

# G-Barrier

3A5056B  
EN

## Power Barrier for Hazardous Locations

Associated apparatus providing intrinsically safe power to hazardous locations using the entity parameter concept. For professional use only.

Not approved for use in explosive atmospheres or hazardous locations.

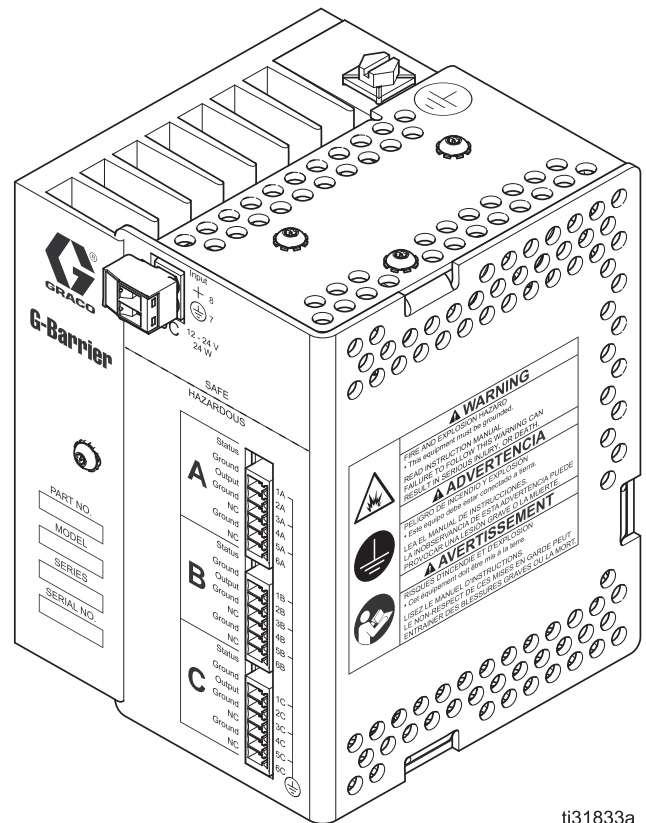
See **Approvals** on page 3 for approval information.



### Important Safety Instructions

Read all warnings and instructions in this manual before using the equipment. Save these instructions.

### 26A364 IS Power Barrier



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# Approvals



For connection to:  
 CLASS I, DIVISION 1, GROUP D (USA & CANADA)  
 CLASS I, ZONE 0, [AEx ia Ga] IIA (USA)  
 $0^{\circ}\text{C} \leq \text{Ta} \leq 54^{\circ}\text{C}$   
 FM18US0213  
 FM18CA0102



II (1) G [Ex ia Ga] IIA  
 $0^{\circ}\text{C} \leq \text{Ta} \leq 54^{\circ}\text{C}$   
 IECEx FMG 18.0022  
 FM18ATEX0053

## List of Standards

- U.S. Approval
  - FM 3600:2018
  - FM 3610:2018
  - FM 3810:2017
  - UL 60079-0:2019
  - ANSI/ISA 60079-11:2014
- Canada Approval
  - CSA C22.2 No. 60079-0:2019
  - CSA C22.2 No. 60079-11:2014
  - CSA C22.2 No. 61010-1:2012
- IECEx Certification
  - IEC 60079-0:2017
  - IEC 60079-11:2011
- ATEX Certification
  - EN 60079-0:2018
  - EN 60079-11:2012

# Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to procedure-specific risks. When these symbols appear in the body of this manual or on warning labels, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

## **WARNING**



### **INTRINSIC SAFETY**

Intrinsically safe equipment that is installed improperly or connected to non-intrinsically safe equipment will create a hazardous condition and can cause fire, explosion, or electric shock. Follow local regulations and the following safety requirements.

- Be sure your installation complies with national, state, and local codes for the installation of electrical apparatus in a Class I, Division 1, Group D, or Zone 0, or 1, Group IIA (as applicable) Hazardous Location, including all of the local safety fire codes. For the United States, this includes NFPA 33, NEC 500 and 516, and OSHA 1910.107.
- Equipment that comes in contact with the G-Barrier's intrinsically safe terminals must be rated for Intrinsic Safety. This includes DC voltage meters, ohmmeters, cables, and connections.
- Do not install the G-Barrier, which is non-intrinsically safe, in a hazardous area, as defined in Article 500 of the National Electrical Code (USA) or your local electrical code.
- The G-Barrier must be properly grounded to be effective. For proper grounding, use the ground wire provided (or a 12-gauge minimum ground wire), and the G-Barrier's ground must be within 1 ohm of true earth ground. For more information, see **Installation**.
- Do not operate the G-Barrier module with the cover removed.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.
- Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.

