

Installation and Maintenance

IMPORTANT: Read carefully and completely before installing, connecting or testing the Barrier SAFE-PAK

General Information

P/N 50625 and P/N 50635 Zener Barrier SAFE-PAKS are solid-state, energy-limiting devices for connection between Gems Flow/Level Switches or Level Transmitters and their related indicating devices to provide intrinsically safe outputs to flow/level switches or level transmitters located in hazardous areas (Fig. 1). Barrier outputs cannot exceed 30 VDC at 60 milliamps, even with up to 250 volts appearing at the inputs . . . under normal or abnormal conditions. The units are rated for operation in ambient temperatures from 0° to 60°C (+32° to +140°F).

The Gems Zener Barrier SAFE-PAK is FM-approved as having an intrinsically safe output for Class I, Division 1, Group D hazardous areas when properly installed and connected.

Installation

The Barrier SAFE-PAK must be installed as follows:

- Both Barrier and indicating device must be located in non-hazardous (safe) areas.
- Ground-connect both mounting tabs to a common mounting plate as in Fig. 2.
- Redundantly ground the mounting plate to earth by means of two conductors (Fig. 3); each with an impedance to earth of 1 ohm or less and adequate in size to handle line-generated fault currents.
- Connect Barrier input and output to indicator and flow or level switch; respectively, as in Fig. 1. Assemble protective stud cover (furnished) over output terminals (Fig. 4).

Wiring to and from Barrier:

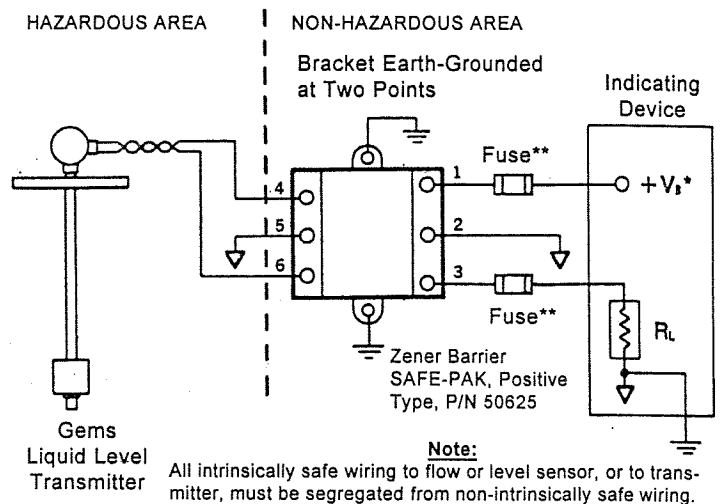
Common, commercially available twisted signal wire may be used over distances to 1000 ft. total (indicator to flow or level switch). Permissible characteristics for any one output wiring loop in the hazardous area, from terminals 4 and 5, or 6 and 5 (consult cable manufacturer if in doubt as to cable characteristics):

Hazardous Atmosphere	Group	Capacitance	Inductance
Methane	D	2.0 μ f	6 mh

Gems Zener Barrier SAFE-PAK types and where used:

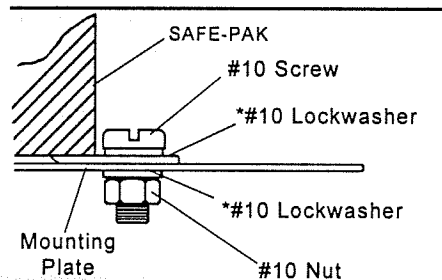
Positive Type (P/N 50625) - Used where circuit common is earth-ground referenced.

Negative Type (P/N 50635) - Used where circuit source voltage (V+) is earth-ground referenced.

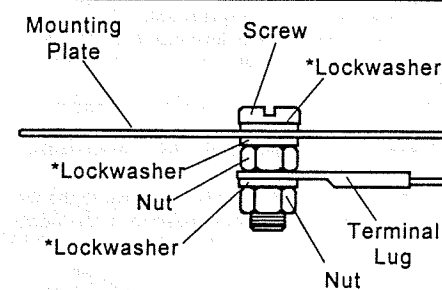


Note:
All intrinsically safe wiring to flow or level sensor, or to transmitter, must be segregated from non-intrinsically safe wiring.
* Input power from source voltage not greater than 250 VAC.
** Littlefuse Type 3AG or equal - optional.

