

# SE-330, SE-330HV SERIES

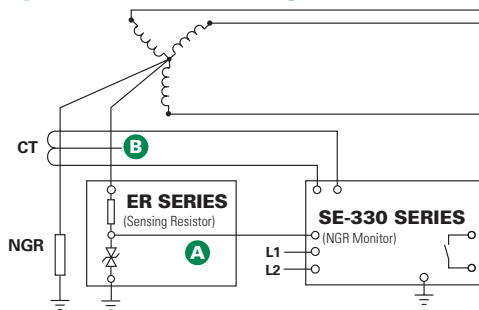
## Neutral-Grounding-Resistor Monitor



### Description

The SE-330 is an advanced ground-fault and neutral-grounding-resistor monitoring relay that is compliant with Rule10-302 of the 2018 Canadian Electrical Code Part I (CE Code). It measures neutral current, neutral-to-ground voltage, and neutral-to-ground resistance. It provides continuous monitoring of the neutral-to-ground path to verify that the neutral-grounding resistor (NGR) is intact and that it has not been bypassed or shorted. An open NGR renders current-sensing ground-fault protection inoperative and could result in a false belief that the system is functioning properly. A shorted NGR results in higher-than-expected ground-fault current. The SE-330 can be used with low- and medium-voltage transformers and generators with low- or high-resistance grounding used in processing, manufacturing, chemical, pulp and paper, petroleum, and water-treatment facilities. For high-voltage applications, use the SE-330HV. For applications that require conformance to Australian standards, use the SE-330AU.

### Simplified Circuit Diagram



For detailed wiring diagram, see adjacent page.

### Ordering Information

| ORDERING NUMBER                       | POWER SUPPLY      | COMM  | K4 UNIT HEALTHY CONTACT |
|---------------------------------------|-------------------|---|-------------------------|
| SE-330                                | X                 | X   | 0                       |
| SE-330 for applications 35 kV or less | 0=120/240 Vac/Vdc | 0=USB Only<br>1=DeviceNet<br>3=EtherNet (Dual RJ45)<br>4=EtherNet (SC Fiber & RJ45)<br>5=EtherNet (Dual SC Fiber) | 0=Normally Open         |
| SE-330HV for 72 kV applications       | 2=48 Vdc          | 6=IEC61850 (Dual RJ45)<br>7=IEC61850 (SC Fiber & RJ45)<br>8=IEC61850 (Dual SC Fiber)                              | 1=Normally Closed       |

NOTE: For Australian applications, see the SE-330AU.

| ACCESSORIES                | REQUIREMENT |
|----------------------------|-------------|
| ER Series Sensing Resistor | Required    |
| Current Transformer        | Required    |
| SE-IP65CVR-G               | Optional    |
| SE-MRE-600                 | Optional    |
| RK-332                     | Optional    |
| NGRM-ENC                   | Optional    |
| PGA-0520                   | Optional    |
| SE-330-SMA                 | Optional    |

### Resistor Monitoring

The SE-330 combines the measured values of resistance, current, and voltage to continuously determine that an NGR is intact. It is able to detect an open or shorted resistor with or without a ground fault present. Sensing resistors are matched to the system voltage and are used to monitor NGRs on systems up to 72 kV.

### Ground-Fault Monitoring

The SE-330 uses an application-appropriate current transformer to reliably detect ground-fault currents as small as 100 mA. Discrete-Fourier Transform (DFT) filtering ensures that false trips due to harmonic noise from adjustable-speed drives do not occur. Should the resistor open and a ground fault subsequently occur, the SE-330 will detect the fault through voltage measurement, while other current-only sensing relays would be ineffective.

### Pulsing Ground-Fault Location

The SE-330 is capable of controlling a pulsing contactor, which is used to switch the NGR resistance in a pulsing-compatible NGR package. The resulting ground-fault current is distinguishable from charging currents and noise and will only appear upstream of the ground fault, making fault location fast and easy, even without isolating feeders or interrupting loads.

### Accessories



#### ER Series Sensing Resistor

Required interface between the power system and the SE-330/SE-330HV. Eliminates hazardous voltage levels at the relay.



#### ELCT5 Series Ground-Fault Current Transformer

Sensitive ground-fault current detection (5 A primary).



#### ELCT30 Series Ground-Fault Current Transformer

Sensitive ground-fault current detection (30 A primary).



#### Other Current Transformer

For low-resistance NGRs choose a CT primary approximately equal to the NGR rating. Inputs are provided for 1- and 5-A secondary CTs.



#### SE-IP65CVR-G Hinged Transparent Cover

Watertight cover, tamper resistant, IP65 protection.

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## Neutral-Grounding-Resistor Monitor

