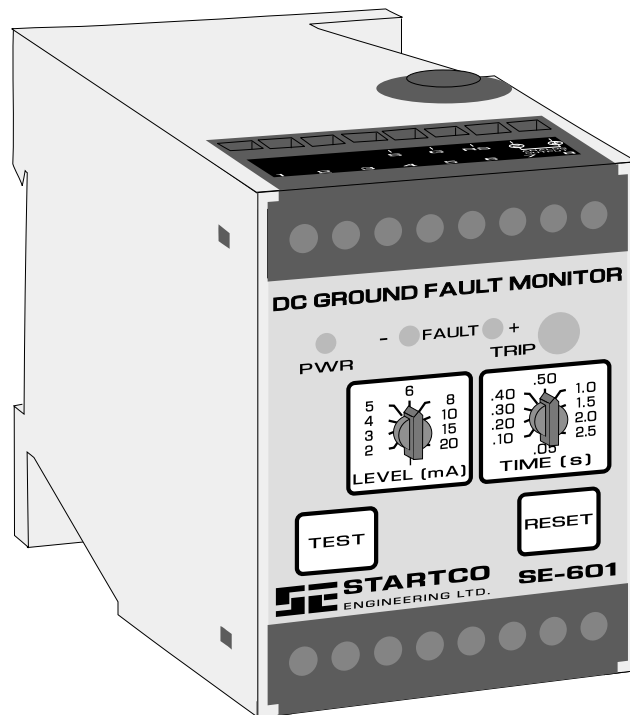


## SE-601 MANUAL DC GROUND-FAULT MONITOR

JULY 4, 2002

REVISION 0



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## TABLE OF CONTENTS

|  | PAGE     |
|--|----------|
| Table of Contents .....                  | i        |
| List of Figures .....                    | i        |
| List of Tables.....                      | i        |
| <b>1. General.....</b>                   | <b>1</b> |
| <b>2. Operation .....</b>                | <b>1</b> |
| 2.1 Configuration-Switch Settings .....  | 1        |
| 2.1.1 Relay Operating Mode .....         | 1        |
| 2.1.2 Autoreset .....                    | 1        |
| 2.2 Front-Panel Controls .....           | 1        |
| 2.2.1 Trip Level .....                   | 1        |
| 2.2.2 Trip Time .....                    | 1        |
| 2.2.3 Reset .....                        | 1        |
| 2.2.4 Test .....                         | 1        |
| 2.3 Front-Panel Indication.....          | 1        |
| 2.3.1 Power .....                        | 1        |
| 2.3.2 Trip .....                         | 1        |
| 2.4 Analog Output.....                   | 3        |
| <b>3. Installation .....</b>             | <b>3</b> |
| <b>4. Technical Specifications .....</b> | <b>3</b> |
| 4.1 SE-601.....                          | 3        |
| 4.2 SE-GRM.....                          | 4        |
| <b>5. Ordering Information.....</b>      | <b>4</b> |

## LIST OF FIGURES

| FIGURE |   | PAGE |
|--------|---|------|
| 1      | SE-601 Outline and Mounting Details ..... | 2    |
| 2      | Typical Connection Diagram .....          | 3    |
| 3      | SE-GRM Ground-Reference Module .....      | 5    |
| 4      | PMA-55 Panel-Mount Adapter .....          | 6    |

## LIST OF TABLES

| TABLE |   | PAGE |
|-------|---|------|
| 1     | SE-601 Trip Levels and Fault Values ..... | 1    |

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## 1. GENERAL

The SE-601 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, and the output contacts are isolated for use in independent control circuits. Additional features include LED and fluorescent-flag indication, front-panel and remote reset, self test, 0 to 5-V analog output, digital selector switches, and autoreset or latching trips. The SE-601 can be DIN-rail, surface, or panel mounted.

Ground-fault current is sensed using an SE-GRM 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. 1)

#### 2.1.1 RELAY OPERATING MODE

The SE-601 has one output relay with isolated normally open and normally closed contacts. The relay contacts (terminals 13, 14, 15, and 16) are shown with the SE-601 de-energized. Switch 1 is used to set the operating mode of the output relay. In the fail-safe mode, the output relay energizes and the contacts change state when the SE-601 is energized and remain in that state unless the ground-fault circuit trips or the SE-601 is de-energized. In the non-fail-safe mode, the output contacts do not change state when the SE-601 is energized or de-energized—the output relay only energizes when a trip occurs.

