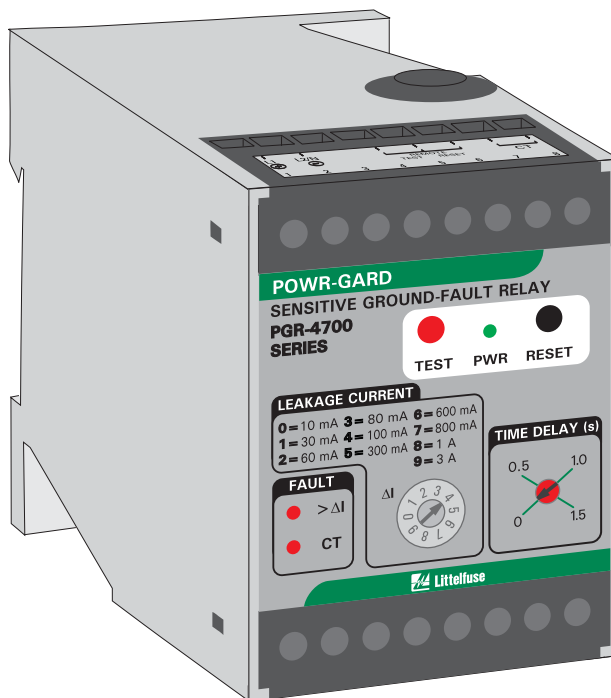


**PGR-4700 MANUAL**  
**SENSITIVE GROUND-FAULT RELAY**

APRIL 20, 2012

REVISION 2



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## 1. GENERAL

The PGR-4700 is a ground-fault relay for ac power supply systems that require ground-fault detection as low as 10 mA. It is suited for sensitive ground-fault protection on systems with significant harmonic content. Its output relays can operate in the fail-safe or non-fail-safe mode for undervoltage or shunt-trip applications. The PGR-4700 has two sets of NO/NC (Form C) relay contacts for use in independent control circuits. Additional features include LED trip and power indication, autoreset or latching trips with front-panel and remote reset, test switch, 0- to 1-mA analog output, CT verification with LED indication, a digital trip-level switch, and a trip-time setting.

Ground-fault current is sensed by a PGC-5000-series core-balance current transformer (CT). The trip level of the ground-fault circuit is digital-switch selectable from 10 mA to 3 A. Trip time is adjustable from 0 to 1.5 s.

## 2. OPERATION

### 2.1 Relay Operating Mode

The relay-operating-mode switch is located behind the front panel. See Fig. 1. Disconnect supply voltage before accessing switch. The front panel snaps into the terminal block and can be removed using a screw driver. In the fail-safe mode (switch open), the output relay energizes when the ground-fault circuit is not tripped. Fail-safe mode is the factory setting.

In the non-fail-safe mode (switch closed), the output relay energizes when a ground-fault trip occurs.

### 2.2 Front-Panel Controls

#### 2.2.1 Ground-Fault Trip Level

The  $\Delta I$  selector switch is used to set the ground-fault trip level from 10 mA to 3 A. For ground-fault detection, the switch setting must be set substantially below the prospective ground-fault current. To avoid sympathetic tripping, the switch setting must be above the charging current of the protected feeder.

#### 2.2.2 Ground-Fault Trip Time

The PGR-4700 has a definite-time trip characteristic. In tripping systems, the TIME DELAY selector is used to set the ground-fault trip time for coordination with upstream and downstream ground-fault devices. Trip time is selectable from 0 to 1.5 s. Coordination requires the same trip level for all ground-fault devices in a system and the trip time to progressively increase upstream. The amount of equipment removed from the system will

be a minimum if the first ground-fault device to operate is the one immediately upstream from the fault.

#### 2.2.3 Reset

The front-panel RESET switch is used to reset latching trips. When remote-reset terminals 5 and 6 are connected, a trip remains latched until the RESET switch is pressed or the remote-reset terminals are momentarily opened. Cycling the supply voltage will also reset the PGR-4700.

If the remote-reset terminals are not connected, the PGR-4700 operates in non-latching mode and a trip will reset when the fault is removed.

A jumper between terminal 5 and 6 will allow latching operation and reset via the front panel.

#### 2.2.4 Test

The TEST switch is used to test the ground-fault CT circuit, the indication, and the output relay. When the TEST switch is pressed, the circuit will trip, the  $>\Delta I$  LED will light, and the output relay will operate. The analog output will indicate full scale (1 mA) during the test.

