

SE-525 MANUAL

EARTH-LEAKAGE AND

GROUND-INTEGRITY MONITOR

SEPTEMBER 11, 2001

PRELIMINARY

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1. GENERAL

The SE-525 is a microprocessor-based earth-leakage and ground-integrity monitor for welding applications. Earth leakage detection can be set as low as 10 mA, and the ground-resistance trip level is fixed at one ohm. 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 trip indication for both earth-fault and grounding integrity fault.
- Autoreset or latching trips.
- Board-level and remote reset.
- 4–20 mA analog output.
- Trip indication relays for earth-fault and continuity fault.
- CT verification.
- Earth-fault test using primary CT injection.
- One ohm grounding integrity test.

Earth-leakage current is sensed by an SE-CS30 series core-balance, earth-fault current transformer. The trip level of the earth-leakage circuit is digital-switch selectable from 10 to 500 mA. Trip time is digital-switch selectable from 30 to 1000 ms.

2. OPERATION

2.1 SETTINGS (See Fig. 1)

2.1.1 TRIP RELAY OPERATING MODE

The SE-525 has one trip output relay with Form C normally open and normally closed contacts. Switch 1 is used to set the operating mode of the output relay. In the fail-safe mode, the output relay energizes when the earth-leakage and ground-integrity circuit is not tripped. In the non-fail-safe mode, the output relay energizes when a trip occurs.

2.1.2 FILTER SELECTION

Switch 2 is used to select the filtering algorithm for a fixed-frequency (50/60 Hz) or variable-frequency application. The fixed-frequency algorithm allows lower trip levels to be used by rejecting harmonics that can cause nuisance tripping. The variable-frequency setting should be used if the line frequency is not 50 or 60 Hz.

2.1.3 CT VERIFICATION

Switch 3 is used to enable CT verification. In the CT VERIFY ON position, a trip will occur if the CT is disconnected.

