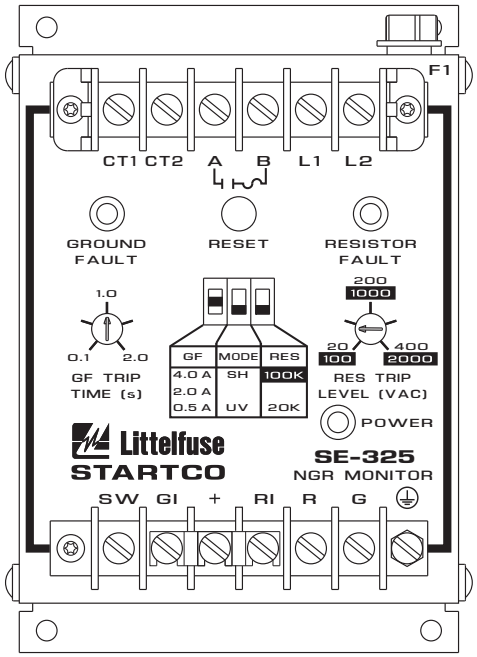
3714 Kinnear Place Saskatoon, SK Canada S7P 0A6 Ph: (306) 373-5505 Fx: (306) 374-2245 www.littelfuse.com/relayscontrols

SE-325 MANUAL

NEUTRAL-GROUNDING-RESISTOR MONITOR

REVISION 13-D-070615



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1. GENERAL

1.1 MODERN RESISTANCE-GROUNDED SYSTEMS

A high-resistance-grounded system uses a neutral-grounding resistor (NGR) with a low let-through current to limit ground-fault current. This is an improvement over low-resistance- or solidly grounded systems because, in those systems, a ground-fault flash hazard exists and a ground fault can result in substantial point-of-fault damage. High-resistance grounding eliminates these problems and modern ground-fault protection operates reliably at these levels. Furthermore, the probability of an arc-flash incident is significantly reduced in a high-resistance-grounded system.

NGR selection depends on system charging current and whether the system is an alarm-only or a tripping system. Alarm-only systems are usually restricted to system voltages up to 5 kV with NGR let-through currents of 5 A or less. Occasionally, alarm-only systems up to 15 kV and up to 10 A are used; however, they are not common because a ground fault on such a system tends to escalate to a phase-to-phase fault before the ground fault can be located and cleared.

System charging current is the capacitive current that flows to ground when a bolted ground fault occurs. This current can be calculated or measured. For small systems, the magnitude of charging current can be conservatively estimated as ½ A per 1,000 kVA on low-voltage systems and 1 A per 1,000 kVA on medium-voltage systems.

In an alarm-only system or in a tripping system without selective coordination, choose an NGR with a let-through current larger than the system charging current and set the pick-up current of ground-fault devices at or below 50% of the NGR let-through current.

In a tripping system with selective coordination, use ground-fault devices with a definite-time characteristic to achieve time coordination. Use the same pick-up current for all ground-fault devices—this value must be larger than the charging current of the largest feeder. Select an NGR with a let-through current between five and ten times the pick-up current of the ground-fault devices.

Do not use a grounding transformer with a low-voltage resistor:

- The combined cost of a transformer and a low-voltage resistor is more than the cost of a resistor rated for line-to-neutral voltage.
- A transformer saturated by a ground fault through a rectifier can make ground-fault protection inoperative.
- Transformer inrush current up to twelve times rated current can cause a ground-fault voltage larger than expected.
- A parallel transformer winding makes it difficult to monitor NGR continuity.
- A transformer can provide the inductance necessary to cause ferroresonance if the NGR opens.

Following these guidelines will reduce the flash hazard, reduce point-of-fault damage, achieve reliable ground-fault protection, and ensure a stable system not subject to ferroresonance.

1.2 SE-325 NGR MONITORING

The SE-325 is a neutral-grounding-resistor monitor for resistance-grounded systems up to 25 kVac. It measures current in a transformer or generator neutral, neutral-to-ground voltage, and continuity of the neutral-grounding resistor. The SE-325 coordinates these three measurements to detect a failed NGR or a ground fault and provides one output contact for shunt or undervoltage operation in a main-breaker trip circuit. Trips are latched and indicated by LED's.

Ground-fault current is sensed by a CT200 window-type current transformer. Either CT input can be grounded to meet electrical codes. A trip level of 0.5, 2.0, or 4.0 A is switch selectable for use with a 5-, 15-, or 25-A grounding resistor. Trip time is adjustable from 0.1 to 2.0 seconds.

Neutral-to-ground voltage and continuity of the neutral-grounding resistor are continuously measured through an ER-series external sensing resistor connected to the neutral. A resistor fault will be detected if ground-fault current is not detected and neutral-to-ground voltage exceeds the trip-level setting, or if NGR resistance exceeds the trip resistance. A resistor-fault hold-off circuit prevents nuisance trips in alarm-only systems.

For additional information on neutral-grounding-resistor monitoring, see "Monitoring Neutral-Grounding Resistors – An Update" at www.littelfuse.com/relayscontrols.

2. OPERATION

2.1 SETTINGS

2.1.1 GF TRIP TIME

Ground-fault trip time is adjustable from 0.1 to 2.0 seconds. Time-coordinated ground-fault protection requires this setting to be longer than the trip times of downstream ground-fault devices.

For the extended ground-fault trip-time option (Option T), trip time is adjustable from 0.1 to 5.0 seconds.

2.1.2 GF

The ground-fault-circuit trip level is 0.5, 2.0, or 4.0 A when current is sensed with a CT200 current transformer. These levels are appropriate for use with 5-, 15-, or 25-A grounding resistors, when a ground-fault trip level less than 20% of the grounding resistor let through current is desired. See Table 1. For other applications, the trip level of the ground-fault circuit is 0.25, 1.0, or 2.0% of the primary rating of the 5-A-secondary current transformer.

2.1.3 MODE

In the shunt-trip mode (SH), the output relay energizes and its contact closes if a resistor-fault or ground-fault trip occurs. The shunt-trip mode is not fail-safe because shunt-trip devices do not operate if supply voltage fails.

In the undervoltage mode (UV), the output relay energizes and its contact closes if the resistor-fault and ground-fault circuits are not tripped. The undervoltage mode is referred to as fail-safe because undervoltage devices release if supply voltage fails.

2.1.4 RES

This switch setting must correspond to the resistance of the external sensing resistor. For the ER-600VC and ER-5KV, select 20K. For the ER-15KV and ER-25KV, select 100K.

2.1.5 RES TRIP LEVEL

Neutral-to-ground trip voltage is adjustable from 20 to 400 Vac with a 20-kΩ sensing resistor, and 100 to 2,000 Vac with a 100-kΩ sensing resistor. To prevent false resistor-fault trips, the RES TRIP LEVEL should be set higher than the voltage across the neutral-grounding resistor when neutral-to-ground current is equal to the operating value of the ground-fault circuit. Typical values for 5-, 15-, and 25-A tripping systems are shown in Table 1. For other systems, refer to the NGR Monitor Set-Point Assistant at www.littelfuse.com/relayscontrols.

2.2 INDICATION AND RESET

The blue POWER LED indicates that the internal power supply is on. Red LED's indicate ground-fault and resistor-fault trips. When a trip occurs, the SE-325 remains latched until Reset is pressed or supply voltage is cycled. Terminals are provided for remote indication and reset as shown in Fig. 1.

For the non-latching option (Option N), the SE-325 resets when the fault clears.

2.3 FUSING

The output contact is protected by fuse F1 (4.0 A, time delay).

TABLE 1. SETTINGS FOR TYPICAL SYSTEMS

System Voltage	Neutral-Grounding Resistor		Sensing Resistor		Ground-Fault Trip Level	ResTrip Level
(Volts)	Let Through (Amperes)	Resistance (Ohms)	Model	Resistance (Ohms)	(Amperes)	(Volts)
480	5	55	ER-600VC	20,000	0.5	30
600	5	69	ER-600VC	20,000	0.5	40
2,400	5	277	ER-5KV	20,000	0.5	140
4,160	5	480	ER-5KV	20,000	0.5	240
480	15	18	ER-600VC	20,000	2.0	40
600	15	23	ER-600VC	20,000	2.0	50
2,400	15	92	ER-5KV	20,000	2.0	190
4,160	15	160	ER-5KV	20,000	2.0	320
7,200	15	277	ER-15KV	100,000	2.0	600
14,400	15	554	ER-15KV	100,000	2.0	1,100
7,200	25	166	ER-15KV	100,000	4.0	700
14,400	25	332	ER-15KV	100,000	4.0	1,400
25,000	25	577	ER-25KV	100,000	4.0	2,000

3. INSTALLATION

3.1 SE-325

SE-325 outline and mounting details are shown in Fig. 2. Typical connections are shown in Fig. 1. Connect supply voltage to L1 and L2. For a 120-Vac supply, connect supply neutral to L2. For a direct-current supply, connect supply negative to L2. Connect chassis-bonding terminal ⏚ to ground.

Connect contact terminals A and B as required.

Faceplate LED's are driven in series with remote-indication LED's. When remote-indication LED's are not used, terminals GI, +, and RI must be connected for the face-plate LED's to operate. These jumpers are installed at the factory.

Install the upper terminal-block cover to prevent inadvertent contact with line terminals.