### 2.3 Front-Panel Indication

#### 2.3.1 Power

The green LED labeled PWR indicates presence of supply voltage.

#### 2.3.2 $>\Delta I$

The red LED labeled  $>\Delta I$  indicates a ground-fault trip.

#### 2.3.3 CT

The red LED labeled CT indicates that a PGC-5000-series current transformer is not connected. See Section 2.7.

### 2.4 Analog Output

A non-isolated, 0- to 1-mA output (terminals 9 and 10) indicates ground-fault current sensed by the CT. The full-scale value corresponds to the ground-fault trip setting. For example, if the ground-fault trip setting is 30 mA, then 1 mA output will be indicated when the measured current is 30 mA. The output is linear between zero and full scale. See Figs. 2 and 6 for PGA-0500 meter details.

### 2.5 Remote Test

Connect terminals 4 and 5 to remote test. See Section 2.2.4.

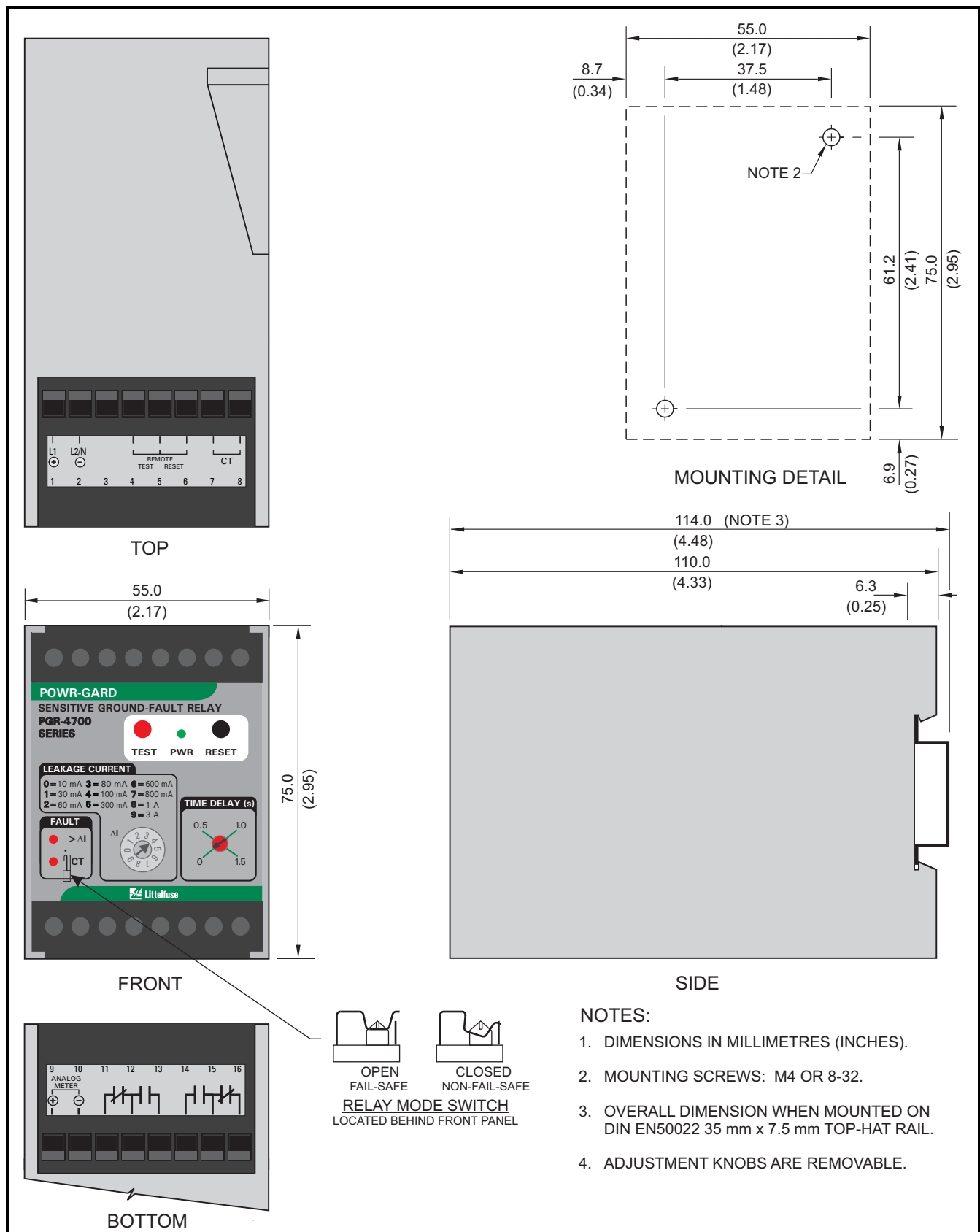


FIGURE 1. PGR-4700 Outline and Mounting Details.

