User Manual

Original Instructions

Allen-Bradley

E200 Electronic Overload Relay/Parameter Configuration Module

Bulletin 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).

Chapter 3

System Operation and Configuration

Chapter 4

Operating Modes

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Protective Trip and Warning Functions

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Appendix A

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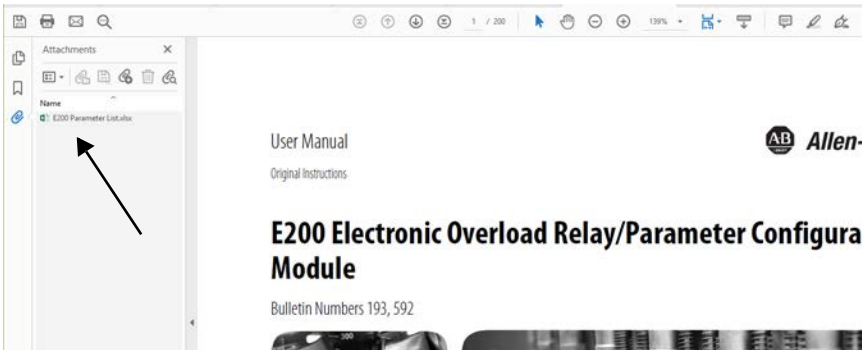
This manual describes how to install, configure, operate, and troubleshoot the E200™ Electronic Overload Relay.

Access Relay Parameters

The Microsoft Excel spreadsheet that is attached to this PDF file details the E200 parameters. To use a spreadsheet file, click the Attachments link and right-click and save the desired file.

If the PDF file opens in a browser and you don't see the Attachments link , download the PDF file and then reopen the file with the Adobe Acrobat Reader application. For full functionality (filter and search), use the Microsoft Excel application.



Additional Resources

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

Resource	Description
E200 Electronic Overload Relay Installation Instructions, publication 193-IN080	Provides complete user information for the E200 Electronic Overload Relay.
E300/E200 Electronic Overload Relay Specifications, publication 193-TD006	Provides complete specifications for the E200 Electronic Overload Relay.
E300/E200 Operator Station, Installation Instructions, publication 193-IN061	Provides complete user information for the E300/E200 Operator Station.
Connected Components Workbench Software Quick Tips, publication 9328-SP002	Provides general overview of the Connected Components Workbench Software.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, https://rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at http://www.rockwellautomation.com/global/literature-library/overview.page. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Notes:

Overview

The E200™ Electronic Overload Relay is the newest part of the E300™ product portfolio. This device is a Parameter Configuration module communication option that is targeted for non-networked (remote) electronic motor overload protection applications. The E200 overload relay is configurable using the Connected Components Workbench™ software. The E200 relay features a single Type B USB interface port, three rotary dials to set the full-load current (FLA) for the application, and an 8-position DIP switch to select trip class and features.

Like the other products in the portfolio, the E200 relay modular design, diagnostic information, simplified wiring, and integration with Connected Components Workbench software make it the ideal overload for motor control applications in an automation system.

E200 Electronic Overload Relays provide the following benefits:

- Intelligent motor control
- Scalable solution
- Diagnostic Information
- Integrated I/O
- Adjustable trip class 5...30
- Wide current range
- Test/Reset button
- Programmable trip and warning settings
- True RMS current/voltage sensing (50/60 Hz)
- Protection for single- and three-phase motors

The E200 relay consists of three modules: sensing, control and communications. You have choices in each of the three with additional accessories to tailor the electronic overload for your application's exact needs.

The E200 overload relay is an overload system configured with the 193-ECM-PCM Parameter Configuration Module communication option. The communication module determines whether the complete assembled device is an E300 or an E200 overload relay.

Module Descriptions and Features

Single-/Three-Phase Operation

You can apply the E200 Electronic Overload Relay to three-phase and single-phase applications. Straight-through wiring is available in both cases.

The E200 overload relay has 54 operating modes that provide motor control functionality for the following motor starter types:

- Overload
- Non-reversing starter

- Reversing starter
- Wye/Delta (Star/Delta) starter
- Two-speed starter
- Monitoring device

Thermal Overload Features

Feature	Description
Thermal Utilization	Based RMS current measurement, the overload relay calculates a thermal model that simulates the actual heating of the motor. Percent of thermal capacity utilization (%TCU) reports this calculated value. An overload trip occurs when the value reaches 100%.
Adjustable Settings	Configure thermal overload protection by programming the motor's full load current (FLC) rating and the desired trip class (5 . . . 30). Programming the actual values via software ensures the accuracy of the protection.
Thermal Memory	A thermal memory circuit approximates the thermal decay for a Trip Class 20 setting. This means that the thermal model of the connected motor is maintained at all times, even if the supply power is removed.
Reset Modes	You can select between manual and automatic reset for an overload trip. The point of reset is adjustable from 1 . . . 100% TCU.
Time to Trip	During an overload condition, an estimated time to trip is calculated.
Time to Reset	Following an overload trip, a reset does not occur until the calculated percentage of thermal capacity utilization falls below the reset level. As this value decays, the time to reset adjusts accordingly.
Thermal Warning	A thermal warning bit is set when the calculated percentage of thermal capacity utilization exceeds the programmed thermal warning level, which has a setting range of 0 . . . 100% TCU.
Two-Speed Protection	There is a second FLA setting for 2-speed motor protection. What used to require two separate overload relays - one for each set of motor windings - is now accomplished with one device.

Current Monitoring Functions

The E200 Electronic Overload Relay lets you monitor the following operational data over a communications network:

- Individual phase currents — in amperes
- Individual phase currents — as a percentage of motor FLA
- Average current — in amperes
- Average current — as a percentage of motor FLA
- Percentage of thermal capacity utilized
- Current imbalance percentage
- Ground fault current

Feature	Description
Jam (Overcurrent)	The overload relay can take a motor off-line in the event of a mechanical jam. Trip adjustments include a trip setting adjustable from 50 . . . 600% FLA and a trip delay time with a range of 0.1 . . . 25.0 seconds. A separate warning setting is adjustable from 50 . . . 600% FLA.
Underload (Undercurrent)	A sudden drop in motor current can signal conditions such as: • Pump cavitation • Tool breakage • Belt breakage Monitoring for an underload event can provide enhanced protection for motors. The underload trip and warning settings are adjustable from 10 . . . 100% FLA. The trip function also includes a trip delay time with a range of 0.1 . . . 25.0 seconds.
Current Imbalance (Asymmetry)	Current imbalance trip and warning settings are adjustable from 10 . . . 100%. The trip function also includes a trip delay time with a range of 0.1 . . . 25.0 seconds.
Stall	Stall is a condition where the motor is not able to reach full-speed operation in the appropriate amount of time required by the application. This can result in motor overheating, as current draw is in excess of the motor's full load current rating. The adjustable stall protection has a trip setting with a range of 100 . . . 600% FLA, and the enable time is adjustable up to 250 seconds.
Phase Loss	Configurable phase loss protection lets you enable or disable the function plus set a time delay setting, adjustable from 0.1 . . . 25.0 seconds. The trip level is factory set at a current imbalance measurement of 100%.

Ground (Earth) Fault

The E200 Electronic Overload Relay incorporates zero sequence (core balance) sensing into its design for low level (arcing) ground fault detection. Trip and warning settings are adjustable from 20 mA...5.0 A. For devices rated greater than 200 A and for ground fault detection less than 0.5 A, the external core balance current transformer accessory is required. This particular detection has been evaluated for compliance with Ground-Fault Sensing calibration and operating times from the Standard for Ground-Fault Sensing and Relaying Equipment per UL 1053.. The E200 Electronic Overload Relay provides a max. trip-inhibit setting, offering flexibility to help prevent tripping when the ground fault current magnitude exceeds 6.5 A. This can be useful to guard against the opening of the controller when the fault current could potentially exceed the controller's interrupting capacity rating.

Note: The E200 Electronic Overload Relay is not a Ground Fault Circuit Interrupter for personnel protection (or Class I) as defined in article 100 of the U.S. National Electric Code.

IMPORTANT For applications that require ground fault detection and use the pass-through sensing module, this feature is only active when native motor current is present in the pass-through apertures; that is, no external step-down current transformers (CTs). You must use an external ground fault sensor for any applications that require external step-down CTs.

Control Module Features

The control module inputs support the connection of devices such as contactors, disconnect auxiliary contacts, pilot devices, limit switches, and float switches. Inputs are rated 24V DC, 120V AC, or 240V AC and are current sinking. Power for the inputs is sourced separately with customer sources. Relay contact outputs can be controlled via the network or DeviceLogix™ function blocks for performing such tasks as contactor operation.

The DeviceLogix engine lets you program custom motor control algorithms. You can write programs for distributed control applications or to turn off a motor smoothly when the network or programmable logic controller is unexpectedly lost.

Control Voltage	I/O		I/O and Protection[1]	
	Inputs	Relay Outputs	Inputs	Relay Outputs
110…120V AC, 50/60 Hz	4	3	2	2
	2	2		
220…240V AC, 50/60 Hz	4	3	2	2
	2	2		
24V DC	6	3	4	2
	2	2		

(1) Includes PTC thermistor and external ground fault.

The control module also monitors positive temperature coefficient (PTC) thermistors.

Sensing Module Features

The E200 sensing module with voltage, current, and ground fault current provides the following:

Feature	Description
Voltage Protection	Protect against voltage issues (such as undervoltage, voltage imbalance, phase loss, frequency, and phase rotation).
Power Protection	Monitor and protect for both excessive and low real power (kW), reactive power (kVAR), apparent power (kVA), and power factor for a specific application (such as pump applications).
Voltage, Power, and Energy Monitoring	Monitor voltage, current, power (kW, kVAR, and kVA), energy (kWh, kVARh, kVAh, kW Demand, kVAR Demand, and kVA Demand), and power quality (power factor, frequency, and phase rotation) down at the motor level.

The sensing module supports:

- Voltage/current/ground fault
- Current/ground fault
- Current
- Current Range [A]
- 0.5...30
- 6...60
- 10...100
- 20...200

Communication Module Features

The following communication module is available:

Communication Module	Description
Parameter Configuration Module (E200)	The Parameter Configuration Module (PCM) has one Type B USB interface port and supports the following: • Stand-alone non-networked applications • Configurable with Connected Components Workbench software • Three rotary dials to set Full Load Amps (FLA) • 8-position DIP switch for trip class and feature selection

Expansion Digital I/O

You can add up to four additional expansion digital modules to the E200 relay expansion bus.

- 4 inputs/2 relay outputs
- 24V DC
- 120V AC
- 240V AC

The remote trip function lets an external device (such as a vibration sensor) induce am trip. External device relay contacts are wired to the discrete inputs. These discrete inputs are configurable with an option for assigning the remote trip function.

Expansion Analog I/O

The E200 analog expansion module lets you protect against over-analog readings from analog-based sensors, such as overtemperature, overflow, or overpressure. The analog expansion module monitors resistance temperature detectors.

You can add up to four additional expansion analog modules to the E200 relay expansion bus.

- 3 universal analog inputs/1 analog output
- 0...10V
- 0...5V
- 1...5V
- 0...20 mA
- 4...20 mA
- RTD (2-wire or 3-wire)
- 0...150 Ω
- 0...750 Ω
- 0...3000 Ω
- 0...6000 Ω (PTC/NTC)

Expansion Power Supply Features

When more than one expansion digital module and one operator station are added to the E200 relay expansion bus, you need an expansion power supply to supplement power for the additional modules. One expansion power supply powers a fully loaded E200 relay expansion bus.

- 120/240V AC
- 24V DC

Expansion Operator Station Features

You can add one operator station to the E200 relay expansion bus to be used as a user interface device. The operator stations provide status indicators and function keys for motor control. The operator stations also support CopyCat™, which lets you upload and download configuration parameters. Using a Series B Control Module and Series B Control/Diagnostic station offers added functionality for the CopyCat feature by also allowing upload and download of any custom DeviceLogix programming. See publication 193-IN061D for more information about using the CopyCat feature.

- Control station
- Diagnostic station

External Current Transformer Options

For motor overload protection applications greater than 200 A, external current transformers (CTs) can be used to step down the main operating current. This also provides isolation for high current conductors and the E200 Overload Relay. There are different current ranges to select from and also different certification standards (for example, UL or CE) to which the respective CT kits conform.

- UL compliant CT types: 300 A and 600 A
- CE compliant CT types: 300 A and 400 A

Status Indicators

The E200 Electronic Overload Relay provides the following LED indicators:

- Power — This green/red LED indicates the status of the overload relay.
- TRIP/WARN — This LED flashes a yellow code under a warning condition and a red code when tripped.

Inputs/Outputs

Inputs allow the connection of such devices as contactor and disconnect auxiliary contacts, pilot devices, limit switches, and float switches. Input status can be monitored via the network and mapped to a controller's input image table. Inputs are rated 24V DC, 120V AC, or 240V AC and are current sinking. Power for the inputs is sourced separately with convenient customer sources at terminal A1. Relay contact outputs can be controlled via the network or DeviceLogix function blocks for performing such tasks as contactor operation.

Test/Reset Button

The Test/Reset button, which is located on the front of the E200 Electronic Overload Relay, lets you perform the following:

- Test — The trip relay contact opens if the E200 Electronic Overload Relay is in an untripped condition and the Test/Reset button is pressed for 2 seconds or longer.
- Reset — The trip relay contact closes if the E200 Electronic Overload Relay is in a tripped condition, supply voltage is present, and the Test/Reset button is pressed.

Single/Three-Phase Operation

You can apply the E200 Electronic Overload Relay to three-phase and single-phase applications. A programming parameter is provided for selection between single- and three-phase operation. Straight-through wiring is available in both cases.

