transmitters	X57-600, X57-660
Honeywell Protocol	X57-600H, X57-660H
Ronan, Hart, Rosemount I.S. Ground Required	X57-600R, X57-660R X57-528N
Solenoids/Relays/LEDs	X57-610, X57-611(S)
I/P Transducers	X57-620

* Some European applications require an "EN" designator within the part number (i.e. X57EN-600). Contact your local Ronan sales office for details.

X57 Common Applications

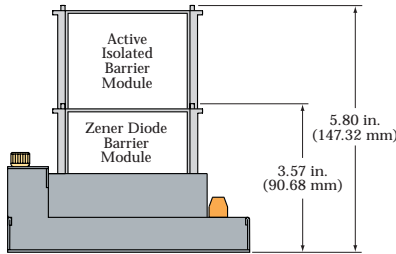
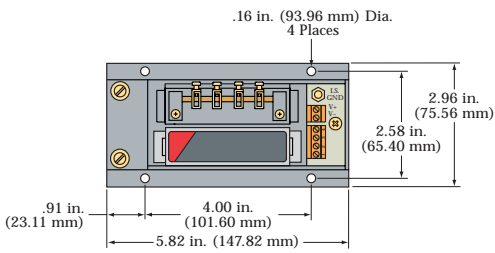
These applications are intended as an aid in selecting possible barrier options. As with any I.S. installation, variables such as area classification, make and model of field device, required approval agency certification, and total loop design can all affect safety

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.

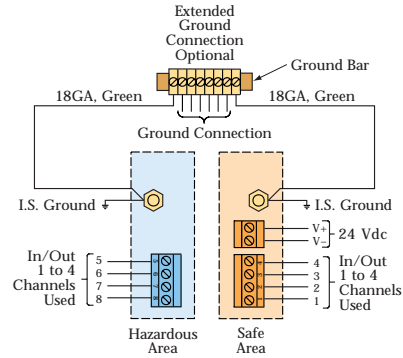


Chassis Options (Surface Mount)

Surface Mount for Active and Zener Barriers



X 5 7 S M - 1



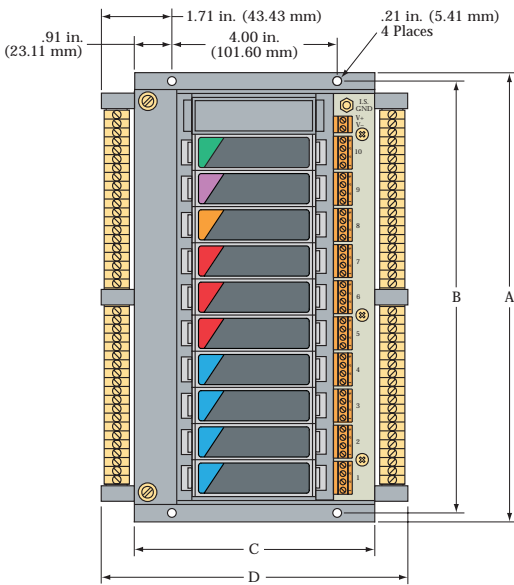
X 5 7 S M - 1 Wiring



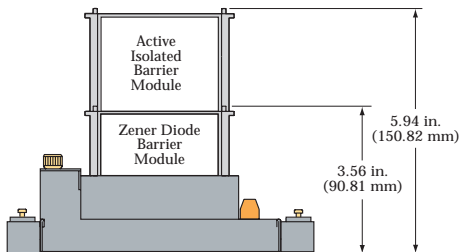
X57-SM-10

**X57-SM-4
with Ground Bars**

**X57-SM-1
with Ground Bars**

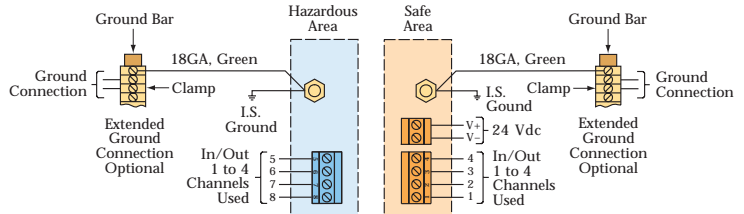


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MODEL NO.	DIMENSION A	DIMENSION B	DIMENSION C	DIMENSION D
X57SM-4	5.68 in. (144.27 mm)	5.28 in. (134.11 mm)	5.82 in. (147.82 mm)	
X57SM-10	11.05 in. (280.67 mm)	10.65 in. (270.51 mm)	5.82 in. (147.82 mm)	
X57SM-16	16.42 in. (417.07 mm)	16.02 in. (406.91 mm)	5.82 in. (147.82 mm)	
X57SM-20	20.00 in. (508.00 mm)	19.60 in. (497.84 mm)	5.82 in. (147.82 mm)	
X57SM-4EG	5.68 in. (144.27 mm)	5.28 in. (134.11 mm)		7.42 in. (188.46 mm)
X57SM-10EG	11.05 in. (280.67 mm)	10.65 in. (270.51 mm)		7.42 in. (188.46 mm)
X57SM-16EG	16.42 in. (417.07 mm)	16.02 in. (406.91 mm)		7.42 in. (188.46 mm)
X57SM-20EG	20.00 in. (508.00 mm)	19.60 in. (497.84 mm)		7.42 in. (188.46 mm)

Extended Ground Connection (Contact Ronan for complete model numbers)
Maximum Number of Modules (Position)