## 2.6 Remote Reset

Terminals 5 and 6 are used for remote reset. A normally closed contact is required to configure the PGR-4700 for latching operation with remote reset. See Section 2.2.3.

## 2.7 CT Verification

A trip will occur and the red CT LED will light when a PGC-5000-series CT is not connected to terminals 7 and 8.

## 3. INSTALLATION

**Note:** Mounting, terminal block connections and wiring must conform to applicable local electrical codes. Check all applicable codes prior to installation.

This ground-fault monitoring system consists of a PGR-4700-series Sensitive Ground-Fault Relay and a PGC-5000-series CT connected as shown in Fig. 2.

A PGR-4700 can be surface or DIN-rail mounted. See Fig. 1. Panel mounting requires a PGK-0055 or PGK-0060 Panel-Mount Adapter. See Figs. 4 and 5.

Use terminal 1 (L1) as the line terminal on ac systems or the positive terminal on dc systems. Use terminal 2 (L2/N) as the neutral terminal on ac systems or the negative terminal on dc systems. There is no separate ground terminal for a ground wire.

Pass the phase conductors through the CT window and position them in the centre of the opening (for 4-wire and single-phase systems, also pass the neutral conductor through the CT window). Do not pass ground conductors through the CT window. In applications that require shields or drain wires to pass through the CT window, return them through the CT window before connecting them to ground. Connect the PGC-5000-series CT to terminals 7 and 8, and connect the shield to terminal 8. CT connections are not polarity sensitive. Certain applications require twisted- or shielded-twisted pair secondary CT conductors. See Fig. 3 for PGC-5000-series CT dimensional drawings.