Modular Design

You can select the specific options that you need for your motor starter application. The E200 relay consists of three modules: sensing, control, and communication. You can customize each of the three with accessories to tailor the electronic motor overload for your application's exact needs.

- Wide current range
- Sensing capabilities (Current, Ground Fault Current, and/or Voltage)
- Expansion I/O
- Operator interfaces

Communication Options

The E200 relay communicates via a USB connection to Connected Components Workbench software.

Diagnostic Information

The E200 relay provides a wide variety of diagnostic information to monitor motor performance, proactively alert you to possible motor issues, or identify the reason for an unplanned shutdown. Information includes:

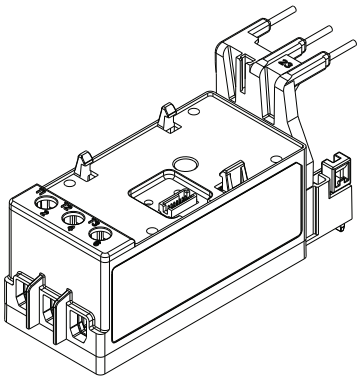
- Voltage, Current, and Energy
- Trip / Warning Histories
- % Thermal Capacity Utilization
- Time to Trip
- Time to Reset
- Operational Hours
- Number of Starts
- Trip Snapshot

Simplified Wiring

The E200 relay provides an easy means to mount to both IEC and NEMA Allen-Bradley® contactors. A contactor coil adapter is available for the 100-C contactor, which lets you create a functional motor starter with only two control wires.

Sensing Module

Figure 1 - Sensing Module



The sensing module electronically samples data about the current, voltage, power, and energy that are consumed by the electric motor internal to the module. You can choose from one of three varieties of the sensing modules depending on the motor diagnostic information that is needed for the motor protection application:

- Current Sensing
- Current and Ground Fault Current Sensing
- Current, Ground Fault Current, Voltage, and Power Sensing

The current ranges for each of three varieties of sensing module are as follows:

- 0.5...30 A
- 6...60 A
- 10...100 A
- 20...200 A

You can choose how the sensing module mechanically mounts inside the electrical enclosure. The following mounting mechanisms are available for the sensing module.

- Mount to the load side of an Allen-Bradley Bulletin 100 IEC Contactor
- Mount to the load side of an Allen-Bradley Bulletin 300 NEMA Contactor

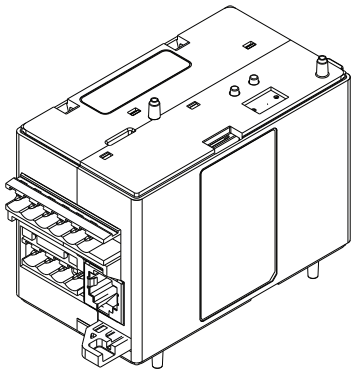
- Mount to the load side of an Allen-Bradley Bulletin 500 NEMA Contactor
- DIN Rail / Panel Mount with power terminals
- Replacement DIN Rail / Panel Mount with power terminals for an Allen-Bradley E3 Plus panel mount adapter
- DIN Rail / Panel Mount with pass-thru power conductors

Use the E200 relay sensing module with external current transformers. The following application guidelines should be adhered to when using an external CT configuration:

- You must mount the E200 Overload Relay a distance equal to or greater than six times the cable diameter (including insulation) from the nearest current-carrying conductor.
- For applications that use multiple conductors per phase, the diameter of each cable should be added and multiplied by six to determine the proper placement distance for the E200 Overload Relay.

Control Module

Figure 2 - Control Module



The control module is the base of the E200 relay and can attach to any sensing module. The control module performs all protection and motor control algorithms and contains the native I/O for the system. The control module has two varieties:

- I/O only
- I/O and protection (PTC and External Ground Fault Current Sensing)

The control module is offered in three control voltages:

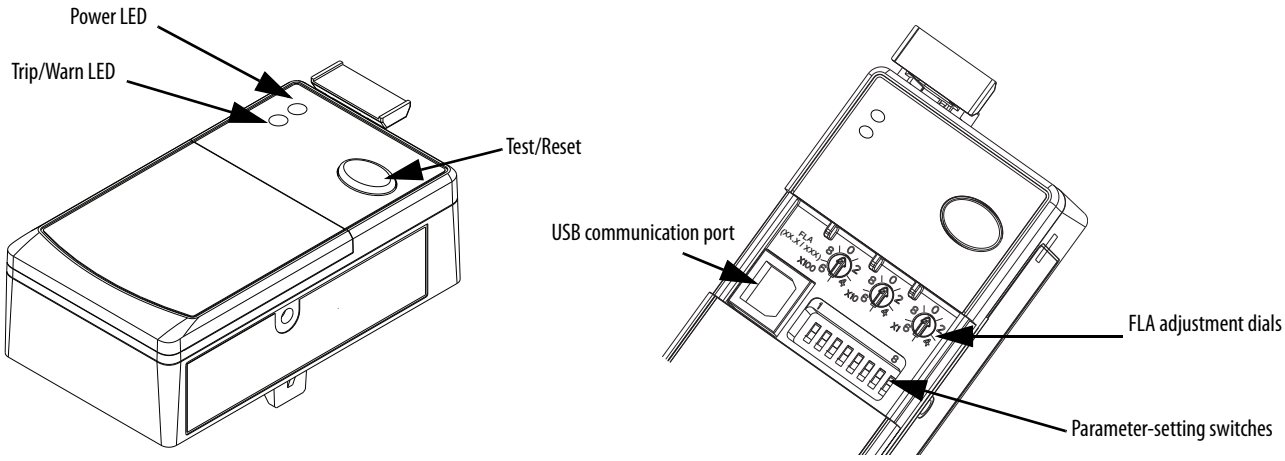
- 110...120V AC, 50/60Hz
- 220...240V AC, 50/60Hz
- 24V DC

The E200 relay requires external control voltage to power and activate the digital inputs.

Communication Module

The parameter configuration module lets the E200 relay integrate into an automation system, and it can attach to any control module. Set the full-load current with rotary turn dials; the module uses diagnostic status indicators to provide system status at the panel.

Figure 3 - Parameter Configuration Module



Optional Add-On Modules

Optional Expansion I/O

If the native I/O count of the base relay is not sufficient for your application, you can add more digital and analog I/O to the system via the E200 relay Expansion Bus. You can add any combination of up to four Digital I/O Expansion Modules that each have four inputs (120V AC, 240V AC, or 24V DC) and two relay outputs.

You can also add up to four Analog I/O Expansion Modules, which have three independent universal analog inputs and one isolated analog output per module. The Analog I/O Expansion Modules require Control Module firmware v3.000 or higher. The independent universal analog inputs accept the following signals:

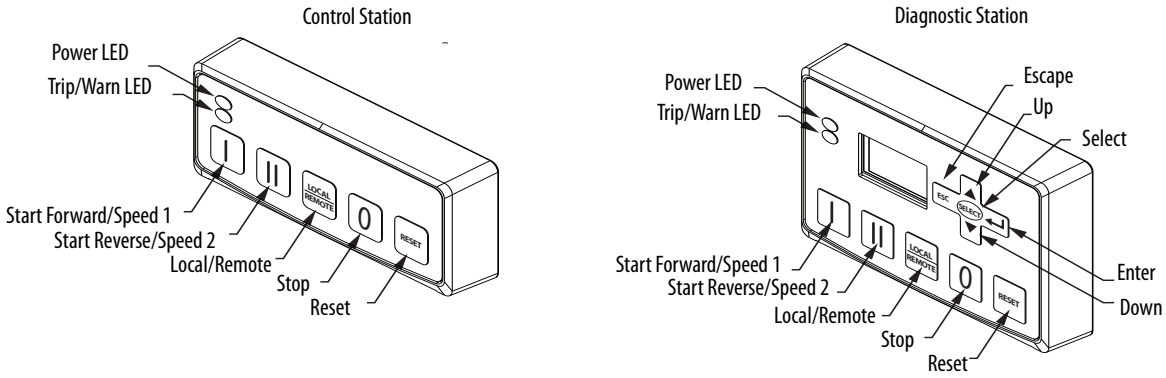
- 4...20 mA
- 0...20 mA
- 0...10V DC
- 1...5V DC
- 0...5V DC
- RTD Sensors (Pt 385, Pt 3916, Cu 426, Ni 618, Ni 672, and NiFe 518)
- Resistance (150 Ω, 750 Ω, 3000 Ω, and 6000 Ω)

Program the isolated analog output to reference a traditional analog signal (4...20 mA, 0...20 mA, 0...10V DC, 1...5V, or 0...10V) to represent the following diagnostic values:

- Average %FLA
- %TCU
- Ground Fault Current
- Current Imbalance
- Average L-L Voltage
- Voltage Imbalance
- Total kW
- Total kVAR
- Total kVA
- Total Power Factor
- User-defined Value

Optional Operator Station

Figure 4 - Operator Stations



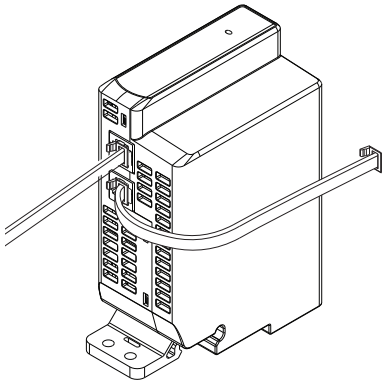
The E200 relay lets you add one operator interface to the Expansion Bus. There are two types of operator stations: Control Station or a Diagnostic Station. Both types of operator stations mount into a standard 22 mm push button knockout, and they provide diagnostic status indicators that let you view the status of the E200 relay from the outside of an electrical enclosure. Both operator stations provide push buttons that can be used for motor control logic, and they both can be used to upload and download parameter configuration data from the base relay.

The Diagnostic Station contains a display and navigation buttons that lets you view and edit parameters in the base relay. The Diagnostic Station requires Control Module firmware v3.000 or higher.

Optional Expansion Bus Power Supply

The E200 relay expansion bus provides enough current to operate a system that has (1) Digital Expansion Module and (1) Operator Station. An E200 relay system that contains more expansion modules needs supplemental current for the Expansion Bus. the E200 relay offers you two types of Expansion Bus Power Supplies: AC (110...240V AC, 50/60 Hz) and DC (24V DC). One Expansion Bus Power Supply supplies enough current for a fully loaded E200 relay Expansion Bus (four Digital Expansion Modules, four Analog Expansion Modules, and one Operator Station). Both Expansion Bus Power Supplies work with any combination of Digital and Analog Expansion Modules.

Figure 5 - Expansion Bus Power Supply



Protection Features

The numbers in parentheses in this section represent specific device functions as they relate to the respective protection measures provided. These protection functions correlate to ANSI standard device numbers as defined by ANSI/IEEE C37.2 Standard—Standard for Electrical Power System Device Function Numbers, Acronyms, and Contact Designations.

Standard Current-based Protection

All versions of the E200 relay provide the following motor protection functions.

- Thermal Overload (51)
- Phase Loss
- Current Imbalance (46)
- Undercurrent – load loss (37)
- Overcurrent – load jam (48)
- Overcurrent – load stall
- Start Inhibit (66)

Ground Fault Current-based Protection

The E200 relay sensing modules and control modules with a ground fault current option provides the following motor protection function:

- Ground Fault – zero sequence method (50 N)

Voltage- and Power-based Protection

The E200 relay sensing modules with voltage sensing provides the following motor protection functions:

- Undervoltage (27)
- Overvoltage (59)
- Phase Reversal (47) – voltage-based
- Over and Under Frequency (81) – voltage-based
- Voltage Imbalance (46)
- Over and Under Power (37)
- Over and Under Leading/Lagging Power Factor (55)
- Over and Under Reactive Power Generated
- Over and Under Reactive Power Consumed
- Over and Under Apparent Power

Thermal-based Protection

The E200 relay provides the following thermal-based motor protection functions:

- Thermistor – PTC (49)
- Stator Protection – RTD (49)
- Bearing Protection – RTD (38)

Applications

Use the E200 relay with the following across-the-line starter applications:

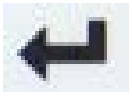
- Non-reversing starter
- Reversing starter
- Wye (Star)/Delta starter
- Two-speed motors
- Low and medium voltage with two or three potential transformers
- With or without Phase current transformers
- With or without zero-sequence core balanced current transformer

Diagnostic Station

The E200 Electronic Overload Relay supports a Diagnostic Station on the E200 Expansion Bus (requires Control Module firmware v3.000 and higher). The Diagnostic Station lets you view any E200 relay parameter and edit any configuration parameter. This chapter explains the navigation keys on the Diagnostic Station, how to view a parameter, how to edit a configuration parameter, and the Diagnostic Station programmable display sequence.

Navigation Keys

The E200 Diagnostic Station has five navigation keys that are used to navigate through the display menu system and edit configuration parameters.

Key	Name	Description
	Up Arrow Down Arrow	• Scroll through the display parameters or groups. • Increment or decrement values.
	Escape	• Back one step in the navigation menu. • Cancel a change to a configuration parameter value
	Select	• Select the next bit When you view a bit-enumerated parameter. • Select the next digit when you edit a configuration value. • Select the next bit when you edit a bit-enumerated parameter.
	Enter	• Start the navigation menu. • Advance one step in the navigation menu. • Display the description for a bit enumerated parameter. • Edit a configuration parameter value. • Save the change to the configuration parameter value.

