



Bulletin 193 E3 and E3 Plus Overload Relays External Current Transformer Application

(Cat 193-EC _ ZZ)



ATTENTION: To prevent electrical shock, disconnect from power source before installing or servicing. Install in suitable enclosure. Keep free from contaminants.



ATTENTION: The E3 Plus overload relay Catalog Number 193-EC2ZZ is **not** a Ground Fault Circuit-Interrupter for personnel protection as defined in article 100 of the U.S. National Electrical Code.

Product Description

E3 and E3 Plus overload relays (cat. no. 193-EC_ZZ) are designed for use with external, separately mounted, customer supplied current transformers as required in higher current applications. The overall FLA Setting range is 9...5000A for these units. However, the "legal" FLA setting range is based upon the selected current transformer ratio as specified in Table 1 below. Parameter 78, *CT Ratio*, is provided for setting the current transformer ratio to be installed. The E3 Plus overload relay (cat. no. 193-EC2ZZ) can also provide ground fault protection when wired to the external core balance ground fault sensor (Cat No. 825-CBCT).

Table 1. CT Ratio / FLA Setting Range Correspondence

CT Ratio	FLA Setting (A)	CT Ratio	FLA Setting (A)	CT Ratio	FLA Setting (A)
50:5	9...45	300:5	60...302	1200:5	240...1215
100:5	18...90	500:5	84...420	2500:5	450...2250
150:5	28...140	600:5	125...630	5000:5	1000...5000
200:5	42...210	800:5	172...860		



ATTENTION: Improper configuration of the CT Ratio parameter can result in the E3 overload relay reporting inaccurate motor operational data, and possibly motor damage.

IMPORTANT: The E3 overload relay will flash an amber configuration warning (13-flash sequence) when the FLA setting is outside of the "legal" FLA range associated with the selected CT Ratio setting (e.g. CT Ratio set to 300:5 and FLA Setting set to 50A).

Current Transformer Specifications

The 193-EC_ZZ E3 overload relays are intended for use with Current Transformers (CT's) with a secondary current rating of 5A. The installer shall provide one CT for each motor phase, and shall connect the CT's secondary leads to the appropriate E3 overload relay power terminals as shown in Figure 2. The CT's shall have an appropriate ratio rating as detailed in Table 1 above. Additionally, the CT shall be selected to be capable of providing the required VA to the secondary load, which includes the E3 overload relay burden of 0.1 VA at the rated secondary current and the wiring burden. Finally, the CT shall be rated for *protective relaying* to accommodate the high inrush currents associated with motor start-up, and shall have an accuracy of $\leq \pm 2\%$ over its normal operating range. Typical CT ratings include (Instrument Transformers, Inc. - Model #23 or equivalent):

ANSI (USA)	Class C5 B0.1
CSA (Canada)	Class 10L5
IEC(Europe)	5VA Class 5P10

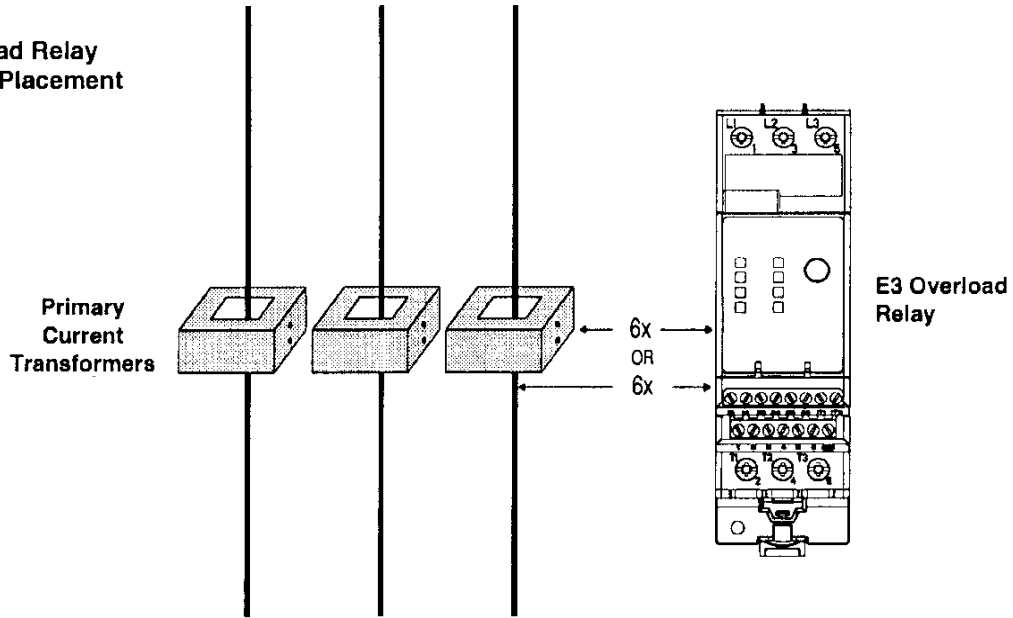


ATTENTION: The improper selection of a current transformer can result in the E3 overload reporting inaccurate motor data, and possibly motor damage. The selected current transformer must be rated for protective relaying applications

E3 Overload Relay Installation Instructions

E3 overload relay catalog numbers 193-EC_ZZ are designed to be installed in panel mount adapter catalog number 193-ECPM2 and connected to separately mounted current transformers. For panel mount adapter assembly instructions, refer to the panel adapter instruction sheet. The E3 overload relay must be mounted a distance equal to or greater than six times the cable diameter (including insulation) from the nearest current carrying conductor or current transformer. For applications employing multiple conductors per phase, the diameter of each cable should be added and multiplied by the factor six in determining proper placement of the E3 overload relay.