# Overview

The G-Barrier associated apparatus power supply has three independent outputs with separate entity parameters. The output barriers are all the trapezoidal type as defined in EN 60079-25 Annex C. Additional features of this module include:

- Wide input power range from 12V to 24V
- Regulated first stage
  - Feedback controlled for high efficiency
  - Overload protection against fuse damage
- Three independent outputs
  - Feedback controlled for high efficiency and stable output
  - Color-coded and keyed output connector
  - Temporary short-circuit protection against fuse damage
- DIN rail mounting
- Ground bond screw

## Power Barrier Output Parameters

<b>Zones</b>	$U_o$	$I_o$	$P_o$	$L_o$	$C_o$	$L_o/R_o$
<b>Divisions</b>	$V_{oc}$	$I_{sc}$	$P_o$	$L_a$	$C_a$	$L_a/R_a$
<b>Units</b>	V	mA	W	$\mu$ H	$\mu$ F	$\mu$ H/Ohm
<b>Value</b>	16.4	592.2	2.82	64	2.4	76.2

# Installation



Do not substitute or modify system components as this may impair intrinsic safety. Do not install equipment approved only for a non-hazardous location in a hazardous location.

- Do not connect the non-intrinsically safe terminals (power rail) to any device that uses or generates more than  $U_m=250$  Vrms or DC, unless the voltage is adequately isolated.
- Installation in the United States must meet the requirements of the National Electrical Code (ANSI/NFPA 70) and Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation Part 1: Intrinsic Safety (ANSI/ISA-RP12.06.01).
- Installation in Canada must meet the requirements of the Canadian Electrical Code, CSA C22.1, Part I, Appendix F.
- For ATEX, install according to EN 60079-14 and applicable local codes and regulations.
- For IECEx, install according to IEC 60079-14 and applicable local codes and regulations.
- Multiple earthing of components is allowed only if a high integrity equipotential system is realized between the points of bonding.
- The G-Barrier does not provide galvanic isolation from earth or between non-intrinsically safe and intrinsically safe connections
- Install wiring associated with intrinsically safe channels A, B, C as separate intrinsically safe circuits according to the applicable installation codes.
- The specified Ca, Co, La, Lo parameters take the effects of combined external capacitance and inductance into account. No further reduction in the specified Ca, Co, La, Lo parameters is required.
- Do not disassemble.