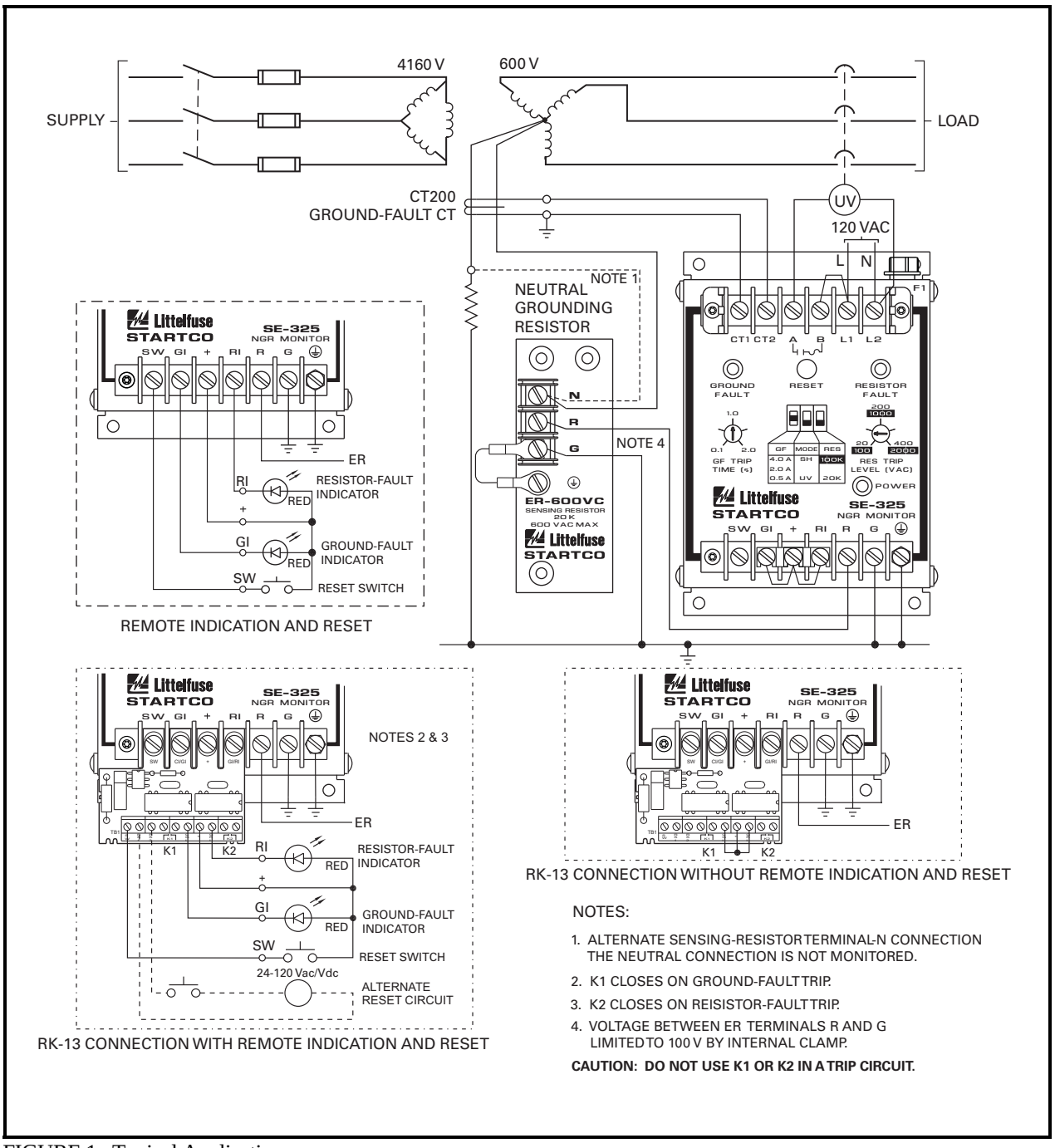


FIGURE 1. Typical Application.

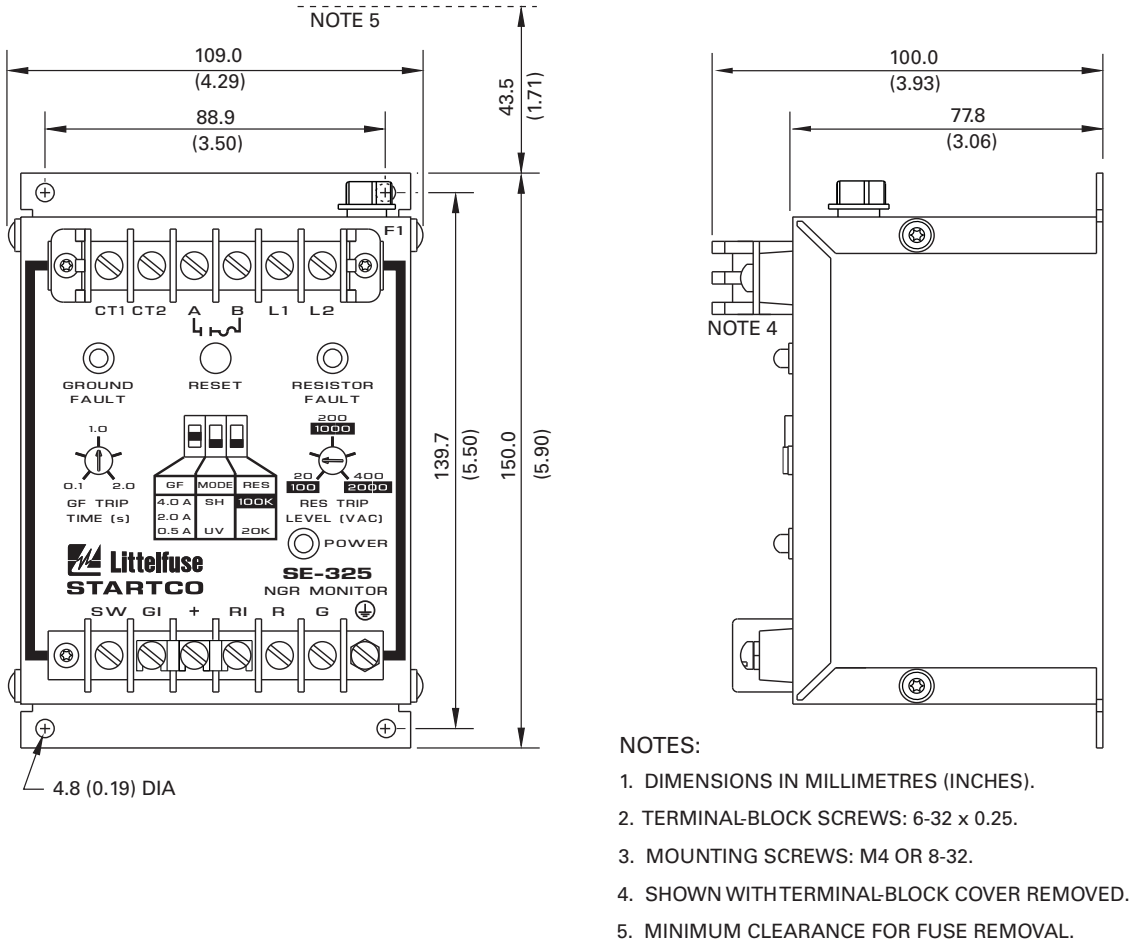


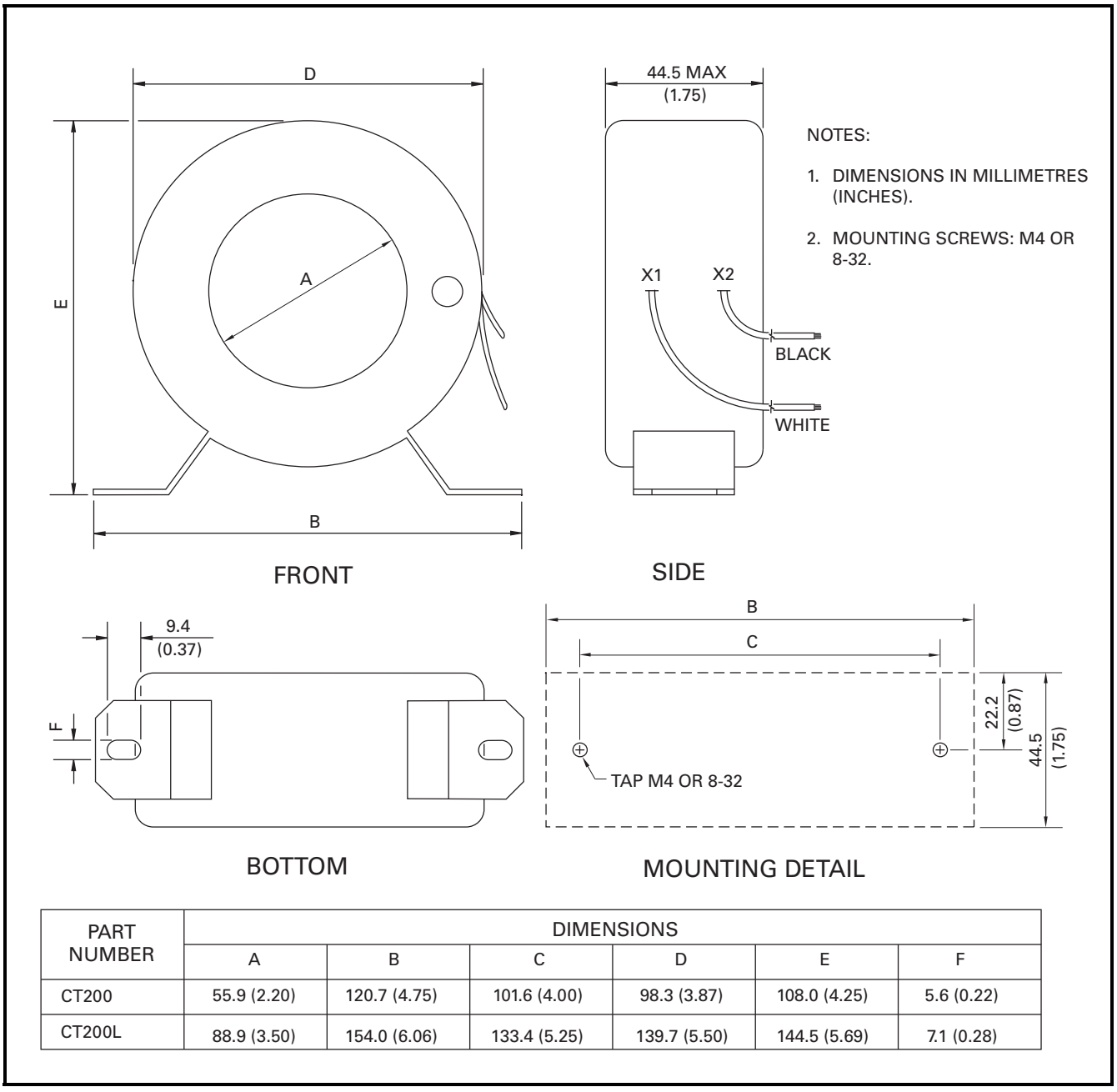
FIGURE 2. SE-325 Outline and Mounting Details.

3.2 GROUND-FAULT CT

Outline and mounting details for CT200 and CT200L current transformers are shown in Fig. 3. Ground-fault-CT connections and the typical ground-fault-CT location are shown in Fig. 1.

Connect the secondary of the ground-fault CT to SE-325 terminals CT1 and CT2. The CT connection to the SE-325 is not polarity sensitive. Ground one side of the CT secondary. For electrically noisy environments or lead lengths in excess of 10 m (30”), use shielded, twisted-pair cable.