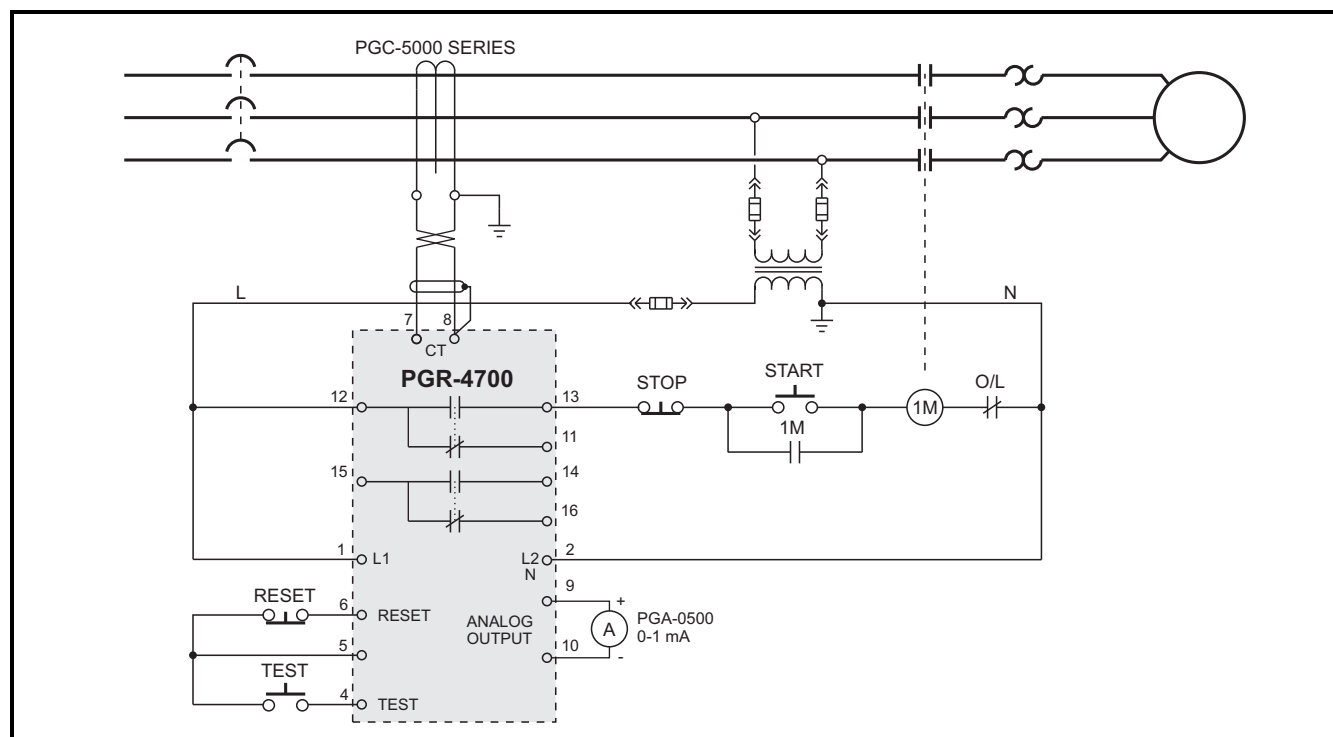


FIGURE 2. Typical Connection Diagram.