Fig. 1
Typical Installation Diagram - Gems Zener Barrier SAFE-PAK, Positive Type, with Gems Liquid Level Transmitter



*Lockwashers to be internal or external tooth type.
Fig. 2



Grounding Hardware to be #8 or larger and Stainless Steel.
Fig. 3

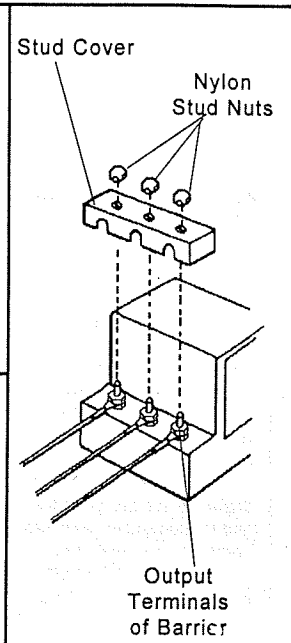


Fig. 4

Multiple Sensor Installations:

Several Barrier units may be installed on a common, earth-grounded mounting plate, in a common enclosure to serve a corresponding number of flow/level switches or level transmitters. Within the enclosure, all intrinsically safe wiring should be separated from that which is non-intrinsically safe by means of independent raceways or trays. Intrinsically safe and non-intrinsically safe connection points should be located sufficiently apart to prevent any possibility of bypassing the barrier by miswiring or during servicing of indicating devices. **See Fig. 5.**

Note: All barriers used for multiple barrier mounting must be of the same polarity.

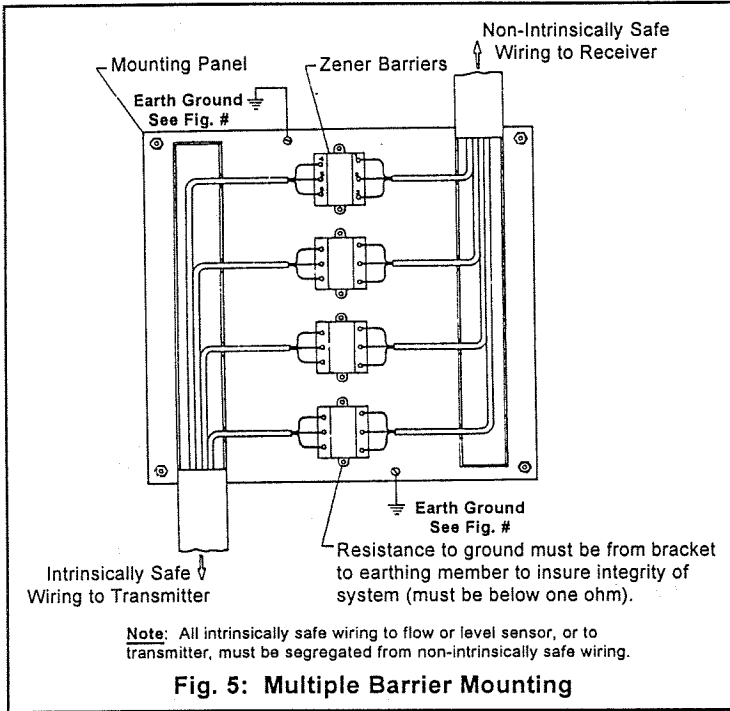


Fig. 5: Multiple Barrier Mounting

Testing Installed Barrier SAFE-PAK

Never conduct tests with circuit connected and active - use of instruments between input and output terminals will bypass barrier, violating intrinsic safety. Perform all testing with circuit inactive and using these instruments:

1. Ohmmeter with resolution down to less than 1 ohm
2. D.C. power supply with 0 to +40 VDC output
3. D. C. voltmeter

Test Procedure: The Barrier SAFE-PAK must pass all of the following tests in order to be acceptable.