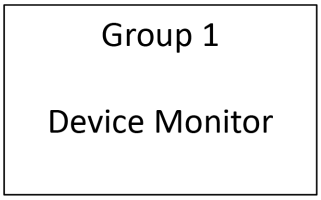
Displaying a Parameter

The E200 Diagnostic Station lets you view parameters by using a group menu system or by a linear list. To start the navigation menu, press the  key. The menu prompts you to view parameters by groups, parameters in a linear list, or E200 relay system information.

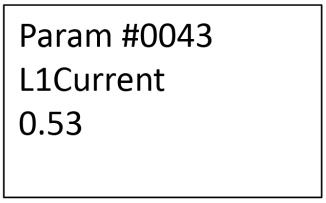
Parameter Group Navigation

To start the navigation menu, press the  key. Use the  or  keys to select the Groups navigation method and press .

Use the ▲ or ▼ keys to select the parameter group to display and press ↵.



Use the ▲ or ▼ keys to view the parameters that are associated with that group.



When you view a bit-enumerated parameter, press ↵ to view the description of each bit. Press SELECT to view the next bit. Press ESC to return to the parameter.

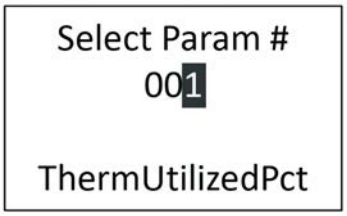
Press ESC to return to the parameter group navigation system.

If you do not press any navigation keys for a period that Display Timeout (Parameter 436) defines, the Diagnostic Station automatically returns to the programmable display sequence.

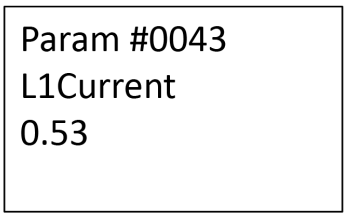
Linear List Navigation

To start the navigation menu, press the ↵ key. Use the ▲ or ▼ keys to select the Linear List navigation method and press ↵.

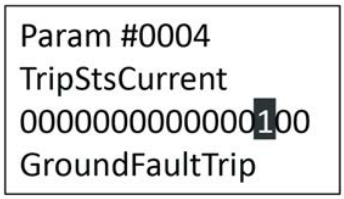
Use the ▲ or ▼ and SELECT keys to select the parameter number to display and press ↵ .



Use the ▲ or ▼ keys to view the next sequential parameter.



When you view a bit-enumerated parameter, press ↵ to view the description of each bit. Press SELECT to view the next bit. Press ESC to return to the parameter.



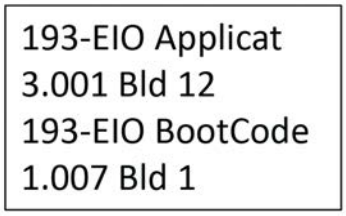
Press ESC to return to the linear list navigation system.

If you do not press any navigation keys for a period that Display Timeout (Parameter 436) defines, the E200 Diagnostic Station automatically returns to the programmable display sequence.

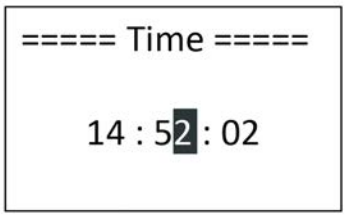
System Info

The E200 Diagnostic Station can display firmware revision information, view the time and date of the E200 relay virtual clock, and edit the time and date of the E200 relay virtual clock. To view E200 relay system information, start the navigation menu by pressing ↵ key. Use the ▲ or ▼ keys to select System Info and press ↵ .

Use the ▲ or ▼ keys to view the E200 relay system information.



To edit the system date or time, press ↵ to modify the value. Use the ▲ or ▼ keys to select the new value. Press SELECT to select the next system value. Press ↵ to save the new system values or press ESC to cancel the modification and restore the previous system values.



Press ESC to return to the navigation menu.

If you do not press any navigation keys for a period that Display Timeout (Parameter 436) defines, the E200 Diagnostic Station automatically cancels the modification, restores the previous value, and returns to its programmable display sequence.

Editing Parameters

This section explains how to edit the parameters of the E200 relay.

Editing a Configuration Parameter

The E200 Diagnostic Station lets you edit configuration parameters by using a group menu system or by a linear list. To start the navigation menu, press the ↵ key. You are prompted to view parameters by groups, parameters in a linear list, or E200 relay system information. Choose the appropriate method and navigate to the parameter to be modified.

Editing a Numeric Parameter

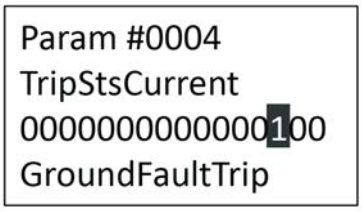
To edit a configuration parameter, press the ↵ key to modify the value. Use the ▲ or ▼ keys to select the new value. Press ↵ to save the new system values or press ESC to cancel the modification and restore the previous value.

Press ESC to return to the navigation menu.

If you do not press any navigation keys for a period that Display Timeout (Parameter 436) defines, the E200 Diagnostic Station automatically cancels the modification, restores the previous value, and returns to its programmable display sequence.

Editing a Bit Enumerated Parameter

When you edit a bit-enumerated parameter, press the ↵ key to view the description of each bit. Use the ▲ or ▼ keys to select the new bit value. Press SELECT to edit the next bit. Press ↵ to save the new value or press ESC to cancel the modification and restore the previous value.



Press ESC to return to the navigation menu.

If you do not press any navigation keys for a period that Display Timeout (Parameter 436) defines, the Diagnostic Station automatically cancels the modification, restores the previous value, and returns to its programmable display sequence.

Programmable Display Sequence

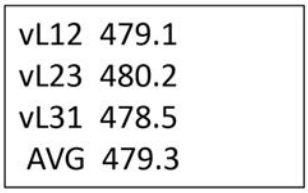
This section explains the programmable display sequence of the E200 relay.

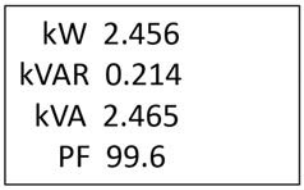
Display Sequence

The Diagnostic Station of the E200 relay sequentially displays up to seven screens every 5 seconds.

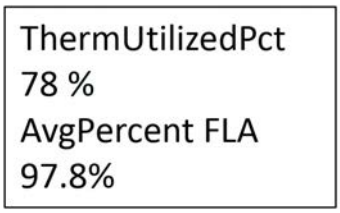
- Three-phase current
- Three-phase voltage
- Total power
- User-defined screen 1
- User-defined screen 2
- User-defined screen 3
- User-defined screen 4

The three-phase voltage and total power screens are only included in the sequence when the E200 relay has a voltage, current, and ground fault current (VIG)-based Sensing Module.





The user-defined screens let you select up to two parameters per screen. See Diagnostic Station User-defined Screens on page 39 to configure the Screen# and Parameter# (Parameters 428...435).



If you do not press any navigation keys for a period that Display Timeout (Parameter 436) defines, the Diagnostic Station automatically cancels any editing modifications, restores the previous value, and returns to its programmable display sequence.

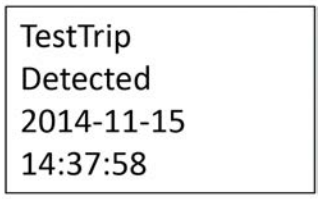
Stopping the Display Sequence

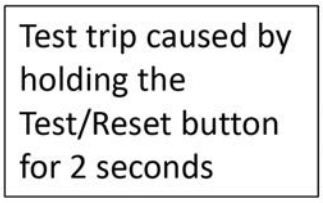
To stop the display sequence, press SELECT. Use the ▲ or ▼ keys to manually sequence through the displays. Press ESC to return to the automatic display sequence.

If you do not press any navigation keys for a period that Display Timeout (Parameter 436) defines, the Diagnostic Station automatically returns to the programmable display sequence.

Automatic Trip and Warning Screens

When the E200 relay is in a trip or warning state, the E200 Diagnostic Station automatically displays the trip or warning event.





Press any of the navigation keys (ESC , SELECT , ↵ , ▲ , or ▼) to return to the automatic display sequence.

When the trip or warning event clears, the E200 Diagnostic Station automatically returns to the programmable display sequence.

If another parameter is displayed and you do not press any navigation keys for a period that Display Timeout (Parameter 436) defines, the Diagnostic Station automatically returns to the trip or warning screen if the trip or warning event is not cleared.

System Operation and Configuration

This chapter provides instructions about how to operate and configure an E200 Electronic Overload Relay system. This chapter includes settings for Device Modes, Option Match, Security Policy, I/O Assignments, Expansion Bus Fault, Emergency Start, and an introduction to Operating Modes.

This chapter shows you the parameters required to program the device; see page 9 for information about the complete parameter spreadsheet that is attached to this PDF.

Device Modes

The E200 relay has five device modes to validate configuration of the device and limit when you can configure the E200 relay, perform a firmware update, and issue commands.

- Administration Mode
- Ready Mode
- Run Mode
- Test Mode
- Invalid Configuration Mode

Administration Mode

Administration Mode is a maintenance mode for the E200 relay that lets you configure parameters, modify security policies, perform firmware updates, and issue commands.

Follow these steps to enter Administration Mode:

1. Set the rotary dials on the E200 Communication Module to 7-7-7.
2. Cycle power on the E200 relay

After you complete commissioning activities and maintenance tasks, return the E200 relay back to Ready or Run Mode by setting the rotary dials of the E200 communication module back to their previous positions and then cycle power.

Ready Mode

Ready Mode is a standby mode for the E200 relay in which the relay is ready to help protect an electric motor and no electrical current has been detected. You can modify configuration parameters, update firmware, and issue commands if the appropriate security policies are enabled. The Power LED on the Communication Module and Operator Stations flash green and bit 14 in Device Status 0 (Parameter 20) is set to 1 when the device is in Ready Mode.

Run Mode

Run Mode is an active mode for the E200 relay in which the relay is sensing electrical current and is actively protecting an electric motor. Only non-motor protection configuration parameters can be modified if the appropriate security policies are enabled. The Power LED on the Communication Module and Operator Stations is

solid green and bits 3, 4, and/or 5 in Device Status 0 (Parameter 20) are set to 1 when the device is in Run Mode.

Test Mode

Test Mode is used by installers of motor control centers who are testing and commissioning motor starters with an automation system. A digital input of the E200 relay is assigned to monitor the Test position of the motor control center enclosure. The Input Assignments (Parameters 196...201) are described later in this chapter.

Anyone who commissions motor starters in an automation system can put their motor control center enclosure into the Test position to activate Test Mode and verify that the digital inputs and relay outputs of the E200 relay are operating properly with the motor starter without energizing power to the motor. If the E200 relay senses current or voltage in Test Mode, it generates a Test Mode Trip.

Invalid Configuration Mode

Invalid Configuration Mode is an active mode for the E200 relay in which the relay is in a tripped state due to invalid configuration data. Invalid Configuration Parameter (Parameter 38) indicates the parameter number that is causing the fault. Invalid Configuration Cause (Parameter 39) identifies the reason for Invalid Configuration Mode.

The Trip/Warn LED on the Communication Module and Operator Stations flashes a pattern of red, 3 long and 8 short blinks, and bits 0 and 2 in Device Status 0 (Parameter 20) are set to 1 when the device is in Invalid Configuration Mode.

To return to Ready/Run Mode, place a valid configuration value in the parameter that is identified by Invalid Configuration Parameter (Parameter 38) and Invalid Configuration Cause (Parameter 39). Reset the trip state of the E200 relay by pressing the blue reset button on the Communication Module, via Connected Components Workbench software, or by an assigned digital input.

Option Match

Due to the modular nature of the E200 relay, you can enable the Option Match feature to verify that the options that you expect for the motor protection application are the ones that are present on the E200 relay system. You can configure an option mismatch to cause a protection trip or provide a warning within the E200 relay.

Enable Option Match Protection Trip (Parameter 186)

To enable the Option Match feature to cause a protection trip in the event of an option mismatch, place a (1) in bit position 8 of Parameter 186 (Control Trip Enable). You can select the specific option match features to cause a protection trip in Parameter 233 (Option Match Action).

Enable Option Match Protection Warning (Parameter 192)

To enable the Option Match feature to cause a warning in the event of an option mismatch, place a (1) in bit position 8 of Parameter 192 (Control Warning Enable). You can select the specific option match features to cause a warning in Parameter 233 (Option Match Action).

Control Module Type (Parameter 221)

The E200 relay offers six different control modules. Place the value of the expected control module into Parameter 221. A value of (0) disables the Option Match feature for the control module.

Sensing Module Type (Parameter 222)

The E200 relay offers 12 different sensing modules. Place the value of the expected sensing module into Parameter 222. A value of (0) disables the Option Match feature for the sensing module.

Communication Module Type (Parameter 223)

The E200 relay offers two different communication modules. Place the value of the expected communication module into Parameter 223. A value of (0) disables the Option Match feature for the communication module.

Operator Station Type (Parameter 224)

The E200 relay offers two different types of operator stations. Place the value of the expected operator station into Parameter 224. A value of (0) disables the Option Match feature for the operator station. A value of (1), *"No Operator Station"*, makes the operator station not allowed on the Expansion Bus and prevents you from connecting an operator station to the E200 relay system.

Digital I/O Expansion Modules

Module 1 Type (Parameter 225)

The E200 relay supports up to four additional Digital I/O expansion modules. This parameter configures the Option Match feature for the Digital I/O expansion module set to Digital Module 1. There are three different types of Digital I/O expansion modules. Place the value of the expected Digital I/O expansion module set to Digital Module 1 into Parameter 225. A value of (0) disables the Option Match feature for this Digital I/O expansion module. A value of (1), *"No Digital I/O Expansion Module"*, makes the Digital I/O expansion module set to Digital Module 1 not allowed on the Expansion Bus and prevents you from connecting a Digital I/O expansion module set to Digital Module 1 to the E200 relay system.