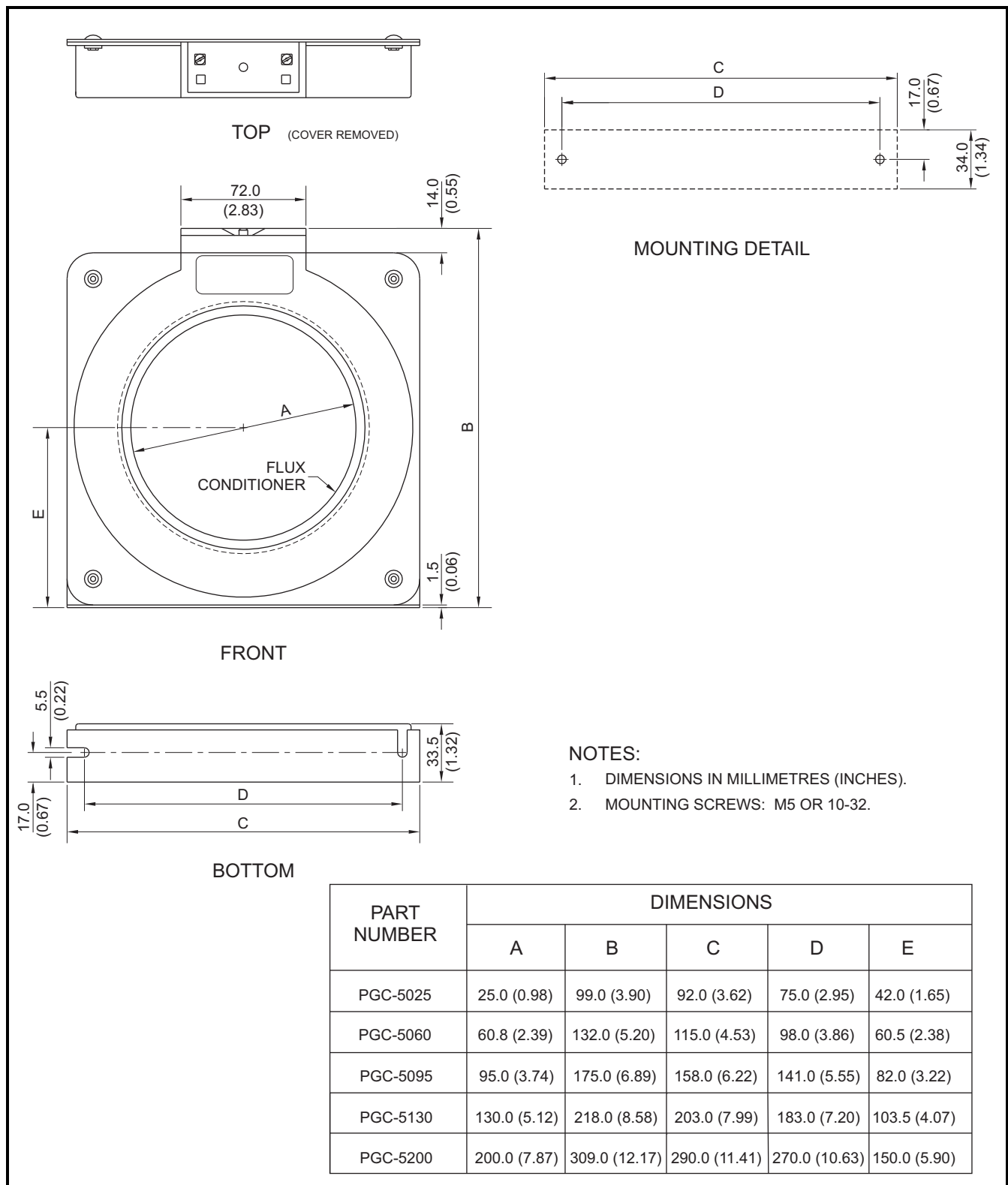


FIGURE 3. PGC-5000-Series Current Transformers.