NOTE: The CT200 and CT200L are 600-V-rated current transformers. When system voltage is above 600 V, ensure conductors passed through the sensor window are insulated to system voltage.



PART NUMBER	DIMENSIONS					
	A	B	C	D	E	F
CT200	55.9 (2.20)	120.7 (4.75)	101.6 (4.00)	98.3 (3.87)	108.0 (4.25)	5.6 (0.22)
CT200L	88.9 (3.50)	154.0 (6.06)	133.4 (5.25)	139.7 (5.50)	144.5 (5.69)	7.1 (0.28)

FIGURE 3. CT200 and CT200L Current Transformers.

3.3 SENSING RESISTOR

Outline and mounting details for ER-600VC, ER-5KV, ER-15KV, and ER-25KV sensing resistors are shown in Figs. 4, 7, 9, and 10. Locate the NGR and the sensing resistor near the transformer or generator. When located outdoors, a sensing resistor must be installed in a suitable enclosure. An optional SE-MRE-600 Moisture Resistant Enclosure is available for applications which may expose an ER-600VC to moisture. See Figs. 5 and 6. The ER-5WP (shown in Fig. 8) is an ER-5KV with moisture-resistant terminal covers. The ER-15KV and ER-25KV include moisture resistant terminal covers. Use suitable water-tight fittings. Ground sensing-resistor terminal G. Pass the sensing-resistor-to-neutral conductor and the NGR-to-neutral conductor through the ground-fault-CT window as shown in Fig. 1.

Separately connect sensing-resistor terminal N and the NGR to the neutral to include neutral connections in the monitored loop. If a ground fault in the sensing-resistor conductor is unlikely, a minimal loss of protection will result if it does not pass through the ground-fault-CT window.

CAUTION: Voltage at terminal N rises to line-to-neutral voltage when a ground fault occurs. The same clearances are required for sensing resistors as for NGR's.

NOTE: The neutral-to-sensing-resistor connection is not a neutral conductor as defined in Canadian Electrical Code Section 10-1108 and National Electrical Code Section 250.36(B). It is not required to be 8 AWG (8.36 mm^2) or larger. Since current through this conductor is always less than 150 mA, a 14 AWG (2.08 mm^2) conductor insulated to the system voltage is sufficient.

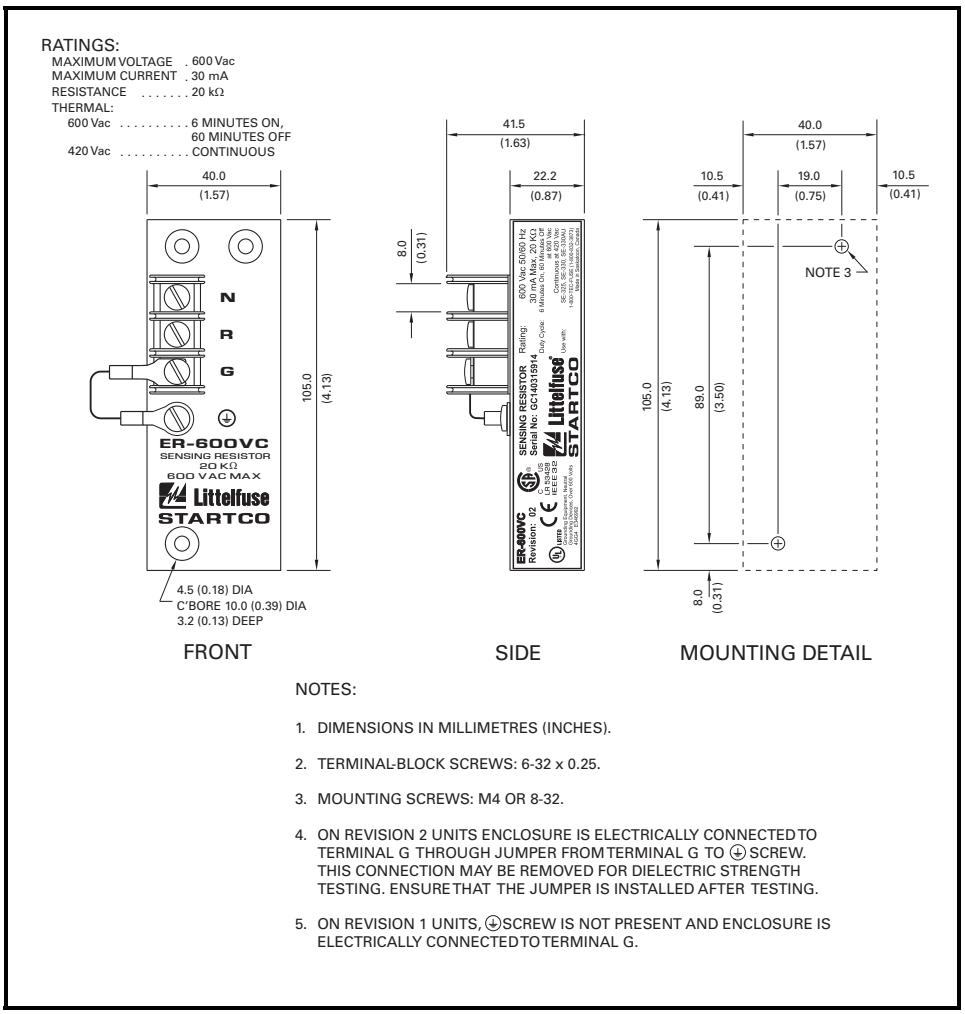


FIGURE 4. ER-600VC Sensing Resistor.

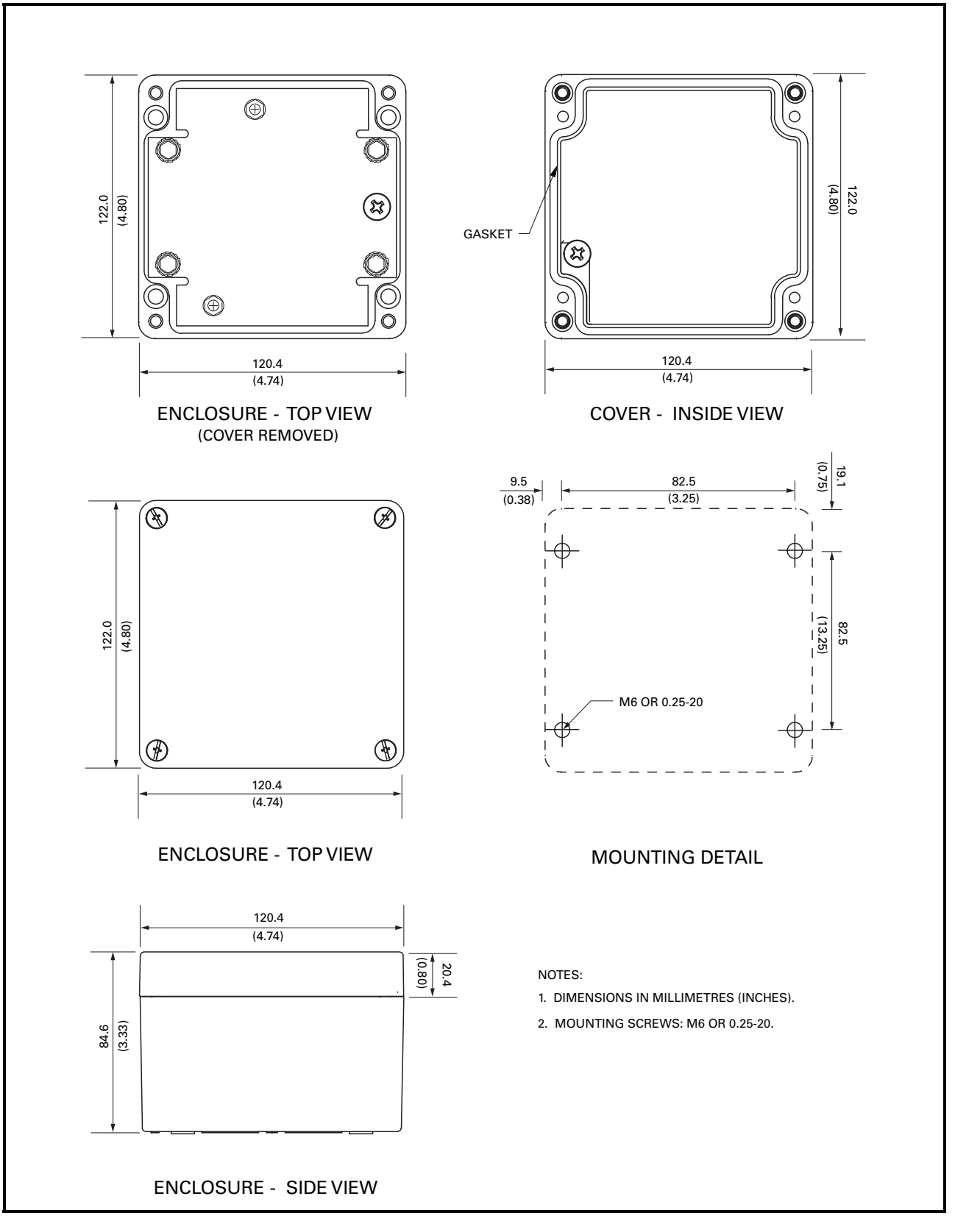
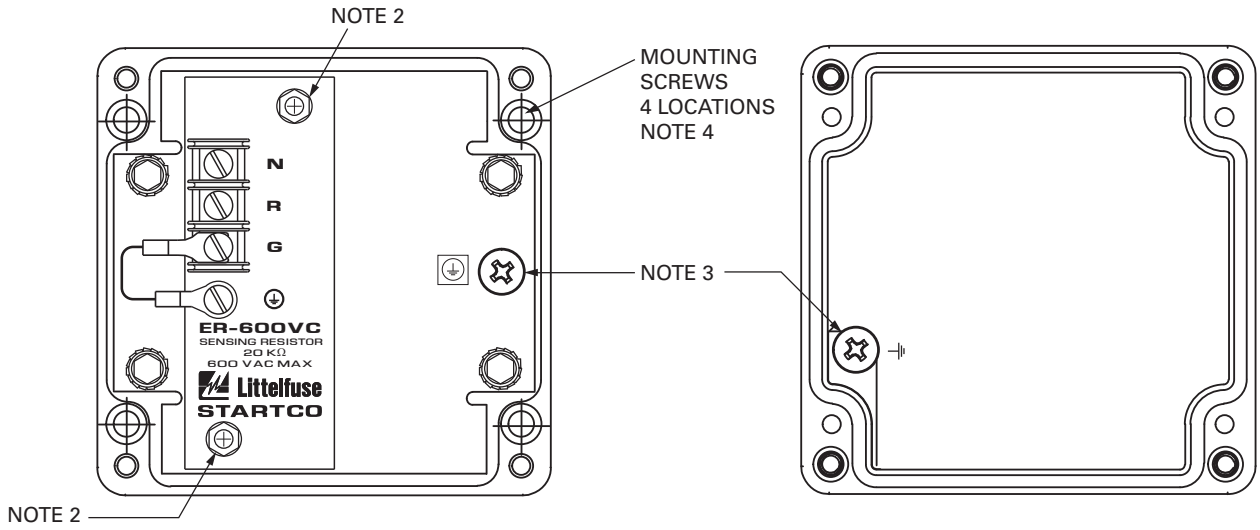


FIGURE 5. SE-MRE-600 Moisture-Resistant Enclosure.