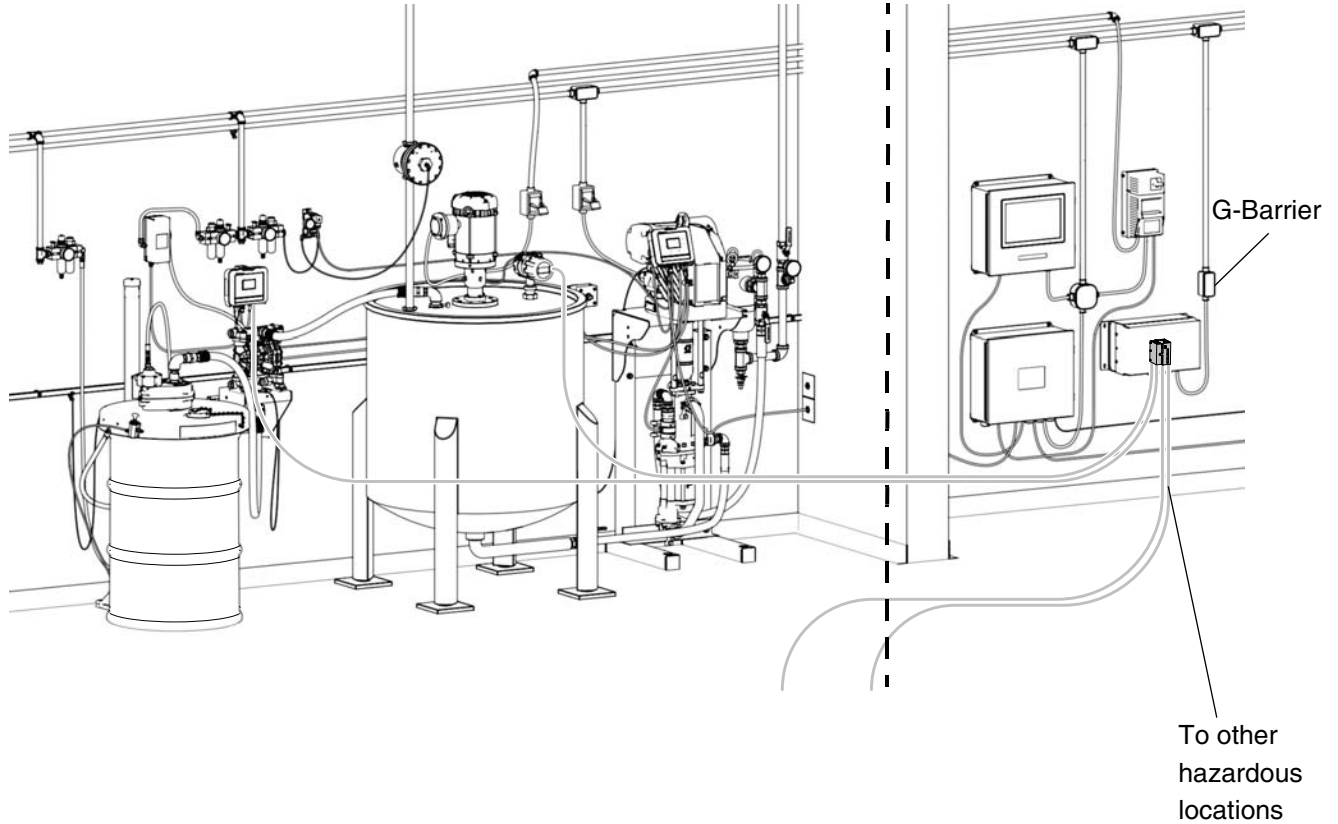
**Hazardous (Classified) Locations**

Class 1, Division 1, Group D, (US and Canada)

Class 1, Zone 0 or Zone 1, Group IIA, (US and Canada)

Zone 0 or Zone 1, Group IIA (ATEX and IECEx)

**Non-Hazardous Location**



**FIG. 1: Typical Hazardous Location Installation**

## Validating the Field Apparatus Entity Parameters

The entity parameters of the barrier outputs must be matched to the entity parameters of the field apparatus power inputs.

The barrier outputs are defined using the symbols  $U_o$ ,  $I_o$ ,  $P_o$ ,  $C_o$ ,  $L_o$ , and  $L_o/R_o$ .

The barrier outputs are alternately defined using the divisions symbols  $V_{oc}$ ,  $I_{sc}$ ,  $P_o$ ,  $C_a$ ,  $L_a$ , and  $L_a/R_a$ .

The field apparatus power inputs are defined using a combination of the symbols  $U_i$ ,  $I_i$ ,  $P_i$ ,  $C_i$ , and  $L_i$ . It is possible that all parameters are not defined. In some cases the equivalent value can be calculated. Refer to the appropriate installation standards if this is the case.

For an installation to be valid and safe, use the following calculation methods. All calculation comparisons must be true:

Parameter	Zones	Divisions
Voltage	$U_o \leq U_i$	$V_{oc} \leq U_{max}$
Current	$I_o \leq I_i$	$I_{sc} \leq I_{max}$
Power	$P_o \leq P_i$	$P_o \leq P_i$
Capacitance	$C_o \geq C_i + C_{cable}$	$C_a \geq C_i + C_{cable}$
Inductance	$L_o \geq L_i + L_{cable}$	$L_a \geq L_i + L_{cable}$
Inductance to Resistance Ratio	$L_o/R_o \geq L_i/R_i$	$L_a/R_a \geq L_i/R_i$

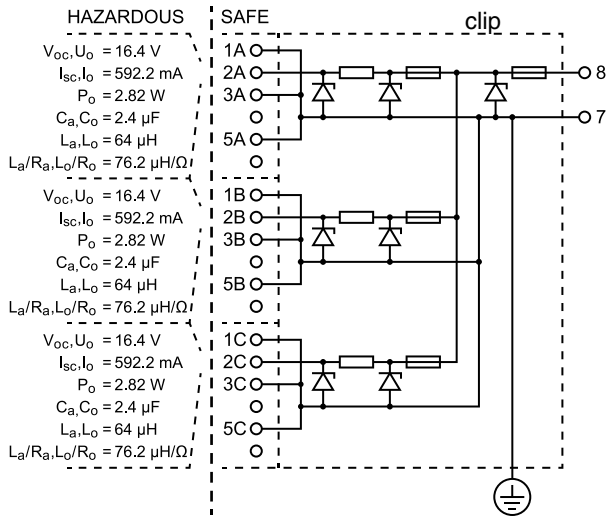
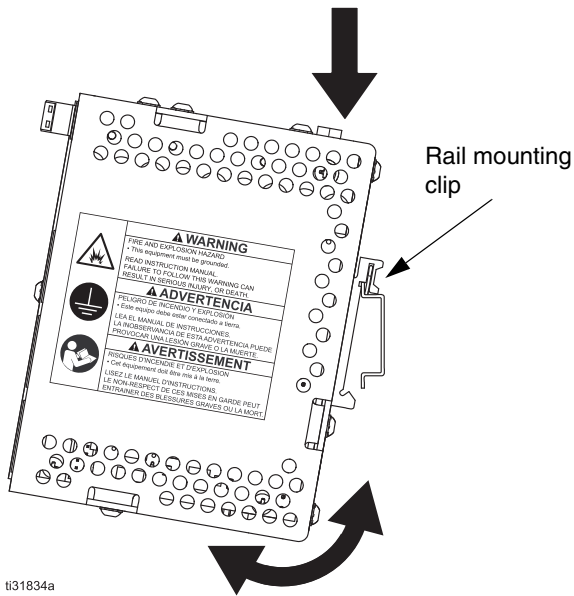


Fig. 2: Entity Parameters

## Mounting and Dismounting to DIN Rail

This device is intended to be mounted on a 35 mm standard DIN rail.