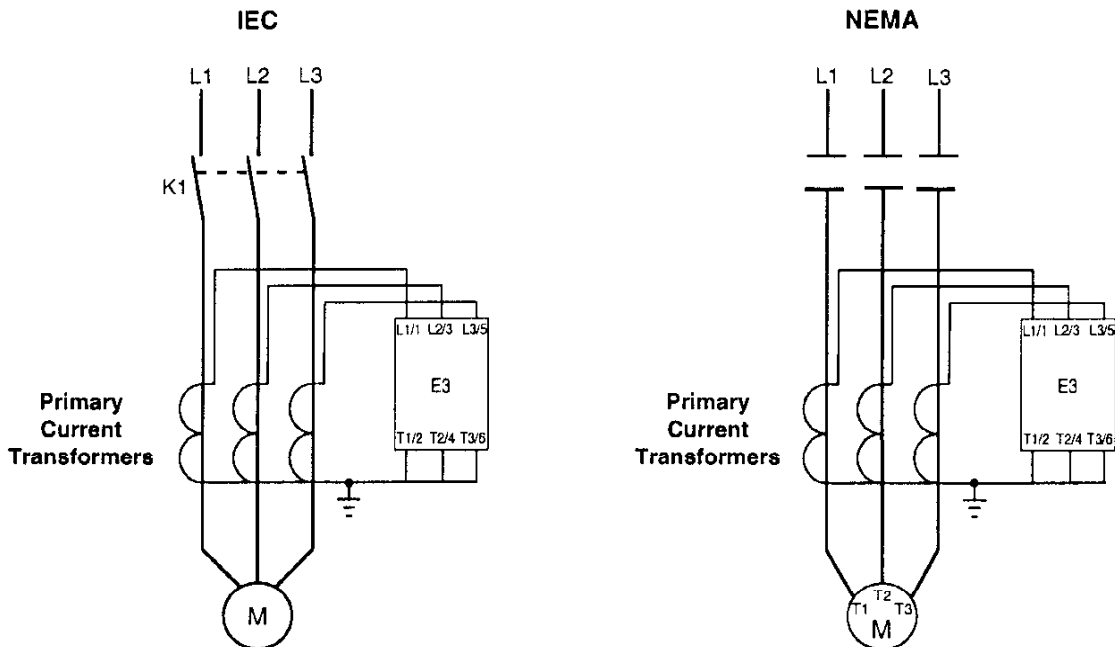
Figure 1
E3 Overload Relay
Mounting Placement



ATTENTION: Placement of the E3 overload relay closer than the recommended distance of six times the cable diameter may compromise its current reporting and protection capabilities.

Current Transformer - E3 Overload Relay Connection

Figure 2
Typical Wiring Diagrams



Refer to Chapter 2 of the user manual (publication 193-UM001_-US-P) for typical control circuit wiring diagrams.

Ground Fault Sensor Installation Instructions

The E3 Plus overload relay (cat. no. 193-EC2ZZ) is intended to provide ground fault protection when used with the external ground fault (core balance) sensor (cat. no. 825-CBCT). The ground fault sensor mounts separately from the E3 Plus overload relay and must be placed within three meters of the 193-EC2ZZ. The customer supplied cable for wiring the sensor to the E3 overload relay should meet the specifications outlined in Table 2.

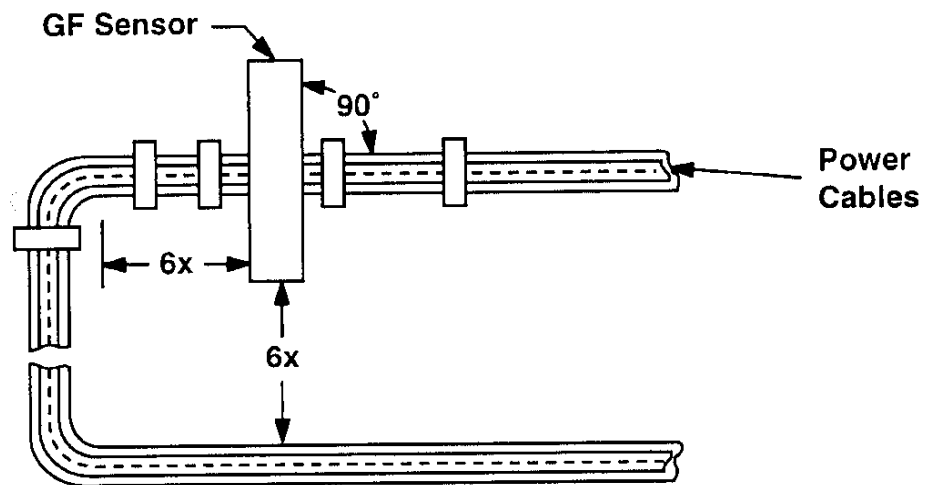
Table 2. Ground Fault Sensor Cable Specifications

Wire Type	Shielded, twisted pair
Cross Section	0.2...4.0 mm ² (24...12AWG)
Torque	0.55 Nm (5 lb-in.)

