

SELECTION GUIDE FOR OMEGA® ZENER BARRIERS FOR INTRINSIC SAFETY

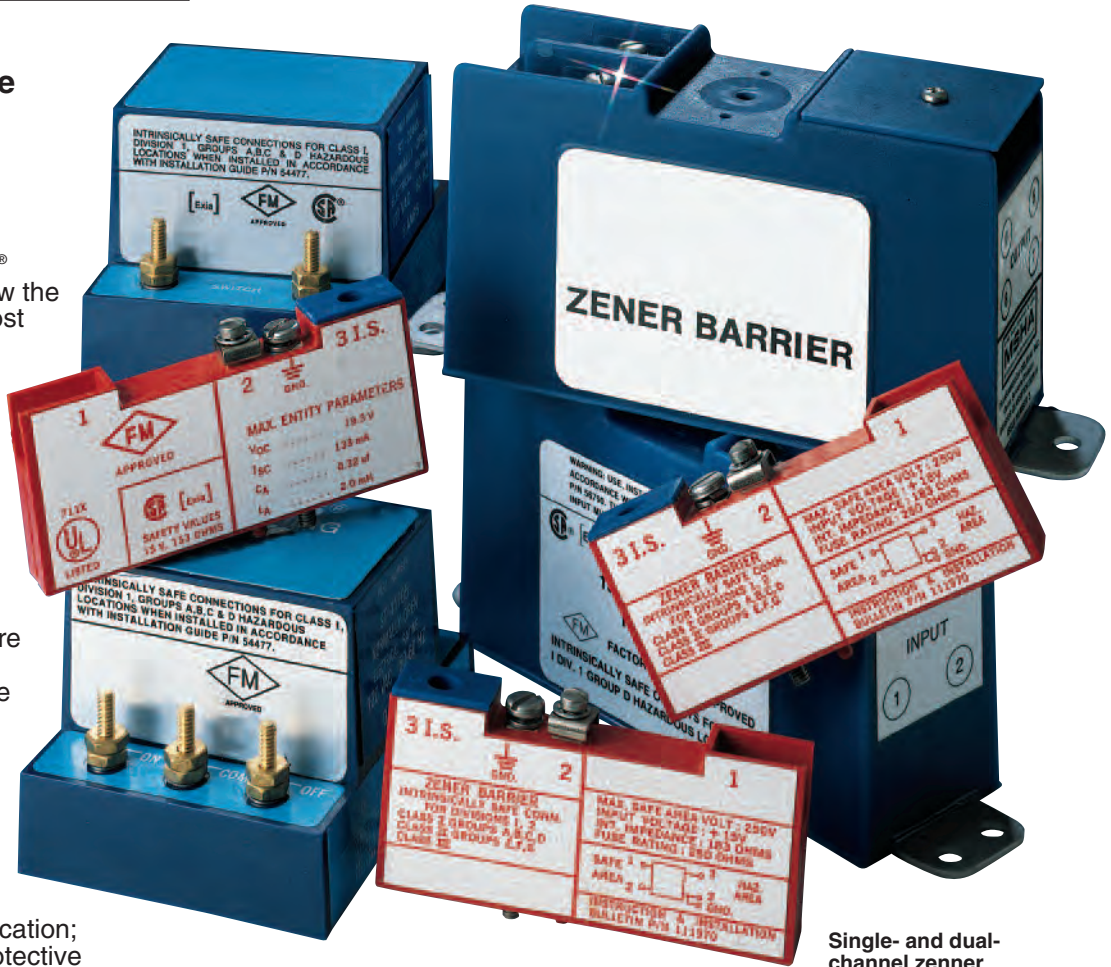


OMEGA® Solid State Relays and Zener Barriers for Intrinsic Safety

The maximum energy possible at the switch terminals of the OMEGA® zener barriers is far below the explosive point of the most volatile surrounding gas conditions. The type of non-voltage-producing switch or sensor best fitted for the application can be used, since the entire switching circuit is rendered intrinsically safe by the OMEGA® zener barrier. Because the switching circuit is low voltage, there is no shock hazard to operating or maintenance personnel.

Installation and Maintenance

OMEGA® zener barrier units are normally installed in a safe area and connected to the sensor in a hazardous location; no explosion-proof or protective housings are needed. Units install singly in any position, or can be grouped on a common earth-grounded plate with mounting tabs to provide electrical grounding. Between 6 and 32 threaded electrical terminals are conveniently placed atop the unit housings.