The DIN rail mounting clip on the device is spring-loaded. No tool is needed to install or remove the device.



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**FIG. 3: DIN Rail Mounting**

A force of approximately 40 lbs (18 Kg-force, 180 N) is necessary to compress the spring enough to allow the DIN rail clip to be latched onto the rail.

The spring must be latched behind the edge of the DIN rail to connect properly. See FIG. 3.

To remove the device from the DIN rail, pull down to compress the spring, pull the bottom out to release it from the rail, and lift it up off the top of the DIN rail.

## Grounding

				
<p>The equipment must be grounded to reduce the risk of static sparking and electric shock. Improper grounding can cause electric shock. Grounding provides an escape wire for the electric current.</p>				

If the DIN rail is bonded to the system ground, then the barrier connection through the DIN rail is adequate for system ground.

NOTE: Always bond the G-Barrier to the ground screw.

The G-Barrier must be bonded to an equipotential grounding system capable of safely carrying any fault currents with a total resistance from the barrier to the grounding electrode not exceeding 1 ohm. The grounding connection is not allowed to carry system supply current in normal operation.

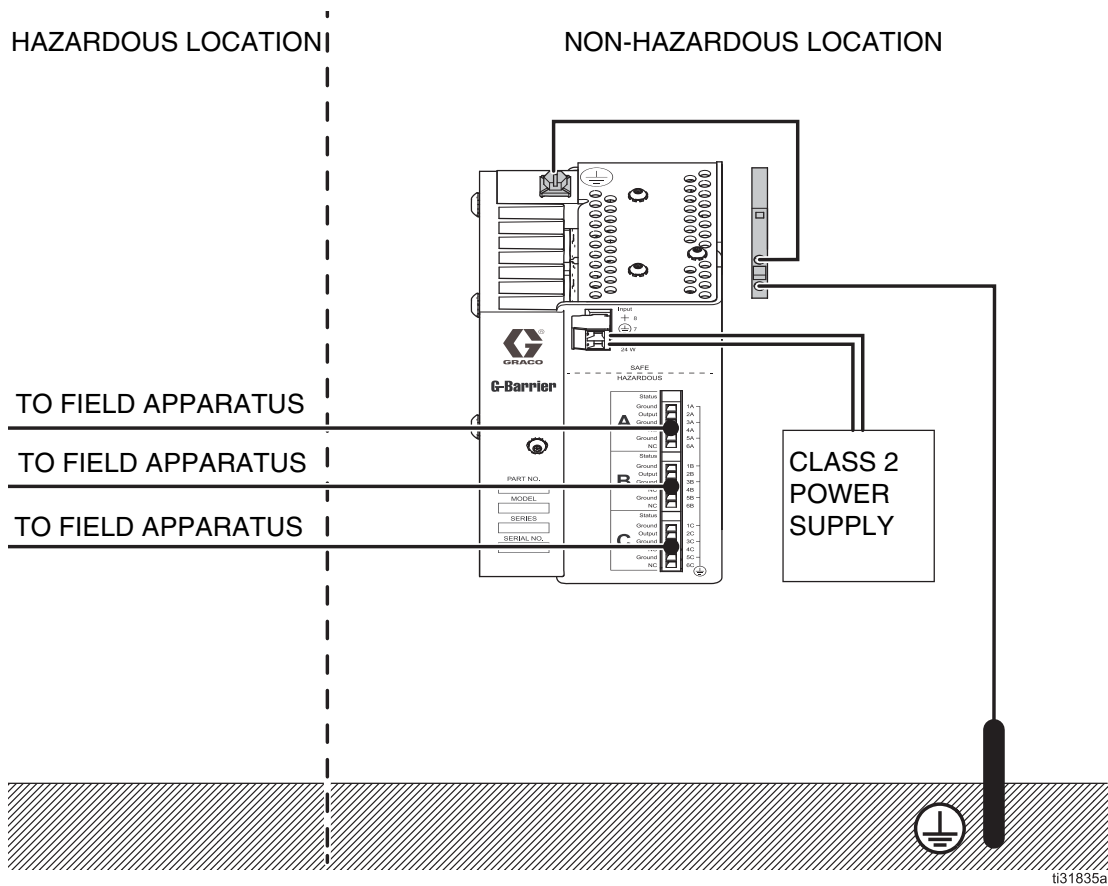
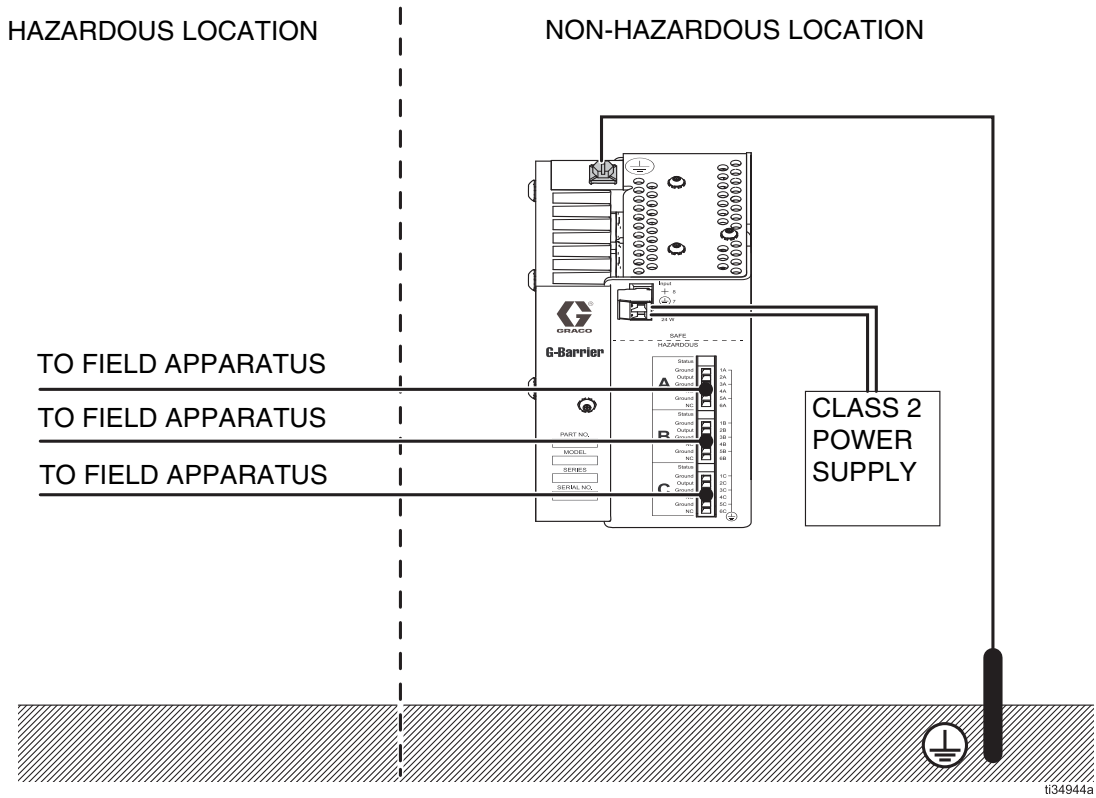


