

E100 Electronic Overload Relay

Catalog Numbers 193, 592



Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.



WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.

IMPORTANT Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.



SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.



BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.



ARC FLASH HAZARD: Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

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About This Publication

This manual describes how to install, configure, operate, and troubleshoot the E100™ Electronic Overload Relay.

Summary of Changes

Topic	Page
Corrected Ground Fault trip adjustment range	11
Added footnotes to 193-ERID and 193-E1ERIDN Remote Indication and Display Module Fault/Status Codes table.	17

Terminology

Throughout this publication, we also refer to the E100 Electronic Overload Relay as the E100 overload relay and E100 relay. These terms are interchangeable.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
E100 Electronic Overload Relay Specifications, publication 193-TD013	Provides complete specifications for the E100 Electronic Overload Relay.
Bulletin 193 Core Balanced Ground Fault Sensor Application and Installation Instructions, publication 193-IN047	Provides instruction about how to install and apply 193-CBCT core balanced ground fault sensors.
E100 Overload Relay Application and Installation Instructions (IEC), publication 193-IN081	Provides instruction about how to install the E100 Overload Relay onto 100-C and 100-D contactors.
E100 Ground Fault/Jam and Remote Reset Module Application and Installation, publication 193-IN082	Provides instruction about how to install and apply the ground fault/jam and remote reset module.
E100 Overload Relay with Pass-thru Wiring Application and Installation Instructions, publication 193-IN083	Provides instruction about how to install the E100 Overload Relay with the pass-thru wiring option.
E100 External Current Transformer Overload Relay Application and Installation Instructions, publication 193-IN084	Provides instruction about how to install the Advanced E100 Overload Relay.
E100 Overload Relay Remote Reset Installation, publication 193-IN085	Provides instruction about how to install and set up the remote reset module.
E100 DIN Rail or Panel Adapter Installation, publication 193-IN086	Provides instruction about how to install the E100 relay onto DIN Rail or the panel adapter.
E100 Remote Indication Display Application and Installation, publication 193-IN087	Provides instruction about how to install and set up the remote status indication module.
E100 Overload Relay Application and Installation Instructions (NEMA), publication 592-IN021	Provides instruction about how to install the E100 Overload Relay onto 500 line contactors.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website: rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at rok.auto/literature.

Notes:

Product Overview

This chapter provides an overview of the E100™ Electronic Overload Relay.

Description

The E100 Electronic Overload Relay is the newest technology for overload protection, and supports both single- and three-phase operation in a single component.

The device is split between two offerings: a Basic (Cat. No. 193-1EE) and Advanced (Cat. No. 193-1EF, 592-1EF) version. The Basic offering allows adjustable trip current and limited trip class selection. The Advanced version offers the same adjustable trip current, a larger selection of trip classes, and the ability to add additional accessory modules.

The E100 relay provides the following benefits:

- Electronic overload detection
- Simple configuration
- Selectable trip class
- Adjustable trip current
- Integration with both IEC and NEMA contactors
- Test and Reset buttons
- Auto/Manual reset selection
- RMS Current sensing (50/60 Hz)
- External current transformers
- Direct and Pass-through mounting

The E100 relay lets you add accessory modules through the front-mounted communication port. Accessories include:

- Ground Fault/Jam Protection Module (193/592-1EF only)
- Remote Reset Solenoid
- Anti-Tamper Shield
- Reset Adapter
- Panel Adapter
- Remote Indication Display, with or without Reset (193/592-1EF only)

Notes:

System Operation and Configuration

This chapter provides instructions about how to operate and configure an E100™ Electronic Overload Relay system. It contains instructions about how to set the Trip Current and Trip Class. This chapter also describes the accessory modules that are available for the Advanced (193/592-1EF) E100 relay.

