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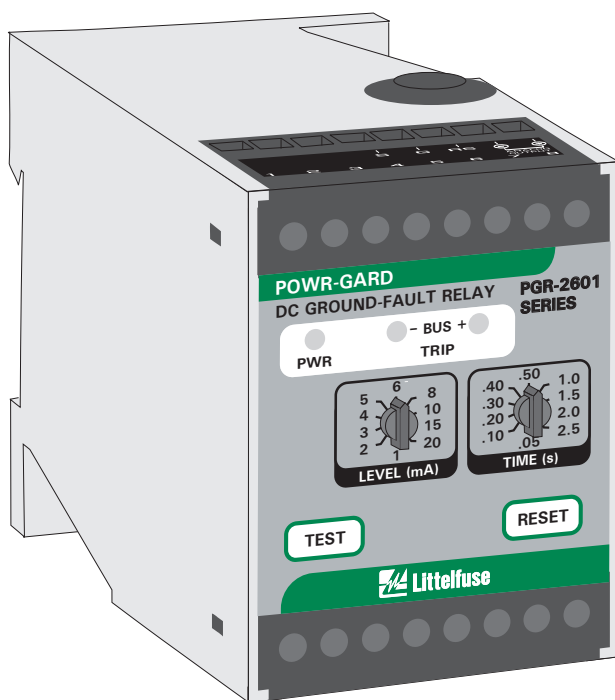
POWR-GARD®
Ungrounded DC System
PGR-2601 SERIES
DC Ground-Fault Relay

PGR-2601 MANUAL

DC GROUND-FAULT RELAY

AUGUST 31, 2009

REVISION 1



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DISCLAIMER

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1. GENERAL

The PGR-2601 is a microprocessor-based ground-fault monitor for ungrounded dc systems. Its output relay can operate in the fail-safe or non-fail-safe mode for undervoltage or shunt-trip applications. The PGR-2601 has one output relay with isolated normally open and normally closed contacts for use in independent control circuits. Additional features include LED power and faulted-bus indication, autoreset or latching trips with front panel and remote reset, trip memory, test switch, 0- to 5-V analog output, and digital selector switches. The PGR-2601 can be DIN-rail, surface, or panel mounted.

Ground-fault current is sensed using a PGG-series Ground Reference Module—a resistor network that limits ground-fault current to 25 mA. The trip level of the ground-fault circuit is selectable from 1 to 20 mA. Trip time is selectable from 0.05 to 2.5 s.

2. OPERATION

2.1 Configuration-Switch Settings (See Fig. 2)

2.1.1 Relay Operating Mode

Switch 1 is used to set the operating mode of the output relay. In the fail-safe mode, the output relay energizes when the PGR-2601 is energized and the ground-fault circuit is not tripped. If tripped, and the supply voltage is cycled, the PGR-2601 will remain tripped, with the trip relay de-energized and a TRIP LED on, until reset.

In the non-fail-safe mode, the output energizes when a ground-fault trip occurs. In the non-fail-safe mode, trip status is not retained in non-volatile memory.

2.1.2 Reset Mode

Switch 2 is used to select autoreset or latching trips. See Section 2.2.3.

2.2 Front-Panel Controls

2.2.1 Ground-Fault Trip Level

The LEVEL (mA) selector switch is used to set the ground-fault trip level.

Ground-fault current is a function of fault resistance, system voltage, and the PGG-series Ground Reference Module. Table 1 lists the PGR-2601 trip levels and fault-resistance values for 24-, 48-, 125-, 250-, 500-, and 780-Vdc systems.

2.2.2 Ground-Fault Trip Time

The PGR-2601 has a definite-time trip characteristic. The TIME (s) selector switch is used to set the ground-fault trip time.