Single- and dual-channel zener barriers, shown smaller than actual size.

OMEGA® zener barriers must be installed in conformance with the National Electrical Code and the Instruction, Installation and Service Bulletin supplied with all units. Periodic checks of ground bonding and cleanliness of units and terminals constitute the only maintenance required.

	Model No.	Approvals			Class	Division	Hazardous Locations						
		UL	FM	CSA			Group						
							A	B	C	D	E	F	G
Single Channel Zener Barriers	SBG111950	X	X	X	I,II	1,2	X	X	X	X	X	X	X
	SBG111954	X	X	X	I,II	1,2	X	X	X	X	X	X	X
	SBG111956	X	X	X	I,II	1,2	X	X	X	X	X	X	X
	SBG113000	X	X	X	I,II	1,2			X	X	X	X	X
	SBG114166	X	X	X	I,II	1,2	X	X	X	X	X	X	X
Dual Channel Zener Barriers	SBG54803	X	X	X	I,II	1,2	X	X	X	X			
	SBG54806	X	X	X	I,II	1,2				X			

Note: Zener barrier model numbers **SBG54803** and **SBG54806** are certified by CSA for mounting inside a suitable enclosure in Div. 2 or non-hazardous locations and must be connected by means of the 2 studs provided to a grounded copper busbar or equivalent.

INTRODUCTION TO SOLID STATE SINGLE- AND DUAL-CHANNEL ZENER BARRIERS FOR INTRINSIC SAFETY



OMEGA® Single-Channel and Dual-Channel Zener Barriers Feature Intrinsic Safety With Solid State Reliability—And These Additional Advantages:

- ✓ Installation Economy
- ✓ No Explosion-Proof Enclosures of any Kind Needed for Sensor Wiring
- ✓ Compact Size—Streamlines Multiple Installations
- ✓ Encapsulated Construction—Impervious to Dust and Moisture, Shock and Vibration Resistant



SBG54803 dual-channel zener barrier, \$315, shown smaller than actual size.

SBG111950 single-channel zener barrier, \$132, shown smaller than actual size.

Single- and Dual-Channel Barriers

For most non-voltage-producing devices located in a hazardous area, a single zener barrier that is negative-earth-grounded (see figure 1) can be used for intrinsic safety. Instrumentation that produces an output (signal conditioners) usually

requires two barriers, one for each “floating” lead. Here, a dual-channel barrier can be provided (see figure 2), or for applications in which the instrument signal return level cannot be reduced, a supply barrier and a low resistance return barrier can be supplied (see diagram 2B on page K-110).

Sensor switch may be any non-voltage-producing device. Flow and level switches, temperature switches (thermostats), pressure switches, or passive, resistive transducers or transmitters are typical.

Fig. 1 Positive single-channel zener barrier with negative ground.

Fig. 2 Positive dual-channel zener barrier with floating leads.

Note: Terminals 3, 4, 5, and 6 are common and are bonded to the mounting tabs for positive redundant grounding.

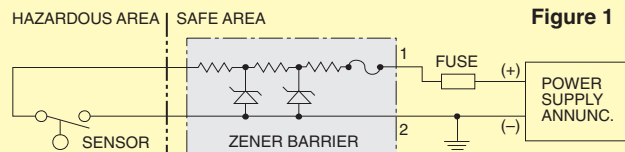


Figure 1

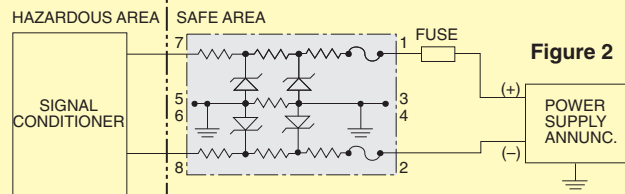
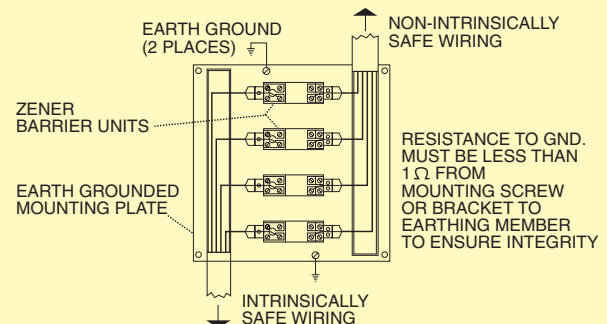