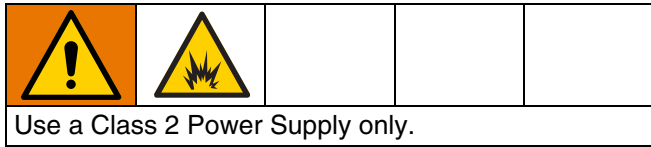
FIG. 4: Grounding, Example 1



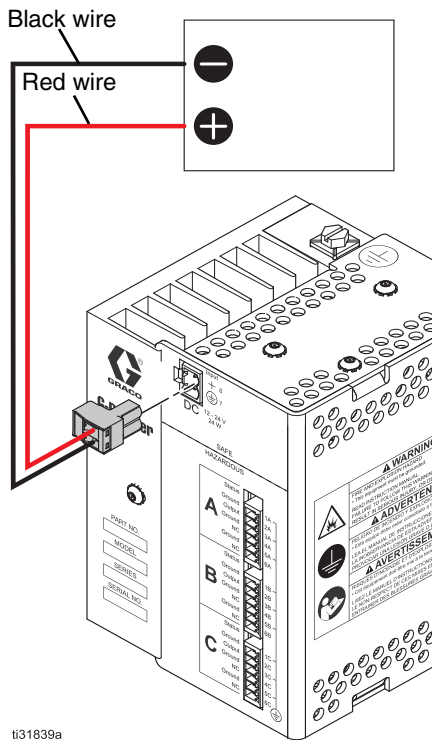
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Fig. 5: Grounding, Example 2