TABLE 1. PGR-2601 Trip Levels and Fault-Resistance Values

TRIP LEVEL (mA)	FAULT RESISTANCE (k Ω)					
	24 Vdc SYSTEM PGG-0024	48 Vdc SYSTEM PGG-0048	125 Vdc SYSTEM PGG-0125	250 Vdc SYSTEM PGG-0250	500 Vdc SYSTEM PGG-0500	780 Vdc SYSTEM PGG-0780
1	11.5	22.3	60.0	120.0	240.0	374.2
2	5.5	11.0	28.7	57.5	115.0	179.2
3	3.5	7.0	18.3	36.6	73.3	114.2
4	2.5	5.0	13.1	26.2	52.5	81.7
5	1.9	3.8	10.0	20.0	40.0	62.2
6	1.5	3.0	7.9	15.8	31.7	49.2
8	1.0	2.0	5.3	10.6	21.3	32.9
10	0.7	1.4	3.7	7.5	15.0	23.2
15	0.3	0.6	1.6	3.3	6.7	10.2
20	0.1	0.2	0.6	1.2	2.5	3.7

2.2.3 Reset

If the Reset Mode switch is in the LATCHING position, a trip remains latched until the RESET switch is pressed or the remote-reset terminals are momentarily connected. In the non-fail-safe mode, cycling the supply voltage will also reset the PGR-2601.

If the Reset Mode switch is in the AUTORESET position, a trip will reset when the fault is removed.

The reset circuit responds only to a momentary closure so that a jammed or shorted switch will not prevent a trip. The front-panel RESET switch is inoperative when the remote-reset terminals (6 and 7) are connected.

2.2.4 Test

The TEST switch is used to test the ground-fault circuit, trip indication, and the output relay. When the TEST switch is pressed for one second, a test signal is applied to the ground-fault-detection circuit, the circuit will trip, both "– BUS" and "+ BUS" TRIP LED's will light, and the output relay will operate.

2.3 Front-Panel Indication

2.3.1 Power

The green LED labeled PWR indicates presence of the supply voltage.

2.3.2 Trip

The TRIP LED's indicate a ground-fault trip. The "– BUS" TRIP LED indicates a ground-fault on the negative dc bus. The "+ BUS" TRIP LED indicates a ground-fault on the positive dc bus. Two fast flashes indicate a diagnostic trip. See Section 2.5.

2.4 Analog Output

The non-isolated, 0- to 5-V analog output indicates ground-fault current. The output is 5 V when ground-fault current is 20 mA.

2.5 Self Diagnostics

A diagnostic trip is indicated by two flashes of the TRIP LED's. It can be caused by a diagnostic problem detected by the watchdog timer or from an incorrect reading from non-volatile memory. Press RESET or cycle supply voltage. If the problem persists, contact 1-800-TEC-FUSE (1-800-832-3873).

3. INSTALLATION

3.1 PGR-2601

A PGR-2601 can be surface or DIN-rail mounted. See Fig. 2. Panel mounting requires a PGK-0055 or PGK-0060 Panel-Mount Adapter. See Figs. 4 and 5.

Connect the PGR-2601 DC Ground-Fault Monitor and PGG-series Ground Reference Module as shown in Fig. 1.

Remove the connection to terminals 5 and 9 for dielectric-strength testing—all inputs and outputs have ANSI/IEEE C37.90 surge-protection circuits that conduct above 300 Vac.

3.2 Ground Reference Modules

Outline and mounting dimensions for the PGG-series Ground Reference Modules are provided in Fig. 3.

The PGG-0780 dissipates approximately 9.6 W under normal conditions and 19.2 W maximum when a ground fault is present at 780 V. If the system is to be operated for more than two minutes with a ground fault present an additional heat sink is required. This can be achieved by applying thermal compound (silicone grease) to the PGG-0780 mounting surface, then securely fastening it to an aluminum panel with minimum dimensions of 300 mm (12") x 300 mm (12") x 3 mm (0.120").