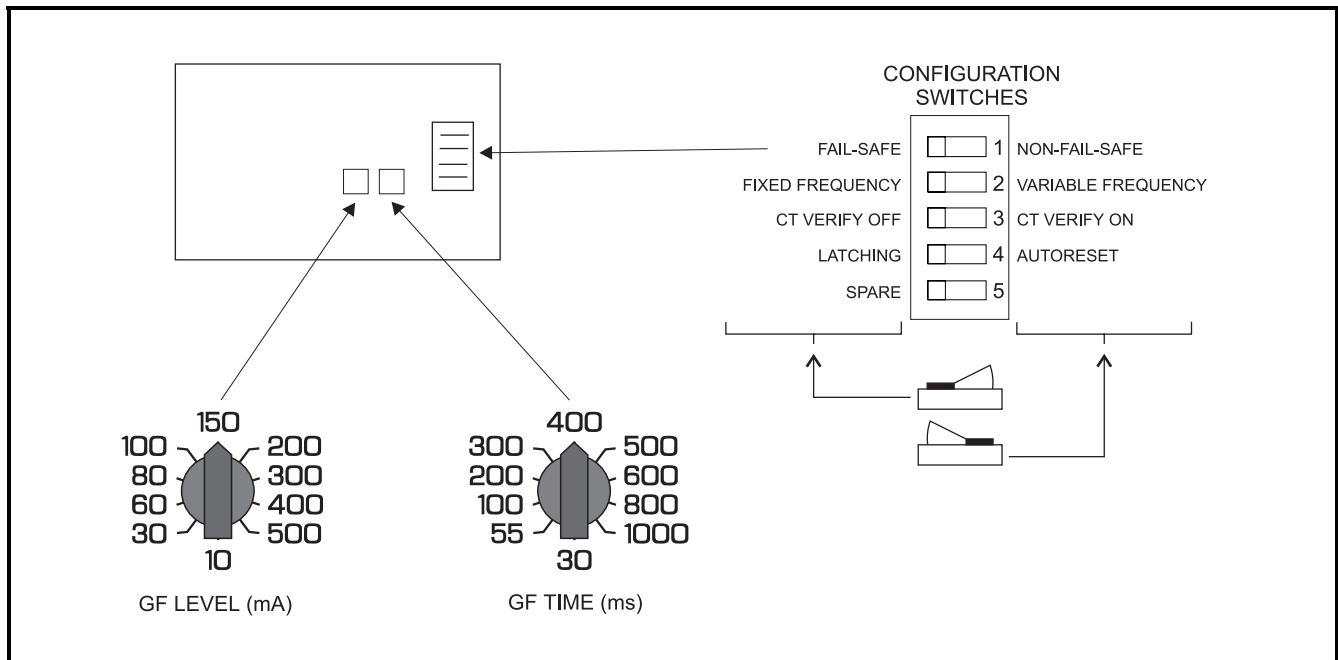


FIGURE 1. SE-525 Switch Configurations.



2.1.4 AUTORESET

Switch 4 is used to select autoreset or latching trips. See 2.1.7.

2.1.5 EARTH-LEAKAGE TRIP LEVEL

The LEVEL (mA) selection switch is used to set the earth-leakage trip level.

2.1.6 EARTH-LEAKAGE TRIP TIME

The TIME (ms) selector switch is used to set the earth-leakage trip time.

2.1.7 RESET

The reset circuit responds only to a momentary closure so that a jammed or shorted switch will not prevent a trip. The board-level RESET switch is inoperative when the remote-reset terminals (RS1, RS2) are shorted.

If Switch 4 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 flags.

If Switch 4 is in the AUTORESET position, a trip will reset when the fault is removed. The fluorescent flags 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 flags unless the remote-reset terminals are shorted.

2.1.8 TEST

Terminals are provided to test the earth-fault trip and grounding-integrity circuits. A line-frequency current output signal is provided at terminals GT1 and GT2. This signal is used to test the earth-fault circuit and is connected as shown in Fig. 2.

A one-ohm test resistor is internally connected across terminals SO and ST. For a typical application, a normally closed push button switch connected as shown in Fig. 2 is used for the ground-integrity test.

2.2 INDICATION

2.2.1 POWER

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

2.2.2 EARTH-LEAKAGE TRIP

The red LED and the fluorescent flag, labeled GF, indicate an earth-leakage trip. The earth-leakage indication relay is energized when the earth-leakage LED is on.

2.2.3 GROUND-INTEGRITY TRIP

The red LED and the fluorescent flag labeled CF, indicate a ground-integrity trip. The ground-integrity indication relay is energized when the ground-integrity trip LED is on.

2.2.4 TRIP RELAY ENERGIZATION

The yellow LED labeled TRIP is on when the trip relay is energized.

2.3 ANALOG OUTPUT

A 4–20 mA analog output indicates earth-leakage current sensed by the earth-leakage CT. The output is 20 mA when CT-primary current is 500 mA.

3. INSTALLATION

This monitoring system consists of an SE-525 monitor and an SE-CS30 current sensor CT, connected as shown in Fig. 2.

Connect an SE-CS30 current sensor to terminals CT1 and CT2, connect the shield to terminal CT2, and earth terminal CT2. Both a single- and 2-wire ground-integrity connection is possible. Remove the connection to the SPG terminal for dielectric-strength testing.

3.1 SINGLE-WIRE GROUND INTEGRITY

In this connection, the resistance of the sense wire is included in the monitored loop. See Fig. 3. The advantage of this connection is that only a single sense wire is required, and the ground-integrity test is provided locally at the source.

3.2 TWO-WIRE GROUND INTEGRITY

If the resistance of the sense lead is in the one-ohm range, the two-wire connection is required. For this connection, the ground-integrity test button must be located at the welder as shown in Fig. 4. For this connection, the sense-line resistance is not included in the monitored loop, and long cable lengths are possible.

