



**SBG54803A, Solid-State Relays  
For Intrinsic Safety Use**  
Instruction Sheet M1775/0515



Shop online at: [omega.com](http://omega.com) e-mail: [info@omega.com](mailto:info@omega.com)  
For latest product manuals: [omegamanual.info](http://omegamanual.info)

**DESCRIPTION**

The OMEGA® SBG54803A Dual Channel Zener Barrier is a solid-state, energy-limiting device for transmitting direct current signals of less than 20V and less than 100mA in an intrinsically safe manner. The unit is designed to be used in conjunction with indicating equipment in hazardous areas defined as Class I, Division 1, and inclusive of Groups A through D. This zener barrier is used where circuit common is earth-ground referenced.

**THE AMBIENT TEMPERATURE OPERATING RANGE OF THIS DEVICE IS 0° TO 60° C. (+32° TO +140° F).**

**UNPACKING**

Remove the Packing List and verify that you have received all equipment. If you have any questions about the shipment, please call the OMEGA Customer Service Department at 1-800-622-2378 or (203) 359-1660. When you receive the shipment, inspect the container and equipment for any signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

**NOTE**

The carrier will not honor any claims unless all shipping material is saved for their examination. After examining and removing contents, save packaging material and carton in the event reshipment is necessary.

**Important: Read carefully and completely before installing or connecting the solid-state relays.**

**CONSIDERATIONS FOR INSTALLATION AND USE**

Only one sensor per channel may be connected to a barrier (See Figure 1).

The barrier and receiving station must be located in a non-hazardous location.

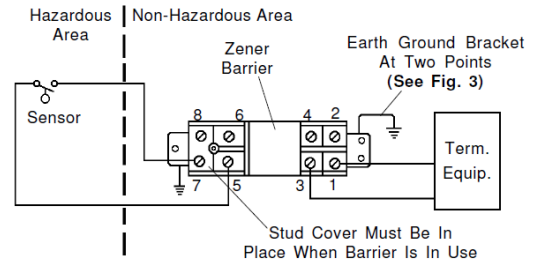
The mounting bracket on the barrier must be connected to an earth ground from both mounting points and two lines for redundancy. The grounding should be adequate for conduction of line generated fault currents. The resistance of either line to earth ground should be maintained at less than one ohm.

To serve multiple tank installations, additional barriers may be placed in an enclosure using a common earth ground (See Figure 2). In this enclosure, the intrinsically safe wiring should be segregated from non-intrinsically safe wiring by independent raceways, wiring trays or other adequate means to insure the integrity of the installation. Additionally, when internal terminations are used, intrinsically safe wiring and non-intrinsically safe wiring should not be adjacent or arranged in such a way as to create the potential to miswire or bypass the barrier during servicing or testing. (See typical installation depicted in Figure 2.)

Common, commercially available signal wire may be used for field wiring and distances of up to 1000 ft. are acceptable using twisted wire. Characteristics of the signal line should not be modified by addition of capacitive or inductive components.

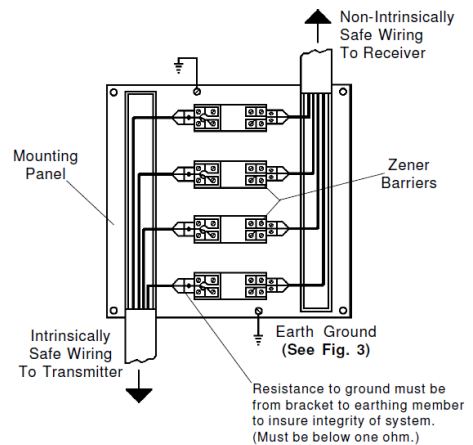
**WARNING**  
Product must be maintained and installed in strict accordance with the National Electrical Code. Failure to observe this warning could result in serious injuries or damages.

Each sensor must have its own ground return wire to pin 5.

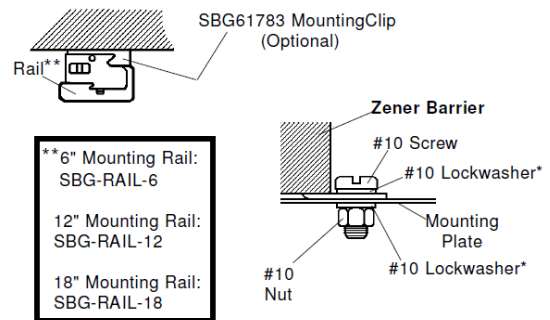


**Fig. 1. Installation Diagram (One Sensor Shown)**

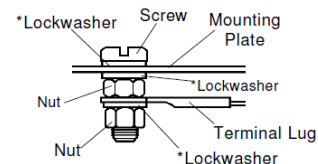
**Important**  
All barriers used for multiple barrier mounting must be of the same polarity.