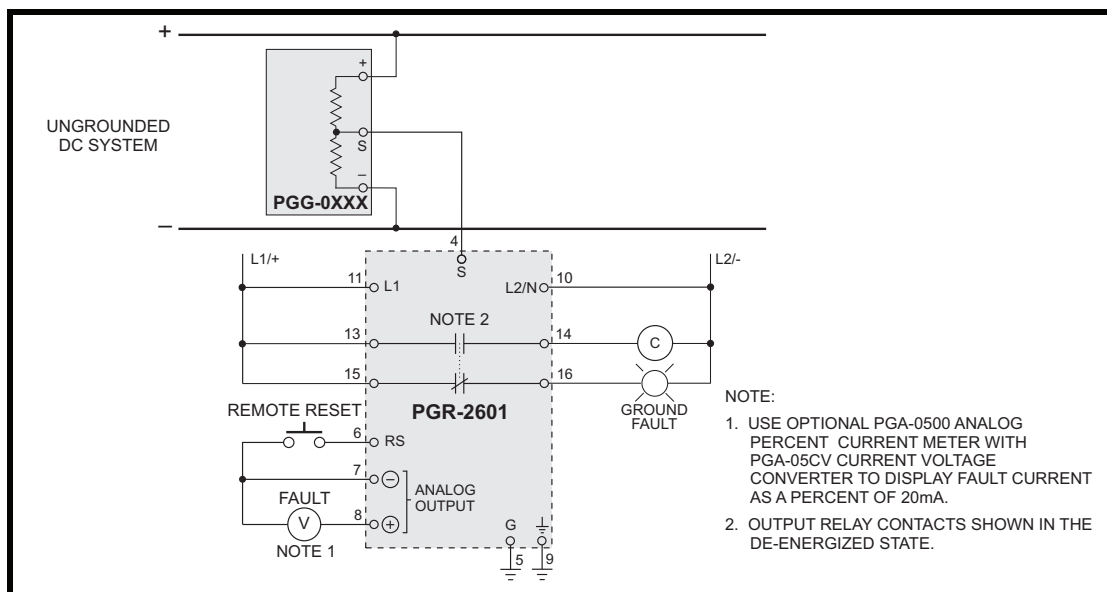


FIGURE 1. Typical Connection Diagram.