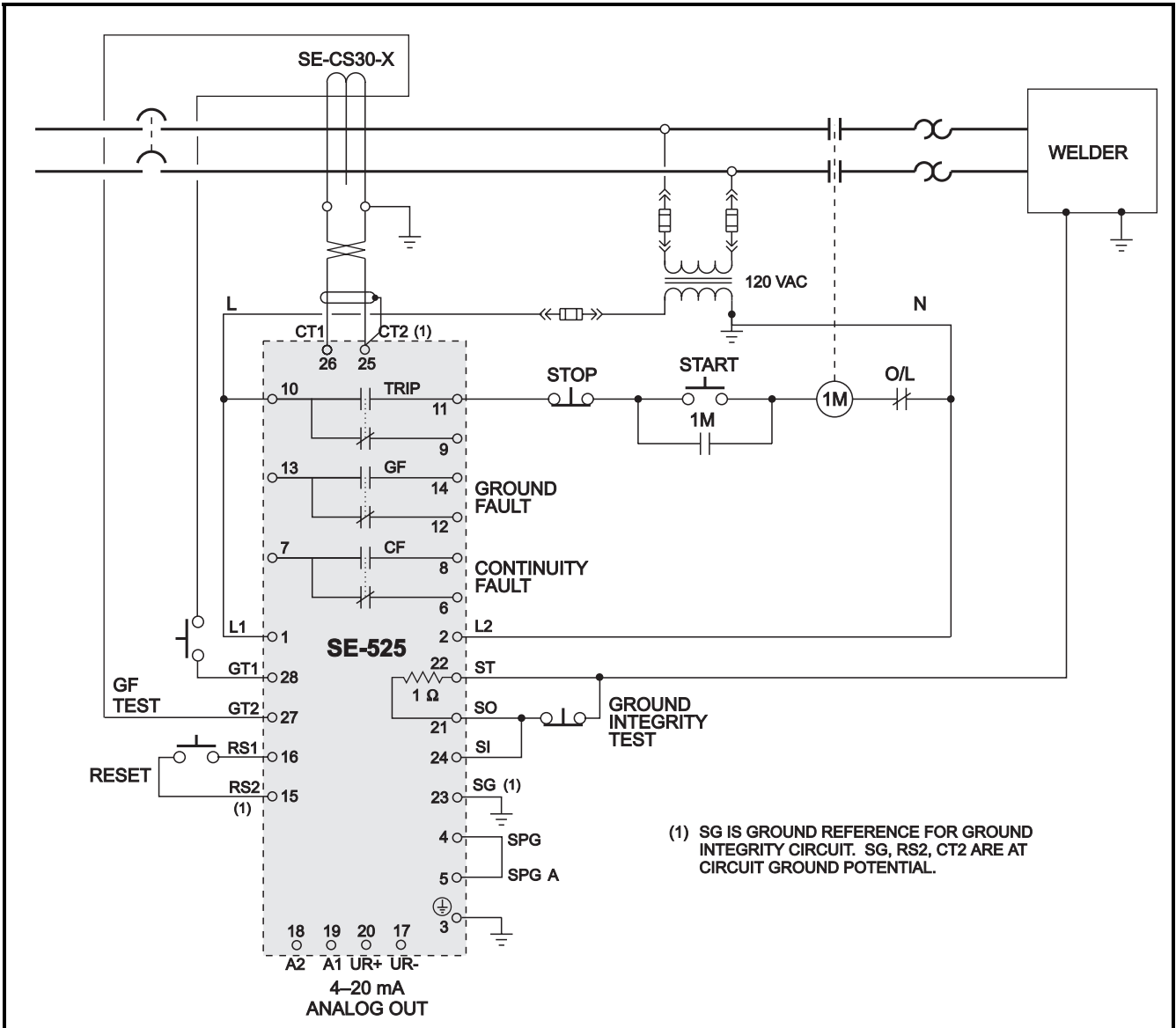


FIGURE 2. Typical Connection Diagram.