Figure 2

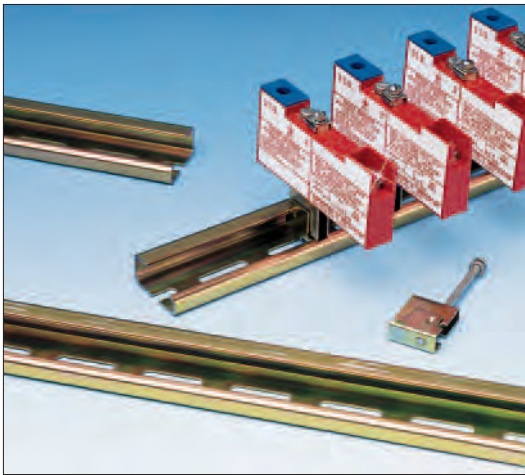
Installation and Maintenance

OMEGA® Zener barriers are installed in non-hazardous (safe) locations, and may be grouped on a common, earth-grounded mounting plate. Intrinsically safe sensor wiring must be separated from non-intrinsically-safe input wiring in separate conduits or raceways to prevent by-pass during testing or servicing. Routine inspections every two years or less to check integrity of earth-grounding and electrical connections, and to make sure the unit is clean, constitute the only maintenance normally required.

Installation and maintenance must be in accordance with the National Electrical Code and the applicable OMEGA® operator's manual.Ω