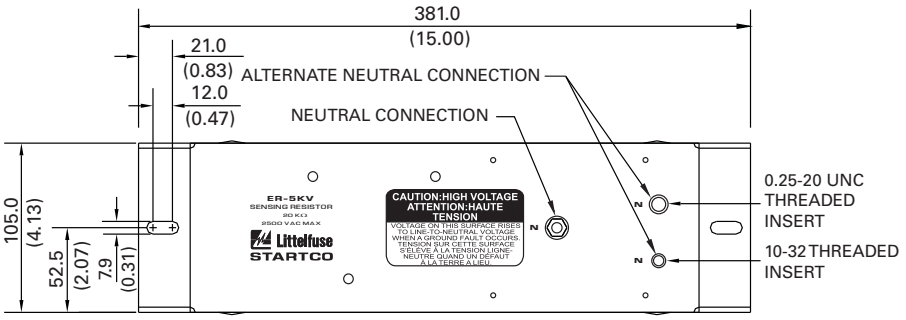
ASSEMBLY INSTRUCTIONS

1. DRILL HOLE FOR ENCLOSURE WIRE ENTRY. USE LIQUID-TIGHT FITTING.
2. REMOVE NYLON NUTS AND WASHERS. INSERT ER-600VC INTO ENCLOSURE. REPLACE NUTS AND WASHERS.
3. ATTACH GROUND WIRE FROM ENCLOSURE TO COVER AND TO ER-600VC TERMINAL G.
4. MOUNT SE-MRE-600 IN PLACE USING M6 OR 0.25-20.
5. COMPLETE OTHER WIRING AND REPLACE COVER.

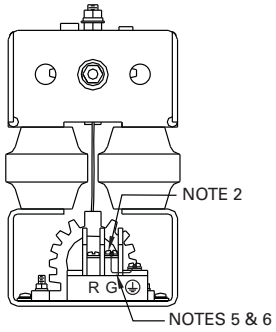
FIGURE 6. SE-MRE-600 with Installed ER-600VC.

RATINGS:

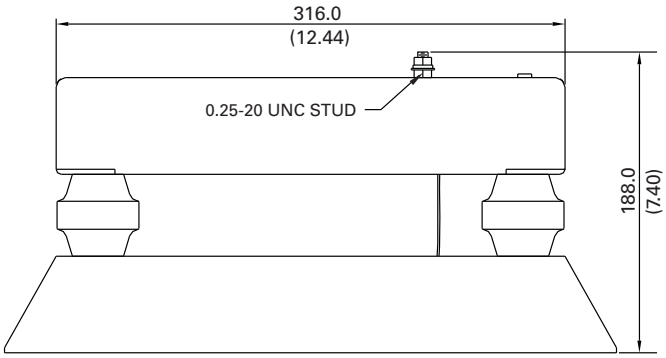
MAXIMUM VOLTAGE . 2,500 Vac
MAXIMUM CURRENT. 125 mA
RESISTANCE . . . . . 20 kΩ
THERMAL . . . . . CONTINUOUS
TORQUE
TERMINAL N (3 LOCATIONS)
10-32 INSERT. . . . . 5.6 N-m (50 in-lb)
OTHERS . . . . . 9.0 N-m (80 in-lb)



TOP VIEW



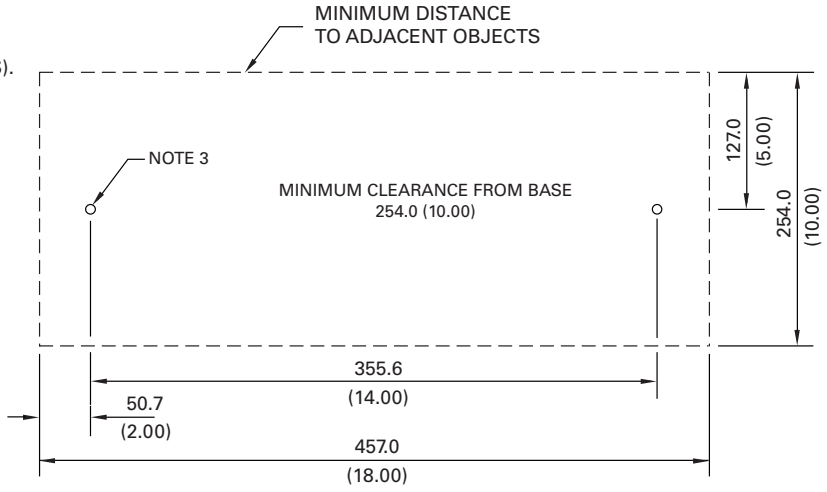
SIDE VIEW



FRONT VIEW

NOTES:

1. DIMENSIONS IN MILLIMETRES (INCHES).
2. TERMINAL-BLOCK SCREWS: 6-32 x 0.25.
3. MOUNTING SCREWS: M6 OR 0.25-20.
4. THIS DEVICE CAN DISSIPATE 300 WATTS. TO MINIMIZE SURFACE TEMPERATURES FOR SYSTEMS ALLOWED TO OPERATE CONTINUOUSLY WITH A GROUND FAULT, MOUNT VERTICALLY WITH R & G TERMINALS DOWN.
5. ON REVISION 2 UNITS BASE IS ELECTRICALLY CONNECTED TO TERMINAL G THROUGH JUMPER FROM TERMINAL G TO ⏚ SCREW. THIS CONNECTION MAY BE REMOVED FOR DIELECTRIC STRENGTH TESTING. ENSURE THAT THE JUMPER IS INSTALLED AFTER TESTING.
6. ON REVISION 0 & 1 UNITS ⏚ SCREW IS NOT PRESENT AND BASE IS ELECTRICALLY CONNECTED TO TERMINAL G.
7. CERTIFICATIONS NOT SHOWN.

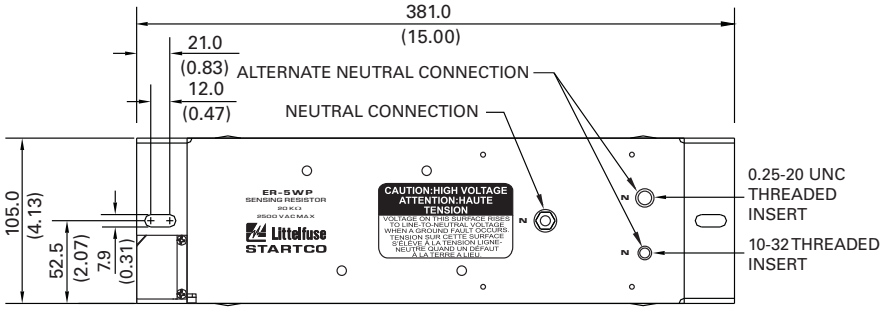


MOUNTING DETAIL

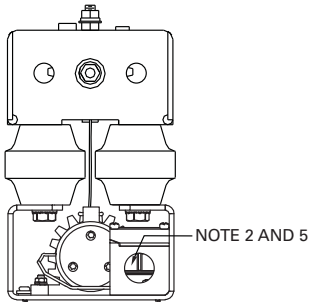
FIGURE 7. ER-5KV Sensing Resistor.

RATINGS:

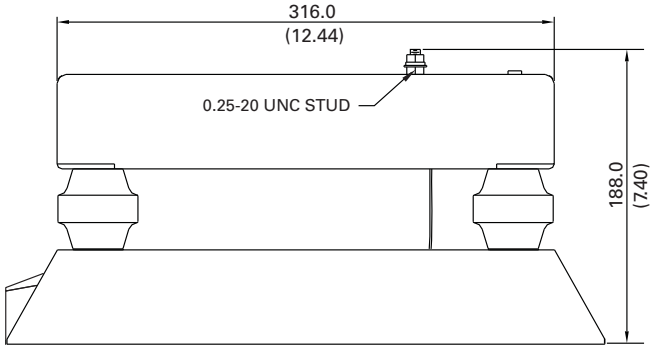
MAXIMUM VOLTAGE . 2,500 Vac
MAXIMUM CURRENT. 125 mA
RESISTANCE . . . . . 20 kΩ
THERMAL . . . . . CONTINUOUS
TORQUE
TERMINAL N (3 LOCATIONS)
10-32 INSERT. . . . . 5.6 N-m (50 in-lb)
OTHERS . . . . . 9.0 N-m (80 in-lb)



TOP VIEW



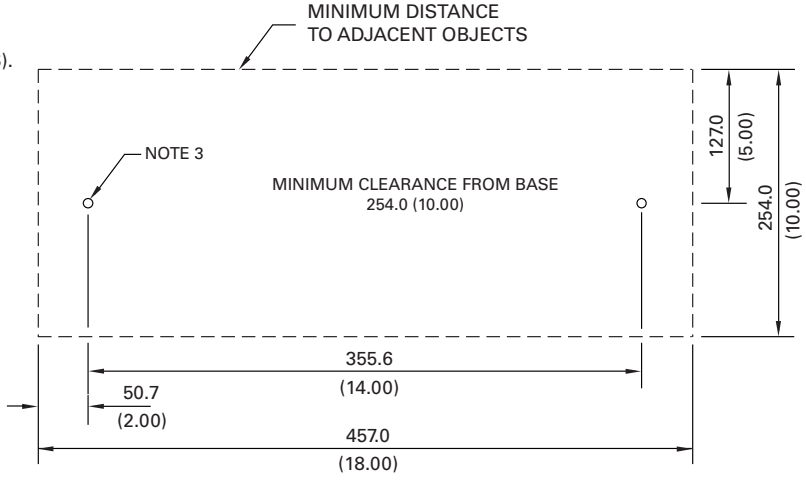
SIDE VIEW



FRONT VIEW

NOTES:

1. DIMENSIONS IN MILLIMETRES (INCHES).
2. TERMINAL-BLOCK SCREWS: 6-32 x 0.25 CABLE ACCESS OPENING IS 1/2 NPT. USE A LIQUID-TIGHT FITTING FOR CABLE ENTRY.
3. MOUNTING SCREWS: M6 OR 0.25-20.
4. THIS DEVICE CAN DISSIPATE 300 WATTS. TO MINIMIZE SURFACE TEMPERATURES FOR SYSTEMS ALLOWED TO OPERATE CONTINUOUSLY WITH A GROUND FAULT, MOUNT VERTICALLY WITH R & G TERMINALS DOWN.
5. BASE IS ELECTRICALLY CONNECTED TO TERMINAL G THROUGH JUMPER FROM TERMINAL G TO ⏚ SCREW. THIS CONNECTION MAY BE REMOVED FOR DIELECTRIC STRENGTH TESTING. ENSURE THAT THE JUMPER IS INSTALLED AFTER TESTING.
6. CERTIFICATIONS NOT SHOWN.