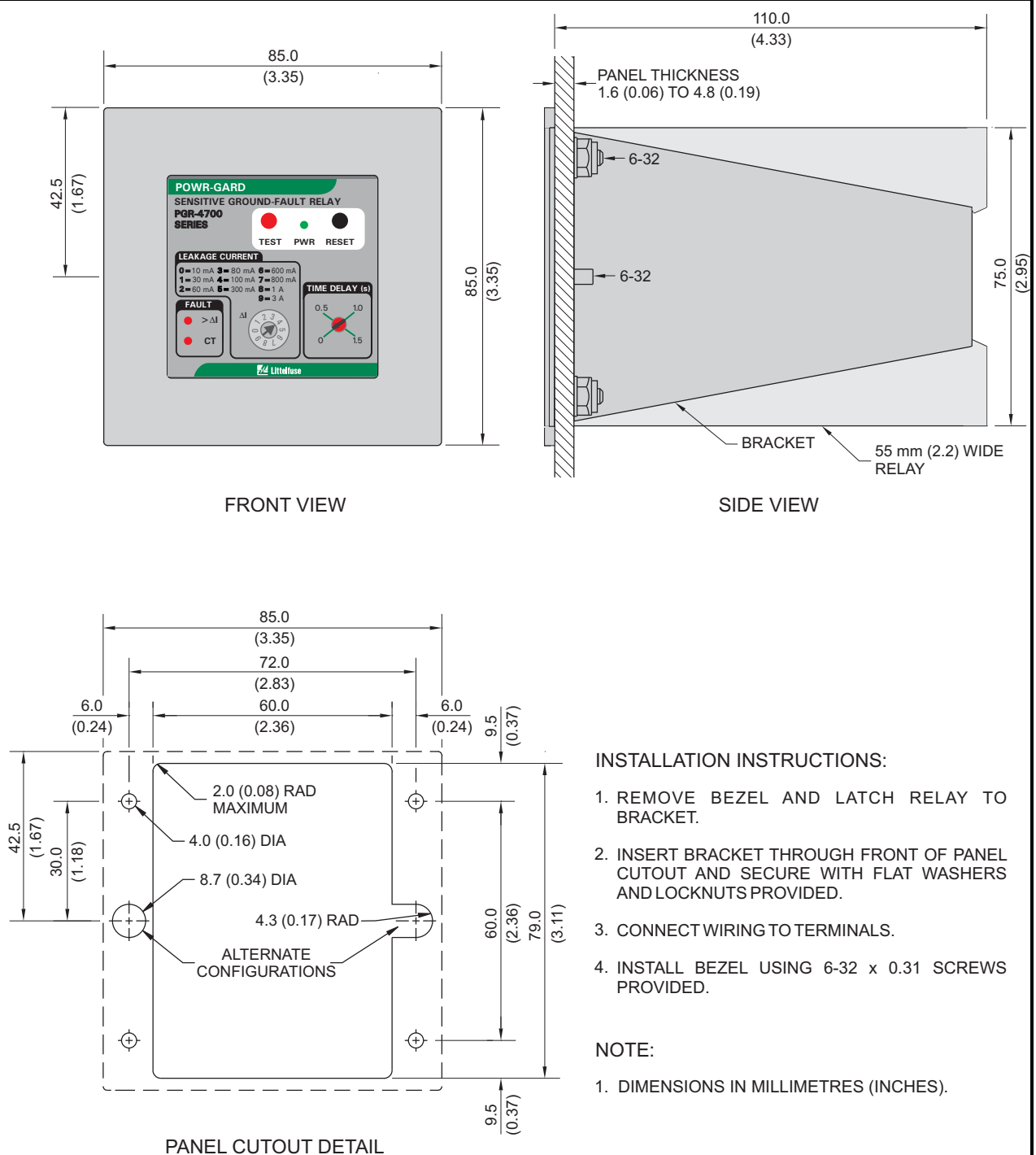
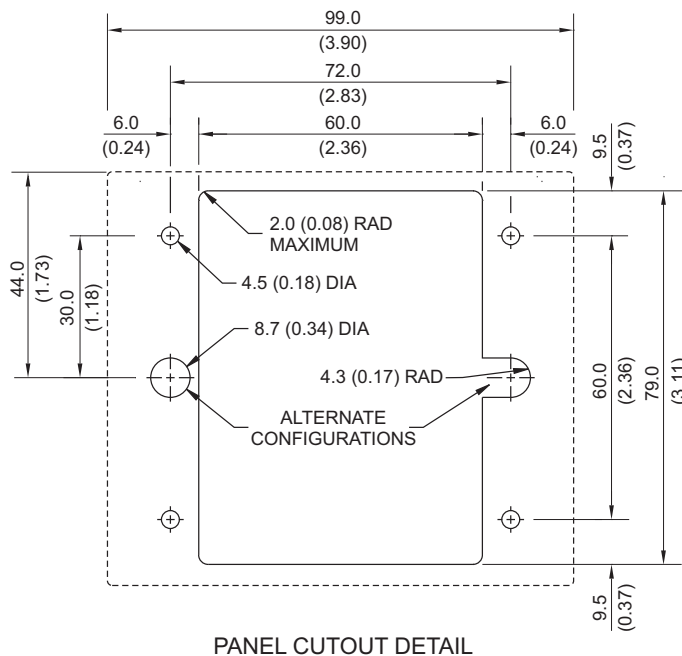
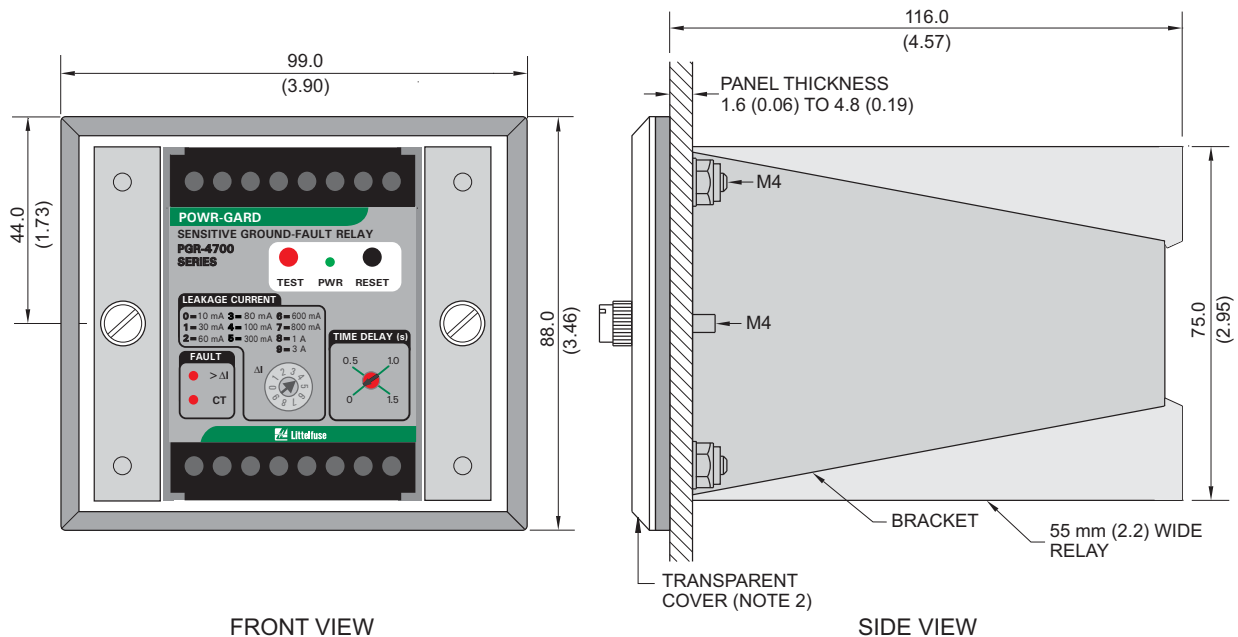


FIGURE 4. PGK-0055 Panel-Mount Adapter.