## Wiring the Power Input Connector



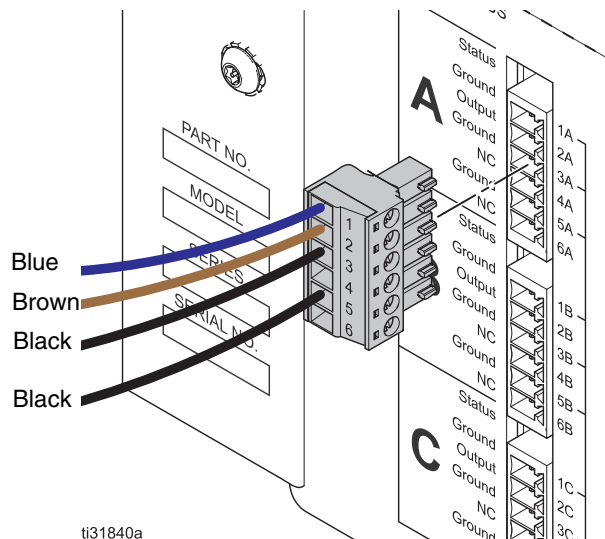
The input power connector, provided with the barrier, is field-wireable with screw terminals.



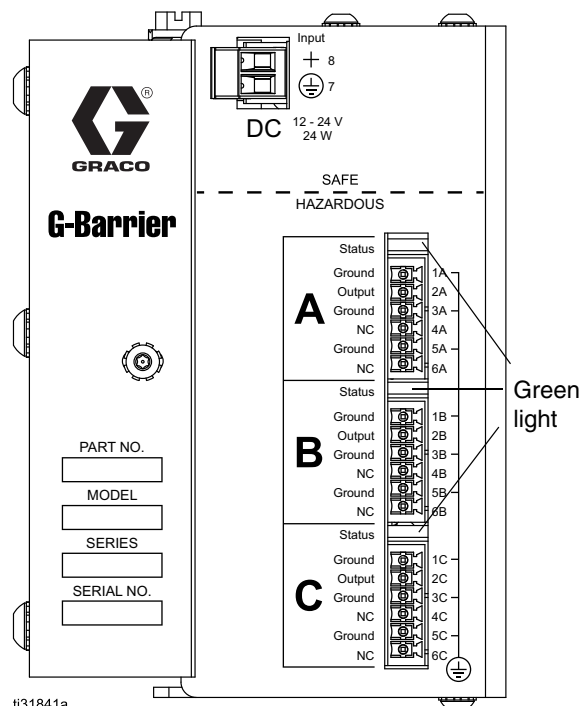
ti31839a **FIG. 6: Wiring Power Input Connector**

## Wiring the Power Output Connectors

The output connectors all have power on pin 2. Pins 1, 3, and 5 are all connected to ground. Pins 4 and 6 are not connected. NOTE: If you are making your own cable connections, the wire colors may differ.



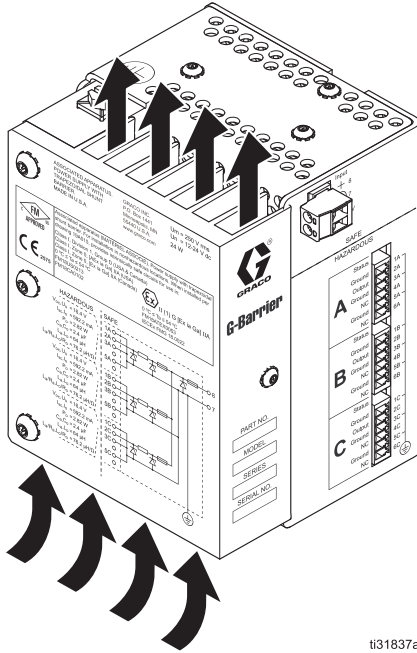
ti31840a **FIG. 7: Wiring When Using 16K509 or 16K615 Cables**



ti31841a **FIG. 8: Wiring Power Output Connectors, Front View**

## Airflow

For best performance, the installation must allow for air-flow through and around the barrier.



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**FIG. 9: Airflow**

# Troubleshooting

The status lights (see FIG. 8) brighten and dim based on the output voltage of the appropriate channel.

If the light becomes dim or turns off when the field apparatus is connected, it may be drawing too much power for correct operation, or the device or cable may be shorted. Determine the fault and replace or repair parts as necessary.

The following tests can be used to validate the operation of the barrier:

Parameter	Procedure	Valid Range
Input Voltage	Check with meter	12 VDC to 24 VDC
Output Voltage with no load	Check with meter	15 VDC
Output Voltage with load	Check with meter	Compare to current from graph. See <b>Performance</b> , page 15.
Output Current with load	Check with meter	Compare to voltage from graph. See <b>Performance</b> , page 15.