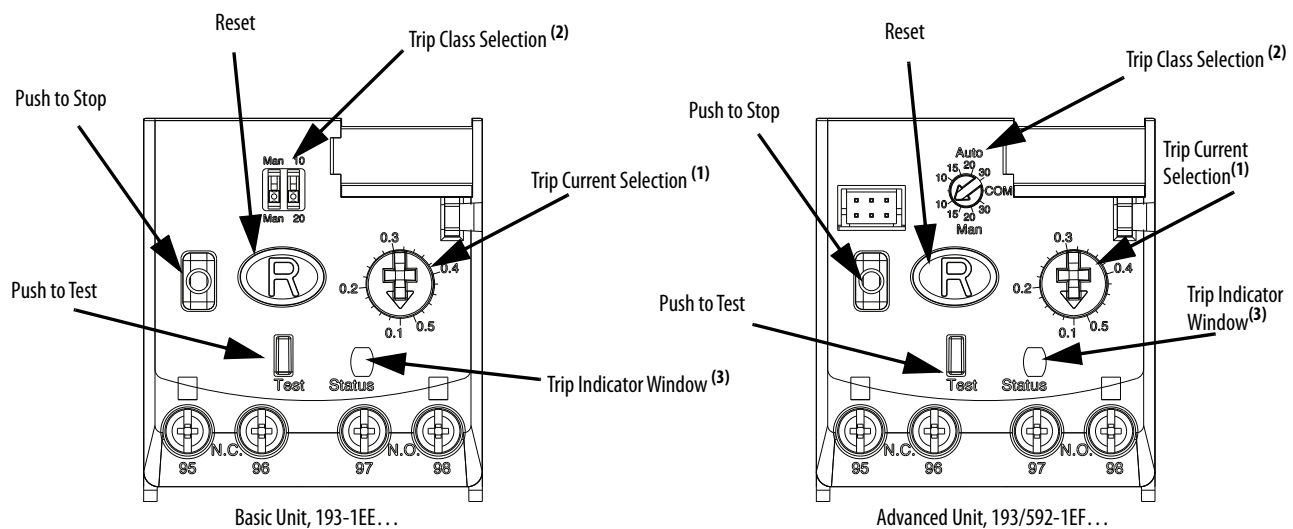
Before You Begin

Before you configure the E100 relay, you must install it onto a contactor or DIN Rail, or mount it on a panel. See [page 5](#) for a list of related installation instructions. You can search for and download literature at rok.auto/literature.

Configure the Device

Use the rotary dials on the front of the unit to select the trip class and adjust the trip current.

Figure 1 - E100 Overload Relay Settings

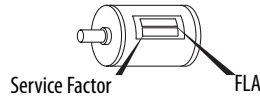


Note Number	Feature	Information
1	Trip Current Selection	To adjust the trip current, turn the dial until the desired current is aligned with the pointer. Trip rating is 120% of dial setting value. Minimum setting is 0.1 FLA.
2	Trip Class Selection	Use this setting to select the desired trip class. Basic units only support manual reset operations. Manual DIP switch position is independent of relay function and trip class. On advanced units, use this setting to select between automatic and manual reset modes.
3	Trip Indicator Window	The red status indicator is illuminated when the unit has tripped.

Set the Trip Current

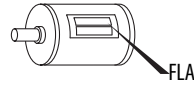
When you set the trip current, you must consider the motor service factor and FLA. You can find this information on the motor nameplate, as shown in [Table 1](#) and [Table 2](#).

Table 1 - Service Factor/Motor FLA Dial Settings



Service Factor	Trip Current Setting
<1.15	0.9 x FLA
≥ 1.15	1 x FLA
YΔ (Star-Delta)	FLA/1.73

Table 2 - Service Factor/Motor FLA Dial Settings



Service Factor	Trip Current Setting
YΔ (Star-Delta)	FLA/1.73
Direct-on-line	1 x FLA

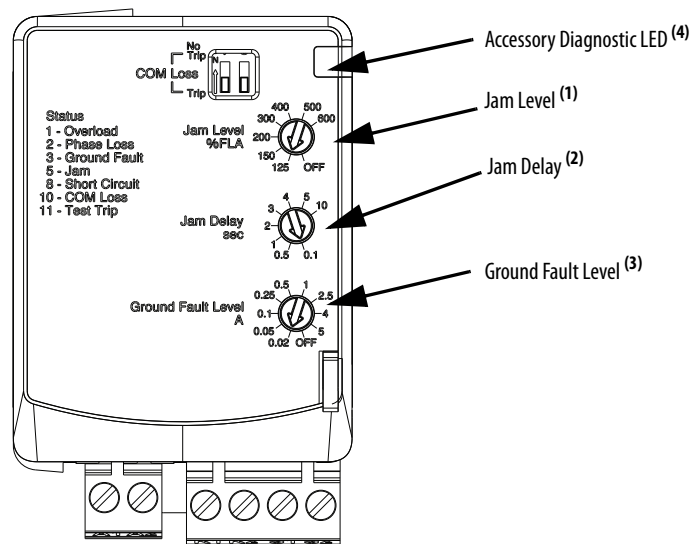
Configure Accessory Modules

This section describes how to configure the accessory modules for the Advanced version (193/592-1EF) of the E100 relay. You must correctly install the accessories before you configure them. See [page 5](#) for a list of related installation instructions.