### Features & Benefits

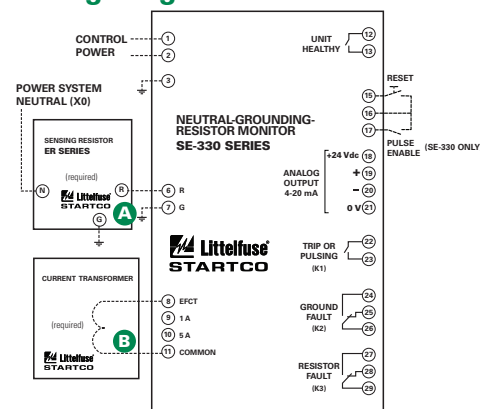
| FEATURES                                 | IEEE #            | BENEFITS   |
|--|-------------------|--|
| <b>Continuous NGR monitoring</b>         | 3                 | Detects resistor failure within seconds, reduces transient-overvoltage risk, removes risk of ground-fault-detection failure  |
| <b>Shorted NGR detection</b>             | 3                 | Detects a ground fault on the neutral that could bypass the resistor, ensures fault current is not higher than expected  |
| <b>Ground-fault detection</b>            | 50G/N, 51G/N, 59N | Main or backup protection to detect a ground fault anywhere on the monitored system  |
| <b>Adjustable pickup (2-100%)</b>        |                   | Select greatest sensitivity without false operation, adjustable in 1% increments (MEM setting)   |
| <b>Adjustable time delay (0.1-10 s)</b>  |                   | Adjustable trip delay allows quick protection and system coordination  |
| <b>Universal CT compatibility</b>        |                   | Allows the use of a CT that gives required ground-fault settings   |
| <b>Programmable output contacts</b>      |                   | Two programmable Form C and One programmable Form A (Ground Fault, Resistor Fault, Unit Health)  |
| <b>Selectable contact operating mode</b> |                   | Selectable fail-safe or non-fail-safe operating modes allows connection to shunt or undervoltage breaker coil or alarm circuit (K1, K2, and K3 output contacts)  |
| <b>Analog output (4-20 mA)</b>           |                   | Connect an optional PGA-0520 meter or control system   |
| <b>Pulsing output (SE-330 only)</b>      |                   | Control the operation of a pulsing ground-fault-location circuit   |
| <b>Trip records</b>                      |                   | On-board 100-event (with date and time) recorder helps with system diagnostics   |
| <b>Harmonic filtering (DFT)</b>          |                   | Eliminate false trips due to harmonic noise from ASDs  |
| <b>Local communications</b>              |                   | Mini USB port to view measured values, configure settings, and check event records   |
| <b>Data logging</b>                      |                   | On-board microSD card (included) can be used for long-term data logging  |
| <b>Network communications</b>            |                   | Remotely view measured values and event records, reset trips, and cause a remote trip<br>Available Protocol Options:<br><b>IEC 61850</b> - with dual RJ45, SC Fiber and RJ45, or Dual SC Fiber Interface<br><b>Modbus TCP and Ethernet/IP</b> - with dual RJ45, SC Fiber and RJ45, or Dual SC Fiber Interface<br><b>DeviceNet</b> - with CAN interface |
| <b>Software</b>                          |                   | PC-interface software (SE-MON330) is available at Littelfuse.com/RelaySoftware   |
| <b>Selectable reset mode</b>             |                   | Selectable latching or auto-reset operation  |
| <b>Unit-healthy output</b>               |                   | Verifies SE-330 is operating correctly, available as Form A or Form B output contact   |
| <b>Conformal coating</b>                 |                   | Internal circuits are conformally coated to protect against corrosion and moisture   |

### Typical Values

| SYSTEM VOLTAGE (VOLTS) | NEUTRAL-GROUNDING RESISTOR |                   | SENSING RESISTOR |                                | GROUND-FAULT PICKUP LEVEL (AMPERES) | V <sub>N</sub> PICKUP LEVEL (VOLTS) |
|------------------------|----------------------------|-------------------|------------------|--------------------------------|-------------------------------------|-------------------------------------|
|                        | CURRENT (AMPERES)          | RESISTANCE (OHMS) | MODEL            | RESISTANCE (SWITCH S5 SETTING) |                                     |                                     |
| 480                    | 5                          | 55                | ER-600VC         | 20 kΩ                          | 2.5                                 | 170                                 |
| 600                    | 5                          | 69                | ER-600VC         | 20 kΩ                          | 2.5                                 | 200                                 |
| 2,400                  | 5                          | 277               | ER-5KV           | 20 kΩ                          | 2.5                                 | 800                                 |
| 4,160                  | 5                          | 480               | ER-5KV           | 20 kΩ                          | 3                                   | 1,700                               |
| 7,200                  | 10                         | 416               | ER-15KV          | 100 kΩ                         | 2                                   | 170 x 5 = 850                       |
| 14,400                 | 15                         | 554               | ER-15KV          | 100 kΩ                         | 3                                   | 340 x 5 = 1,700                     |

DISCLAIMER: The above table is for illustrative purposes only. Actual values may differ based on a variety of individual system considerations, such as capacitive charging current and coordination study results.

### Wiring Diagram



### Specifications

- IEEE Device Numbers** Ground Fault (50G/N, 51G/N, 59N), Checking Relay (3), Lockout Relay (86)
- Input Voltage** See ordering information
- Dimensions** **H** 213 mm (8.4"); **W** 98 mm (3.9"); **D** 132 mm (5.2")
- GF Trip-Level Settings** 2-100% of CT-Primary Rating in 1% increments
- GF Trip-Time Settings** 0.1-10 s
- V<sub>n</sub> Trip-Level Settings** 20-2,000 Vac (≤5 kV systems) 100-10,000 Vac (>5 kV systems)
- Contact Operating Mode** Selectable fail-safe or non-fail-safe (K1, K2, K3)
- Harmonic Filtering** Standard feature
- Reset Button** Standard feature
- Output Contacts** Two Form A and two Form C
- Pulsing Circuit** 1.0-3.0 s in 0.2 s increments (SE-330 only)
- Approvals** CSA certified, UL Listed (E340889), CE (European Union), RCM (Australian)
- Communications** Mini USB (standard); DeviceNet (optional), IEC 61850 (optional), Modbus TCP and EtherNet/IP (optional)
- Analog Output** 4-20 mA, self or loop powered
- Conformally Coated** Standard feature
- Warranty** 5 years
- Mounting** Panel and Surface (optional)

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