Module 2 Type (Parameter 226)

The E200 relay supports up to four additional Digital I/O expansion modules. This parameter configures the Option Match feature for the Digital I/O expansion module set to Digital Module 2. There are three different types of Digital I/O expansion modules. Place the value of the expected Digital I/O expansion module set to Digital Module 2 into Parameter 226. A value of (0) disables the Option Match feature for this Digital I/O expansion module. A value of (1), *"No Digital I/O Expansion Module"*, makes the Digital I/O expansion module set to Digital Module 2 not allowed on the Expansion Bus and prevents you from connecting a Digital I/O expansion module set to Digital Module 2 to the E200 relay system.

Module 3 Type (Parameter 227)

The E200 relay supports up to four additional Digital I/O expansion modules. This parameter configures the Option Match feature for the Digital I/O expansion module set to Digital Module 3. There are three different types of Digital I/O expansion

modules. Place the value of the expected Digital I/O expansion module set to Digital Module 3 into Parameter 227. A value of (0) disables the Option Match feature for this Digital I/O expansion module. A value of (1), *"No Digital I/O Expansion Module"*, makes the Digital I/O expansion module set to Digital Module 3 not allowed on the Expansion Bus and prevents you from connecting a Digital I/O expansion module set to Digital Module 3 to the E200 relay system.

Module 4 Type (Parameter 228)

The E200 relay supports up to four additional Digital I/O expansion modules. This parameter configures the Option Match feature for the Digital I/O expansion module set to Digital Module 4. There are three different types of Digital I/O expansion modules. Place the value of the expected Digital I/O expansion module set to Digital Module 4 into Parameter 228. A value of (0) disables the Option Match feature for this Digital I/O expansion module. A value of (1), *"No Digital I/O Expansion Module"*, makes the Digital I/O expansion module set to Digital Module 4 not allowed on the Expansion Bus and prevents you from connecting a Digital I/O expansion module set to Digital Module 4 to the E200 relay system.

Analog I/O Expansion Modules

Module 1 Type (Parameter 229)

The E200 relay supports up to four additional Analog I/O expansion modules. This parameter configures the Option Match feature for the Analog I/O expansion module set to Analog Module 1. There is one type of Analog I/O expansion module. Place the value of the expected Analog I/O expansion module set to Analog Module 1 into Parameter 229. A value of (0) disables the Option Match feature for this Analog I/O expansion module. A value of (1), *"No Analog I/O Expansion Module"*, makes the Analog I/O expansion module set to Analog Module 1 not allowed on the Expansion Bus and prevents you from connecting an Analog I/O expansion module set to Analog Module 1 to the E200 relay system.

Module 2 Type (Parameter 230)

The E200 relay supports up to four additional Analog I/O expansion modules. This parameter configures the Option Match feature for the Analog I/O expansion module set to Analog Module 2. There is one type of Analog I/O expansion module. Place the value of the expected Analog I/O expansion module set to Analog Module 2 into Parameter 230. A value of (0) disables the Option Match feature for this Analog I/O expansion module. A value of (1), *"No Analog I/O Expansion Module"*, makes the Analog I/O expansion module set to Analog Module 2 not allowed on the Expansion Bus and prevents you from connecting an Analog I/O expansion module set to Analog Module 2 to the E200 relay system.

Module 3 Type (Parameter 231)

The E200 relay supports up to four additional Analog I/O expansion modules. This parameter configures the Option Match feature for the Analog I/O expansion module set to Analog Module 3. There is one type of Analog I/O expansion module. Place the value of the expected Analog I/O expansion module set to Analog Module 3 into Parameter 231. A value of (0) disables the Option Match feature for this Analog I/O expansion module. A value of (1), *"No Analog I/O Expansion Module"*, makes the Analog I/O expansion module set to Analog Module 3 not allowed on the Expansion

Bus and prevents you from connecting an Analog I/O expansion module set to Analog Module 3 to the E200 relay system.

Module 4 Type (Parameter 232)

The E200 relay supports up to four additional Analog I/O expansion modules. This parameter configures the Option Match feature for the Analog I/O expansion module set to Analog Module 4. There is one type of Analog I/O expansion module. Place the value of the expected Analog I/O expansion module set to Analog Module 4 into Parameter 232. A value of (0) disables the Option Match feature for this Analog I/O expansion module. A value of (1), *"No Analog I/O Expansion Module"*, makes the Analog I/O expansion module set to Analog Module 4 not allowed on the Expansion Bus and prevents you from connecting an Analog I/O expansion module set to Analog Module 4 to the E200 relay system.

Option Match Action (Parameter 233)

The Option Match feature for the E200 relay lets you specify an action when there is an option mismatch—Protection Trip or Warning. Place a (0) in the appropriate bit position for a warning, and place a (1) in the appropriate bit position to cause a protection trip if there is an option mismatch.

Security Policy

The E200 relay has a security policy that can be used to prevent anyone with malicious intent to potentially damage a motor or piece of equipment. By default, you can only modify the security policy when the E200 relay is in Administration Mode (see page 29 to learn how to enable Administration Mode).

Table 1 - Security Policy Types

Policy Type	Description
Device Configuration	• lets you send external message instructions via a communication network to write values to configuration parameters • when this policy is disabled, all external message instructions with configuration data return a communication error when the E200 relay is in Ready Mode or Run Mode
Device Reset	• lets you send external message instruction via a communication network to perform a soft device reset when the E200 relay is in Ready Mode • when this policy is disabled, all external reset message instructions return a communication error when the E200 relay is in Ready Mode or Run Mode
Firmware Update	• lets you update the internal firmware of the communication module and control module via ControlFlash when the E200 relay is in Ready Mode • when this policy is disabled, firmware updates return a communication error when the E200 relay is in Ready Mode or Run Mode
Security Configuration	• lets you modify the Security Policy of the E200 relay in Ready Mode • when this policy is disabled, it can only be modified when the E200 relay is in Administration Mode

I/O Assignments

The E200 relay has native digital inputs and relay outputs in the Control Module. This I/O can be assign to dedicated functions. The following sections list the function assignments for the available Control Module I/O.

Input Assignments

You can assign digital inputs via the following parameters:

- Input Pt00 Assignment (Parameter 196)
- Input Pt01 Assignment (Parameter 197)
- Input Pt02 Assignment (Parameter 198)
- Input Pt03 Assignment (Parameter 199)

- Input Pt04 Assignment (Parameter 200)
- Input Pt05 Assignment (Parameter 201)

Output Assignments

You can assign relay outputs via the following parameters:

- Output Pt00 Assignment (Parameter 202)
- Output Pt01 Assignment (Parameter 203)
- Output Pt02 Assignment (Parameter 204)

Output Relay Configuration States

When assigned as a Normal/General Purpose Relay or Control/Control & Trip Relay, you can configure the E200 relay's output relays to go to a specific safe state when one of following events occur:

- Protection Fault Mode - when a trip event occurs
- Communication Fault Mode - when network communication is lost or an error occurs
- Communication Idle Mode - when a network scanner changes to Idle mode or a PLC changes to Program mode

IMPORTANT It is important that you fully understand the use of these parameters and the order of their priority under the conditions of a protection trip, communication fault, and communication idle event.

The default setting for these three modes is to Open/de-energize all E200 output relays that are assigned as a Normal/General Purpose Relay or Control/Control & Trip Relay.

The E200 output relay states when assigned as a Normal/General Purpose Relay or Control/Control & Trip Relay follow this priority order:

Table 2 - Output Relay Priority

Priority	Normal/General Purpose Relay	Control/Control & Trip Relay
1	Output Protection Fault State	Output Communication Fault State
2	Output Communication Fault State	Output Final Fault State
3	Output Final Fault State	Output Communication Idle State
4	Output Communication Idle State	

The optional eight output relays on the digital expansion I/O modules operate as a Normal/General Purpose relay with the same E200 relay safe state settings. There are two relays per module with maximum of four modules.

Output Relay Protection Fault Modes

When the E200 relay has a trip event, you can configure the E200 output relays to go to a specific state (Open or Closed) or ignore the trip event and continue to operate as normal. The parameters that are listed in Table 3 configure the Protection Fault Mode for each E200 output relay.

Table 3 - Protection Fault Mode Parameters

Fault Name	Parameter No.	Description
Output Relay 0 Protection Fault Action	304	• defines how Output Relay 0 when assigned as a Normal/General Purpose Relay responds when a trip event occurs
Output Relay 0 Protection Fault Value	305	• defines which state Output Relay 0 should go to when a trip event occurs
Output Relay 1 Protection Fault Action	310	• defines how Output Relay 1 responds when a trip event occurs when this parameter is assigned as a Normal/General Purpose Relay
Output Relay 1 Protection Fault Value	311	• defines which state Output Relay 1 should go to when a trip event occurs
Output Relay 2 Protection Fault Action	316	• defines how Output Relay 2 responds when a trip event occurs when this parameter is assigned as a Normal/General Purpose Relay.
Output Relay 2 Protection Fault Value	317	• defines which state Output Relay 2 should go to when a trip event occurs
Digital Expansion Module 1 Output Relay Protection Fault Action	322	• defines how both output relays on Digital Expansion Module 1 responds when a trip event occurs
Digital Expansion Module 1 Output Relay Protection Fault Value	323	• defines which state both output relays should go to when a trip event occurs
Digital Expansion Module 2 Output Relay Protection Fault Action	328	• defines how both output relays on Digital Expansion Module 2 responds when a trip event occurs
Digital Expansion Module 2 Output Relay Protection Fault Value	329	• defines which state both output relays should go to when a trip event occurs
Digital Expansion Module 3 Output Relay Protection Fault Action	334	• defines how both output relays on Digital Expansion Module 3 responds when a trip event occurs
Digital Expansion Module 3 Output Relay Protection Fault Value	335	• defines which state both output relays should go to when a trip event occurs
Digital Expansion Module 4 Output Relay Protection Fault Action	340	• defines how both output relays on Digital Expansion Module 4 responds when a trip event occurs
Digital Expansion Module 4 Output Relay Protection Fault Value	341	• defines which state both output relays should go to when a trip event occurs

Output Relay Communication Fault Modes

When the E200 relay loses communication, experiences a communication bus fault, or has a duplicate node address, you can configure the E200 output relays with the Communication Fault Mode parameters to go to a specific state (Open or Closed) or hold the last state.

An E200 relay with firmware revision v5.000 or higher supports the Fault Mode Output State Duration feature, which can be used with redundant network scanners or control systems. The Fault Mode Output State Duration is the time that the E200 output relays can go to a temporary state (Open, Closed, or Hold Last State) when a communication fault occurs. Configure this temporary state by using the Communication Fault Mode parameters.

If communication between the E200 relay and a network scanner or control system is not restored within the Fault Mode Output State Duration time (Parameter 561), the E200 output relays go to a final fault state (Open or Closed), which you configure by using the Final Fault Mode parameters.

If communication between the E200 relay and a network scanner or control system is restored within the Fault Mode Output State Duration time (Parameter 561), the E200 output relays resume with the state commanded by the network scanner or control system.

The parameters that are listed in Table 4 configure the Configuration Fault Mode for each E200 output relay.

Table 4 - Configuration Fault Mode Parameters

Fault Name	Parameter No.	Description
Fault Mode Output State Duration[1]	561	• defines the amount of time (s) that the E200 relay remains in the Communication Fault Mode state when a communication fault occurs. 0 = forever • If communication between the E200 relay and a network scanner or control system is not restored within the Fault Mode Output State Duration time the E200 output relays go to the final fault state (configured by using Final Fault Mode Parameters
Output Relay 0 Communication Fault Action	306	• defines how Output Relay 0 responds when a communication fault occurs when this parameter is assigned as a Normal/General Purpose Relay or Control/Control & Trip Relay
Output Relay 0 Communication Fault Value	307	• defines which state Output Relay 0 should go to when a communication fault occurs
Output Relay 0 Final Fault Value[1]	562	• defines which state Output Relay 0 should go to when communication is not restored with the time defined in Fault Mode Output State Duration (Parameter 561)
Output Relay 1 Communication Fault Action	312	• defines how Output Relay 1 responds when a communication fault occurs when this parameter is assigned as a Normal/General Purpose Relay or Control/Control & Trip Relay
Output Relay 1 Communication Fault Value	313	• defines which state Output Relay 1 should go to when a communication fault occurs
Output Relay 1 Final Fault Value[1]	563	• defines which state Output Relay 1 should go to when communication is not restored with the time defined in Fault Mode Output State Duration (Parameter 561)
Output Relay 2 Communication Fault Action	317	• defines how Output Relay 2 responds when a communication fault occurs when this parameter is assigned as a Normal/General Purpose Relay or Control/Control & Trip Relay
Output Relay 2 Communication Fault Value	319	• defines which state Output Relay 2 should go to when a communication fault occurs
Output Relay 2 Final Fault Value[1]	564	• defines which state Output Relay 2 should go to when communication is not restored with the time defined in Fault Mode Output State Duration (Parameter 561)
Digital Expansion Module 1 Output Relay Communication Fault Action	324	• defines how both output relays on Digital Expansion Module 1 responds when a communication fault occurs
Digital Expansion Module 1 Output Relay Communication Fault Value	325	• defines which state both output relays should go to when a communication fault occurs
Digital Expansion Module 1 Output Relay Final Fault Value[1]	565	• defines which state both output relays should go to when communication is not restored with the time defined in Fault Mode Output State Duration (Parameter 561)
Digital Expansion Module 2 Output Relay Communication Fault Action	330	• defines how both output relays on Digital Expansion Module 2 responds when a communication fault occurs
Digital Expansion Module 2 Output Relay Communication Fault Value	331	• defines which state both output relays should go to when a communication fault occurs
Digital Expansion Module 2 Output Relay Final Fault Value[1]	566	• defines which state both output relays should go to when communication is not restored with the time defined in Fault Mode Output State Duration (Parameter 561)
Digital Expansion Module 3 Output Relay Communication Fault Action	336	• defines how both output relays on Digital Expansion Module 3 responds when a communication fault occurs
Digital Expansion Module 3 Output Relay Communication Fault Value	337	• defines which state both output relays should go to when a communication fault occurs
Digital Expansion Module 3 Output Relay Final Fault Value[1]	567	• defines which state both output relays should go to when communication is not restored with the time defined in Fault Mode Output State Duration (Parameter 561)
Digital Expansion Module 4 Output Relay Communication Fault Action	342	• defines how both output relays on Digital Expansion Module 4 responds when a communication fault occurs
Digital Expansion Module 4 Output Relay Communication Fault Value	343	• defines which state both output relays should go to when a communication fault occurs
Digital Expansion Module 4 Output Relay Final Fault Value[1]	568	• defines which state both output relays should go to when communication is not restored with the time defined in Fault Mode Output State Duration (Parameter 561)

(1) Available in E200 relay firmware v5.000 and higher.