MOUNTING DETAIL

FIGURE 8. ER-5WP Sensing Resistor.

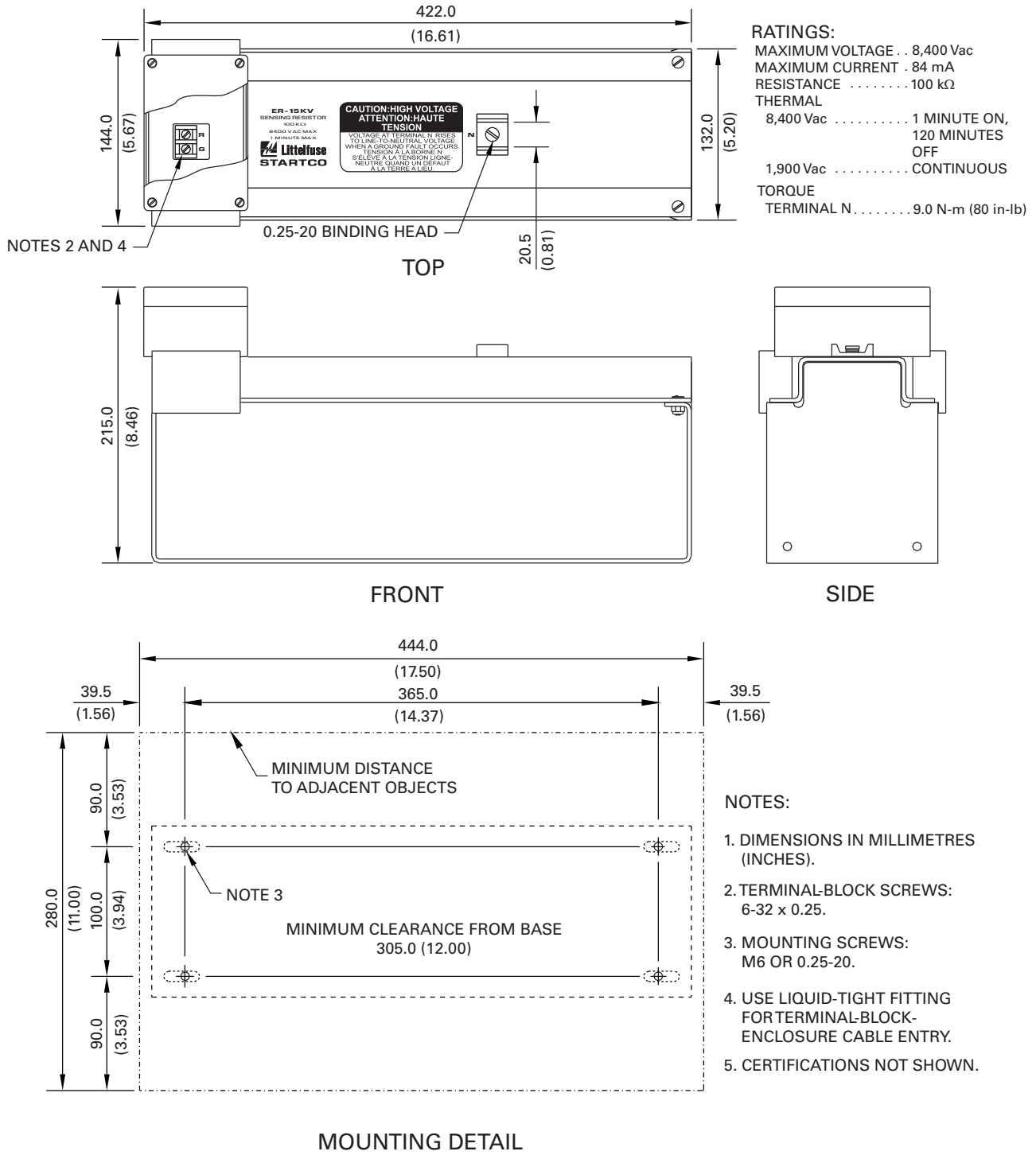


FIGURE 9. ER-15KV Sensing Resistor.

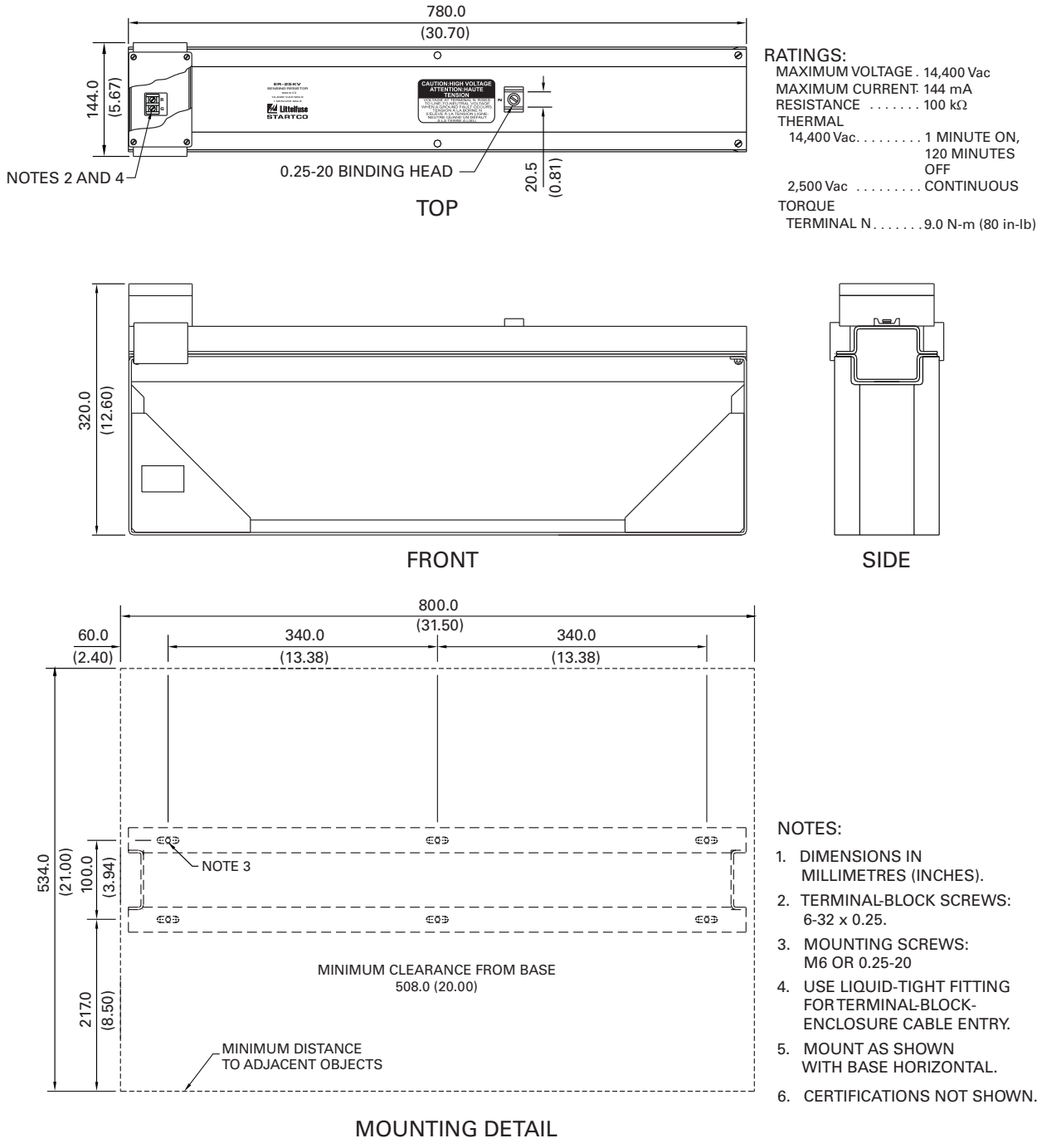


FIGURE 10. ER-25KV Sensing Resistor.