**Fig. 2. Multiple Barrier Mounting**



**Detail of Earth Grounding**



**Notes**

1. Grounding Hardware to be #8 or larger and stainless steel
2. \*(Lockwashers to be internal or external tooth type)

**Fig. 3. Details of Mounting and Grounding**

**Field Testing of Barrier**

- A. Never conduct tests while circuit is active. The use of instruments between input and output terminals will bypass the barrier.

	Group	Capcittance*	Inductance*
Hydrogen & Acetylene	A & B	0.4 $\mu$ F	0.9 mH
Ethylene	C	1.2 $\mu$ F	5.0mH
Methane	D	3.2 $\mu$ F	10.0mH

**Note:** \*Values are for any one loop in the hazardous area. (i.e., Terminals 7 to 5 or 8 to 5)

B. All testing is to be done with circuit inactive using the following instruments:

1. Ohmmeter with resolution down to less than 1 ohm.
2. D. C. power supply with an output of 0 to +25 VDC.
3. D. C. voltmeter.

C. **Test performance (See Fig. 5)**

**Step 1:**

Disconnect all leads to unit under test except to the earth grounding mounting tabs.

**Step 2:**

- a. Measure the resistance between terminals 1 & 7 and then 2 & 8. This resistance should be 250 ohms  $\pm 5\%$  ( $\pm$  instrument tolerance).
- b. Measure the resistance between terminals 5 & 3 and then terminal 5 and the mounting tab. Both readings should be below one ohm.
- c. Apply 24 volts to terminals 7(+) and 5 (common). Then read the voltage between the terminals 1 (+) and 3 (common)\*. This voltage must be between 18.5 and 21.5 volts. In the same fashion, conduct this same test with the voltage connected across 8 (+) and 5 (common) and measure the output across 2 (+) and 3 (common).
- d. Connect an ohmmeter between the mounting tab (not the mounting screw) and the earth ground reference. The reading must be less than one ohm. **The barrier must pass all parts of this test or it is unacceptable.**

\* The fuses located in the circuits 7-1 and 8-2 are rated at 100mA. Therefore, care should be exercised in testing this device so that no accidental current greater than 100mA enters or leaves terminal 1 or 2.

**Note:** Every effort should be made to keep these barriers clean and free of contaminating atmospheres. A periodic check should be made to verify that they are in good condition, physically and electrically.