Output Relay Communication Idle Modes

When a network scanner goes into Idle mode or a PLC goes into Program mode while communicating with an E200 relay, you can configure the E200 output relays to go to a specific state (Open or Close) or hold the last state. The parameters that are listed in Table 5 configure the Communication Idle Mode for each E200 output relay.

Table 5 - Communication Idle Mode Parameters

Fault Name	Parameter No.	Description
Output Relay 0 Communication Idle Action	308	• defines how Output Relay 0 when assigned as a Normal/General Purpose Relay or Control/ Control & Trip Relay responds when a network scanner goes into Idle Mode or a programmable logic controller (PLC) goes into Program Mode
Output Relay 0 Communication Idle Value	309	• defines which state Output Relay 0 should go to when a network scanner goes into Idle Mode or a PLC goes into Program Mode
Output Relay 1 Communication Idle Action	314	• defines how Output Relay 1 when assigned as a Normal/General Purpose Relay or Control/ Control & Trip Relay responds when a network scanner goes into Idle Mode or a PLC goes into Program Mode
Output Relay 1 Communication Idle Value	315	• defines which state Output Relay 1 should go to when a network scanner goes into Idle Mode or a PLC goes into Program Mode
Output Relay 2 Communication Idle Action	320	• defines how Output Relay 2 when assigned as a Normal/General Purpose Relay or Control/ Control & Trip Relay responds when a network scanner goes into Idle Mode or a PLC goes into Program Mode
Output Relay 2 Communication Idle Value	321	• defines which state Output Relay 2 should go to when a network scanner goes into Idle Mode or a PLC goes into Program Mode
Digital Expansion Module 1 Output Relay Communication Idle Action	326	• defines how both output relays on Digital Expansion Module 1 responds when a network scanner goes into Idle Mode or a PLC goes into Program Mode
Digital Expansion Module 1 Output Relay Communication Idle Value	327	• defines which state both output relays should go to when a network scanner goes into Idle Mode or a PLC goes into Program Mode
Digital Expansion Module 2 Output Relay Communication Idle Action	332	• defines how both output relays on Digital Expansion Module 2 responds when network scanner goes into Idle Mode or a PLC goes into Program Mode
Digital Expansion Module 2 Output Relay Communication Idle Value	333	• defines which state both output relays should go to when a network scanner goes into Idle Mode or a PLC goes into Program Mode
Digital Expansion Module 3 Output Relay Communication Idle Action	338	• defines how both output relays on Digital Expansion Module 3 responds when a network scanner goes into Idle Mode or a PLC goes into Program Mode
Digital Expansion Module 3 Output Relay Communication Idle Value	339	• defines which state both output relays should go to when a network scanner goes into Idle Mode or a PLC goes into Program Mode
Digital Expansion Module 4 Output Relay Communication Idle Action	344	• defines how both output relays on Digital Expansion Module 4 responds when a network scanner goes into Idle Mode or a PLC goes into Program Mode
Digital Expansion Module 4 Output Relay Communication Idle Value	345	• defines which state both output relays should go to when a network scanner goes into Idle Mode or a PLC goes into Program Mode

Expansion Bus Fault

The expansion bus of the E200 relay can be used to expand the I/O capabilities of the device with the addition of digital and analog expansion I/O modules. The Expansion Bus Fault lets you have the E200 relay go into a Trip or Warning state when established Expansion Bus communication is disrupted between the Control Module and any digital and analog expansion I/O modules.

The Expansion Bus Fault is used when the Option Match feature is not enabled for the digital and/or analog expansion I/O modules. The Expansion Bus Fault only monitors for communication disruptions between the Control Module and digital and/or analog expansion I/O modules. Expansion bus communication disruptions between the Control Module and Operator Station do not affect the Expansion Bus fault.

Table 6 - Expansion Bus Fault Functions

Function Name	How to Enable	Setting Parameter No.	Description	Trip/Warn Module Blink Pattern	To Return to Ready/Run Mode:
Expansion Bus Trip	Set Control Trip Enable bit 10 to 1	186	• When communication is disrupted between the Control Module and digital and/or analog expansion I/O modules, the E200 relay goes into a tripped state	• Red 3 long and 11 short	• Verify that the expansion bus cables are properly plugged into the Bus In and Bus Out ports of all expansion modules • When all expansion I/O modules' status LEDs are solid green, reset the trip state of the E200 relay by pressing the blue reset button on the Communication Module, via Connected Components Workbench software, or by an assigned digital input.
Expansion Bus Warning	Set Control Warning Enable bit 10 to 1	192	• When communication is disrupted between the Control Module and digital and/or analog expansion I/O modules, the E200 relay goes into a warning state	• Yellow 3 long and 11 short	• Verify that the expansion bus cables are properly plugged into the Bus In and Bus Out ports of all expansion modules • When all expansion I/O modules' status LEDs are solid green, the warning state of the E200 relay automatically clears

Emergency Start

In an emergency, it may be necessary to start a motor even if a protection fault or a communication fault exists. The trip condition may be the result of a thermal overload condition or the number of starts exceeded its configuration. These conditions can be overridden using the Emergency Start feature of the E200 relay.

IMPORTANT Activating Emergency Start inhibits overload and blocked start protection. Running in this mode can cause equipment overheating and fire.

To enable the Emergency Start feature in the E200 relay, set the Emergency Start Enable (Parameter 216) to Enable.

Table 7 - Emergency Start (Parameter 216)

Value	Description
0	Disable
1	Enable

Configure one of the Ptxx Input Assignments (Parameters 196...201) to Emergency Start and activate the corresponding digital input.

Table 8 - Emergency Start Input PTXX Assignment (Parameters 196…201)

Value	Assignment	Description
0	Normal	Function as a digital input
1	Trip Reset	Reset the E200 relay when it is in a tripped state
2	Remote Trip	Force the E200 relay to go into a tripped state
3	Activate FLA2	Use the value in FLA2 Setting (Parameter 177) for the current-based protection algorithms
4	Force Snapshot	Force the E200 relay to update its Snapshot log
5	Emergency Start	Issue an Emergency Start command

When the Emergency Start feature is active, the following actions occur in the E200 relay:

- Protection trips are ignored
- Output relays configured as Trip Relays are put into closed state

- Normal operation resumes with any Normal or Control Relay assigned output relay
- The Emergency Start Active bit is set to 1 in Device Status 0 (Parameter 20) bit 6

Language

The E200 relay supports multiple languages when you usethe optional expansion Operator Diagnostic Station. Parameter text is displayed in the selected language. The language parameter (212) displays the E200 relay parameter text displayed in the selected language.

Diagnostic Station User-defined Screens

The Diagnostic Station has four user-defined screens that are part of the its display sequence, in which you can define up to two parameters per screen.

Table 9 - User-defined Screen Parameters

Name	Parameter No.	Description(1)
User-defined Screen 1 – Parameter 1	428	• the E200 parameter number to display for the first parameter in user-defined screen 1
User-defined Screen 1 – Parameter 2	429	• the E200 parameter number to display for the second parameter in user-defined screen 1
User-defined Screen 2 – Parameter 1	430	• he E200 parameter number to display for the first parameter in user-defined screen 2
User-defined Screen 2 – Parameter 2	431	• the E200 parameter number to display for the second parameter in user-defined screen 2
User-defined Screen 3 – Parameter 1	432	• the E200 parameter number to display for the first parameter in user-defined screen 3
User-defined Screen 3 – Parameter 2	433	• the E200 parameter number to display for the second parameter in user-defined screen 3
User-defined Screen 4 – Parameter 1	434	• the E200 parameter number to display for the first parameter in user-defined screen 4
User-defined Screen 4 – Parameter 2	435	• the E200 parameter number to display for the second parameter in user-defined screen 4

(1) You can select one of the 560 available E200 relay parameters.

Display Timeout

Display Timeout (Parameter 436) defines the time duration in which there is no display navigation activity, and the E200 Diagnostic Station returns to its normal display sequence. Any configuration parameters that were left in an edit state are canceled. A value of zero disables the display timeout function.

Analog I/O Expansion Modules

The E200 relay supports up to four Analog I/O Expansion Modules on the E200 Expansion Bus. The E200 Analog Expansion Module has three independent universal inputs and one analog output.

Analog Input Channels

Table 10 shows the analog signals that the universal analog inputs can accept.

Table 10 - Universal Analog Input Signals

Signal Type	Possible Values					
Current	0…20 mA			4…20 mA		
Voltage	0…10V DC		1…5V DC		0…5V DC	
2-Wire RTD Sensors 3-Wire RTD Sensor	100 Ω, 200 Ω, 500 Ω, 1000 Ω Pt 385	100 Ω, 200 Ω, 500 Ω, 1000 Ω Pt 3916	10 Ω Cu 426	100 Ω Ni 618	120 Ω Ni 672	604 Ω NiFe 518
Resistance	0…150 Ω	0…750 Ω	0…3000 Ω	0…6000 Ω (PTC and NTC Sensors)		

The analog inputs can report data in four different formats. Table 11 through Table 14 display the data ranges for all available analog input types for the four available data formats.

Table 11 - Analog Input Data Format for Current Input Type

Input Range	Input Value	Condition	Engineering Units	Engineering Units x 10	Raw / Proportional	PID
4…20 mA	21.00 mA	High Limit	21000	2100	32767	17407
	20.00 mA	High Range	20000	2000	32767	16383
	4.00 mA	Low Range	4000	400	-32768	0
	3.00 mA	Low Limit	3000	300	-32768	-1024
0…20 mA	21.00 mA	High Limit	21000	2100	32767	17202
	20.00 mA	High Range	20000	2000	32767	16383
	0.00 mA	Low Range	0	0	-32768	0
	0.00 mA	Low Limit	0	0	-32768	0

Table 12 - Analog Input Data Format for Voltage Input Type

Input Range	Input Value	Condition	Engineering Units	Engineering Units x 10	Raw / Proportional	PID
0…10 V DC	10.50V DC	High Limit	10500	1050	32767	17202
	10.00V DC	High Range	10000	1000	32767	16383
	0.00V DC	Low Range	0	0	-32768	0
	0.00V DC	Low Limit	0	0	-32768	0
1…5 V DC	5.25V DC	High Limit	5250	525	32767	17407
	5.00V DC	High Range	5000	500	32767	16383
	1.00V DC	Low Range	1000	100	-32768	0
	0.50V DC	Low Limit	500	50	-32768	-2048
0…5V DC	5.25V DC	High Limit	5250	525	32767	17202
	5.00V DC	High Range	5000	500	32767	16383
	0.00V DC	Low Range	0	0	-32768	0
	0.00V DC	Low Limit	0	0	-32768	0