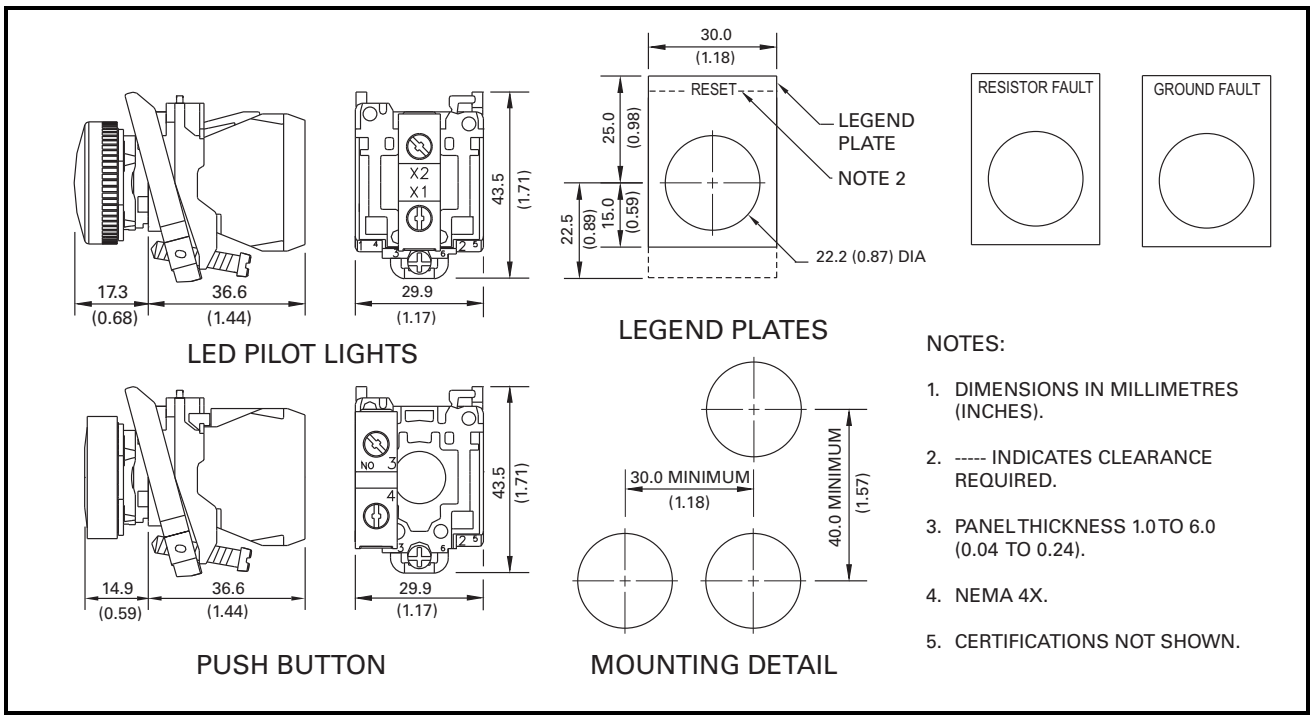


FIGURE 11. RK-302 Remote Indication and Reset Kit.

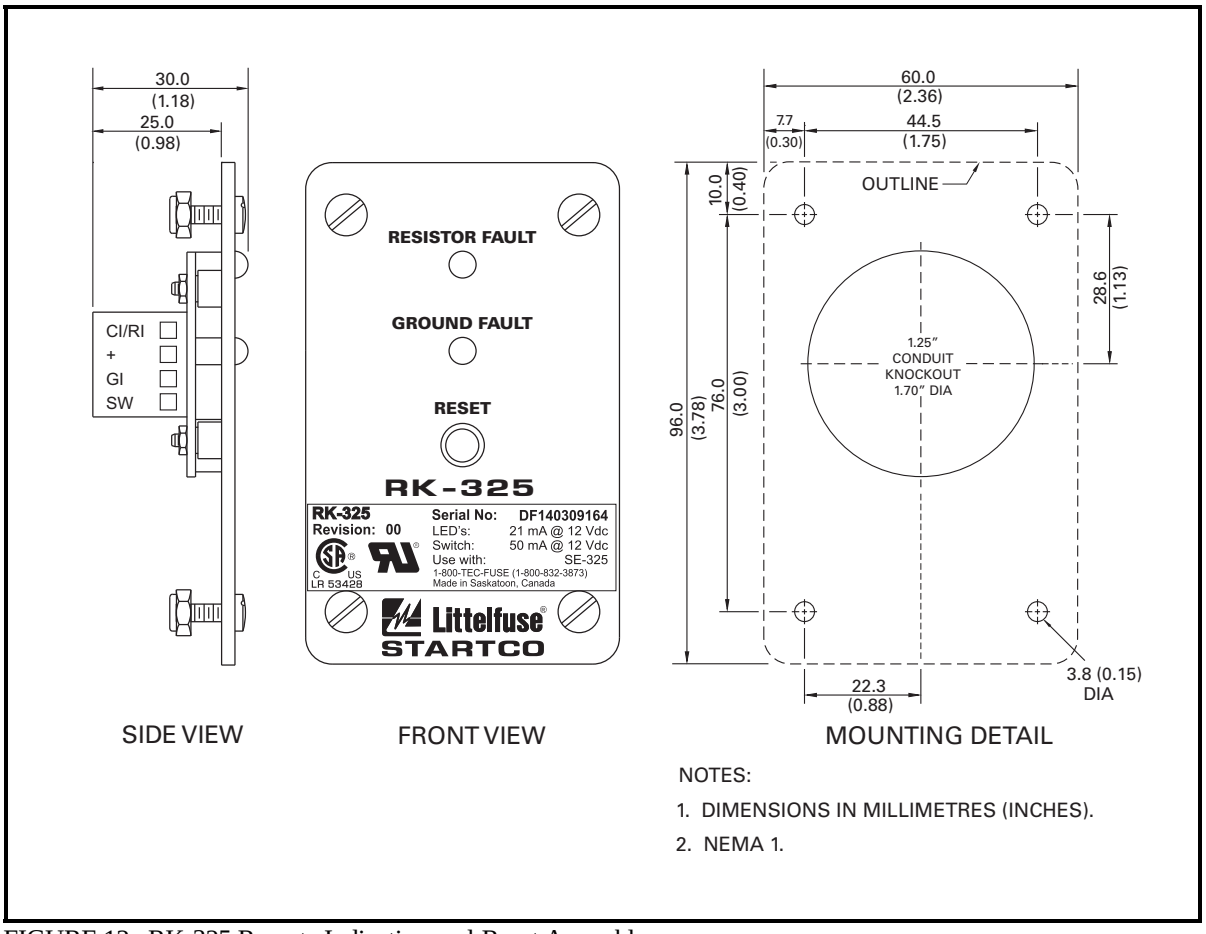


FIGURE 12. RK-325 Remote Indication-and-Reset Assembly.

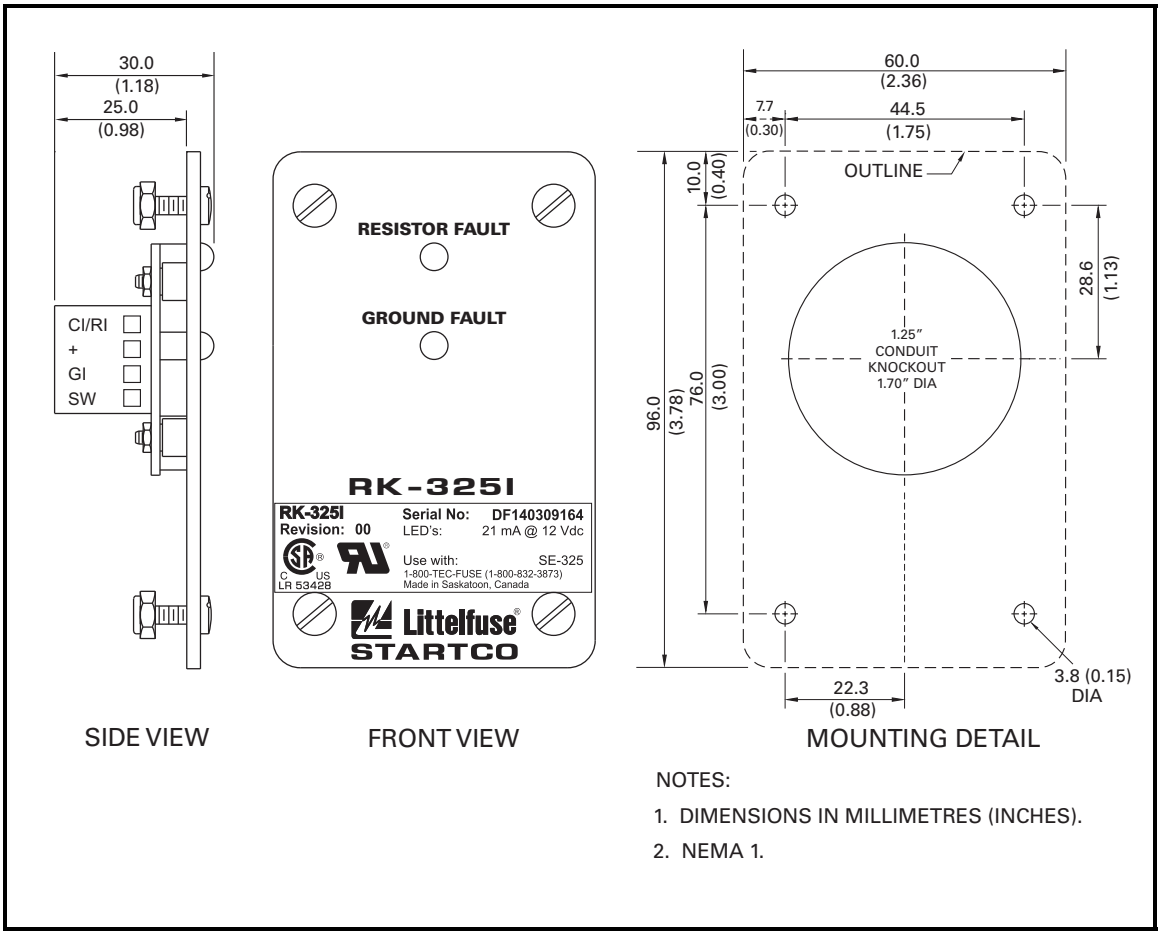


FIGURE 13. RK-325I Remote Indication Assembly.