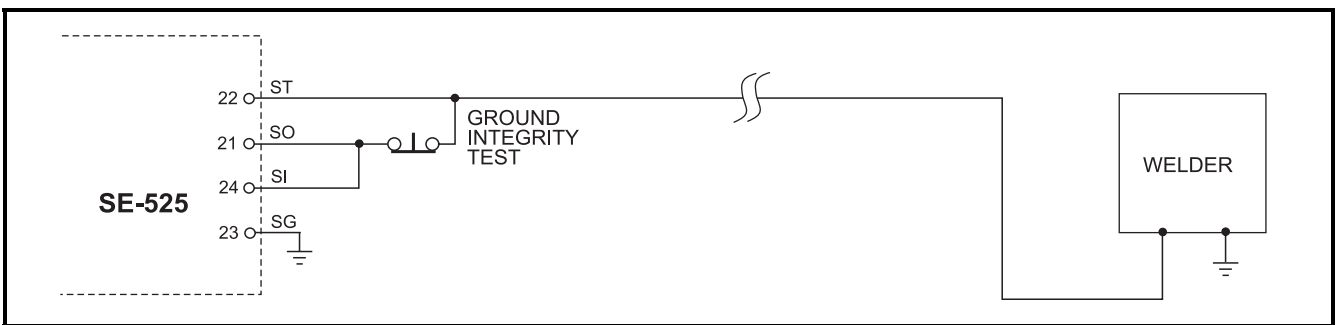


FIGURE 3. Single-Wire Connection Diagram.

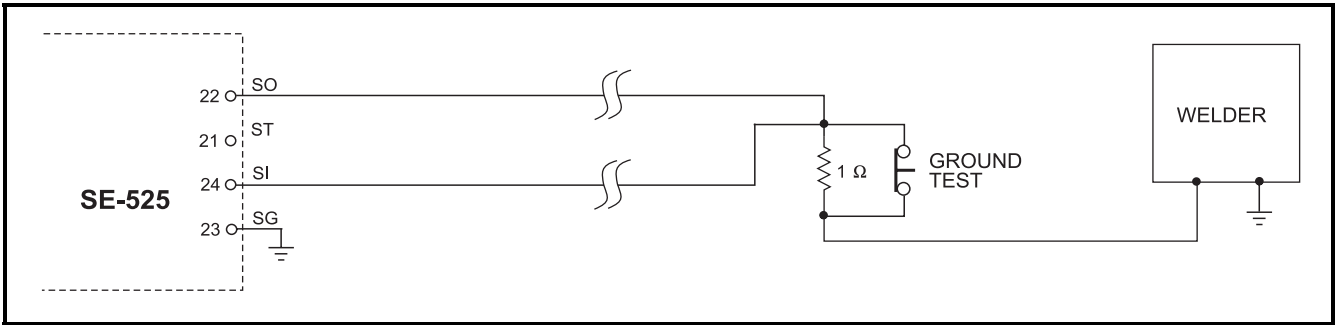


FIGURE 4. Two-Wire Connection Diagram.

3.3 ANALOG OUTPUT CONNECTIONS

The current output can be connected as a self-powered or loop powered output as shown in Fig. 5. The self-powered connection uses the unregulated output (UR) to power the 4–20 mA output with the common being circuit ground. This is a non-isolated connection.

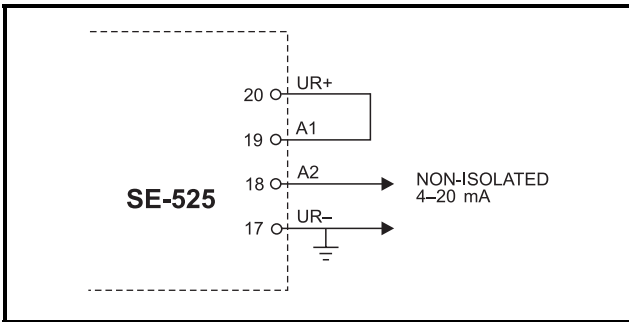


FIGURE 5. Self-Powered Connection.