Cat. No. 193-1EGJ Universal Protection Expansion Module

The Cat. No. 193-1EGJ E100 Universal Protection expansion module adds Ground fault and Jam protection to the Advanced version (193/592-1EF) of the E100 relay. The add-on module lets you select the jam current level, jam trip delay, and ground fault level.

Figure 2 - Cat. No. 193-1EGJ Universal Protection Expansion Module Settings

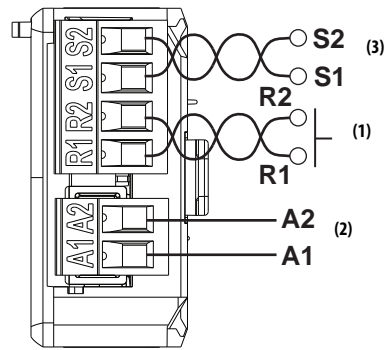


Note Number	Feature	Information
1	Jam Level Selection	Set the FLA percentage for Jam Protection. Selectable from 125...600% FLA.
2	Jam Delay Selection	Set the time delay for a Jam Trip to occur. Customizable from 0.1...10 seconds.
3	Ground Fault Level Selection	Set the current level for a Ground Fault Trip to occur. Customizable from 0.02...5 A.
4	Accessory Diagnostic LED	For more information about the diagnostic LED codes, see Chapter 3 .

Wiring

[Figure 3](#) and [Figure 5](#) show the basic wiring for the 193-1EGJ Module.

Figure 3 - Cat. No. 193-1EGJ Universal Protection Expansion Module Wiring

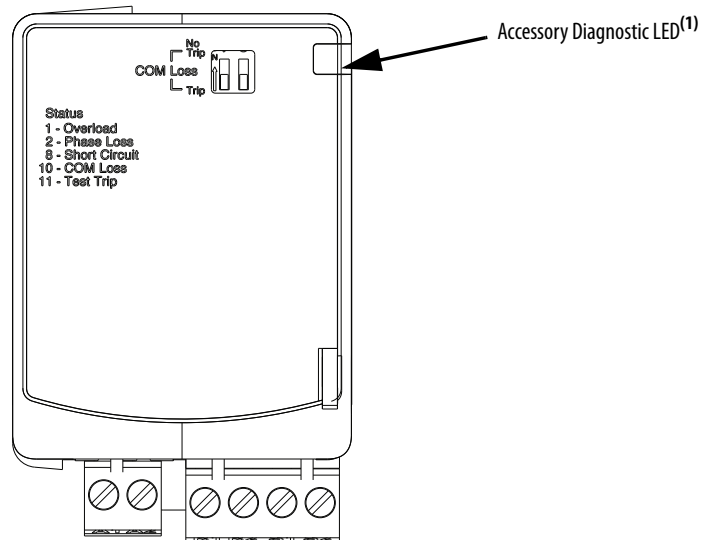


Note Number	Information
1	Terminals R1 and R2 are used with 193-ERID and 193-1ERIDN modules.
2	External power must be user supplied. 24...240V, 47...63 Hz or DC.
3	Reserved for 193-CBCT external ground fault current sensor.

Cat. No. 193-1ERR Electronic Reset and Indication Display Module

The Cat. No. 193-1ERR Electronic Reset and Indication Display Module lets you use the Cat. No. 193-ERID and 193-ERIDN Remote Indication and Display module with your Advanced version (193/592-1EF) of the E100 relay.

Figure 4 - Cat. No. 193-1ERR Electronic Reset and Indication Display Module

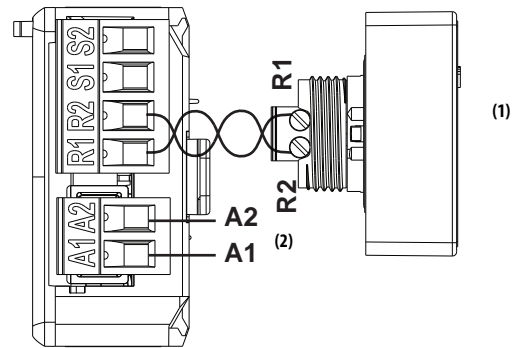


Note Number	Feature	Information
1	Accessory Diagnostic LED	For more information about the diagnostic LED codes, see Chapter 3 .