#### INSTALLATION INSTRUCTIONS:

1. WITH COVER REMOVED LATCH RELAY TO BRACKET.
2. INSERT BRACKET THROUGH FRONT OF PANEL CUTOUT AND SECURE WITH FLAT WASHERS AND LOCKNUTS PROVIDED.
3. CONNECT WIRING TO TERMINALS.
4. ATTACH COVER USING THUMB SCREWS PROVIDED.

#### NOTE:

1. DIMENSIONS IN MILLIMETRES (INCHES).
2. MEETS NEMA3, IP53.

FIGURE 5. PGK-0060 Panel-Mount Adapter.

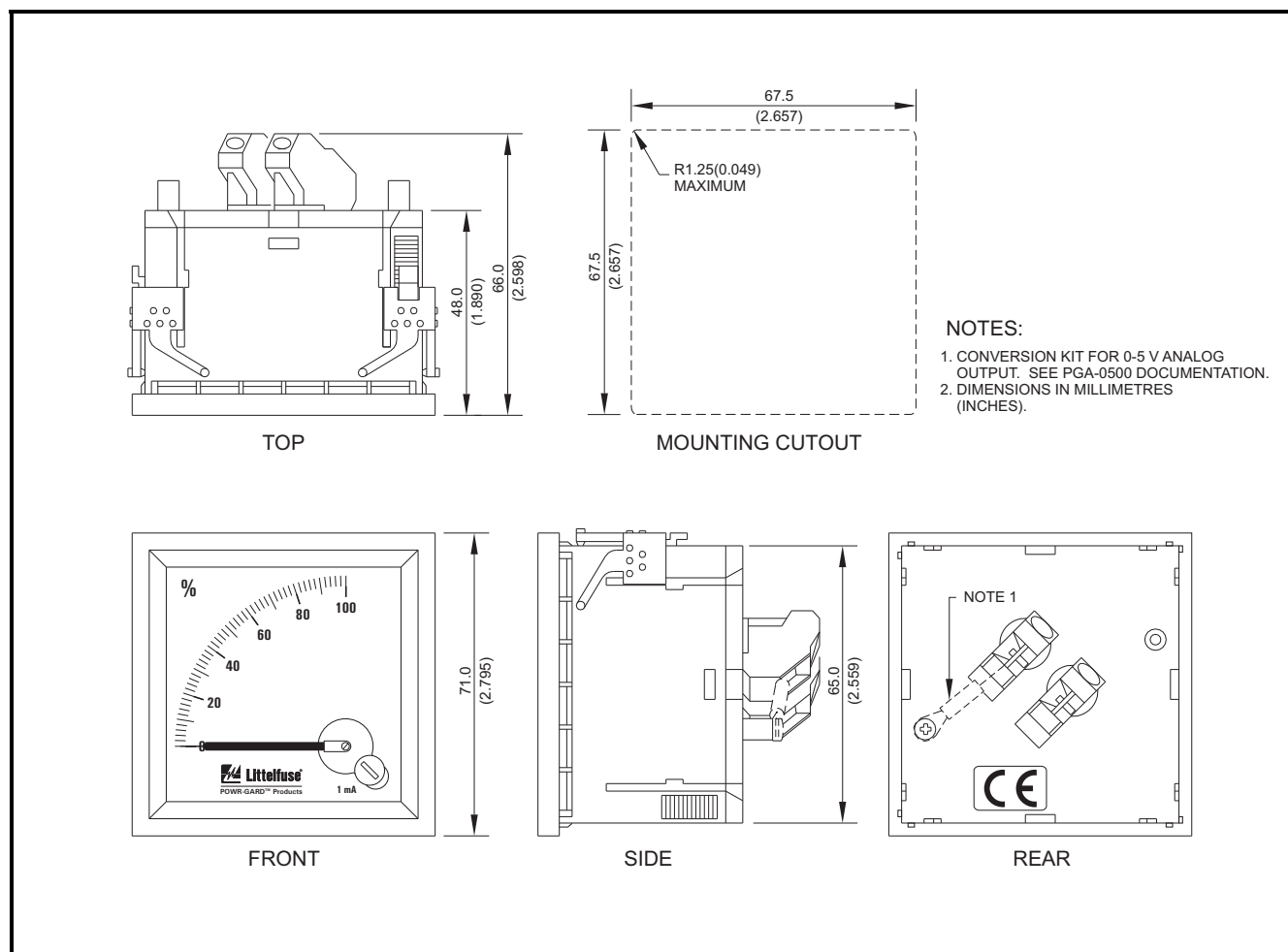


FIGURE 6. PGA-0500 Analog Percent Current Meter.