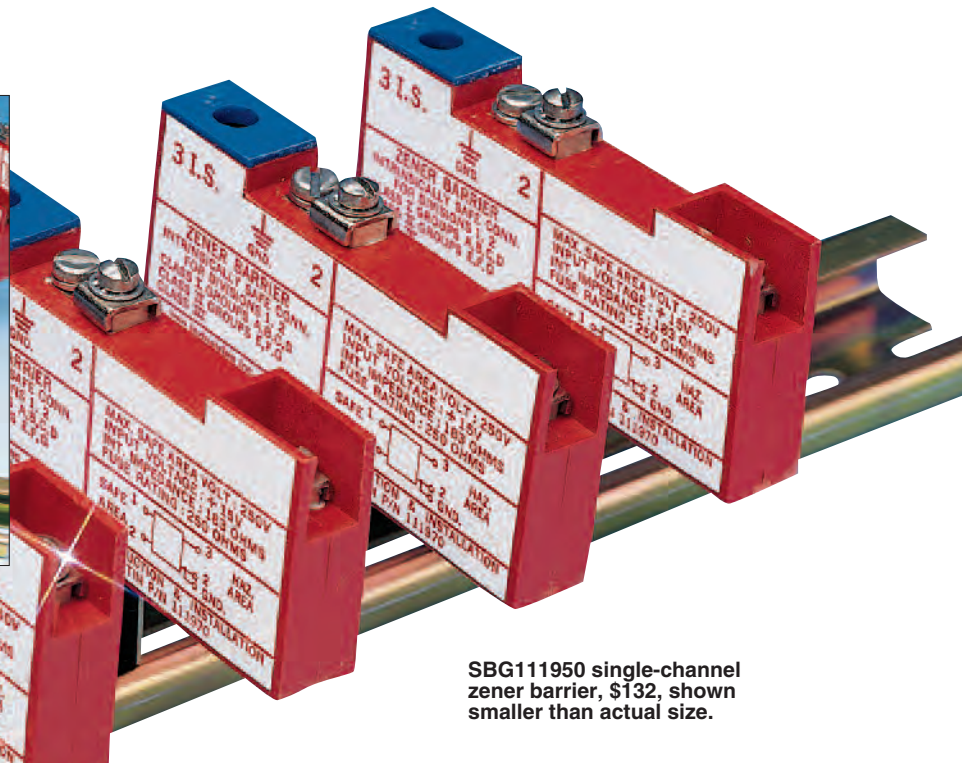


SINGLE-CHANNEL ZENER BARRIERS, DC

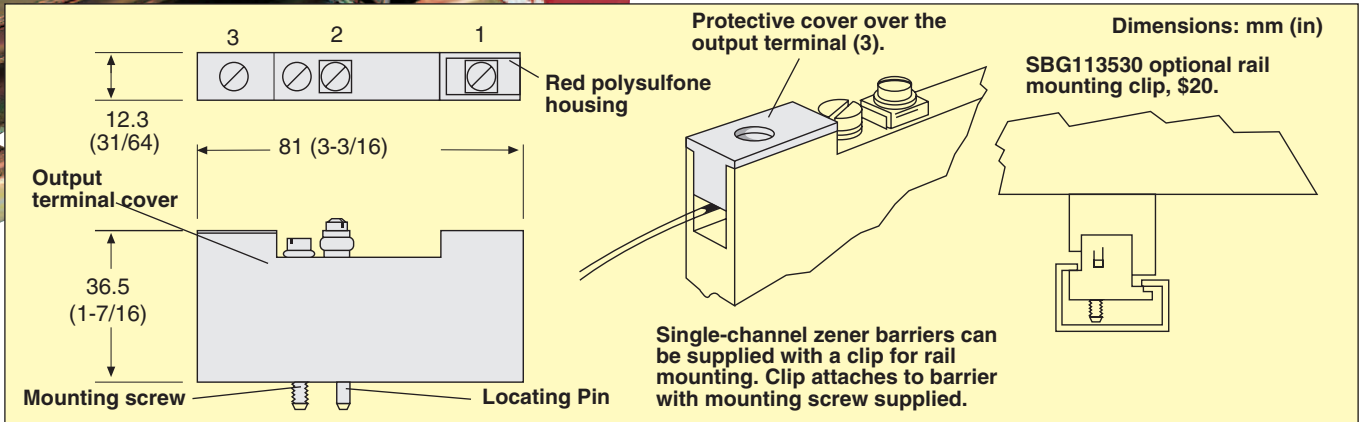


Mounting Accessories

Model No.	Price	Description
SBG113530	\$20	TS32 style rail mounting clip



SBG111950 single-channel zener barrier, \$132, shown smaller than actual size.



MOST POPULAR MODELS HIGHLIGHTED!

To Order (Specify Model Number)

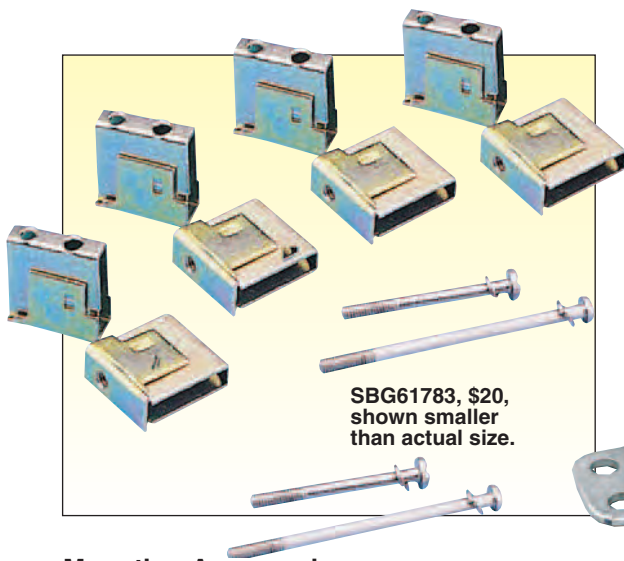
Model No.	Price	DC Input to Barrier, Max		Signal Polarity	Series Resist. Ω	Applications Groups Class I & II, Div. 1, 2	Reactive Limits		Ambient Operating Temperature
		Voltage	Fuse Rating Current, mA				Capacitance μF	Inductance mH	
SBG111950	\$132	+15	250	Positive	183	Groups A, B, C, D, E, F, G	0.32	2.0	-40 to 60°C (-40 to 140°F)
SBG111954	132	+24	62	Positive	390		0.12	3.0	
SBG111956	132	+30	62	Positive	750		0.07	1.8	
SBG11300	132	+30	250	Positive	303	Groups C, D, E, F, G	0.20	3.0	
Signal Return Barrier									
SBG114166	132	+30	250	Positive	33.9	Groups A, B, C, D, E, F, G	0.07	0.35	-40 to 60°C (-40 to 140°F)

The exceptionally compact, almost "wafer-thin" design single-channel zener barriers save space and simplify installation, especially in multiples on a common mounting plate. Single-screw mounting is standard; units can be supplied with an optional clip for rail mounting. The single through-mounting screw also provides an electrical connection to ground through the earth-grounded mounting surface.

Ordering Example: SBG111954, zener barrier, 24 V, 62 mA and SBG113530, rail mounting clip, \$132 + 20 = \$152.