#### 2.1.2 AUTORESET

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

### 2.2 FRONT-PANEL CONTROLS

#### 2.2.1 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 SE-GRM Ground-Reference Module. Table 1 lists the SE-601 trip levels and fault-resistance values for 24-, 48-, 125-, and 250-Vdc systems.

TABLE 1. SE-601 TRIP LEVELS AND FAULT-RESISTANCE VALUES

| TRIP LEVEL (mA) | FAULT RESISTANCE (kΩ)   |                         |                          |                          |
|-----------------|-------------------------|-------------------------|--------------------------|--------------------------|
|                 | 24 Vdc SYSTEM SE-GRM024 | 48 Vdc SYSTEM SE-GRM048 | 125 Vdc SYSTEM SE-GRM125 | 250 Vdc SYSTEM SE-GRM250 |
| 1               | 11.5                    | 22.3                    | 60.0                     | 120.0                    |
| 2               | 5.5                     | 11.0                    | 28.7                     | 57.5                     |
| 3               | 3.5                     | 7.0                     | 18.3                     | 36.6                     |
| 4               | 2.5                     | 5.0                     | 13.1                     | 26.2                     |
| 5               | 1.9                     | 3.8                     | 10.0                     | 20.0                     |
| 6               | 1.5                     | 3.0                     | 7.9                      | 15.8                     |
| 8               | 1.0                     | 2.0                     | 5.3                      | 10.6                     |
| 10              | 0.7                     | 1.4                     | 3.7                      | 7.5                      |
| 15              | 0.3                     | 0.6                     | 1.6                      | 3.3                      |
| 20              | 0.1                     | 0.2                     | 0.6                      | 1.2                      |

#### 2.2.2 TRIP TIME

The TIME (s) selector switch is used to set the ground-fault trip time.

#### 2.2.3 RESET

The reset circuit responds only to a momentary closure so that a jammed or shorted switch will not maintain a reset signal. The front-panel RESET switch is disabled when remote-reset terminals 6 and 7 are shorted.

If Switch 2 is in the LATCHING position, a trip remains latched until the RESET switch is pressed, the remote-reset terminals are momentarily shorted, or the supply voltage is cycled. Cycling the supply voltage will not reset (black) the fluorescent flag.

If Switch 2 is in the AUTORESET position, a trip will reset when the fault is removed. The fluorescent flag will not reset until the RESET switch is pressed or the remote-reset terminals are momentarily shorted. Cycling the supply voltage will not reset the fluorescent flag unless the remote-reset terminals are shorted.

#### 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 the circuit will trip, both "-" and "+" FAULT LED's will illuminate, the fluorescent flag will be set (red), 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 FAULT LED's and the fluorescent flag labeled TRIP indicate a ground-fault trip. The "-" FAULT LED indicates a ground-fault on the negative dc bus. The "+" FAULT LED indicates a ground-fault on the positive dc bus.