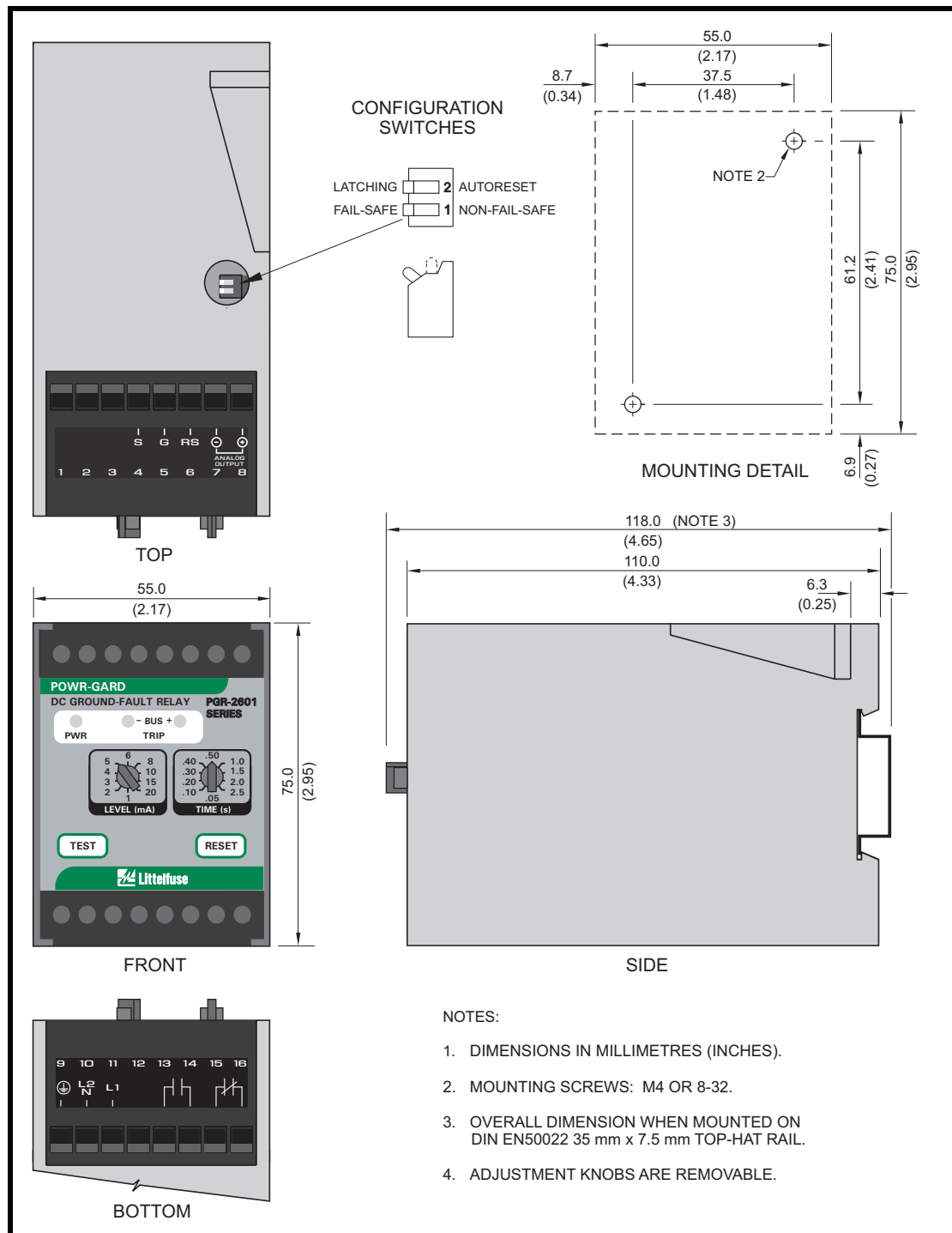


FIGURE 2. PGR-2601 Outline and Mounting Details.