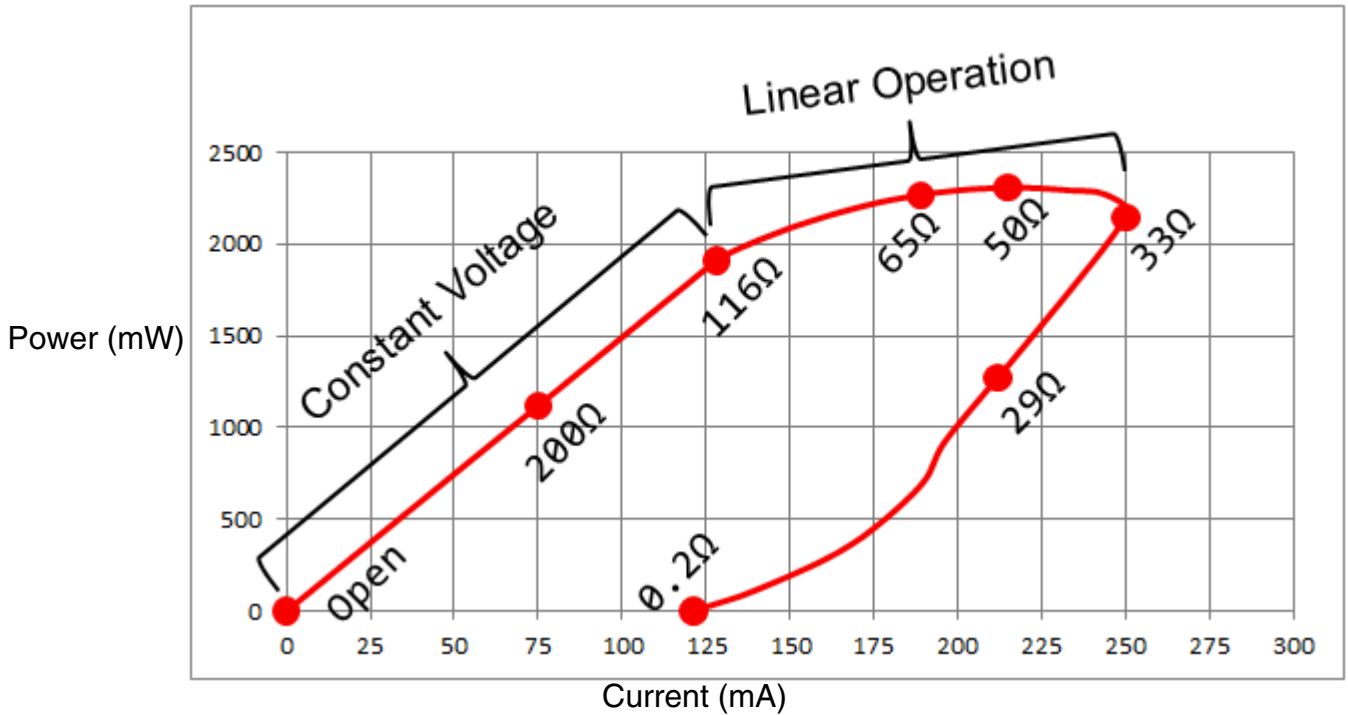
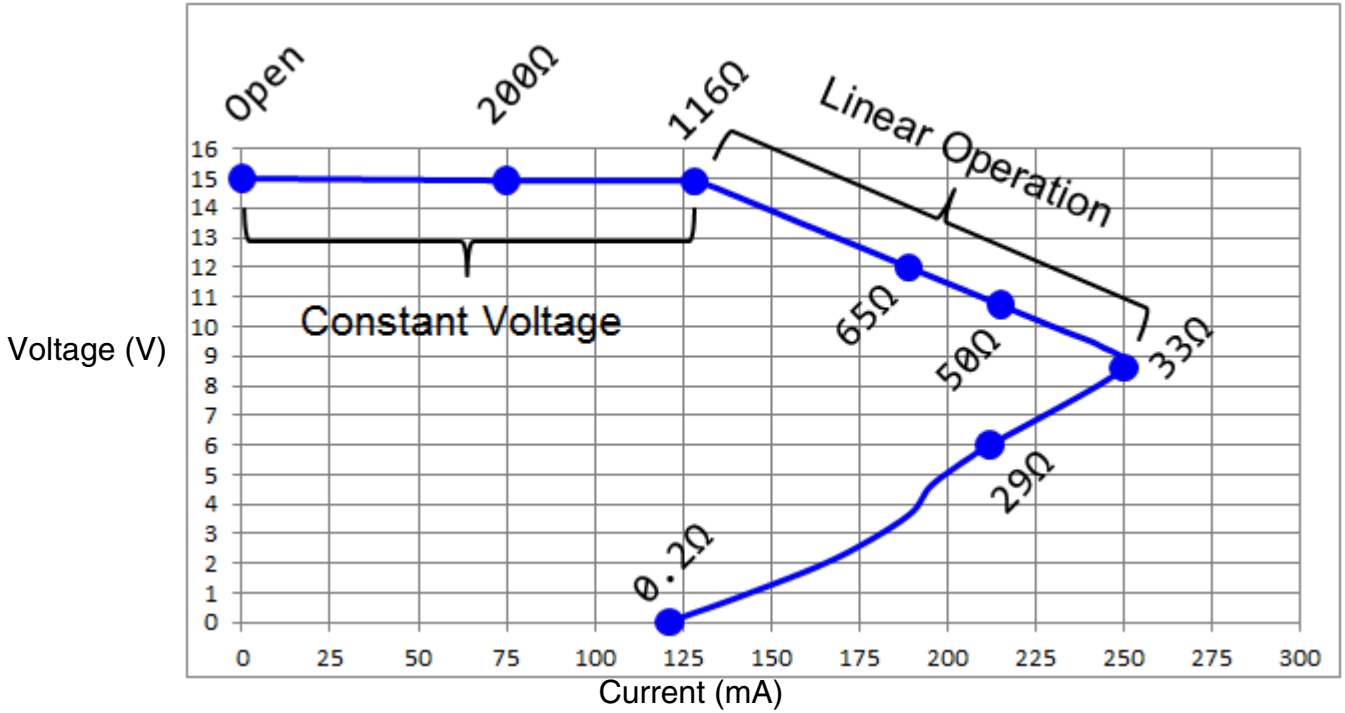
# Parts