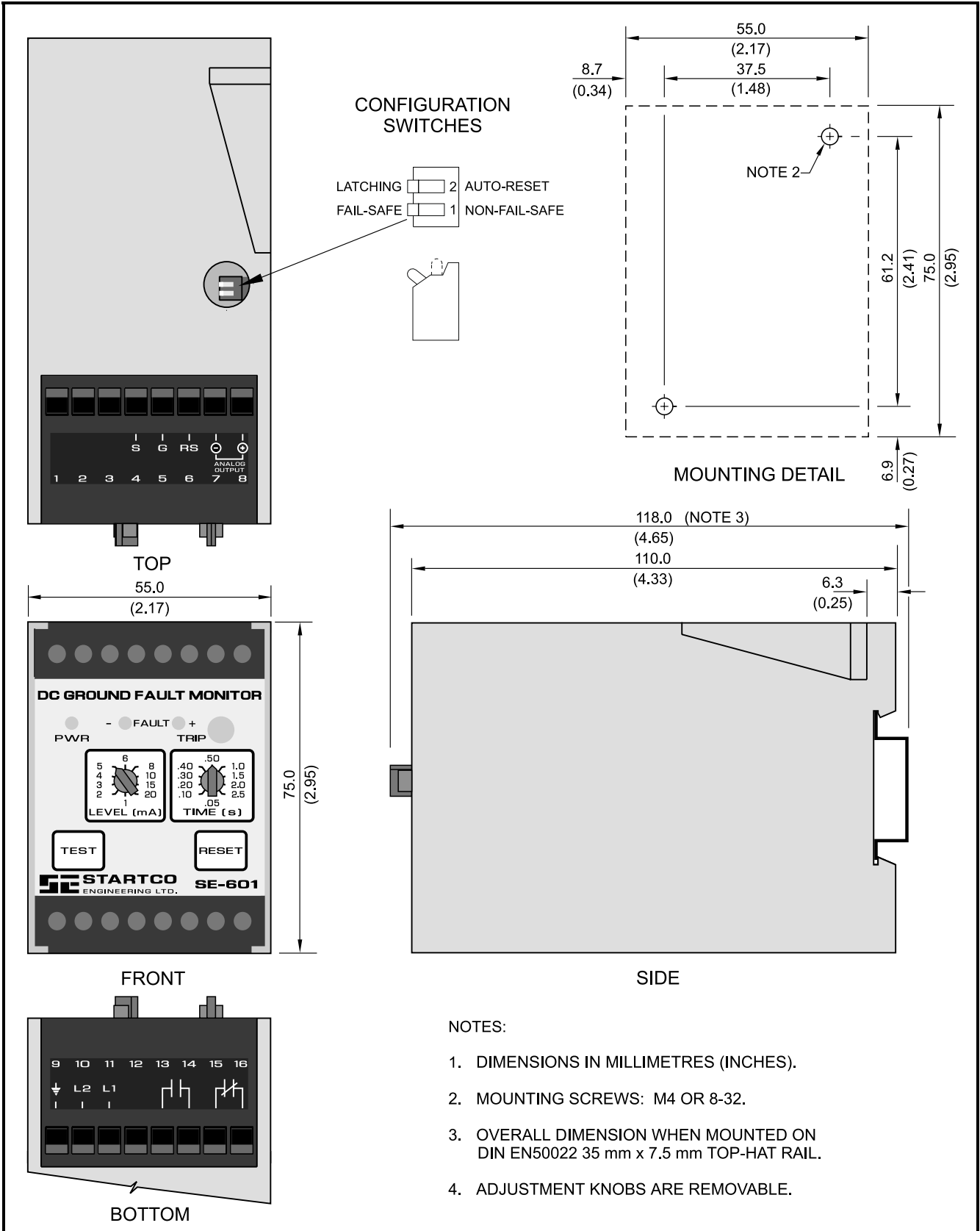


FIGURE 1. SE-601 Outline and Mounting Details.



### 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 22 mA.

### 3. INSTALLATION

Connect the SE-601 DC Ground-Fault Monitor and SE-GRM Ground-Reference Module as shown in Fig. 2.

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.

### 4. TECHNICAL SPECIFICATIONS

#### 4.1 SE-601

Supply:

- 0U Option .....55 to 275 Vac, 50/60 Hz, 3.5 VA  
75 to 275 Vdc, 2.0 W
- 0D Option .....9 to 36 Vdc, 3.0 W
- 0T Option .....30 to 70 Vdc, 3.0 W

Dimensions:

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

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

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:

- Trip Level..... 10% of setting or  
0.5 mA, whichever is less
- Trip Time ..... 10% of setting or  
20 ms, whichever is less

Operating Mode..... Latching or Autoreset

Analog Output:

- Range..... 0 to 5 V, 0.23 V per mA
- Output Impedance..... 220 Ω

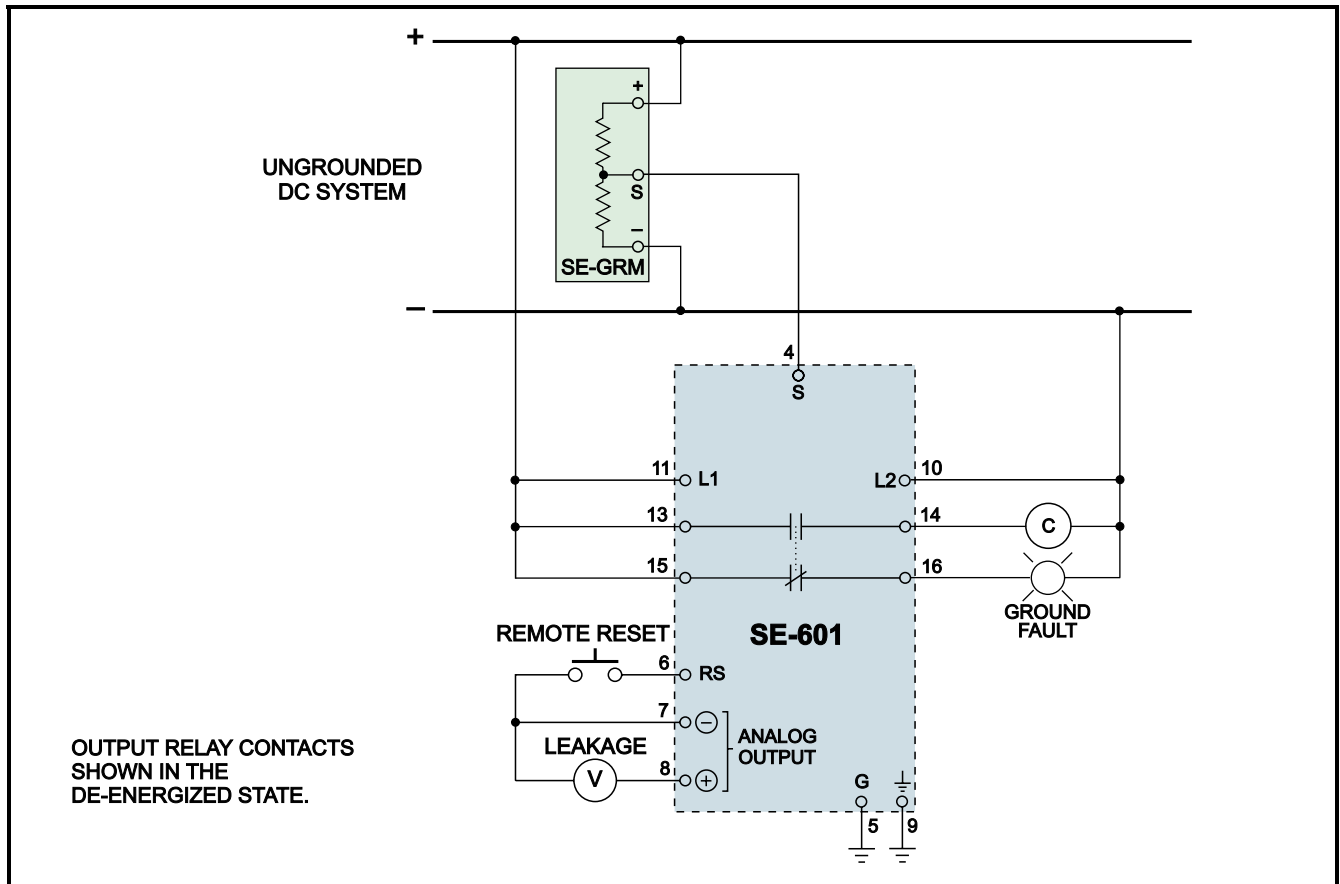


FIGURE 2. Typical Connection Diagram.



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

Functional Test.....Front-Panel Switch

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

Supplemental Contact Ratings:  
 Make/Carry 0.2 s .....20 A  
 Break:  
 dc .....30 W resistive,  
 15 W inductive  
 (L/R = 0.4 s)  
 ac .....2000 VA resistive  
 1400 VA inductive  
 (PF = 0.4)  
 Subject to maximums of 8 A and 250 V (ac or dc).

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

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

## 4.2 SE-GRM

Nominal Current ..... 12.5 mA

Maximum Fault Current ..... 25 mA

Duty Cycle ..... Continuous

Dimensions: (for units listed below)  
 Height ..... 105.0 mm (4.13")  
 Width..... 40.0 mm (1.57")  
 Depth ..... 41.5 mm (1.63")

Shipping Weight ..... 300 g (0.7 lb)

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

## 5. ORDERING INFORMATION

SE-601-0  — U Universal ac/dc Supply  
 D 9- to 36-Vdc Supply  
 T 30- to 70-Vdc Supply

SE-GRM024....Ground-Reference Module for 24-Vdc system.