Note: Order rail mounting clip separately.

DUAL-CHANNEL ZENER BARRIERS, DC



SBG61783, \$20, shown smaller than actual size.

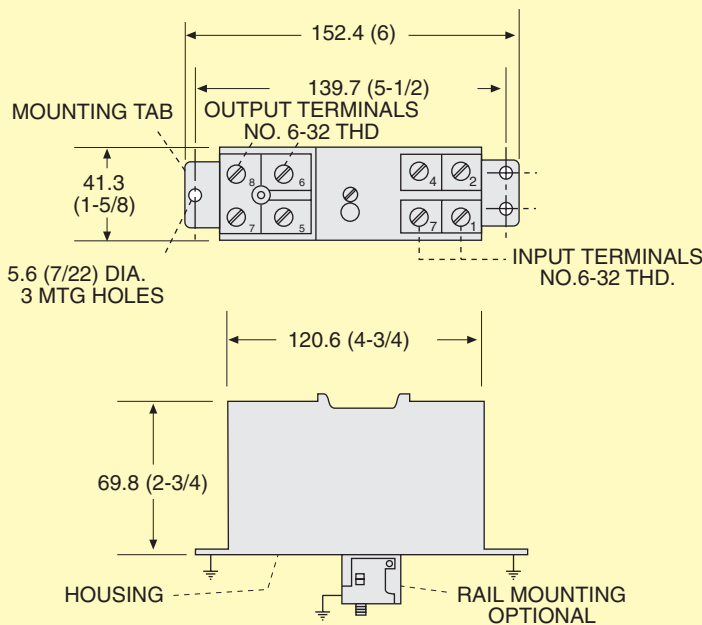


SBG54803, \$315, shown smaller than actual size.

Mounting Accessories

Model No.	Price	Description
SBG61783	\$20	Rail mounting clips for dual-channel zener barriers

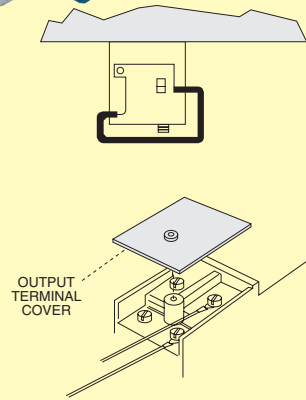
Dimensions: mm (in)



Dual-channel zener barriers can be mounted with a clip for rail mounting.

Standard tabs on barrier allow surface mounting.

A protective cover ensures intrinsic safety integrity of sensor terminals and wiring.



Note 1: Dual-channel zener barriers are internally fused. If a "fault" or abnormal signal level continues for a sustained period, the internal fusing within the barrier will open, disconnecting the barrier. External fuses (Littlefuse Type 3AG or equal) are recommended to protect the barrier from incorrect wiring at start-up, or from other equipment fault.

Note 2: Housing material is blue Lexan®.

Note 3: For typical wiring diagrams, see pages K-109 and K-110.

Typical applications for dual-channel zener barriers include solenoids, switches or 4 to 20 mA DC transmitters. When applicable, using a dual-channel barrier can save money in installation over 2 single-channel barriers.

MOST POPULAR MODEL HIGHLIGHTED!

To Order (Specify Model Number)

Model No.	Price	DC Input to Barrier, Max		Signal Polarity	Series Resist. Ω	Applications Groups Class I & II, Div. 1, 2	Reactive Limits		Ambient Operating Temp.
		Voltage	Fuse Rating Current, mA				Capacitance μF	Inductance mH	
SBG54803	\$315	20	100	Positive	270	Groups A, B, C, D	-3.2	-10	-40 to 60°C
SBG54806	315	30	60	Positive	270	Group D	2.4	6.0	(-40 to 140°F)

Ordering Example: SBG54803, 20 V, 100 mA zener barrier, and SBG61783, mounting clips, \$315 + 20 = \$335.

Note: Order rail mounting clips SBG61783 separately.