#### 4. TECHNICAL SPECIFICATIONS

##### Supply:

120 Option .....	4 VA, 120 Vac, (+10, -15%) 50/60 Hz
240 Option .....	4 VA, 240 Vac, (+10, -15%) 50/60 Hz
24 Option .....	3.0 W, 14 to 30 Vdc

Trip-Level Settings ( $\Delta I$ ) ..... 10, 30, 60, 80, 100,  
300, 600, 800, 1,000,  
and 3,000 mA

Trip-Time Settings..... 0 to 1,500 ms

Accuracies: <sup>(1, 2)</sup>

Trip Level: <sup>(3)</sup>

300 to 3,000 mA .....	+2, -8% (60 Hz) +0, -10% (50 Hz)
60 to 100 mA .....	+4, -4 mA
30 mA .....	+10, -0 mA
10 mA .....	+5, -0 mA
Trip Time <sup>(4)</sup> .....	10% of Setting, 40 ms min

##### Input:

3 dB Frequency	
Response .....	20 to 90 Hz
CT .....	PGC-5000-Series
CT Detection .....	Open-Circuit Detection
Thermal Withstand:	
Continuous .....	25-A Ground-Fault Current
1-Second .....	400-A Ground-Fault Current

**Analog Output:**

Mode.....% of Trip-Level Setting  
Range.....0 to 1 mA dc

Reset ..... Front-Panel Switch and  
Remote N.C. Contact

Test ..... Front-Panel Switch and  
Remote N.O. Contact

**Output Relay:**

Contact Configuration ..... 2 Form C  
Operating Mode ..... Fail-Safe or Non-Fail-Safe  
CSA/UL Rating ..... 8 A Resistive, 250 Vac,  
1/3 HP, 250 Vac  
1/6 HP, 120 Vac

**Supplemental Contact Ratings:**

Carry Continuous ..... 10 A  
Break:  
dc (Resistive)..... 10 A, 30 Vdc,  
0.3 A, 110 Vdc,  
0.12 A, 220 Vdc  
ac (Resistive)..... 2,500 VA

Operating Mode ..... Latching or Autoreset

Terminals..... Wire Clamping,  
22 to 12 AWG  
(0.2 to 2.5 mm<sup>2</sup>)  
Conductors

**Dimensions:**

Height .....75 mm (3.0")  
Width.....55 mm (2.2")  
Depth .....115 mm (4.5")

Shipping Weight.....0.45 kg (1 lb)

**Environment:**

Operating Temperature .. -10°C to 60°C  
Storage Temperature..... -40°C to 80°C  
Humidity..... 85% Non-Condensing

Certification..... UL 508 E183688

## 5. ORDERING INFORMATION

**PGR-4700-**

120 120-Vac Supply  
240 240-Vac Supply  
24 24-Vdc Supply

PGA-0500 ..... Analog Percent Current Meter

PGC-5025 ..... Current Transformer,  
25.0-mm (0.98") Window

PGC-5060 ..... Current Transformer,  
60.8-mm (2.39") Window

PGC-5095 ..... Current Transformer,  
95.0-mm (3.74") Window

PGC-5130 ..... Current Transformer,  
130.0-mm (5.12") Window

PGC-5200 ..... Current Transformer,  
200.0-mm (7.87") Window

PGK-0055 ..... Panel-Mount Adapter, NEMA 1

PGK-0060 ..... Panel-Mount Adapter, NEMA 3, IP53

PGK-0003 ..... Adapter Plate, GEC/MCGG

Consult factory for custom mounting adapters.

- (1) At 50 or 60 Hz unless otherwise noted.
- (2) PGC-5000-series CT included.
- (3) Maximum lead resistance of 2  $\Omega$ .
- (4) At 3 x trip-level setting.



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