See Figs 1 and 6

1. Disconnect all leads from unit to be tested; except earth grounding mounting tabs.
2. Measure resistance between terminals 1 and 4, then terminals 3 and 6: Should be 270 ohms $\pm 5\%$ (\pm instrument tolerance) in both cases.
3. Measure resistance between terminals 5 and 2, then terminal 5 and mounting tab: Should be less than 1 ohm in both cases.
4. Apply 35 VDC across terminals 4 (+) and 5 (common) and check voltage across terminals 1 (+) and 2 (common). **See Note 1 Below.** Apply 24 VDC across terminals 6 (+) and 5 (common) and check voltage across 3 (+) and 2 (common). Both voltage readings must be between 28 and 32 VDC.

Note 1: Fuses within the unit, between terminals 4 and 1, and between terminals 6 and 3, are rated at 60 mA. Care should be taken during testing to make sure that no current greater than 60 mA accidentally flows through terminals 1 or 3.

5. Measure resistance between mounting tab (not mounting screw) and earth ground reference: Must be less than 1 ohm.
6. Reconnect leads to barrier after completion of testing.
7. Each sensor must have its own ground return wire to pin #5.

Maintenance

The only maintenance required: Periodic checks of ground bonding, and to make sure that units are clean and free from contaminating atmospheres and are in good physical and electrical condition.

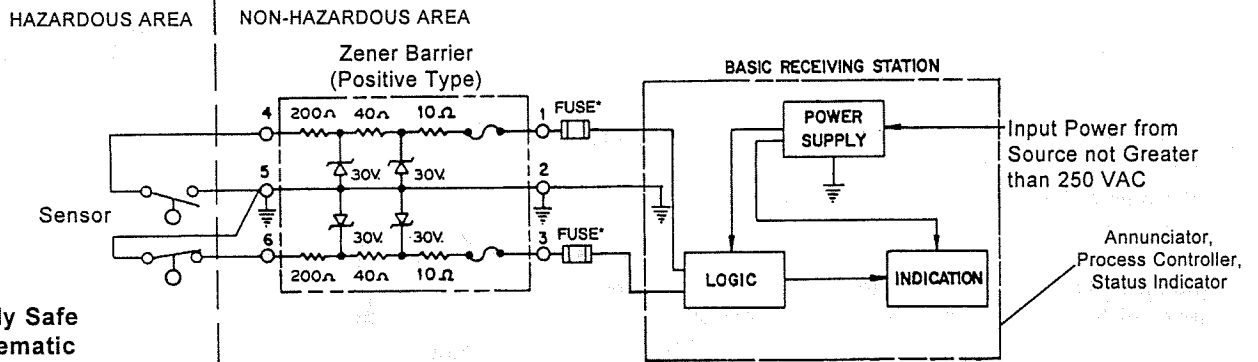


Fig. 6: Intrinsically Safe Loop Schematic

Important Points!

Product must be maintained and installed in strict accordance with the National Electrical Code and GEMS technical brochure and instruction bulletin. Failure to observe this warning could result in serious injuries or damages.

An appropriate explosion-proof enclosure or intrinsically safe interface device must be used for hazardous area applications involving such things as (but not limited to) ignitable mixtures, combustible dust and flammable materials.

Pressure and temperature limitations shown on individual catalog pages and drawings for the specified products must not be exceeded. These pressures and temperatures take into consideration possible system surge pressures/temperatures and their frequencies.

Selection of materials for compatibility with the media is critical to the life and operation of GEMS products. Take care in the proper selection of materials

of construction; particularly wetted materials.

Life expectancy of switch contacts varies with applications. Contact GEMS if life cycle testing is required.

Ambient temperature changes do affect switch set points, since the specific gravity of a liquid can vary with temperature.

Gems products have been designed to resist shock and vibration; however, shock and vibration should be minimized.

Liquid media containing particulate and/or debris should be filtered to ensure proper operation of GEMS products.

Electrical entries and mounting points may require liquid/vapor sealing if located in an enclosed tank.

Gems products must not be field repaired.

Physical damage sustained by the product may render it unserviceable.

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