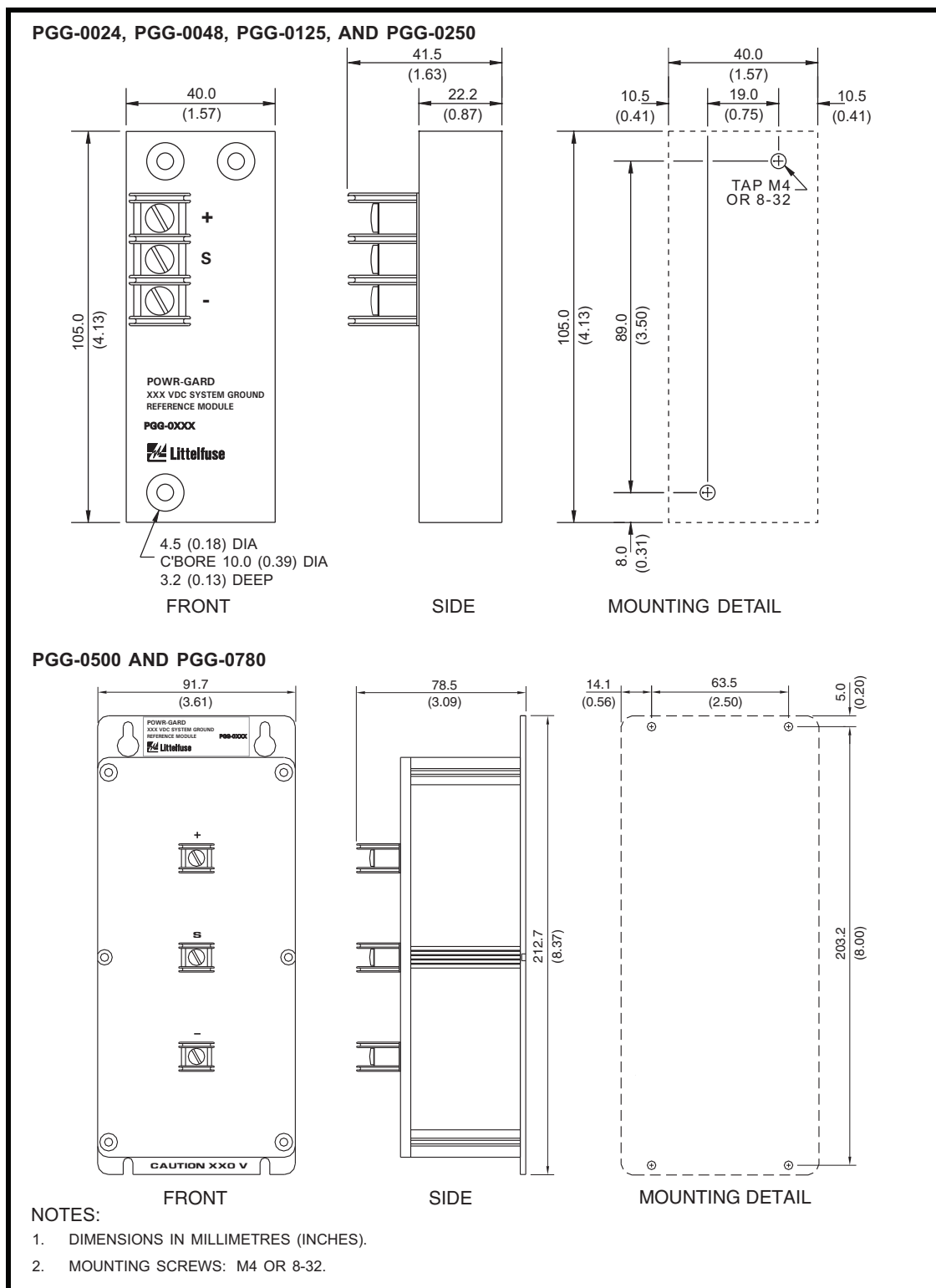


FIGURE 3. Ground Reference Modules Outline and Mounting Details.

4. TECHNICAL SPECIFICATIONS

4.1 PGR-2601

Supply:

0U Option	5 VA, 120 to 240 Vac (+20, -55%), 50/60 Hz, 2.0 W, 100 to 240 Vdc (+20, -25%)
0D Option	2.0 W, 12 to 30 Vdc (+20, -25%)
0T Option	2.0 W, 40 to 55 Vdc (+20, -25%)

Trip-Level Settings 1, 2, 3, 4, 5, 6, 8, 10, 15, and 20 mA

Trip-Time Settings 0.05, 0.10, 0.20, 0.30, 0.40, 0.50, 1.0,
1.5, 2.0, and 2.5 s

Accuracies⁽¹⁾:

Trip Level	5% of setting, 0.1 mA minimum
Trip Time ⁽²⁾	5% of setting, 15 ms minimum

Operating Mode Latching or Autoreset

Analog Output:

Range	0 to 5 V, 0.25 V per mA
Output Impedance	220 Ω

Reset Front-Panel Switch and
Remote, N.O. Momentary Contact

Functional Test Front-Panel Switch

Relay Contacts:

Configuration	Isolated N.O. and N.C.
Operating Mode	Fail-Safe or Non-Fail-Safe
CSA/UL Rating	8 A resistive, 250 Vac 8 A resistive, 30 Vdc

Supplemental Contact Ratings:

Make/Carry 0.2 s 20 A

Break:

dc	30 W resistive, 15 W inductive (L/R = 0.04)
ac	2,000 VA resistive 1,400 VA inductive (PF = 0.4)
Subject to maximums of 8 A and 250 V (ac or dc).	

Terminals..... Wire-clamping
24 to 12 AWG (0.2 to 2.5 mm²) conductors

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

Environment:

Operating Temperature -40°C to 60°C
Storage Temperature -55°C to 80°C
Humidity 85% Non-Condensing

Surge Withstand ANSI/IEEE 37.90.1-1989
(Oscillatory and Fast Transient)

Notes:

- (1) Over operating temperature range of -40 to 60°C.
(2) Trip time at 3 x trip-level setting.

4.2 Ground Reference Modules

Nominal Current..... 12.5 mA

Maximum Fault Current 25 mA

Duty Cycle..... Continuous

Environment:

Operating Temperature -40 to 60°C
Storage Temperature -55 to 80°C
Humidity 85% Non-Condensing

PGG-0024:

Power Dissipation
 @ 24 Vdc..... Unfaulted 0.3 W
 Ground Fault 0.6 W maximum
Shipping Weight..... 300 g (0.7 lb)

PGG-0048:

Power Dissipation
 @ 48 Vdc..... Unfaulted 0.6 W
 Ground Fault 1.2 W maximum
Shipping Weight..... 300 g (0.7 lb)

PGG-0125:

Power Dissipation

@ 125 Vdc..... Unfaulted 1.6 W
Ground Fault 3.2 W maximum

Shipping Weight 300 g (0.7 lb)

PGG-0250:

Power Dissipation

@ 250 Vdc..... Unfaulted 3.2 W
Ground Fault 6.3 W maximum

Shipping Weight 300 g (0.7 lb)

PGG-0500:

Power Dissipation

@ 500 Vdc..... Unfaulted 6.3 W
Ground Fault 12.5 W maximum

Shipping Weight 2.1 kg (4.5 lb)

PGG-0780:

Power Dissipation

@ 780 Vdc..... Unfaulted 9.6 W
Ground Fault 19.2 W maximum

Shipping Weight 2.1 kg (4.5 lb)

5. ORDERING INFORMATIONPGR-2601-0 ☐

└─ U Universal 120/240-Vac/Vdc Supply
D 12/24-Vdc Supply
T 48-Vdc Supply

PGG-0024Ground Reference Module for 24-Vdc system.