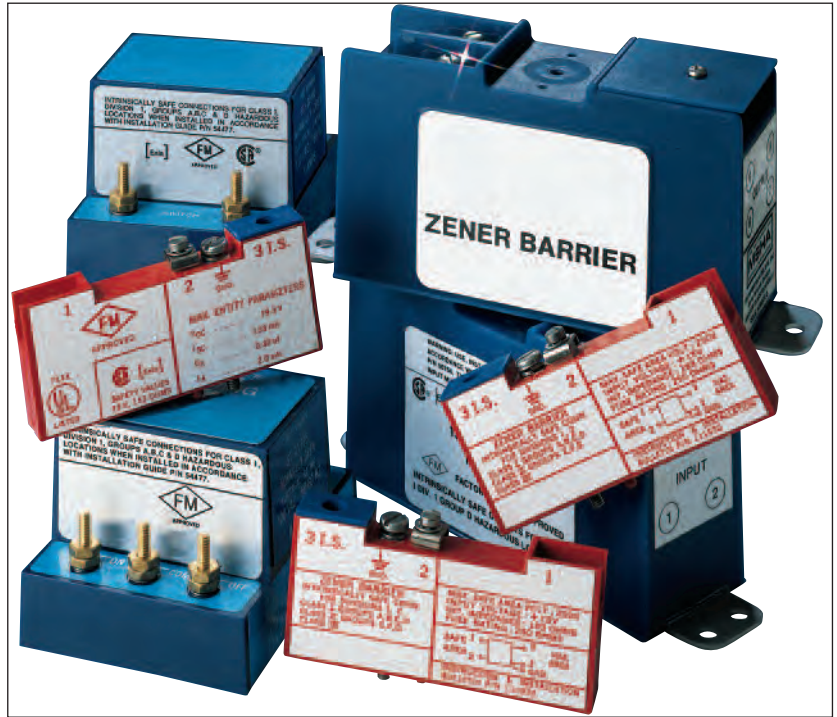
DUAL CHANNEL ZENER BARRIERS, DC

Choosing a suitable barrier for a particular application involves a number of considerations

1. Select a barrier that has the Agency Approvals and Hazardous Location Ratings required (see page K-109).
2. Choose the barrier by the Loop or Entity concept, whichever applies. If the associated equipment has been approved under the loop concept, then the specified barrier must be used. If the associated equipment is approved under the entity concept, then the barrier can be chosen using the entity parameters. The entire loop or system should be evaluated including possible failures or miswiring causing shorts or open loops.

Intrinsic Safety barriers are chosen based on the following parameters as defined by Testing Agencies

1. Maximum Open Circuit Voltage
2. Maximum Short-Circuit Current
3. End to End Resistance—this is the total resistance of the barrier. The entire circuit loop resistance should be evaluated, to make sure the loop will still function with the barrier installed.

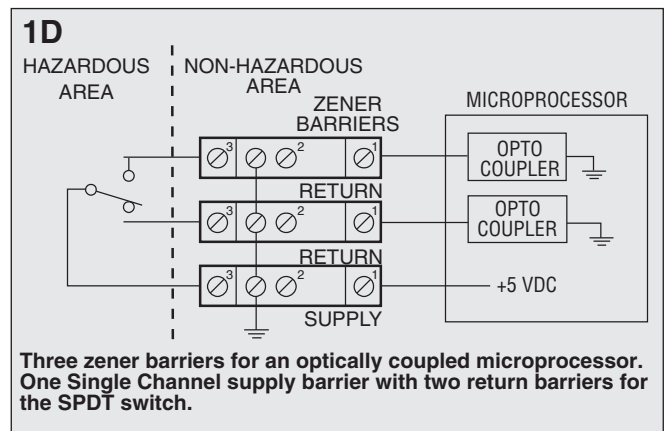
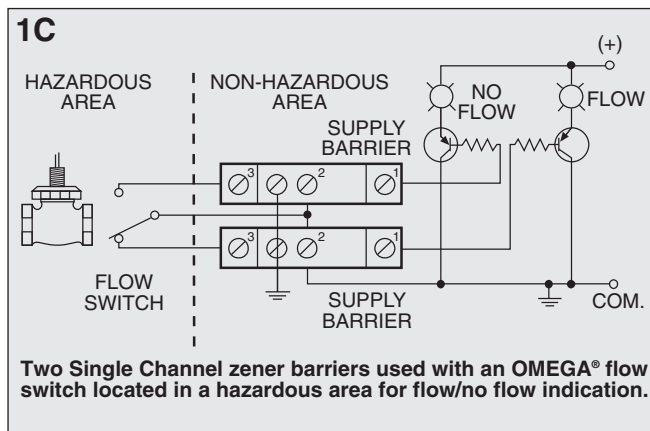
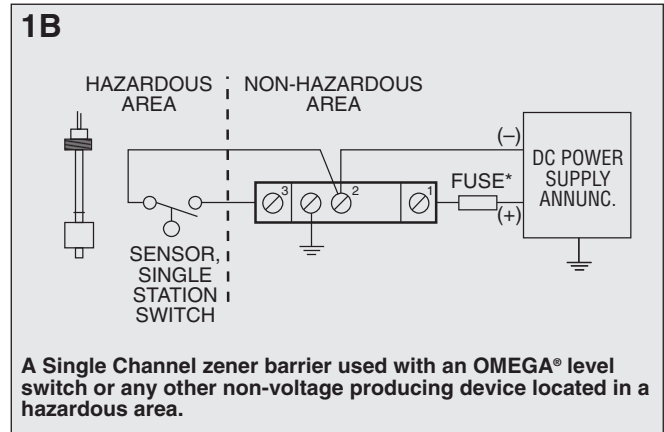
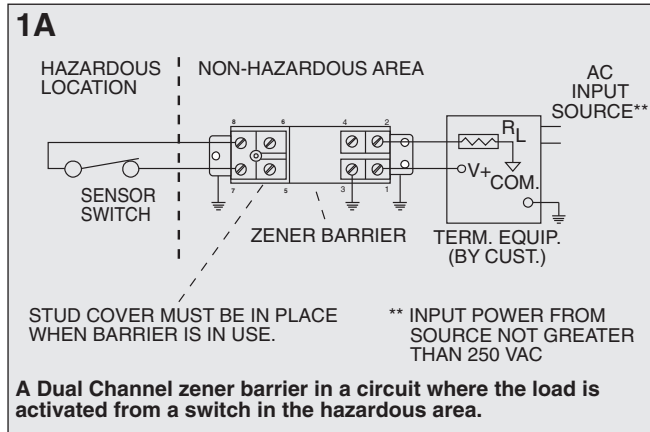