Table 13 - Analog Input Data Format for RTD Input Type

Input Range	Input Value	Condition	Engineering Units	Engineering Units x 10	Raw / Proportional	PID
RTD 100 Ω, 200 Ω, 500 Ω, 1000 Ω Pt 385	850.0 °C	High Limit	8500	850	32767	16383
	850.0 °C	High Range	8500	850	32767	16383
	-200.0 °C	Low Range	-2000	-200	-32768	0
	-200.0 °C	Low Limit	-2000	-200	-32768	0
	1562.0 °F	High Limit	15620	1562	32767	16383
	1562.0 °F	High Range	15620	1562	32767	16383
	-328.0 °F	Low Range	-3280	-328	-32768	0
	-328.0 °F	Low Limit	-3280	-328	-32768	0
RTD 100 Ω, 200 Ω, 500 Ω, 1000 Ω Pt 3916	630.0 °C	High Limit	6300	630	32767	16383
	630.0 °C	High Range	6300	630	32767	16383
	-200.0 °C	Low Range	-2000	-200	-32768	0
	-200.0 °C	Low Limit	-2000	-200	-32768	0
	1166.0 °F	High Limit	11660	1166	32767	16383
	1166.0 °F	High Range	11660	1166	32767	16383
	-328.0 °F	Low Range	-3280	-328	-32768	0
	-328.0 °F	Low Limit	-3280	-328	-32768	0
RTD 10 Ω Cu 426	260.0 °C	High Limit	2600	260	32767	16383
	260.0 °C	High Range	2600	260	32767	16383
	-100.0 °C	Low Range	-1000	-100	-32768	0
	-100.0 °C	Low Limit	-1000	-100	-32768	0
	500.0 °F	High Limit	5000	500	32767	16383
	500.0 °F	High Range	5000	500	32767	16383
	-148.0 °F	Low Range	-1480	-148	-32768	0
	-148.0 °F	Low Limit	-1480	-148	-32768	0
RTD 100 Ω Ni 618	260.0 °C	High Limit	2600	260	32767	16383
	260.0 °C	High Range	2600	260	32767	16383
	-100.0 °C	Low Range	-1000	-100	-32768	0
	-100.0 °C	Low Limit	-1000	-100	-32768	0
	500.0 °F	High Limit	5000	500	32767	16383
	500.0 °F	High Range	5000	500	32767	16383
	-148.0 °F	Low Range	-1480	-148	-32768	0
	-148.0 °F	Low Limit	-1480	-148	-32768	0
RTD 120 Ω Ni 672	260.0 °C	High Limit	2600	260	32767	16383
	260.0 °C	High Range	2600	260	32767	16383
	-80.0 °C	Low Range	-800	-80	-32768	0
	-80.0 °C	Low Limit	-800	-80	-32768	0
	500.0 °F	High Limit	5000	500	32767	16383
	500.0 °F	High Range	5000	500	32767	16383
	-112.0 °F	Low Range	-1120	-112	-32768	0
	-112.0 °F	Low Limit	-1120	-112	-32768	0
RTD 100 Ω NiFe 518	200.0 °C	High Limit	2000	200	32767	16383
	200.0 °C	High Range	2000	200	32767	16383
	-100.0 °C	Low Range	-1000	-100	-32768	0
	-100.0 °C	Low Limit	-1000	-100	-32768	0
	392.0 °F	High Limit	3920	392	32767	16383
	392.0 °F	High Range	3920	392	32767	16383
	-148.0 °F	Low Range	-1480	-148	-32768	0
	-148.0 °F	Low Limit	-1480	-148	-32768	0

Table 14 - Analog Input Data Format for Resistance Input Type

Input Range	Input Value	Condition	Engineering Units	Engineering Units x 10	Raw / Proportional	PID
Resistance 0…50 Ω	150.00 Ω	High Limit	15000	1500	32767	16383
	150.00 Ω	High Range	15000	1500	32767	16383
	0.00 Ω	Low Range	0	0	-32768	0
	0.00 Ω	Low Limit	0	0	-32768	0
Resistance 0…750 Ω	750.0 Ω	High Limit	7500	750	32767	16383
	750.0 Ω	High Range	7500	750	32767	16383
	0.0 Ω	Low Range	0	0	-32768	0
	0.0 Ω	Low Limit	0	0	-32768	0
Resistance 0…3000 Ω	3000.0 Ω	High Limit	30000	3000	32767	16383
	3000.0 Ω	High Range	30000	3000	32767	16383
	0.0 Ω	Low Range	0	0	-32768	0
	0.0 Ω	Low Limit	0	0	-32768	0
Resistance 0…6000 Ω (PTC / NTC)	6000 Ω	High Limit	6000	600	32767	16383
	6000 Ω	High Range	6000	600	32767	16383
	0 Ω	Low Range	0	0	-32768	0
	0 Ω	Low Limit	0	0	-32768	0

The performance for the input channels of the E200 Analog I/O Expansion Module is dependent on the filter setting for each channel. The total scan time for the input channels of the module is determined by adding the conversion time for all enabled input channels.

Table 15 - Analog Input Channel Conversion Time

Input Type	Filter Frequency	Conversion Time
Current, Voltage, 2-Wire RTD, Resistance	17 Hz	153 ms
	4 Hz	512 ms
	62 Hz	65 ms
	470 Hz	37 ms
3-Wire RTD	17 Hz	306 ms
	4 Hz	1024 ms
	62 Hz	130 ms
	470 Hz	74 ms

Example:

- Channel 00 is configured for a 3-wire RTD and 4 Hz filter (conversion time = 1024 ms).
- Channel 01 is configured for 17 Hz voltage (conversion time = 153 ms).
- Channel 02 is configured for 62 Hz current (conversion time = 65 ms).

The E200 Analog I/O Expansion Module input channel scan time is 1242 ms (1024+153+65).

Analog Output Channel

Table 16 shows the values that you can program the isolated analog output to provide.

Table 16 - Universal Analog Output Signals

Signal Type	Possible Values		
Current	0…20 mA		4…20 mA
Voltage	0…10V DC	1…5V DC	0…5V DC

The analog outputs can report data as a percent of range. Table 17 and Table 18 display the data ranges for all available analog output types.

Table 17 - Analog Output Data Format for Current Output Type

Output Range	Output Signal	Condition	% Range
4…20 mA	21.000 mA	High Limit	106.25%
	20.000 mA	High Range	100.00%
	4.000 mA	Low Range	0.00%
	3.000 mA	Low Limit	-6.25%
0…20 mA	21.00 mA	High Limit	105.00%
	20.00 mA	High Range	100.00%
	0.00 mA	Low Range	0.00%
	0.00 mA	Low Limit	0.00%

Table 18 - Analog Output Data Format for Voltage Output Type

Output Range	Output Value	Condition	% Range
0…10 V DC	10.50V DC	High Limit	105.00%
	10.00V DC	High Range	100.00%
	0.00V DC	Low Range	0.00%
	0.00V DC	Low Limit	0.00%
1…5 V DC	5.25V DC	High Limit	106.25%
	5.00V DC	High Range	100.00%
	1.00V DC	Low Range	0.00%
	0.50V DC	Low Limit	-6.25%
0…5 V DC	5.25V DC	High Limit	105.00%
	5.00V DC	High Range	100.00%
	0.00V DC	Low Range	0.00%
	0.00V DC	Low Limit	0.00%

The analog output can be used to communicate E200 diagnostic information via an analog signal to distributed control systems, programmable logic controllers, or panel-mounted analog meters. The analog output can represent one of the following E200 diagnostic parameters:

- Average %FLA
- %TCU
- Ground Fault Current
- Current Imbalance
- Average L-L Voltage
- Voltage Imbalance
- Total kW
- Total kVAR
- Total kVA
- Total Power Factor
- User-defined Value

Table 19 - Analog Output Selection Type

Output Selection	Low Range	High Range
Average % FLA	0%	100%
Scaled Average % FLA	0%	200%
% TCU	0%	100%
Ground Fault Current		
Internal, 0.50…5.00 A	0.50 A	5.00 A
External, 0.02…0.10 A	0.02 A	0.10 A
External, 0.10…0.50 A	0.10 A	0.50 A
External, 0.20…1.00 A	0.20 A	1.00 A
External, 1.00…5.00 A	1.00 A	5.00 A
Current Imbalance	0%	100%
Average L-L Voltage	0V	(PT Primary) V
Voltage Imbalance	0%	100%
Total kW	0 kW	(FLA1 x PT Primary x 1.732) V
Total kVAR	5.25V DC	(FLA1 x PT Primary x 1.732) V
Total kVA	5.00V DC	(FLA1 x PT Primary x 1.732) V
Total Power Factor	-50% (Lagging)	+50% (Leading)
User-defined Value	-32768	32767

The E200 Analog I/O Expansion Module output channel update rate is 10 ms.

Analog Modules

Table 20 - Analog Module 1 Channel Descriptions

Name	Parameter No.	Description
Input Channel 00 Type	437	• defines the type of analog signal that Input Channel 00 of Analog Module 1 monitors
Input Channel 00 Format	438	• defines the data format for how the analog reading is reported
Input Channel 00 Temperature Unit	439	• defines the temperature unit for RTD sensor readings
Input Channel 00 Filter Frequency	440	• defines update rate for the input channels of the analog module
Input Channel 00 Open Circuit State	441	• defines what the input channel reports when the input channel has an open circuit(1)
Input Channel 00 RTD Type Enable	442	• defines the type of RTD to monitor when the input channel type is configured to scan an RTD sensor
Input Channel 01 Type	446	• defines the type of analog signal that Input Channel 01 of Analog Module 1 monitors
Input Channel 01 Format	447	• defines the data format for how the analog reading is reported
Input Channel 01 Temperature Unit	448	• defines the temperature unit for RTD sensor readings
Input Channel 01 Filter Frequency	449	• defines update rate for the input channels of the analog module
Input Channel 01 Open Circuit State	450	• defines what the input channel reports when the input channel has an open circuit(1)
Input Channel 01 RTD Type Enable	451	• defines the type of RTD to monitor when the input channel type is configured to scan an RTD sensor
Input Channel 02 Type	455	• defines the type of analog signal that Input Channel 02 of Analog Module 1 monitors
Input Channel 02 Format	456	• defines the data format for how the analog reading is reported
Input Channel 02 Temperature Unit	457	• defines the temperature unit for RTD sensor readings
Input Channel 02 Filter Frequency	458	• defines update rate for the input channels of the analog module
Input Channel 02 Open Circuit State	459	• defines what the input channel reports when the input channel has an open circuit(1)
Input Channel 02 RTD Type Enable	460	• defines the type of RTD to monitor when the input channel type is configured to scan an RTD sensor
Output Channel 00 Type	464	• defines the type of analog signal that Output Channel 00 of Analog Module 1 provides
Output Channel 00 Selection	465	• defines the E200 relay parameter that Output Channel 00 represents
Output Channel 00 Expansion Bus Fault Action	466	• defines the value that Output Channel 00 provides when there is an E200 Expansion Bus fault
Output Channel 00 Protection Fault Action	467	• defines the value that Output Channel 00 provides when the E200 is in a tripped state

(1) Open circuit detection is always enabled for this input channel.

Table 21 - Analog Module 2 Descriptions

Name	Parameter No.	Description
Input Channel 00 Type	468	• defines the type of analog signal that Input Channel 00 of Analog Module 2 monitors
Input Channel 00 Format	469	• defines the data format for how the analog reading is reported
Input Channel 00 Temperature Unit	470	• defines the temperature unit for RTD sensor readings
Input Channel 00 Filter Frequency	471	• defines update rate for the input channels of the analog module
Input Channel 00 Open Circuit State	472	• defines what the input channel reports when the input channel has an open circuit(1)
Input Channel 00 RTD Type Enable	473	• defines the type of RTD to monitor when the input channel type is configured to scan an RTD sensor
Input Channel 01 Type	477	• defines the type of analog signal that Input Channel 01 of Analog Module 2 monitors
Input Channel 01 Format	478	• defines the data format for how the analog reading is reported
Input Channel 01 Temperature Unit	479	• defines the temperature unit for RTD sensor readings
Input Channel 01 Filter Frequency	480	• defines update rate for the input channels of the analog module
Input Channel 01 Open Circuit State	481	• defines what the input channel reports when the input channel has an open circuit(1)
Input Channel 01 RTD Type Enable	482	• defines the type of RTD to monitor when the input channel type is configured to scan an RTD sensor
Input Channel 02 Type	486	• defines the type of analog signal that Input Channel 02 of Analog Module 2 monitors
Input Channel 02 Format	487	• defines the data format for how the analog reading is reported
Input Channel 02 Temperature Unit	488	• defines the temperature unit for RTD sensor readings
Input Channel 02 Filter Frequency	489	• defines update rate for the input channels of the analog module
Input Channel 02 Open Circuit State	490	• defines what the input channel reports when the input channel has an open circuit(1)
Input Channel 02 RTD Type Enable	491	• defines the type of RTD to monitor when the input channel type is configured to scan an RTD sensor
Output Channel 00 Type	464	• defines the type of analog signal that Output Channel 00 of Analog Module 2 provides
Output Channel 00 Selection	496	• defines the E200 relay parameter that Output Channel 00 represents
Output Channel 00 Expansion Bus Fault Action	497	• defines the value that the E200 Analog I/O Expansion Module Output Channel 00 provides when there is an E200 Expansion Bus fault
Output Channel 00 Protection Fault Action	498	• defines the value that the E200 Analog I/O Expansion Module Output Channel 00 provides when the E200 is in a tripped state

(1) Open circuit detection is always enabled for this input channel.

Table 22 - Analog Module 3 Channel Descriptions

Name	Parameter No.	Description
Input Channel 00 Type	499	• defines the type of analog signal that Input Channel 00 of Analog Module 3 monitors
Input Channel 00 Format	500	• defines the data format for how the analog reading is reported
Input Channel 00 Temperature Unit	501	• defines the temperature unit for RTD sensor readings
Input Channel 00 Filter Frequency	502	• defines update rate for the input channels of the analog module
Input Channel 00 Open Circuit State	503	• defines what the input channel reports when the input channel has an open circuit(1)
Input Channel 00 RTD Type Enable	504	• defines the type of RTD to monitor when the input channel type is configured to scan an RTD sensor
Input Channel 01 Type	508	• defines the type of analog signal that Input Channel 01 of Analog Module 3 monitors
Input Channel 01 Format	509	• defines the data format for how the analog reading is reported
Input Channel 01 Temperature Unit	510	• defines the temperature unit for RTD sensor readings
Input Channel 01 Filter Frequency	511	• defines update rate for the input channels of the analog module
Input Channel 01 Open Circuit State	512	• defines what the input channel reports when the input channel has an open circuit(1)
Input Channel 01 RTD Type Enable	513	• defines the type of RTD to monitor when the input channel type is configured to scan an RTD sensor
Input Channel 02 Type	517	• defines the type of analog signal that Input Channel 02 of Analog Module 3 monitors
Input Channel 02 Format	518	• defines the data format for how the analog reading is reported
Input Channel 02 Temperature Unit	519	• defines the temperature unit for RTD sensor readings
Input Channel 02 Filter Frequency	520	• defines update rate for the input channels of the analog module
Input Channel 02 Open Circuit State	521	• defines what the input channel reports when the input channel has an open circuit(1)
Input Channel 02 RTD Type Enable	522	• defines the type of RTD to monitor when the input channel type is configured to scan an RTD sensor
Output Channel 00 Type	526	• defines the type of analog signal that Output Channel 00 of Analog Module 3 provides
Output Channel 00 Selection	527	• defines the E200 relay parameter that Output Channel 00 represents
Output Channel 00 Expansion Bus Fault Action	528	• defines the value that the E200 Analog I/O Expansion Module Output Channel 00 provides when there is an E200 Expansion Bus fault
Output Channel 00 Protection Fault Action	529	• defines the value that the E200 Analog I/O Expansion Module Output Channel 00 provides when the E200 is in a tripped state

(1) Open circuit detection is always enabled for this input channel.