Wiring

[Figure 3](#) and [Figure 5](#) show the basic wiring for the 193-1ERR Module.

Figure 5 - Cat. No. 193-1ERR Electronic Reset and Indication Display Module Wiring

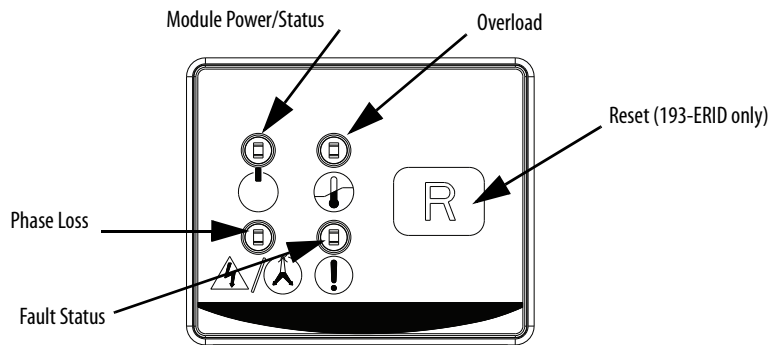


Note Number	Information
1	Cat. No. 193-ERID or 193-1ERIDN Remote Indication and Display module.
2	External power must be user supplied. 24...240V, 47...63 Hz or DC.

Cat. No. 193-ERID or 193-1ERIDN Remote Indication and Display Module

The remote indication and display modules let you view the status of the E100 relay from the front of a panel. Cat. No. 193-ERID also features a reset button. The light-emitting diode (LED) status indicators notify you of the status of the overload relay.

Figure 6 - Cat. No. 193-ERID and 193-1ERIDN Remote Indication and Display Module Features



See [page 17](#) for information about the fault and status codes for the remote indication and display modules.

[Figure 3](#) and [Figure 5](#) show the basic wiring for the 193-ERID and 193-1ERIDN Modules.

Notes:

Troubleshooting

This chapter helps you troubleshoot the E100™ Electronic Overload Relay by using the diagnostic LED status indicators. It also guides you through troubleshooting associated accessory modules.



ATTENTION: Servicing energized industrial control equipment can be hazardous. Electrical shock, burns, or unintentional actuation of controlled industrial equipment may cause death or serious injury. For safety of maintenance personnel and others who may be exposed to electrical hazards associated with the maintenance activities, follow the local safety-related work practices (for example, the NFPA 70E, Part II, Electrical Safety for Employee Workplaces, in the United States) when working on or near energized equipment. Maintenance personnel must be trained in the safety practices, procedures, and requirements that pertain to their respective job assignments. Do not work alone on energized equipment.



ATTENTION: Do not attempt to defeat or override fault circuits. The cause of a fault indication must be determined and corrected before attempting operation. Failure to correct a control system or mechanical malfunction may result in personal injury and/or equipment damage due to uncontrolled machine system operation.

E100 Electronic Overload Relay

All E100 relay units include a trip indicator window on the front of the unit labeled “Status”. If the red indicator is not visible, the overload relay is not tripped. If the red indicator is visible, the overload relay is tripped.

Accessory Modules

Universal Protection Module and Remote Reset Module

The Universal Protection Module and the Remote Reset Module both include an LED status indicator that shows the state of the E100 relay. The modules are supplied with external power, so in the event of a fault event, the status LEDs still operates.

Table 3 - 193-1EGJ and 193-1ERR Remote Indication and Display Module Fault/Status Codes

Status Indicator Color	Solid/Flashing	Description	Solution
Green	Flashing	Module powered	—
	Solid	Module powered and motor current present	—
Amber	Flashing	Warning	
Red	Flashing	Fault detected and overload relay tripped	
	Solid	Hardware fault; internal hardware fault detected and overload relay trip attempted	<ul style="list-style-type: none"> Recover fault by cycling overload relay accessory supply voltage Verify that the supply voltage is within limits Verify the wiring to the terminals is correct Verify that the pins that connected the accessory to the overload relay are not damaged or misaligned Verify the operating temperature of the devices is within specification limits

The status LED indicates the module status by flashing a red trip code. The number of flashes followed by a pause identifies the specific trip code as shown in [Table 4](#)