PGG-0048Ground Reference Module for 48-Vdc system.

PGG-0125Ground Reference Module for 125-Vdc system.

PGG-0250Ground Reference Module for 250-Vdc system.

PGG-0500Ground Reference Module for 500-Vdc system.

PGG-0780Ground Reference Module for 780-Vdc system.

Consult factory for other ground reference modules.

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

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

Consult factory for custom mounting adapters.

PGA-0500Analog Percent Current Meter, 0 to 100% range.

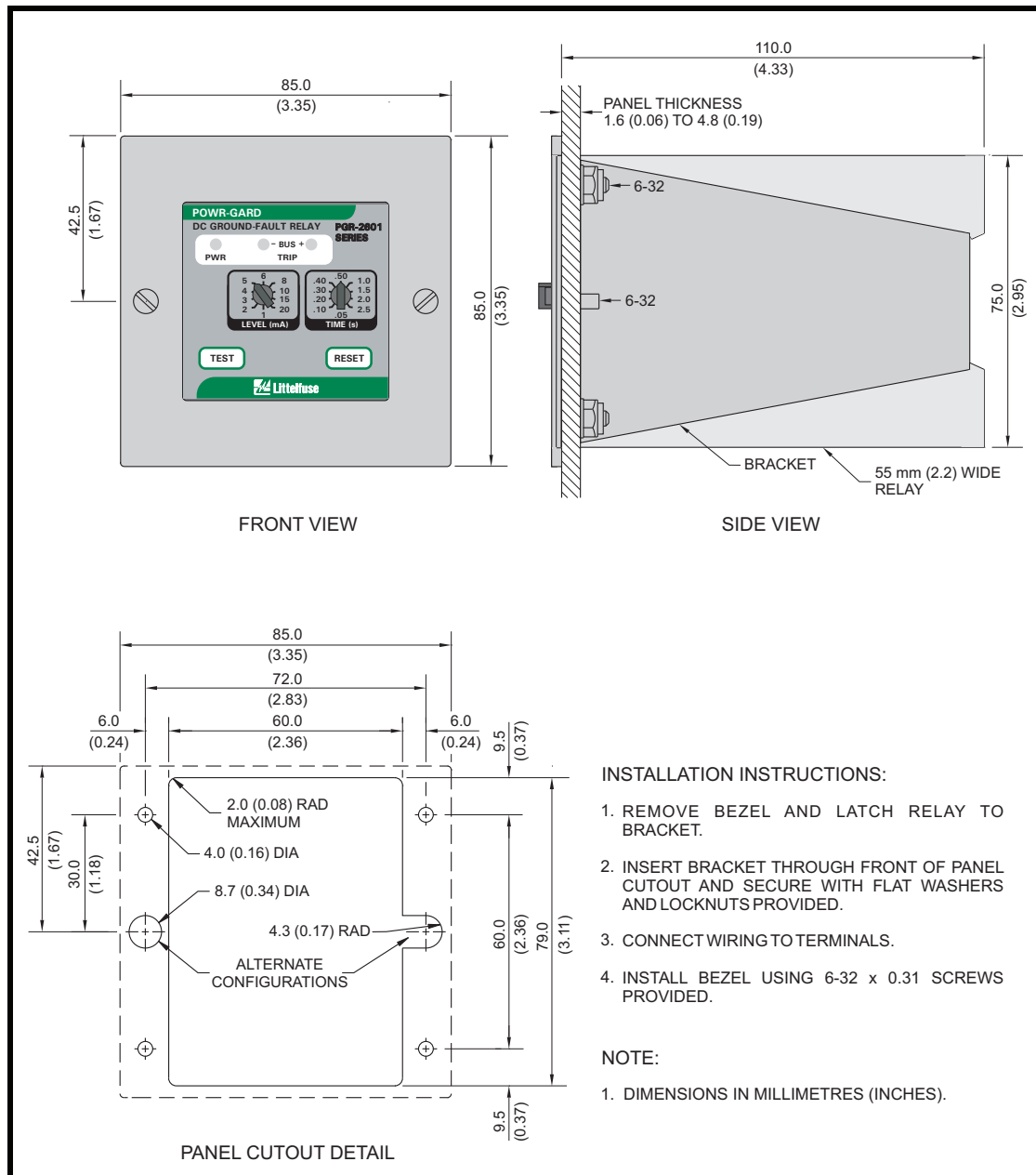


FIGURE 4. PGK-0055 Panel-Mount Adapter.