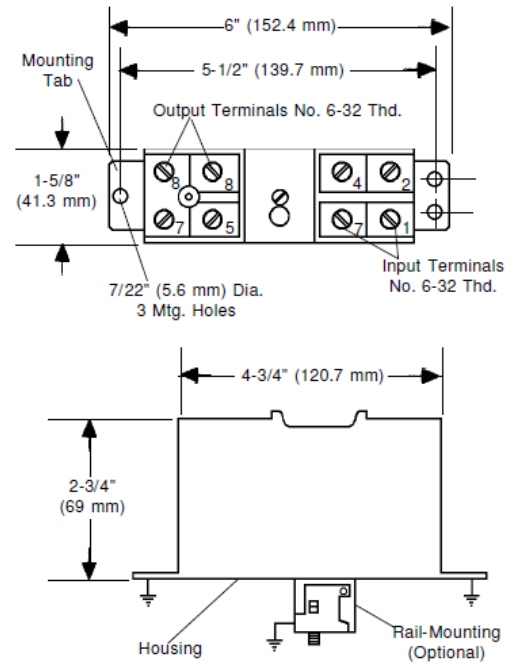


Fig. 4. Dimensions

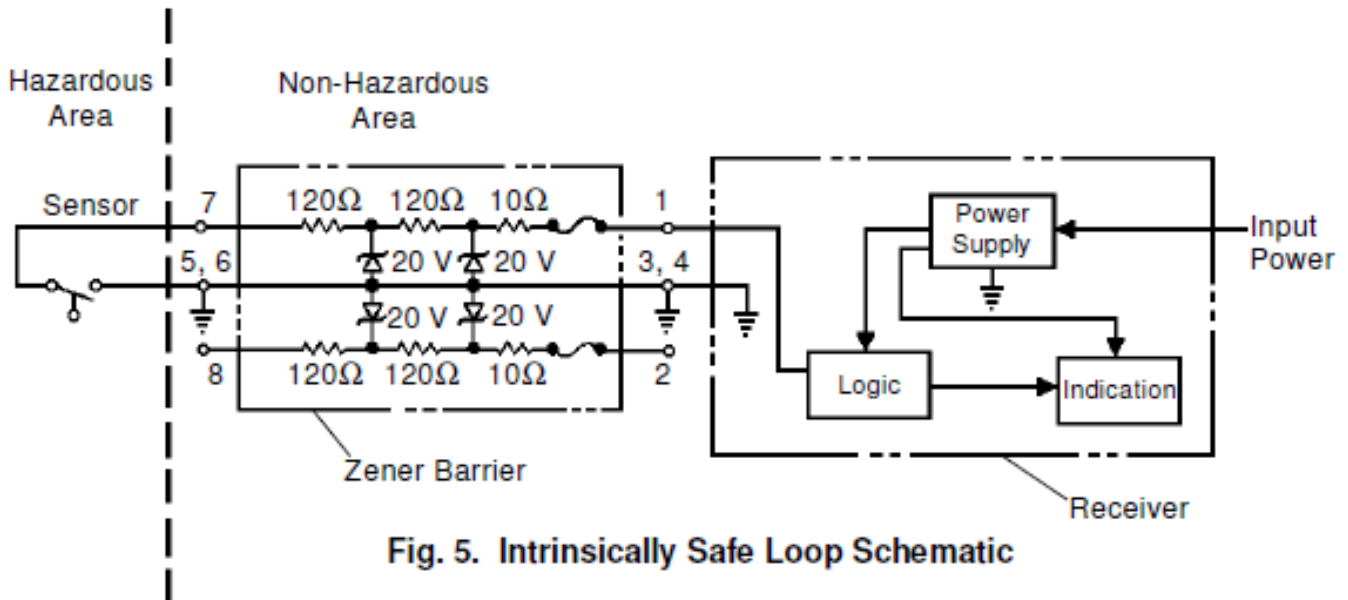


Fig. 5. Intrinsically Safe Loop Schematic

Table 1. Specifications

Model Number	DC Input to Barrier, Max.		Signal Polarity	Series Resist.	Applications Groups Class i & II, Div 1, 2	Reactive Limits		Ambient Oper. Temp.	Weight
	Voltage	Fuse Rating Current, mA				Capacitance $\mu\text{F}$	Inductance mH		
SBG54803A	20	100	Positive	270	Groups A, B, C, D	0.4	0.9	0° to +60°C	495g

**omega.com**<sup>®</sup>

Ω OMEGA

OMEGAnet<sup>®</sup> Online Service  
omega.com

Internet e-mail  
info@omega.com

**Servicing North America:**

**U.S.A.:** Omega Engineering, Inc., One Omega Drive, P.O. Box 4047  
ISO 9001 Certified Stamford, CT 06907-0047  
Toll-Free: 1-800-826-6342 Tel: (203) 359-1660  
FAX: (203) 359-7700 e-mail: info@omega.com

**Canada:** 976 Bergar  
Laval (Quebec), Canada H7L 5A1  
Toll-Free: 1-800-826-6342 TEL: (514) 856-6928  
FAX: (514) 856-6886 e-mail: info@omega.ca

**For immediate technical or application assistance:**

**U.S.A. and Canada:** Sales Service: 1-800-826-6342 / 1-800-TC-OMEGA\*  
Customer Service: 1-800-622-2378 / 1-800-622-BEST\*  
Engineering Service: 1-800-872-9436 / 1-800-USA-WHEN\*

**Mexico:** En Español: 001 (203) 359-7803 FAX: (001) 203-359-7807  
info@omega.com.mx e-mail: espanol@omega.com

**Servicing Europe:**

**Benelux:** Managed by the United Kingdom Office  
Toll-Free: 0800 099 3344 TEL: +31 20 347 21 21  
FAX: +31 20 643 46 43 e-mail: sales@omega.nl

**Czech Republic:** Frystatska 184  
733 01 Karviná, Czech Republic  
Toll-Free: 0800-1-66342 TEL: +420-59-6311899  
FAX: +420-59-6311114 e-mail: info@omegashop.cz

**France:** Managed by the United Kingdom Office  
Toll-Free: 0800 466 342 TEL: +33 (0) 161 37 29 00  
FAX: +33 (0) 130 57 54 27 e-mail: sales@omega.fr

**Germany/Austria:** Daimlerstrasse 26, D-75392 Deckenpfronn, Germany  
Toll-Free: 0 800 6397678 TEL: +49 (0) 7059 9398-0  
FAX: +49 (0) 7056 9398-29 e-mail: info@omega.de

**United Kingdom:** OMEGA Engineering Ltd.  
One Omega Drive, River Bend Technology Centre, Northbank  
Irlam, Manchester M44 5BD England  
ISO 9001 Certified Toll-Free: 0800-488-488 TEL: +44 (0)161 777-6611  
FAX: +44 (0)161 777-6622 e-mail: sales@omega.co.uk

It is the policy of OMEGA Engineering, Inc. to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification. The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

**WARNING:** These products are not designed for use in, and should not be used for, human applications.

**WARRANTY/DISCLAIMER**

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

**OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.**

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

**RETURN REQUESTS / INQUIRIES**

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

© Copyright 2009 OMEGA ENGINEERING, INC. All rights reserved. This document may not be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine-readable form, in whole or in part, without the prior written consent of OMEGA ENGINEERING, INC.

P/N 158351 rev A