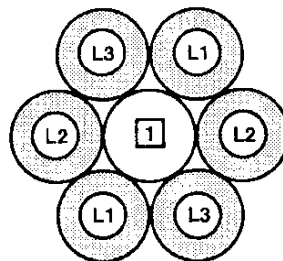
Power Wiring Installation Instructions

1. All power wires (including the neutral when used) must pass through the sensor window. The equipment ground conductor (the conductor used to connect the noncurrent-carrying metal parts of equipment as defined by Article 100 of the NEC) must not pass through sensor window.
2. The power wires through the sensor window should be straight, tightly bundled, centered in the window, and perpendicular to the sensor for a distance equal to or greater than six times the cable diameter (see Figure 3). All other conductors with available currents in excess of 1,000 amperes should be placed a distance equal to or greater than six times the cable diameter (including insulation) from the sensor. For applications employing multiple conductors per phase, the diameter of each cable should be added and multiplied by the factor six in determining proper sensor placement. Refer to Figure 4 for additional guidelines concerning multiple conductor applications.
3. The power wires of the branch circuit to be protected by the E3 Plus overload relay must not be grounded on the load side of the sensor.
4. If the power wires are enclosed in a conducting jacket, this jacket must be grounded only on the line side of the sensor. The jacket must not pass through the sensor window, but must be cut at the window and joined with a conductor that passes outside the sensor window.
5. The power system may be solidly grounded or grounded through an impedance at its source as long as the impedance allows a magnitude of current to flow that is within the 1...5 ampere operational range of the E3 Plus overload relay.

**Figure 3
Ground Fault Sensor
Mounting Placement**



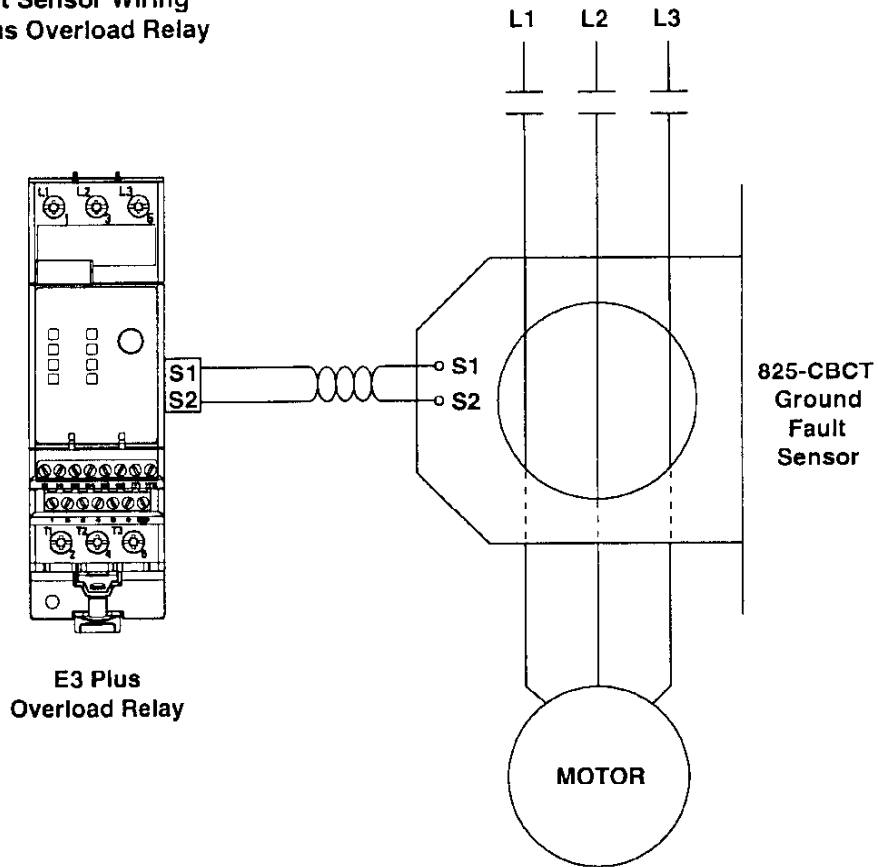
**Figure 4
Power Cable Configuration -
Two Cables per Phase**



- 1 The spacer is a short (approximately 10 times the cable diameter in length) piece of cable with no connections to any terminal.

Ground Fault Sensor - E3 Overload Relay Connection

Figure 5
Ground Fault Sensor Wiring
to the E3 Plus Overload Relay



IMPORTANT: The shield of the twisted pair cable must be connected to earth ground at the sensor, with no connection made at the E3 Plus overload relay.