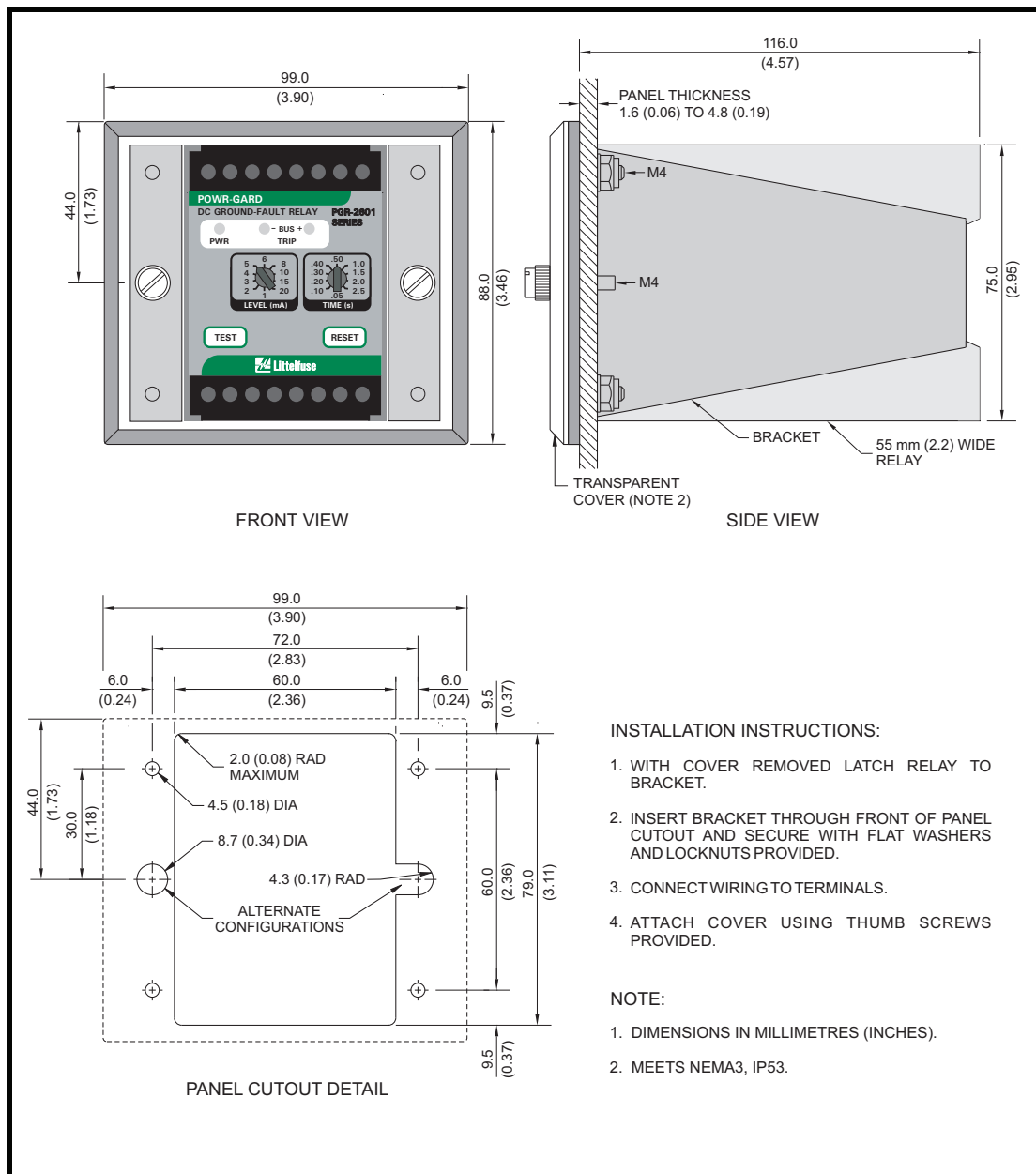


FIGURE 5. PGK-0060 Panel-Mount Adapter.