Table 4 - Trip Code Identification

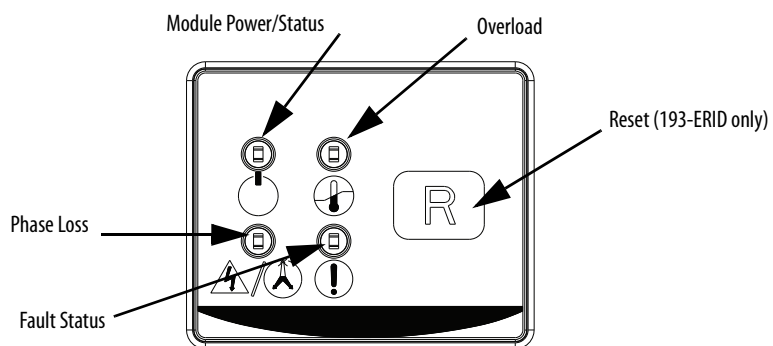
No. of Flashes	Trip Type
1	Overload Trip
2	Phase Loss
3	Ground Fault
5	Jam
8	Short Circuit
10	COM Loss ⁽¹⁾
11	Test Trip

(1) If you experience repeated COM Loss trips, this may be due to a damaged communication interface cable. To test whether this is the case, unplug the communication interface cable from the communication port and wait at least 3 seconds before re-connecting. If the issue persists, consider replacing the communication interface cable.

Remote Indication Display





There are four LED status indicators on the front of the Cat. No. 193-ERID and 193-1ERIDN modules. These status indicators show Module Power/Status, Overload, Phase Loss, and Fault Status. See [Figure 7](#)

Figure 7 - Cat. No. 193-ERID and 193-E1ERIDN Remote Indication and Display Module Features



[Table 5](#) lists the fault and status codes for the remote indication and display modules.

Table 5 - 193-ERID and 193-E1ERIDN Remote Indication and Display Module Fault/Status Codes

Status Indicator	Symbol	Status Indicator Color	Solid/Flashing	Description
Module Power/Status		Green	Flashing	Module powered
			Solid	Module powered and motor current present
Overload		Red	Solid	Hardware fault
		Amber	Flashing	Overload warning ⁽¹⁾
Phase Loss		Red	Solid	Short Circuit Trip
			Flashing	Phase Loss Trip
Fault Status		Amber	Flashing	Phase Loss Warning ⁽²⁾
		Red	3 Flashing	Ground Fault Trip ⁽³⁾
		Amber	3 Flashing	Ground Fault Warning
		Red	5 Flashing	Jam Trip
		Amber	5 Flashing	Jam Warning ⁽⁴⁾
		Red	9 Flashing	Welded Contact ⁽⁵⁾
		Red	10 Flashing	Comm Loss
Amber	10 Flashing	Comm Warning		
Red	11 Flashing	Test Trip		

- (1) An Overload warning occurs when the E100 overload reaches 90% thermal capacity utilization (TCU). The overload trips at 100% TCU.
- (2) Phase Loss warning is active if the overload detects a Phase Loss condition. The warning is maintained for 3 seconds before a Phase Loss Trip occurs.
- (3) A Ground Fault trip occurs if the configured Ground Fault Level is reached for 100 ms.
- (4) A Jam warning is active if the measured FLA is greater than the set Jam Level. The warning is active until the Jam Delay is reached. At this point, the overload relay trips.
- (5) Does not apply to the E100 relay.

Notes:

Wiring Diagrams

E100 Wiring Configurations

The following pages illustrate various wiring configurations for the E100™ Electronic Overload Relay.