Part	Description	Qty
26A507	Circuit, IS power barrier	1
116343	Ground screw	1
19A612*	Power input connector, six position	3
17T870*	Power input connector, two position	1

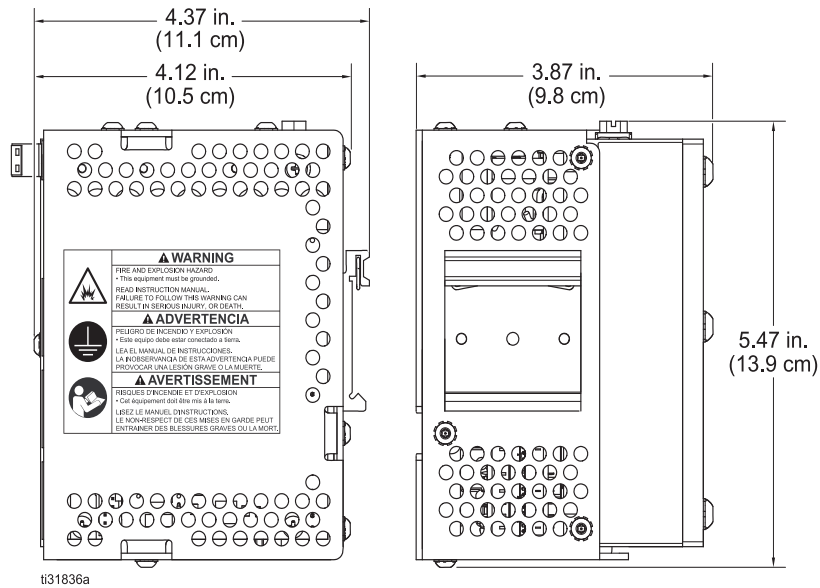
\* Part of G-Barrier Power Connector Kit 25E511

# Performance

This trapezoidal barrier maintains a relatively constant output voltage until it reaches an output current of 125 mA. From this point, it resembles a linear barrier until it approaches an output current of 250 mA. Circuitry in the barrier reduces the output voltage to protect both the internal fuse and any associated apparatus that may be shorting out. As the short is released, the barrier returns to linear operation, and then to constant voltage operation.



# Dimensions



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**FIG. 10: Dimensions of the G-Barrier**

# Technical Specifications

	US	Metric
<b>Electrical Parameters</b>		
Maximum input voltage		24 VDC
Minimum input voltage		12 VDC
Maximum input power		24 W
Power supply type		Class 2
<b>Environmental Parameters</b>		
Ambient temperature range	32 °F ≤ Ta ≤ 129 °F	0 °C ≤ Ta ≤ 54 °C
Humidity	0% to 90%	
Clearance above unit*	1 in	25 mm
Clearance to side of unit*	1/4 in	6 mm
Clearance below unit*	1/2 in	12 mm
Enclosure material	Aluminum, Anodized aluminum	
Weight*	1 lb	1000 g
Width*	2 in	50 mm
Height*	5 in	125 mm
Depth*	4 in	100 mm

\* Measurements are approximate.

# Graco Standard Warranty

Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

**THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.**

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

**GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IN CONNECTION WITH ACCESSORIES, EQUIPMENT, MATERIALS OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO.** These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

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For patent information, see [www.graco.com/patents](http://www.graco.com/patents).

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**Phone:** 612-623-6921 **or Toll Free:** 1-800-328-0211 **Fax:** 612-378-3505

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Original instructions. This manual contains English. MM 3A5056

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Revision B, 2019-01