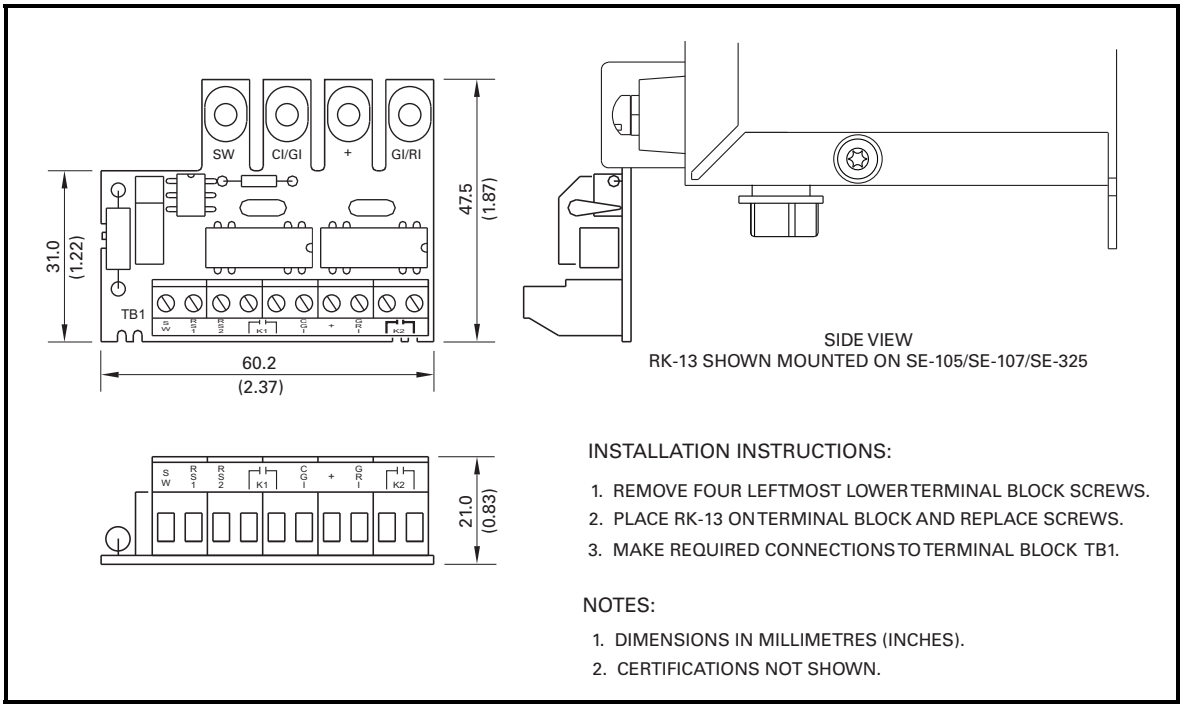


FIGURE 14. RK-13 Relay Interface Module.

3.4 Isolated-Ground Connection

The SE-325 is intended for use in installations where the NGR is connected to local ground. Some installations require the NGR to be isolated from local ground. See Technical Note RG-1 "NGR Monitoring with Isolated Ground Beds" at www.littelfuse.com/relayscontrols.

3.5 Overhead Lines

In overhead-line applications, atmospheric conditions can cause false resistor-fault trips. The "S" option or an SE-330 NGR Monitor is recommended for these applications.

3.6 Remote Operation

Terminals SW, GI, +, and RI are provided for remote LED indication and remote reset as shown in Fig. 1. Remote LED's are driven in series with the front-panel LED's.

Remove factory-installed jumpers from terminals GI, +, and RI, and connect a remote kit as shown in Fig. 1. Optional remote kits are shown in Figs. 11, 12, and 13. Standard LED indicator lamps are not compatible with the SE-325.

For general-purpose applications, use the RK-325 Remote Indication-and-Reset Assembly or the RK-325I Remote Indication Assembly. Connect terminals SW, GI, +, and RI to remote-kit terminals SW, GI, +, and CI/RI.

For 22-mm-component applications, use the RK-302 Remote Indication and Reset Kit. Connect terminal X2 of the red ground-fault indicator to GI, terminal X2 of the red resistor-fault indicator to RI, and connect indicator X1 terminals to +. For remote reset, connect the normally open push-button switch across terminals + and SW.

If indication is required from a separate voltage source, or if separate ground-fault and resistor-fault contacts are required, use an RK-13 Relay Interface Module. The RK-13 mounts on the SE-325 lower terminal block and it is compatible with the RK-302, RK-325 and RK-325I. See Figs. 1 and 14. Contact K1 closes when the Ground-Fault LED is on and contact K2 closes when the Resistor-Fault LED is on.

3.7 Ground-Fault Testing

Use CT-primary current injection to test the ground-fault circuit. Fig. 15 shows test circuits using the SE-400 Ground-Fault-Relay Test Unit and the SE-100T Ground-Fault-Relay Tester. The SE-400 has a programmable output of 0.5 to 9.9 A for a duration of 0.1 to 9.9 seconds. The SE-100T has LO and HI outputs for 5- and 15-A resistance-grounded systems.

A test-record form is provided in Section 7 of this manual. Record the test results and test dates on this form to meet the requirements of the National Electrical Code (NEC). Retain the form so that the test data can be made available to the authority having jurisdiction.

4. Technical Specifications

4.1 SE-325

Supply:

ac	10 VA, 120 or 240 Vac (+10, -45%), 50/60 Hz
ac/dc	5 W, 120 Vdc (+40, -8%); 10 VA, 120 Vac (+10, -45%), 50/60 Hz

NOTE: Voltage between supply terminals (L1, L2) and ground terminal (G) must not exceed 300 Vac continuous or 1,250 Vac under transient conditions.

Dimensions:

Height	150 mm (5.9")
Width	109 mm (4.3")
Depth	100 mm (4.0")

Shipping Weight	1 kg (2.2 lb)

Environment:

Operating Temperature	-40 to 60°C (-40 to 140°F)
Storage Temperature	-55 to 80°C (-67 to 176°F)
Humidity	85% Non-Condensing

Ground-Fault Circuit:

CT Ratio	200:5
CT Input Burden	0.02 Ω
Trip Level [1]	0.5, 2.0, or 4.0 A
Frequency Response[2]	25 to 110 Hz
Trip Time	0.1 to 2.0 s, 0.1 to 5.0 s with Option T
Thermal Withstand [1]	200 A Continuous, 2,500 A for 2 s
Trip-Level Accuracy	+10, -20%
CT Lead Resistance Limit [3]	
0.5 A Trip Level	2 Ω
2 A Trip Level	5 Ω
4 A Trip Level	5 Ω
Trip-Time Accuracy	10%
Trip Mode	Latching, Non-latching with Option N

Resistor-Fault Circuit:
- Neutral-To-Ground
- Trip Voltage (V_N) ..... 20 to 2,000 Vac Adjustable
- NGR Trip Resistance, $V_N = 0$:
  - ER-600VC or ER-5KV ..... 2 kΩ
  - ER-15KV or ER-25KV ..... 6 kΩ, 50 kΩ with Option S
- Neutral-To-Ground DC-Voltage Rejection:
  - ER-600VC or ER-5KV ..... 1.2 V
  - ER-15KV or ER-25KV ..... 0.7 V, 4 V with Option S
- Trip-Resistance Accuracy ..... +5, -2% of Sensing Resistor Resistance
- Trip Time ..... 5 ± 0.5 s, 20 ± 3 s with Option S
- Trip Mode ..... Latching, Non-latching with Option N

Output Relay:
- CSA/UL Contact Rating ..... 1 mA to 4 A Resistive, 240 Vac or 28 Vdc
- Supplemental Contact Ratings:
  - Make/carry 0.2 s ..... 10 A
  - Carry continuous ..... 4 A
  - Break:
    - dc ..... 20 W resistive, 10 W inductive (L/R = 0.04 s)
    - ac ..... 960 VA resistive, 700 VA inductive (PF = 0.4)
  - Subject to maximums of 4 A and 240 V (ac or dc)
- Contact Configuration ..... N.O. (Form A)
- Fuse Rating (F1) ..... 4.0 A, 250 Vac, Time Delay
- Fuse Part Number ..... Bussman MSL-4 or Littelfuse 313004.
- Operating Mode ..... UV (Fail-Safe) or SH (Non-Fail-Safe)

Remote Indication:
- \+ ..... 12 Vdc
- GI/RI ..... Current Sink, 560 Ω Internal

Optional RK-13 Module:
- Contact Ratings ..... 0.08 A, 120 V (ac or dc), 0.50 A, 24 Vdc
- Contact Configuration ..... N.O. (Form A)
- Reset Input ..... 24 to 120 V (ac or dc), Isolated

PWB Conformal Coating ..... MIL-1-46058 qualified, UL QMJU2 recognized

Certification ..... CSA, Canada and USA

LR 53428

UL Listed

Ground Fault Sensing and Relaying Equipment 4FX9 E340889

Australia[4]

N11659

Commonwealth of Pennsylvania
SE-325 BOTE 1767-99
SE-325P BOTE 1797-00

FCC

NOTES:
(1) Currents referred to primary of CT200 for prospective ground-fault currents less than 4,000 A.
(2) Prior to hardware revision 11, standard unit freq. rep. was 25 to 400 Hz and option H was 25 to 110 Hz.
(3) Typical maximum CT lead resistance to meet specified trip level accuracy.
(4) Applicable only on 240 Vac Supply (Option E in the ordering information).

4.2 SENSING RESISTORS

ER-600VC:
- Maximum Voltage ..... 600 Vac
- Maximum Current ..... 30 mA
- Resistance ..... 20 kΩ
- Thermal:
  - 420 Vac ..... Continuous
  - 600 Vac ..... 6 minutes on, 60 minutes off
- Shipping Weight ..... 300 g (0.7 lb)
- Extended Operating Temperature ..... -55 to 60°C (-67 to 140°F)[1]

ER-5KV:
- Maximum Voltage ..... 2,500 Vac
- Maximum Current ..... 125 mA
- Resistance ..... 20 kΩ
- Thermal ..... Continuous
- Torque:
  - Terminal N:
    - 10-32 Insert ..... 5.6 N-m (50 in-lb)
    - Others ..... 9.0 N-m (80 in-lb)
- Shipping Weight ..... 5.0 kg (11 lb)

ER-5WP:
- Maximum Voltage ..... 2,500 Vac
- Maximum Current ..... 125 mA
- Resistance ..... 20 kΩ
- Thermal ..... Continuous
- Torque:
  - Terminal N:
    - 10-32 Insert ..... 5.6 N-m (50 in-lb)
    - Others ..... 9.0 N-m (80 in-lb)
- Shipping Weight ..... 5.0 kg (11 lb)

ER-15KV:
- Maximum Voltage ..... 8,400 Vac
- Maximum Current ..... 84 mA
- Resistance ..... 100 kΩ
- Thermal:
  - 8,400 Vac ..... 1 minute on, 120 minutes off
  - 1,900 Vac ..... Continuous
- Torque (Terminal N) ..... 9.0 N-m (80 in-lb)
- Shipping Weight ..... 5.0 kg (11 lb)

ER-25KV:
- Maximum Voltage ..... 14,400 Vac
- Maximum Current ..... 144 mA
- Resistance ..... 100 kΩ
- Thermal:
  - 14,400 Vac ..... 1 minute on, 120 minutes off
  - 2,500 Vac ..... Continuous
- Torque (Terminal N) ..... 9.0 N-m (80 in-lb)
- Shipping Weight ..... 20 kg (44 lb)

Certification ..... CSA, Canada and USA

C SA ® LR 53428 US

UL Listed

UL LISTED
Ground Fault Sensing and Relaying Equipment
4FX9 E340889

CE, European Union

CE

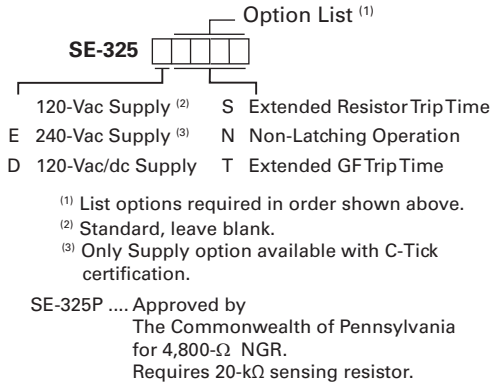
NOTES:
(1) Electrical specifications have been verified at a Littelfuse lab.