4. Maximum allowed external series inductance
5. Maximum allowance capacitance.

APPLICATION DATA

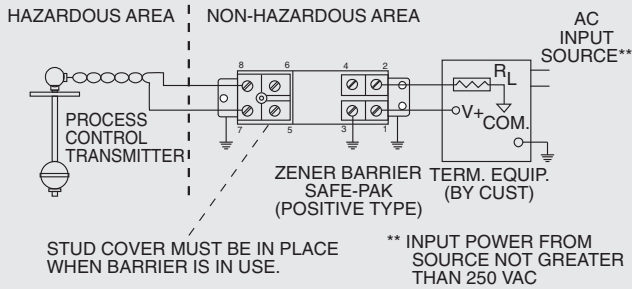
Typical Intrinsic Safety Barrier Wiring Diagrams

I. Switches



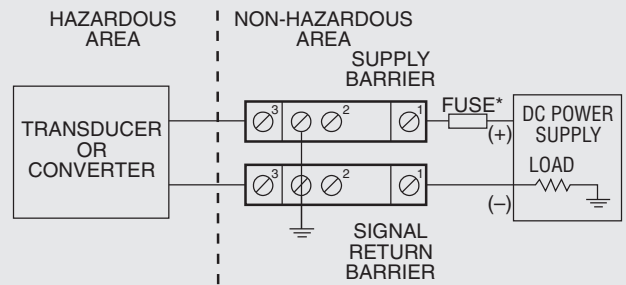
II. Two-wire, 4-20 mA Transmitters

2A



A Dual Channel zener barrier in a current loop used with an approved intrinsically safe transmitter in a process control system.

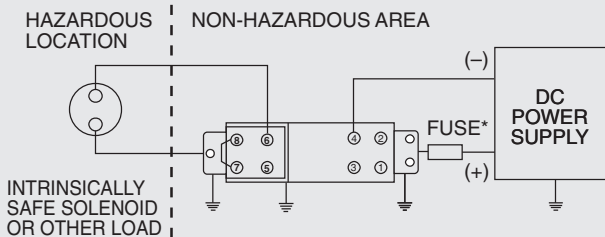
2B



Two Single Channel zener barriers for a floating system in a current loop with an approved intrinsically safe transducer. The signal return barrier is used to minimize the total resistance in the loop.