SE-GRM048....Ground-Reference Module for 48-Vdc system.

SE-GRM125....Ground-Reference Module for 125-Vdc system.

SE-GRM250....Ground-Reference Module for 250-Vdc system.

Consult factory for other ground-reference modules.

PMA-55 ..... Panel-Mount Adapter (See Fig. 4)  
 Consult factory for custom mounting adapters.

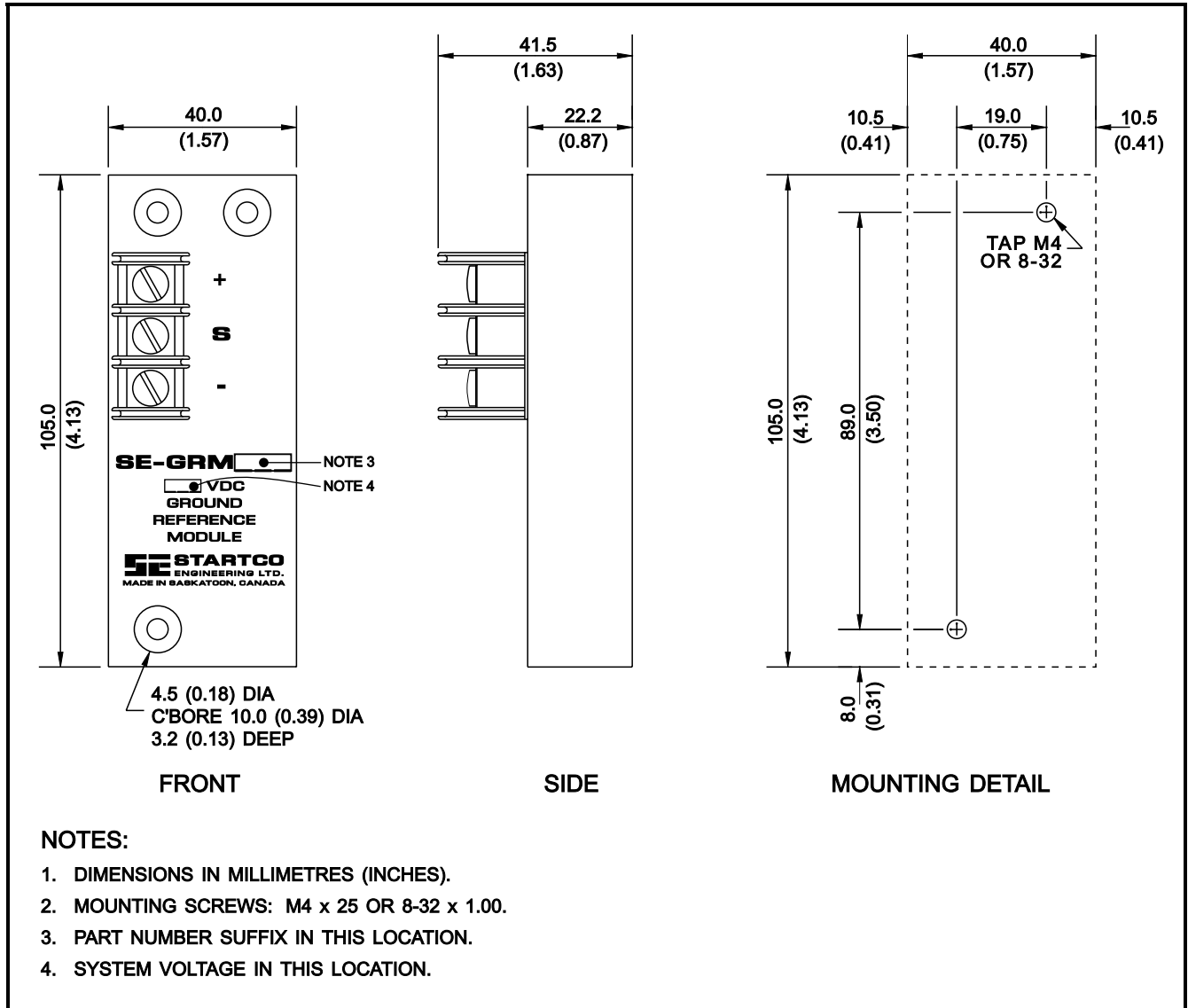


FIGURE 3. SE-GRM Ground-Reference Module.