Table 23 - Analog Module 4 Channel Descriptions

Name	Parameter No.	Description
Input Channel 00 Type	530	• defines the type of analog signal that Input Channel 00 of Analog Module 4 monitors
Input Channel 00 Format	531	• defines the data format for how the analog reading is reported
Input Channel 00 Temperature Unit	532	• defines the temperature unit for RTD sensor readings
Input Channel 00 Filter Frequency	533	• defines update rate for the input channels of the analog module
Input Channel 00 Open Circuit State	534	• defines what the input channel reports when the input channel has an open circuit(1)
Input Channel 00 RTD Type Enable	535	• defines the type of RTD to monitor when the input channel type is configured to scan an RTD sensor
Input Channel 01 Type	539	• defines the type of analog signal that Input Channel 01 of Analog Module 4 monitors
Input Channel 01 Format	540	• defines the data format for how the analog reading is reported
Input Channel 01 Temperature Unit	541	• defines the temperature unit for RTD sensor readings
Input Channel 01 Filter Frequency	542	• defines update rate for the input channels of the analog module
Input Channel 01 Open Circuit State	543	• defines what the input channel reports when the input channel has an open circuit(1)
Input Channel 01 RTD Type Enable	544	• defines the type of RTD to monitor when the input channel type is configured to scan an RTD sensor
Input Channel 02 Type	548	• defines the type of analog signal that Input Channel 02 of Analog Module 4 monitors
Input Channel 02 Format	549	• defines the data format for how the analog reading is reported
Input Channel 02 Temperature Unit	550	• defines the temperature unit for RTD sensor readings
Input Channel 02 Filter Frequency	551	• defines update rate for the input channels of the analog module
Input Channel 02 Open Circuit State	552	• defines what the input channel reports when the input channel has an open circuit(1)
Input Channel 02 RTD Type Enable	556	• defines the type of RTD to monitor when the input channel type is configured to scan an RTD sensor
Output Channel 00 Type	557	• defines the type of analog signal that Output Channel 00 of Analog Module 4 provides
Output Channel 00 Selection	558	• defines the E200 relay parameter that Output Channel 00 represents
Output Channel 00 Expansion Bus Fault Action	559	• defines the value that the E200 Analog I/O Expansion Module Output Channel 00 provides when there is an E200 Expansion Bus fault
Output Channel 00 Protection Fault Action	560	• defines the value that the E200 Analog I/O Expansion Module Output Channel 00 provides when the E200 is in a tripped state

(1) Open circuit detection is always enabled for this input channel.

Introduction to Operating Modes

The E200 relay supports a number of Operating Modes, which consist of configuration rules and logic to control typical full-voltage motor starters, including:

- Overload
- Non-Reversing Starter
- Reversing Starter
- Wye/Delta (Star/Delta) Starter
- Two-Speed Starter
- Monitor

The default Operating Mode (Parameter 195) for the E200 relay is Overload (Network) in which the E200 relay operates like a traditional overload relay in which one of the output relays is assigned as a Trip Relay or Control Relay. Use commands to control any output relays that are assigned as Normal output relays or Control Relays. Invalid configuration of the output relays causes the E200 relay to go into Invalid Configuration Mode and trip on a configuration trip. Operating Modes on page 49 describes the functionality of the available Operating Modes for the E200 relay and their associated configuration rules.

Notes:

Operating Modes

The E200 Electronic Overload Relay supports up to 54 operating modes, which consist of configuration rules and logic to control typical full-voltage motor starters, including:

- Overload
- Non-reversing starter
- Reversing starter
- Wye/Delta (Star/Delta) starter
- Two-speed starter
- Monitoring device

This chapter explains the configuration rules, logic, and control wiring that is required for the available operating modes. The default Operating Mode (Parameter 195) for the E200 relay is Overload (Network)—even though the E200 relay is non networked. In this mode, the E200 relay operates like a traditional overload relay in which one of the output relays is assigned as a Trip Relay or Control Relay. Use commands via the operator control/diagnostic station to control any output relays that are assigned as Normal output relays or Control Relays. Invalid configuration of the output relays causes the E200 relay to go into Invalid Configuration Mode and trip on a configuration trip.

Overload Operating Modes

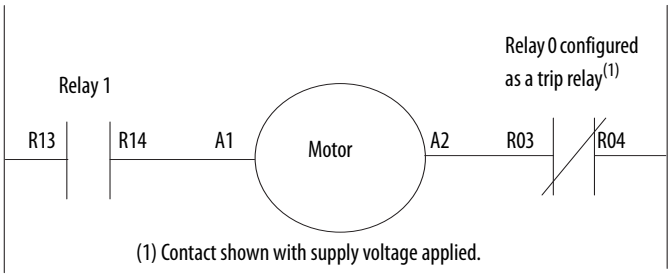
The overload-based operating modes of the E200 relay make the device operate as a traditional overload relay, in which it interrupts the control circuit of a contactor coil with a normally closed trip relay or a normally open control relay. There are four overload-based operating modes to choose from:

- Network
  - Because the E200 is non-networked, the overload outputs cannot be controlled over a network. This default mode allows the device to function as a normally closed overload relay.
- Operator Station
- Local I/O
- Custom

The E200 relay is wired as a traditional overload relay with one of the output relays configured as a normally closed trip relay. Figure 6 is a wiring diagram of a non-reversing starter. Relay 0 is configured as a trip relay, and Relay 1 is configured as a normally open control relay, which receives commands to energize the contactor coil from an automation controller.

You can also wire the E200 relay as a control relay so that the relay is controlled by local means and opens when a trip event occurs. Figure 7 is a wiring diagram of a non-reversing starter with Relay 0 configured as a control relay. Relay 0 receives control commands to energize or de-energize the contactor coil locally or from an external source. Relay 0 also goes to an open state when there is a trip event.

Figure 6 - Trip Relay Wiring Diagram



For Control Module firmware v3.000 and higher, you can also wire the E200 relay as a control relay so that the relay that is controlled by the communication network opens when a trip event occurs. Figure 7 is a wiring diagram of a non-reversing starter with Relay 0 configured as a control relay. Relay 0 receives control commands from an automation controller to energize or de-energize the contactor coil. Relay 0 also goes to an open state when there is a trip event.

Figure 7 - Control Relay Wiring Diagram

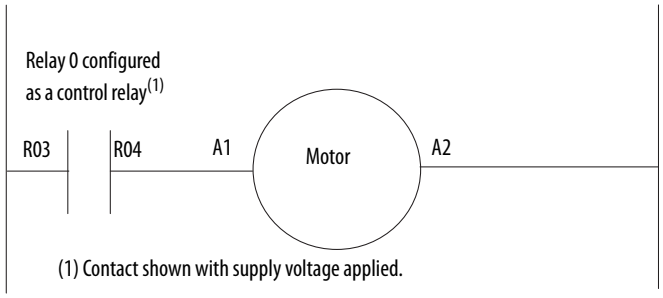
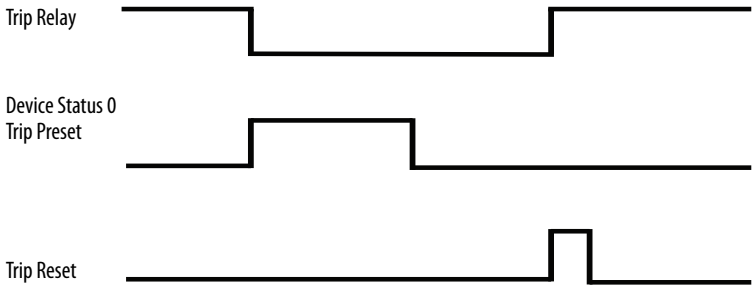


Figure 8 - Timing Diagram



Overload (Network)

The default Operating Mode (Parameter 195 = 2) of the E200 relay is *Overload (Network)*, in which the E200 operates as a traditional overload relay with one output relay that is assigned as a normally closed trip relay or a normally open control relay. Use network commands to control the control relay or any of the remaining output relays that are assigned as normal output relays.

The reset button of the E200 Operator Station is enabled for this operating mode.

The E200 relay's default Operating Mode (Parameter 195 = 2) is Network Overload (note: Since the E200 is non-networked, the overload outputs cannot be controlled over a network.), in which the E200 operates as a traditional overload relay with one output relay that is assigned as a normally closed trip relay or a normally open control relay. Use commands locally or via external means to control the control relay or any of the remaining output relays that are assigned as normal output relays.

The reset button of the E300/E200 Operator Station is enabled for this operating mode.

Rules

1. You must assign one output relay as a trip relay or control relay. Set any of the Output Ptxx Assignments (Parameters 202...204) to Trip Relay or Control Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).

DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 2

Overload (Operator Station)

Operating Mode *Overload (Operator Station)* (Parameter 195 = 26) operates as a traditional overload relay with one output relay that is assigned as a normally closed trip relay or a normally open control relay. The Overload (Operator Station) operating mode is used when an external source uses the start and stop keys of the E200 Operator Station for its motor control logic. Use commands locally or via external means to control the control relay or any of the remaining output relays that are assigned as normal output relays.

The reset button of the E200 Operator Station is enabled, and the Local/Remote yellow LED is illuminated to indicate that the operator station is being used for local control.

Rules

1. You must assign one output relay as a trip relay or control relay. Set any of the Output Ptxx Assignments (Parameters 202...204) to Trip Relay or Control Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).
3. Operator Station Trip must be disabled in TripEnableC (Parameter 186).
4. Operator Station Option Match Trip or Warning must be enabled.
   - Option Match Trip or must be enabled in TripEnableC (Parameter 186)
   - Operator Station must be enabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)

   Or

   - Option Match Warning must be enabled in WarningEnableC (Parameter 192)
   - Operator Station must be disabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)
5. Communication Fault & Idle Override (Parameter 346) must be enabled.
6. Network Fault Override (Parameter 347) must be enabled.

DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 26.

Overload (Local I/O)

Operating Mode *Overload (Local I/O)* (Parameter 195 = 35) operates as a traditional overload relay with one output relay that is assigned as a normally closed trip relay or a normally open control relay. The Overload (Local I/O) operating mode is used for standalone applications or automation systems that do not use an E200 Operator Station. Use the digital inputs of the E200 locally for the motor control logic. The E200 relay can use network commands to control the control relay or any of the remaining output relays that are assigned as Normal output relays. The reset button of the E200 Operator Station is disabled, and a digital input that is assigned as a trip reset is required.

Rules

1. You must assign one output relay as a trip relay or control relay. Set any of the Output Ptxx Assignments (Parameters 202...204) to Trip Relay or Control Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).
3. Operator Station Trip must be disabled in TripEnableC (Parameter 186).
4. Operator Station Option Match Trip or Warning must be enabled.
5. Option Match Trip or must be enabled in TripEnableC (Parameter 186)
   - Operator Station must be enabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)

   Or
   - Option Match Warning must be enabled in WarningEnableC (Parameter 192)
   - Operator Station must be disabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)
6. Communication Fault & Idle Override (Parameter 346) must be enabled.
7. Network Fault Override (Parameter 347) must be enabled.

DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 35.

Overload (Custom)

Operating Mode *Overload (Custom)* (Parameter 195 = 49) operates as a traditional overload relay with one output relay that is assigned as a normally closed trip relay or a normally open control relay. The Overload (Custom) operating mode is used for applications that require customized DeviceLogix programs. This operating mode requires minimal configuration rules.

Rules

1. Set any of the Output Ptxx Assignments (Parameters 202...204) to Trip Relay or Control Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).

DeviceLogix Program

The last saved DeviceLogix program is executed in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 49.

Non-reversing Starter Operating Modes

The non-reversing starter-based operating modes of the E200 relay provide the control logic for a non-reversing full voltage starter. A normally open control relay controls the contactor coil. When a trip event occurs, the control relay remains open until the E200 receives a trip reset command. There are 15 non-reversing starter-based operating modes to choose from:

- Network
- Network with Feedback
- Operator Station
- Operator Station with Feedback
- Local I/O – Two-wire Control
- Local I/O with Feedback – Two-wire Control
- Local I/O – Three-wire Control
- Local I/O with Feedback – Three-wire Control
- Network & Operator Station
- Network & Operator Station with Feedback
- Network & Local I/O – Two-wire Control
- Network & Local I/O with Feedback – Two-wire Control
- Network & Local I/O – Three-wire Control
- Network & Local I/O with Feedback – Three-wire Control
- Custom

Non-reversing Starter (Network)

Operating Mode *Non-Reversing Starter (Network)* (Parameter 195 = 3) uses the network tag *LogicDefinedPt00Data* in Output Assembly 144 to control Relay 0, which controls the contactor coil. LogicDefinedPt00Data is a maintained value, so the non-reversing starter remains energized when LogicDefinedPt00Data has a value of 1. Program the appropriate state of the starter by using the Network Communication Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3.

The reset button of the E200 Operator Station is enabled for this operating mode.