The loop-powered connection uses an external, 24-Vdc supply as shown in Fig. 6. The 4–20 mA output is isolated from ground.

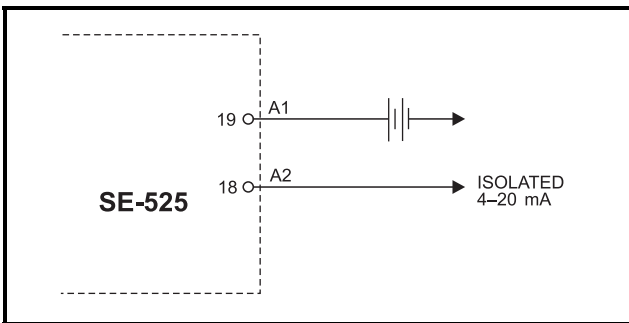


FIGURE 6. Loop-Powered Connection.

4. TECHNICAL SPECIFICATIONS

Supply: 120 or 240 Vac (+15%, -30%), 50/60 Hz, 10 VA

Dimensions:

Height 150 mm (5.91")
Width 200 mm (7.87")
Depth 33 mm (1.375")

Shipping Weight 0.45 kg (1 lb.)

Trip-Level Settings 10, 30, 60, 80, 100, 150,
200, 300, 400, and 500 mA

Trip-Time Settings 30, 55, 100, 200, 300, 400,
500, 600, 800, and
1000 ms

Accuracies: (SE-CS30 series CT included)*

Trip Level:

> 60 mA + 5, -10%
= 60 mA + 0, -10 mA
= 30 mA + 0, -6 mA
= 10 mA ± 2 mA

Trip Time ± 12 ms

* For earth-fault current in kA < 150 divided by the trip setting in mA.

Earth-Leakage Input:

Algorithms DFT Digital or Peak
DFT Filter 50 to 60 Hz, Bandpass
CT SE-CS30 Current Sensor

Thermal Withstand:

Continuous < 25 A Earth-Fault Current
1-Second > 400 A Earth-Fault
Current

CT Trip Time 2.5 s

Operating Mode Latching or Autoreset



Ground Integrity:

Trip Level 1 Ω, +0, -10%
 Trip Time (open) < 60 ms
 Sense Current 100 mA dc
 Open-Circuit Voltage 9 Vdc maximum,
 SO or ST to ground.
 AC Withstand 1.5 Vac

Analog Output:

Type 4-20 mA Loop Powered,
 20 mA = 500 mA
 fault current
 Isolation 240 Vac

Reset Board-Mount Switch and
 Remote, N.O. Contact

Trip Relay:

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

Supplemental Contact Ratings:

Make/Carry 0.2 s 20 A
 Carry Continuous 8 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).

Remote Indication Relays:

CSA/UL Rating 8 A Resistive,
 250 Vac/30 Vdc
 Contact Configuration Form C N.O. and N.C.

Environment:

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

5. ORDERING INFORMATION

SE-525-□ — 01 120-Vac Supply
 02 240-Vac Supply

SE-CS30-2 Current Sensor c/w Flux Conditioner,
 60 mm (2.36 in.) Window
 SE-CS30-4 Current Sensor c/w Flux Conditioner,
 95 mm (3.75 in.) Window
 SE-CS30-5 Current Sensor c/w Flux Conditioner,
 130 mm (5.10 in.) Window