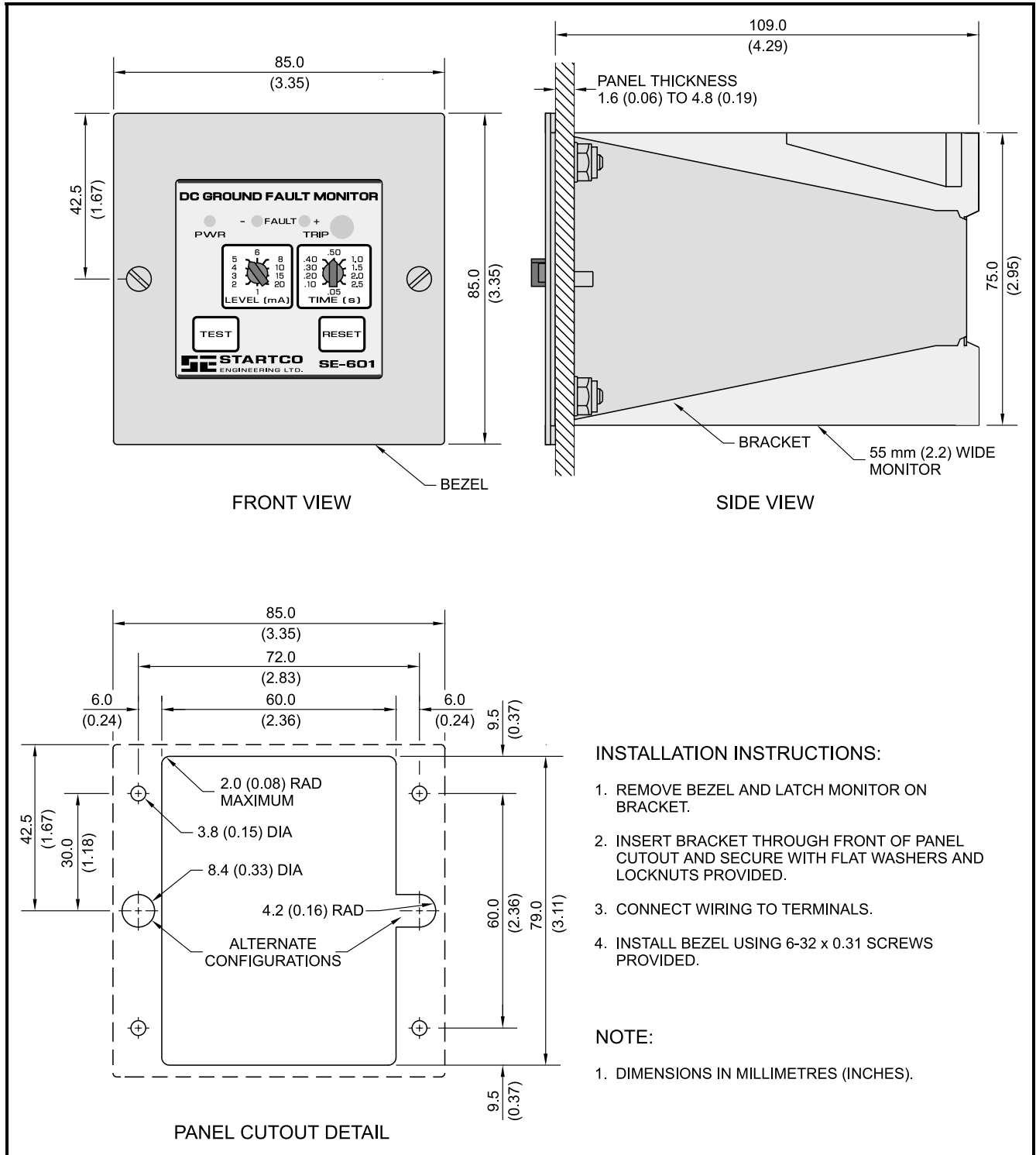


FIGURE 4. PMA-55 Panel-Mount Adapter.