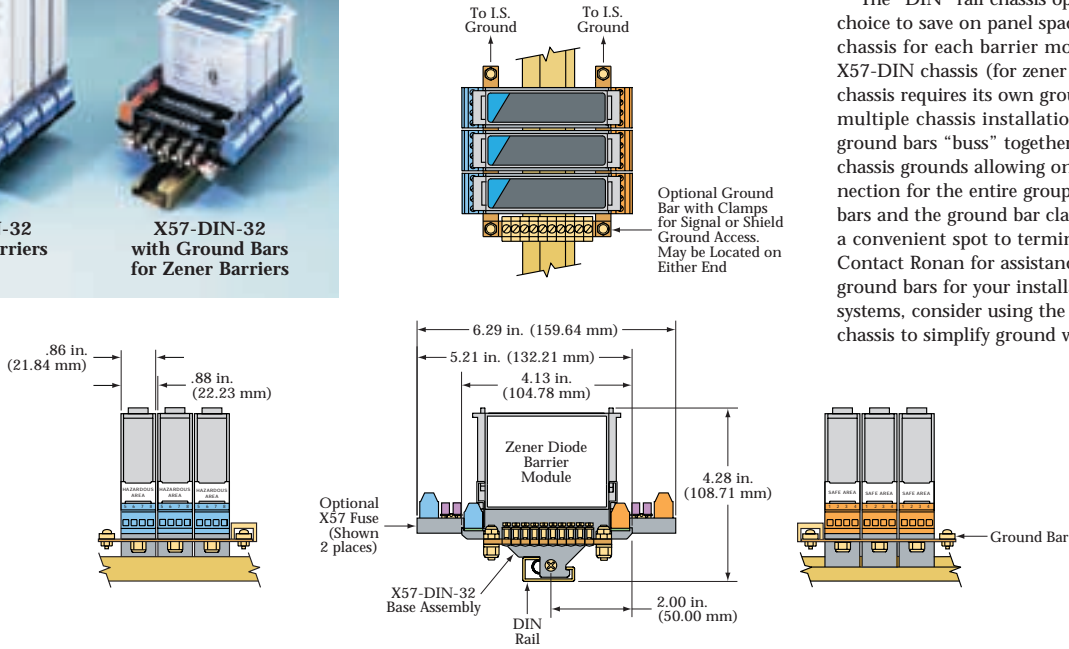
X 5 7 S M - 4, - 1 0, - 1 6, and - 2 0 Wiring

X57 Chassis Options (DIN Rail Mount)



DIN Rail Mount for Active and Zener Barriers

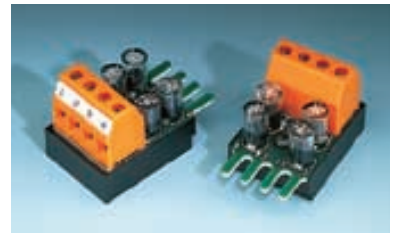
The "DIN" rail chassis options are an ideal choice to save on panel space. Order one chassis for each barrier module. With the X57-DIN chassis (for zener barriers) each chassis requires its own ground wire. On multiple chassis installations, the optional ground bars "buss" together the individual chassis 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 Roman for assistance in specifying ground bars for your installation. On larger systems, consider using the surface mount chassis to simplify ground wiring.



X57-DIN-32 (Shown) and X57-DIN-35

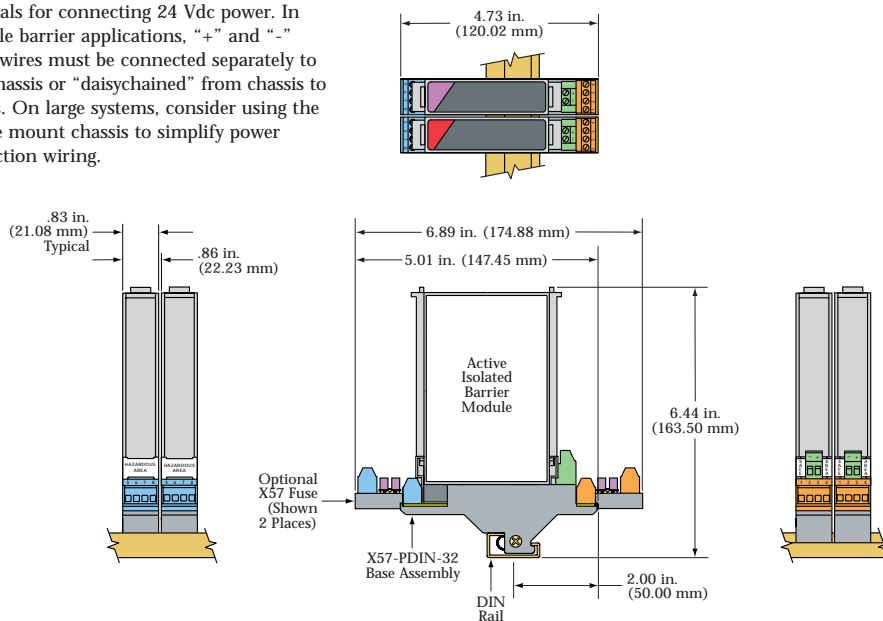
The X57-PDIN chassis was designed for use with X57-600 Series (active) barriers only. These chassis do not have safety ground connections. Therefore, they can not be used with zener barriers. Each chassis has a set of terminals for connecting 24 Vdc power. In multiple barrier applications, "+" and "-" power wires must be connected separately to each chassis or "daisy-chained" from chassis to chassis. On large systems, consider using the surface mount chassis to simplify power connection 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 Roman for availability.



Optional Fuse Protection Device

The X57-FUSE device attaches to the existing terminal blocks of any X57 chassis, and it provides a duplicate/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.



X57-PDIN-32 (Shown) and X57-PDIN-35

W a r r a n t y

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.



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