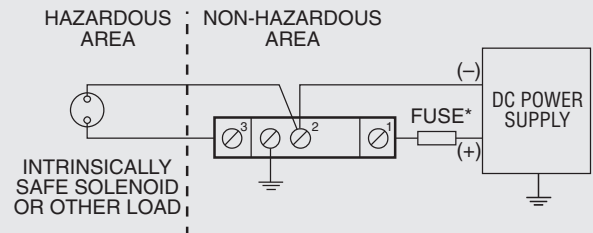
III. Intrinsically-Safe Solenoids

3A



A Dual Channel zener barrier used for supply & return voltage leads. This circuit is used whenever a floating power system must be maintained. For optimum power transfer, the total resistance of the barrier must be matched to the resistance of the solenoid.

3B



A Single Channel zener barrier used where the load in a hazardous area can function with a negative signal that is earth-grounded.

HAZARDOUS AREA

INTRINSICALLY SAFE APPARATUS

Maximum Open Circuit Voltage V_{max}
 Maximum Short Circuit Current I_{max}
 Maximum Unprotected Capacitance C_i
 Maximum Unprotected Inductance L_i

NON-HAZARDOUS AREA

INTRINSIC SAFETY BARRIER

Maximum Open Circuit Voltage V_{oc}
 Maximum Short Circuit Current I_{sc}
 Maximum Allowed Capacitance C_a
 Maximum Allowed Inductance L_a

\geq
 \geq
 \leq
 \leq

Warning

Product must be maintained and installed in strict accordance with the National Electrical Code and the applicable OMEGA® operator's manual. Failure to observe this warning could result in serious injuries or damages.

C_i and L_i Must Also Take Into Account The Interconnecting Wiring Inductance L_w And The Interconnecting Wiring Capacitance C_w .



UNITED STATES

www.omega.com
1-800-TC-OMEGA
Stamford, CT.

CANADA

www.omega.ca
Laval(Quebec)
1-800-TC-OMEGA

GERMANY

www.omega.de
Deckenpfronn, Germany
0800-8266342

UNITED KINGDOM

www.omega.co.uk
Manchester, England
0800-488-488

FRANCE

www.omega.fr
Guyancourt, France
088-466-342

CZECH REPUBLIC

www.omegaeng.cz
Karviná, Czech Republic
596-311-899

BENELUX

www.omega.nl
Amstelveen, NL
0800-099-33-44



More than 100,000 Products Available!

• Temperature

Calibrators, Connectors, General Test and Measurement Instruments, Glass Bulb Thermometers, Handheld Instruments for Temperature Measurement, Ice Point References, Indicating Labels, Crayons, Cements and Lacquers, Infrared Temperature Measurement Instruments, Recorders Relative Humidity Measurement Instruments, RTD Probes, Elements and Assemblies, Temperature & Process Meters, Timers and Counters, Temperature and Process Controllers and Power Switching Devices, Thermistor Elements, Probes and Assemblies, Thermocouples Thermowells and Head and Well Assemblies, Transmitters, Wire

• Flow and Level

Air Velocity Indicators, Doppler Flowmeters, Level Measurement, Magnetic Flowmeters, Mass Flowmeters, Pitot Tubes, Pumps, Rotameters, Turbine and Paddle Wheel Flowmeters, Ultrasonic Flowmeters, Valves, Variable Area Flowmeters, Vortex Shedding Flowmeters

• pH and Conductivity

Conductivity Instrumentation, Dissolved Oxygen Instrumentation, Environmental Instrumentation, pH Electrodes and Instruments, Water and Soil Analysis Instrumentation

• Data Acquisition

Auto-Dialers and Alarm Monitoring Systems, Communication Products and Converters, Data Acquisition and Analysis Software, Data Loggers Plug-in Cards, Signal Conditioners, USB, RS232, RS485 and Parallel Port Data Acquisition Systems, Wireless Transmitters and Receivers

• Pressure, Strain and Force

Displacement Transducers, Dynamic Measurement Force Sensors, Instrumentation for Pressure and Strain Measurements, Load Cells, Pressure Gauges, Pressure Reference Section, Pressure Switches, Pressure Transducers, Proximity Transducers, Regulators, Strain Gages, Torque Transducers, Valves

• Heaters

Band Heaters, Cartridge Heaters, Circulation Heaters, Comfort Heaters, Controllers, Meters and Switching Devices, Flexible Heaters, General Test and Measurement Instruments, Heater Hook-up Wire, Heating Cable Systems, Immersion Heaters, Process Air and Duct, Heaters, Radiant Heaters, Strip Heaters, Tubular Heaters