Figure 8 - 3-Phase, Full-voltage Direct-on-line Starter, NEMA Symbology

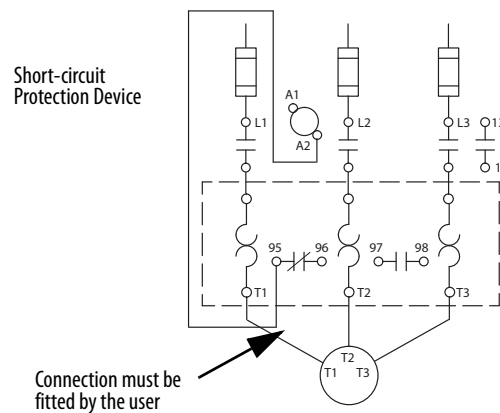


Figure 9 - 3-Phase, Full-voltage Direct-on-line Starter, IEC Symbology

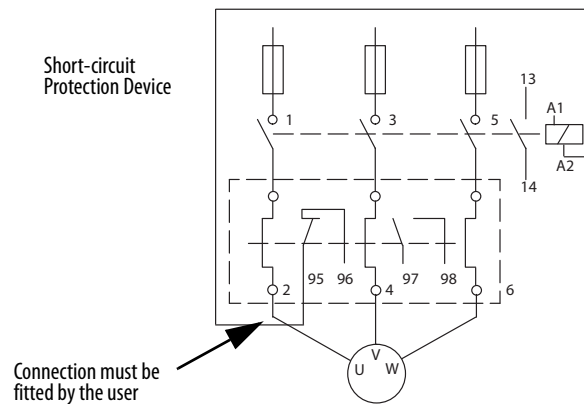


Figure 10 - 1-Phase, Full-voltage Direct-on-line Starter, NEMA Symbology

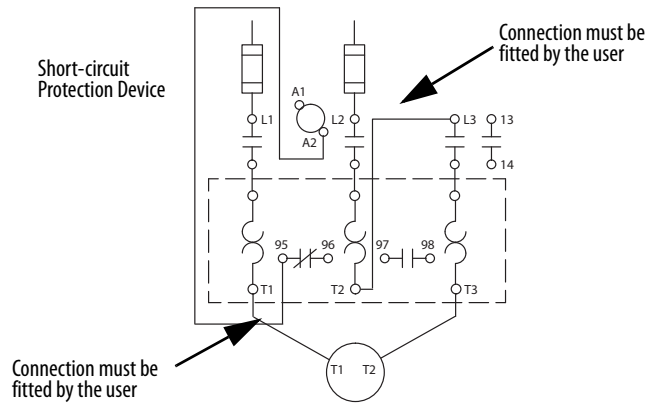


Figure 11 - 1-Phase, Full-voltage Direct-on-line Starter, IEC Symbology

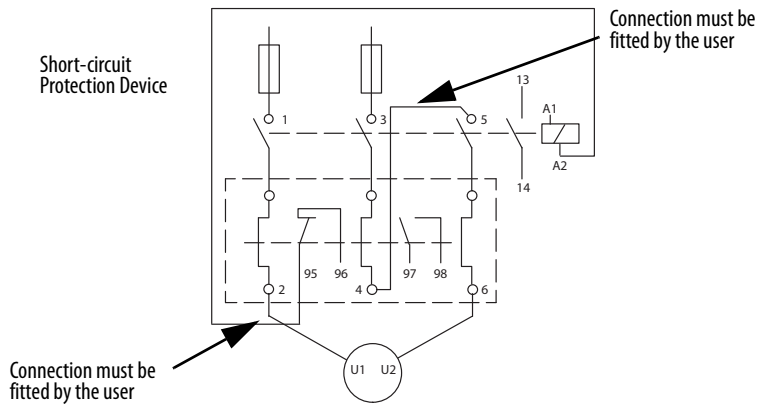
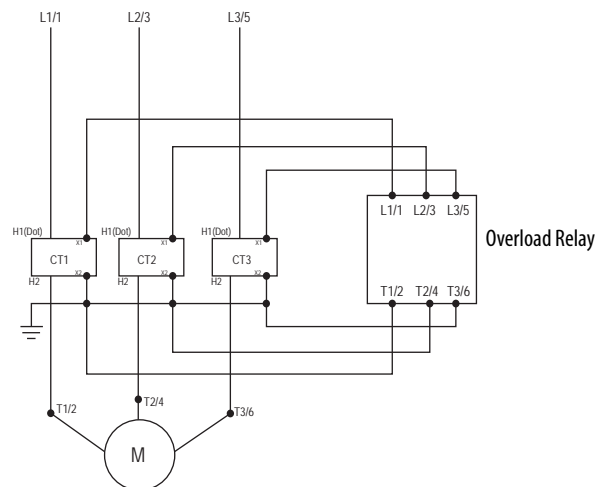


Figure 12 - E100 Overload Relay with External Current Transformer



For more information about how to install an external Current Transformer, see Bulletin 193 Core Balanced Ground Fault Sensor Application and Installation Instructions, publication [193-IN047](#).

Notes:

Rockwell Automation Support

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	rok.auto/support
Knowledgebase	Knowledgebase Articles	rok.auto/knowledgebase
Local Technical Support Phone Numbers	Locate the phone number for your country.	rok.auto/phonesupport
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	rok.auto/pcdc

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