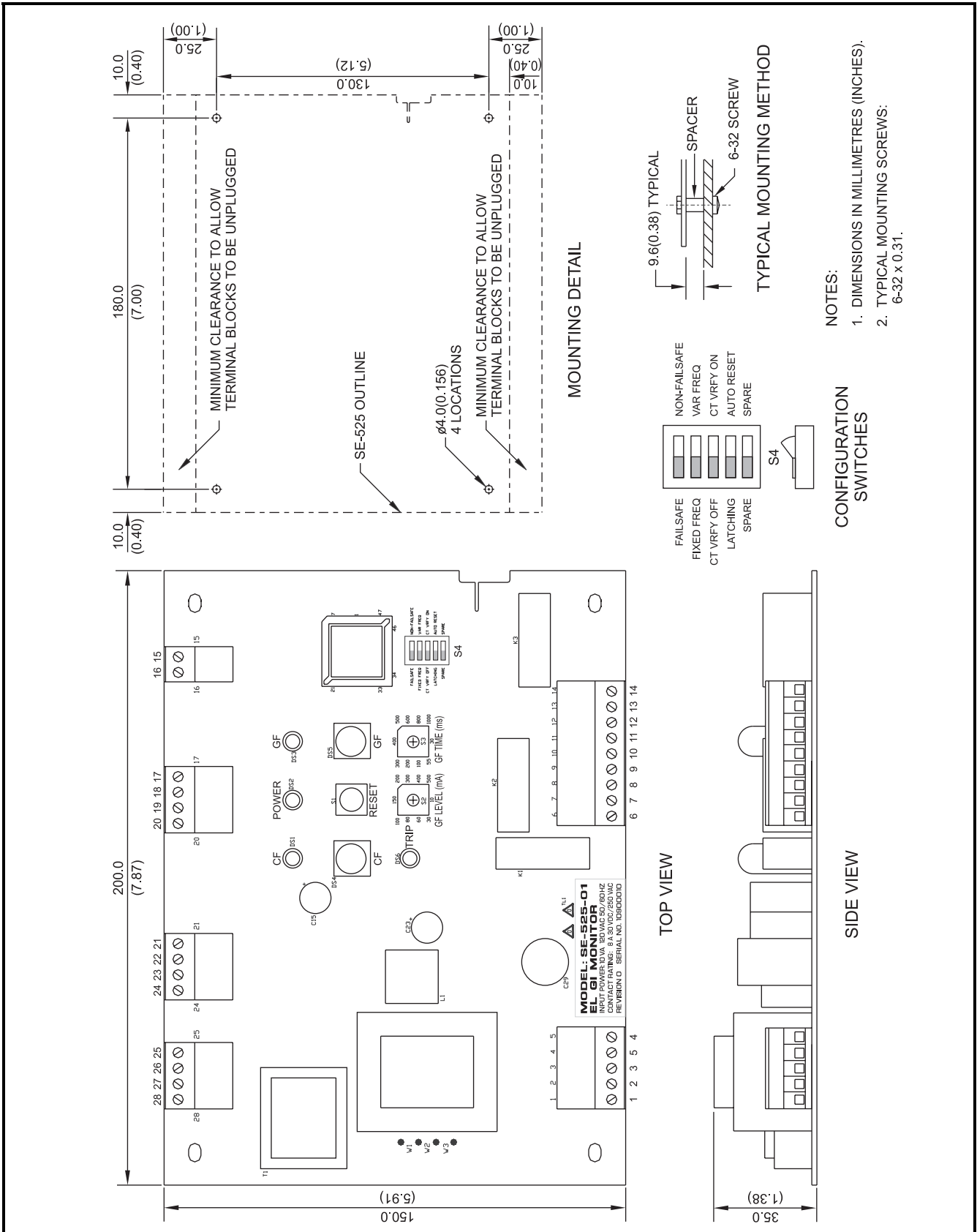


FIGURE 7. SE-525 Outline and Mounting Details.