4.3 CURRENT TRANSFORMERS

CT200:
- Current Ratio ..... 200:5 A
- Insulation ..... 600-V Class
- Window Diameter ..... 56 mm (2.2”)
- Shipping Weight ..... 1 kg (2.2 lb)

CT200L:
- Current Ratio ..... 200:5 A
- Insulation ..... 600-V Class
- Window Diameter ..... 89 mm (3.5”)
- Shipping Weight ..... 1.2 kg (2.6 lb)

5. ORDERING INFORMATION



Sensing Resistors:

ER-600VC	For system voltages up to 1 kVac
SE-MRE-600	Optional ER-600VC moisture- resistant enclosure
ER-5KV	For system voltages up to 5 kVac
ER-5WP	For system voltages up to 5 kVac
ER-15KV	For system voltages up to 15 kVac
ER-25KV	For system voltages up to 25 kVac

Ground-Fault CT:

CT200	56 mm (2.2”) window
CT200L	89 mm (3.5”) window

Remote Indication and Reset:

RK-302	Includes two LED pilot lights, a reset push button, and legend plates
RK-325	Indication-and-Reset Assembly
RK-325I	Indication Assembly
RK-13	Relay Interface Module

6. WARRANTY

The SE-325 Neutral-Grounding-Resistor Monitor is warranted to be free from defects in material and workmanship for a period of five years from the date of purchase.

Littelfuse Startco will (at Littelfuse Startco’s option) repair, replace, or refund the original purchase price of an SE-325 that is determined by Littelfuse Startco to be defective if it is returned to the Startco factory, freight prepaid, within the warranty period. This warranty does not apply to repairs required as a result of misuse, negligence, an accident, improper installation, tampering, or insufficient care. Littelfuse Startco does not warrant products repaired or modified by non-Littelfuse Startco personnel.

7. TEST PROCEDURES

7.1 GROUND-FAULT PERFORMANCE TEST

To meet the requirements of the National Electrical Code (NEC), as applicable, the overall ground-fault protection system requires a performance test when first installed. A written record of the performance test is to be retained by those in charge of the electrical installation in order to make it available to the authority having jurisdiction. A test-record form is provided for recording the date and the final results of the performance tests. The following ground-fault system tests are to be conducted by qualified personnel:

a) Evaluate the interconnected system in accordance with the overall equipment manufacturer's detailed instructions.

b) Verify proper location of the ground-fault current transformer. Ensure the cables pass through the ground-fault-current-transformer window. This check can be done visually with knowledge of the circuit. The connection of the current-transformer secondary to the SE-325 is not polarity sensitive.

c) Verify that the system is correctly grounded and that alternate ground paths do not exist that bypass the current transformer. High-voltage testers and resistance bridges can be used to determine the existence of alternate ground paths.

d) Verify proper reaction of the circuit-interrupting device in response to a simulated or controlled ground-fault current. To simulate ground-fault current, use CT-primary current injection. Fig. 15a shows a test circuit using an SE-400 Ground-Fault-Relay Test Unit. The SE-400 has a programmable output of 0.5 to 9.9 A for a duration of 0.1 to 9.9 seconds. Set the test current to 0.6, 2.3, or 4.6 A for SE-325 units set at 0.5, 2.0, or 4.0 A respectively. Fig. 15b shows a test circuit using an SE-100T Ground-Fault-Relay Tester. The SE-100T provides a test current of 0.65 or 2.75 A for testing 0.5- and 2.0-A trip levels. Inject the test current through the current-transformer window for at least 2.5 seconds. Verify that the circuit under test has reacted properly. Correct any problems and re-test until the proper reaction is verified.

e) Record the date and the results of the test on the attached test-record form.

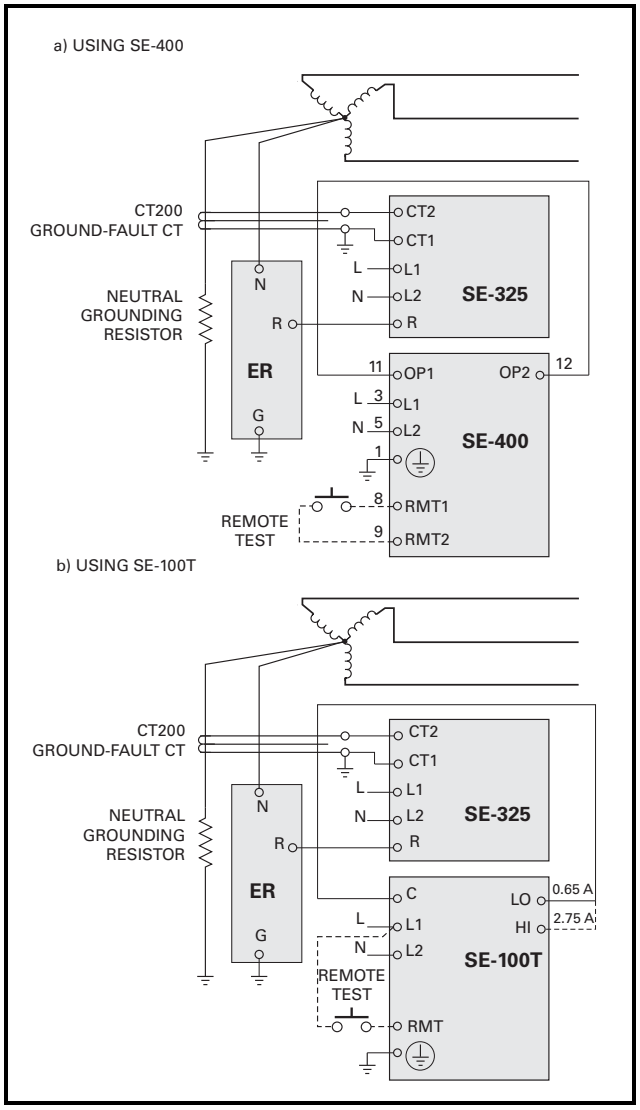


FIGURE 15. Ground-Fault-Test Circuits.

TABLE 2. GROUND-FAULT-TEST RECORD

DATE	TEST RESULTS

Retain this record for the authority having jurisdiction.

7.2 RESISTOR-FAULT TESTS

Perform tests with system de-energized and supply voltage applied to the SE-325.

7.2.1 OPEN TEST

Test Equipment: 20-kΩ and 100-kΩ, ¼-watt, 1% resistors (included with SE-325).

Procedure:

- Remove connections to SE-325 R and G terminals.
- Connect the 20-kΩ resistor to R and G terminals.
- Set the RES switch to 20K.
- Press RESET.
- The RESISTOR-FAULT LED should be off.
- Remove the test resistor and wait 5 seconds (20 seconds with Option S).
  PASS: The SE-325 should trip on RESISTOR FAULT.
- Connect the 100-kΩ resistor to R and G terminals.
- Set the RES switch to 100K.
- Press RESET.
- The RESISTOR-FAULT LED should be off.
- Remove the test resistor and wait 5 seconds (20 seconds with Option S).
  PASS: The SE-325 should trip on RESISTOR FAULT.

To test the connected wiring, sensing resistor, and NGR:

- Reconnect SE-325 R and G connections.
- Set the RES switch to match sensing resistor.
- Press RESET.
  PASS: The RESISTOR FAULT LED should be off.

7.2.2 VOLTAGE TEST

Test Equipment: 0 to 120 Vac voltage source and multimeter.

NOTE: Also use an isolation transformer if the test-voltage source does not provide dc continuity for the SE-325 resistance-measurement circuit.

NOTE: Applying the test voltage to the R and G terminals will damage the SE-325 and the ER sensing resistor. The RES TRIP LEVEL is the trip voltage at terminal N, not terminal R.

Procedure:

- Check the ER sensing resistor connection to the SE-325.
- Disconnect the wire from sensing resistor terminal N. A resistor-fault trip will occur.
- Set the voltage source to 0 V.
- Connect the voltage source between sensing resistor N and G terminals.
- Set the RES TRIP LEVEL (VAC) to 20.
- Press RESET.
- The RESISTOR-FAULT LED should be off.
- Increase the test voltage to 25 Vac for 20-kΩ sensors or 120 Vac for 100-kΩ sensors and wait 5 seconds (20 seconds with Option S).
  PASS: The SE-325 should trip on RESISTOR FAULT.

7.3 SENSING-RESISTOR TEST

Test Equipment: Multimeter.

Procedure:

- Disconnect the sensing resistor.
- Measure the resistance between sensing-resistor terminals R and N.
  PASS: Resistance should be between 19.6 and 20.4 kΩ for 20-kΩ sensing resistors. Resistance should be between 98 and 102 kΩ for 100-kΩ sensing resistors.
- Measure the resistance between sensing-resistor terminals R and G in both directions.
  PASS: Resistance should be greater than 10 MΩ in both directions.

APPENDIX A
SE-325 REVISION HISTORY

MANUAL RELEASE DATE	MANUAL REVISION	PRODUCT REVISION (REVISION NUMBER ON PRODUCT LABEL)
July 6, 2015	13-D-070615	13
September 23, 2014	13-C-092314	12
August 27, 2013	13-B-082713	
August 13, 2013	13-A-081313	

MANUAL REVISION HISTORY

REVISION 13-D-070615

SECTION 5

FCC certification added.
Updated Fuse F1 part number.

APPENDIX A

Revision history updated.

REVISION 13-C-092314

SECTION 3

Updated Figs. 4, 7, 8, 9, 10, 12, and 13.

SECTION 4

Updated RK-13 contact ratings.

APPENDIX A

Revision history updated.

REVISION 13-B-082713

SECTION 3

Updated Figures 7, 8, 9, and 10.

REVISION 13-A-081313

SECTION 3

Updated Figure 11.

APPENDIX A

Added Revision History.

PRODUCT REVISION HISTORY

HARDWARE REVISION 13

Minor hardware change.

HARDWARE REVISION 12

Component change to improve stability of ground-fault detection circuit.

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