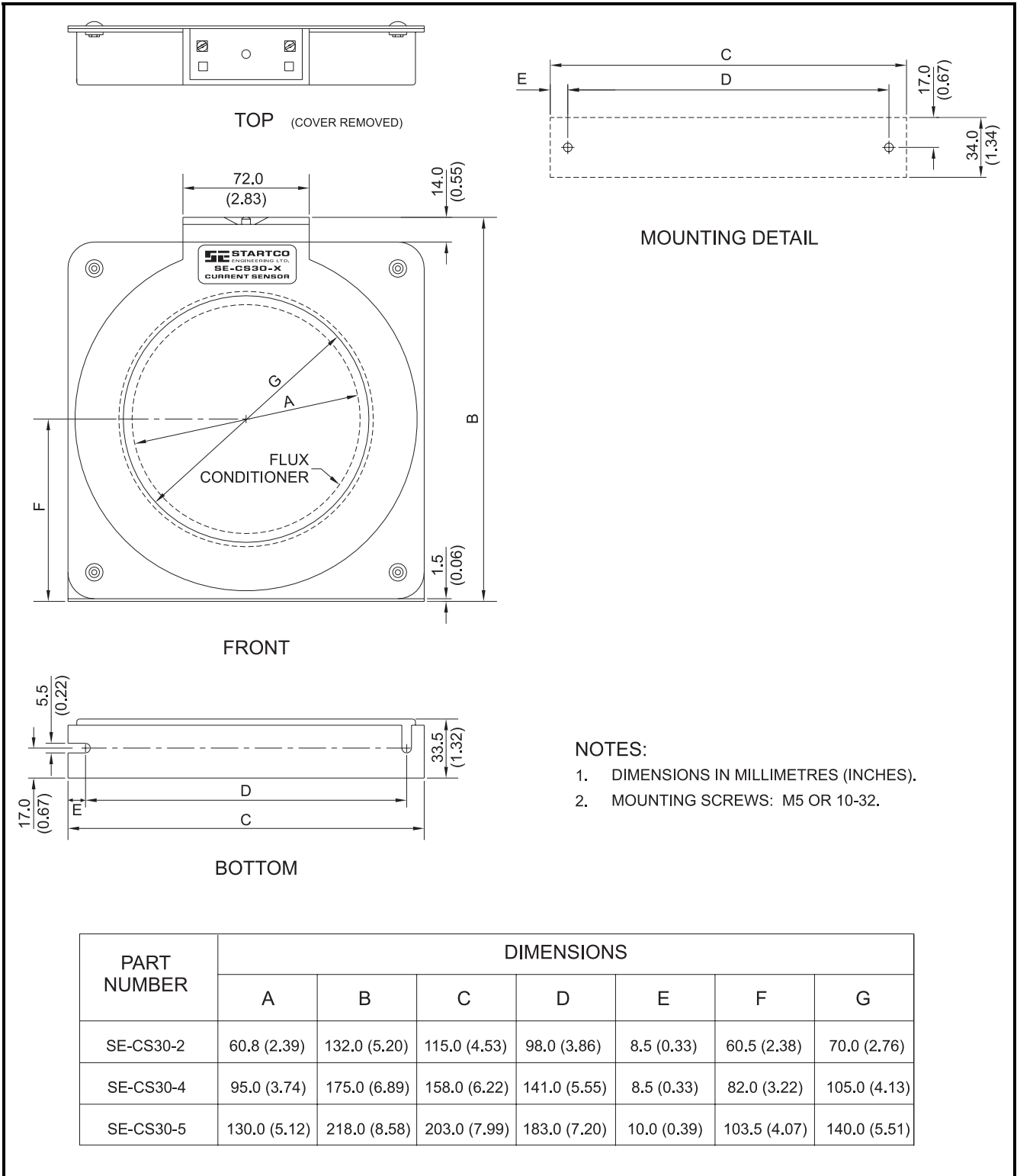


FIGURE 8. SE-CS30 Current Sensors.

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