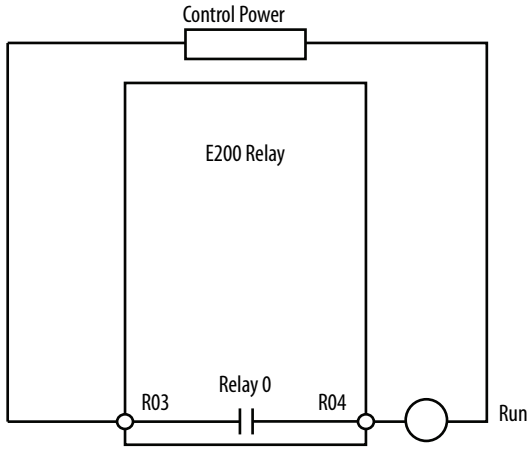
Rules

1. Output Pt00 Assignment (Parameters 202) must be set to Control Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).

Wiring Diagram

Output Relay 0 is wired as a control relay in which the relay can be controlled locally and opens when a trip event occurs. Figure 9 is a wiring diagram of a non-reversing starter with Output Relay 0 configured as a control relay.

Figure 9 - Non-reversing Starter (Network) Wiring Diagram

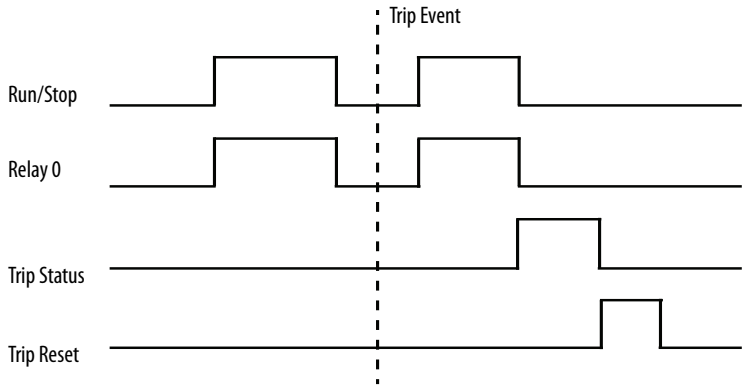


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 3.

Timing Diagram

Figure 10 - Non-reversing Starter (Network) Timing Diagram



Non-reversing Starter (Network) with Feedback

Operating Mode *Non-Reversing Starter (Network) with Feedback* (Parameter 195 = 4) uses the network tag *LogicDefinedPt00Data* in Output Assembly 144 to control Relay 0, which controls the contactor coil. LogicDefinedPt00Data is a maintained value, so the non-reversing starter remains energized when LogicDefinedPt00Data has a value of 1. Use the Network Communication Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3 to program the appropriate state of the starter.

The auxiliary contact from the contactor of the non-reversing starter is wired into Input 0. If a feedback signal is not received before the time identified in Feedback Timeout (Parameter 213), the E200 Relay issues a trip or warning event.

The reset button of the E200 Operator Station is enabled for this operating mode.

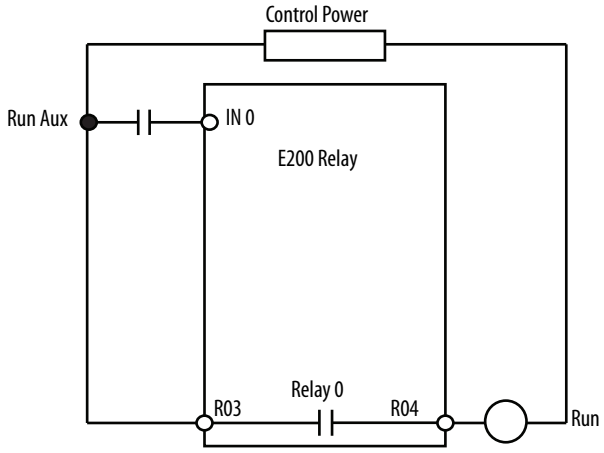
Rules

1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).
3. Feedback Timeout Trip in TripEnableC (Parameter 186) or Feedback Timeout Warning in WarningEnableC (Parameter 192) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay and opens when a trip event occurs. Figure 11 is a wiring diagram of a non-reversing starter with the contactor auxiliary wired to Input 0 and Output Relay 0 configured as a control relay.

Figure 11 - Non-reversing Starter (Network) with Feedback Wiring Diagram

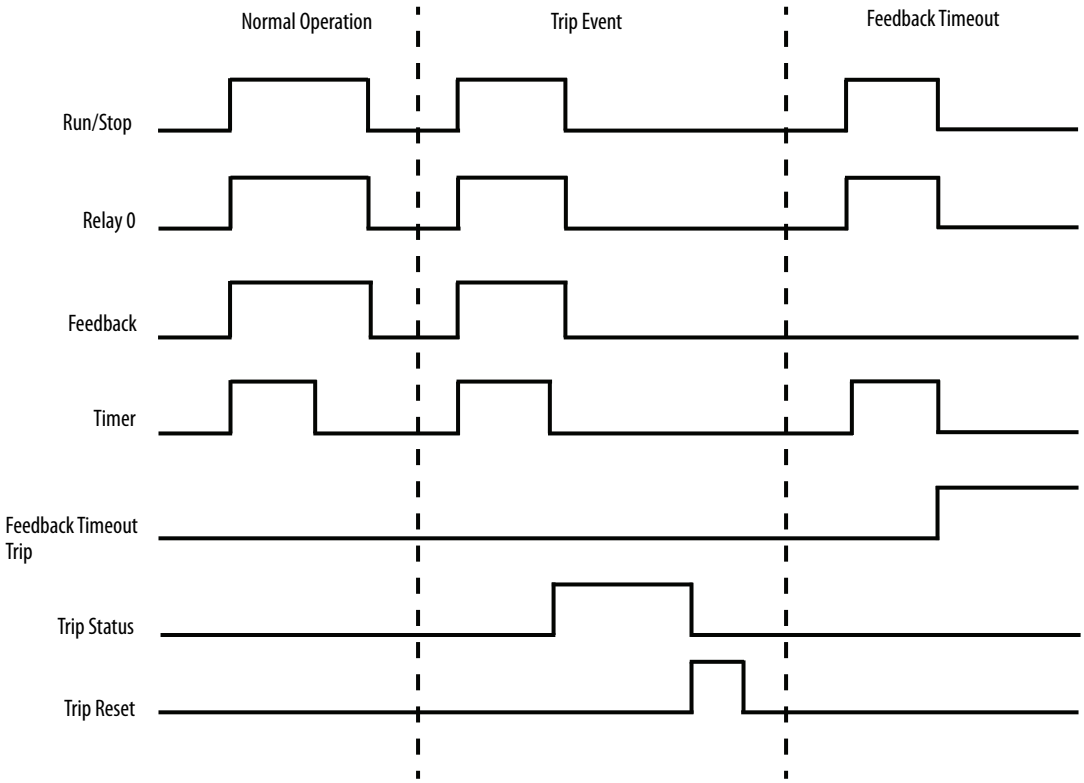


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 4.

Timing Diagram

Figure 12 - Non-reversing Starter (Network) with Feedback Timing Diagram



Non-reversing Starter (Operator Station)

Operating Mode *Non-Reversing Starter (Operating Station)* (Parameter 195 = 27) uses the Operator Station's "I" and "0" keys to control Relay 0, which controls the contactor coil. These keys are momentary push buttons, so the non-reversing starter remains energized when you release the "I" button. The E200 relay issues a trip or warning event if the E200 Operator Station disconnects from the base relay.

The reset button of the E200 Operator Station is enabled, and the Local/Remote yellow LED is illuminated to indicate that the operator station is being used for local control.

Rules

1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).
3. Operator Station Trip must be disabled in TripEnableC (Parameter 186).
4. Operator Station Option Match Trip or Warning must be enabled.
   - Option Match Trip or must be enabled in TripEnableC (Parameter 186)
   - Operator Station must be enabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)

   Or

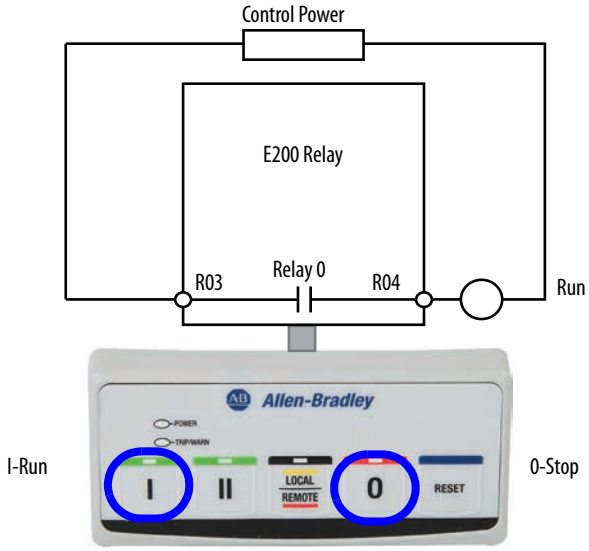
- Option Match Warning must be enabled in WarningEnableC (Parameter 192)
- Operator Station must be disabled in Mismatch Action (Parameter 233)
- An operator station must be selected in Operator Station Type (Parameter 224)

5. Communication Fault & Idle Override (Parameter 346) must be enabled.
6. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay, and it opens when a trip event occurs. Figure 13 is a wiring diagram of a non-reversing starter with Output Relay 0 configured as a control relay.

Figure 13 - Non-reversing Starter (Operator Station) Wiring Diagram

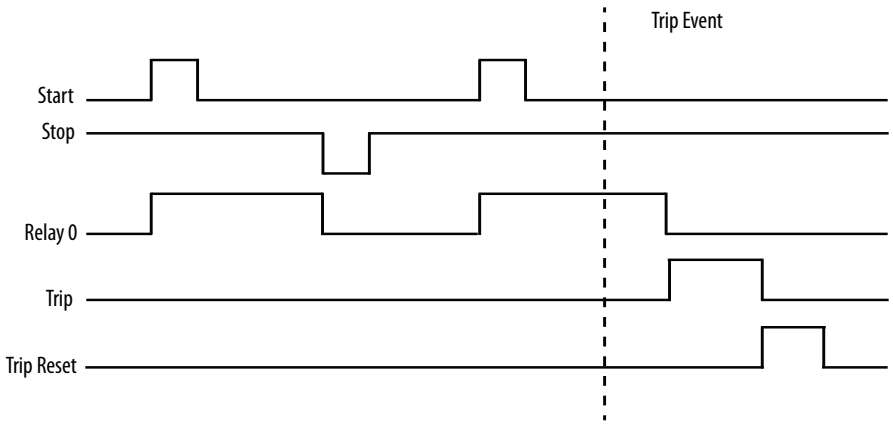


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 27.

Timing Diagram

Figure 14 - Non-reversing Starter (Operator Station) Timing Diagram



Non-reversing Starter (Operator Station) with Feedback

Operating Mode *Non-Reversing Starter (Operator Station) with Feedback* (Parameter 195 = 28) uses the E200 Operator Station "I" and "0" keys to control Relay 0, which controls the contactor coil. These keys are momentary push buttons, so the non-reversing starter remains energized when you release the "I" button. The E200 relay issues a trip or warning event if the E200 Operator Station disconnects from the base relay.

The auxiliary contact from the contactor of the non-reversing starter is wired into Input 0. If a feedback signal is not received before the time identified in Feedback Timeout (Parameter 213), the E200 Relay issues a trip or warning event.

The reset button of the E200 Operator Station is enabled, and the Local/Remote yellow LED is illuminated to indicate that the operator station is being used for local control.

Rules

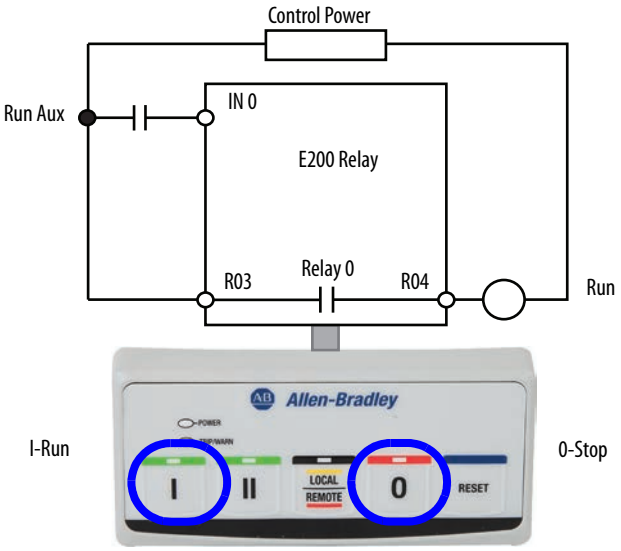
1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).
3. Operator Station Trip must be disabled in TripEnableC (Parameter 186).
4. Operator Station Option Match Trip or Warning must be enabled.
   - Option Match Trip or must be enabled in TripEnableC (Parameter 186)
   - Operator Station must be enabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)

   Or
   - Option Match Warning must be enabled in WarningEnableC (Parameter 192)
   - Operator Station must be disabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)
5. Communication Fault & Idle Override (Parameter 346) must be enabled.
6. Network Fault Override (Parameter 347) must be enabled.
7. Feedback Timeout Trip in TripEnableC (Parameter 186) or Feedback Timeout Warning in WarningEnableC (Parameter 192) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay in which the relay is controlled locally and opens when a trip event occurs. Figure 15 is a wiring diagram of a non-reversing starter with the contactor auxiliary wired to Input 0 and Output Relay 0 configured as a control relay.

Figure 15 - Non-reversing Starter (Operator Station) with Feedback Wiring Diagram

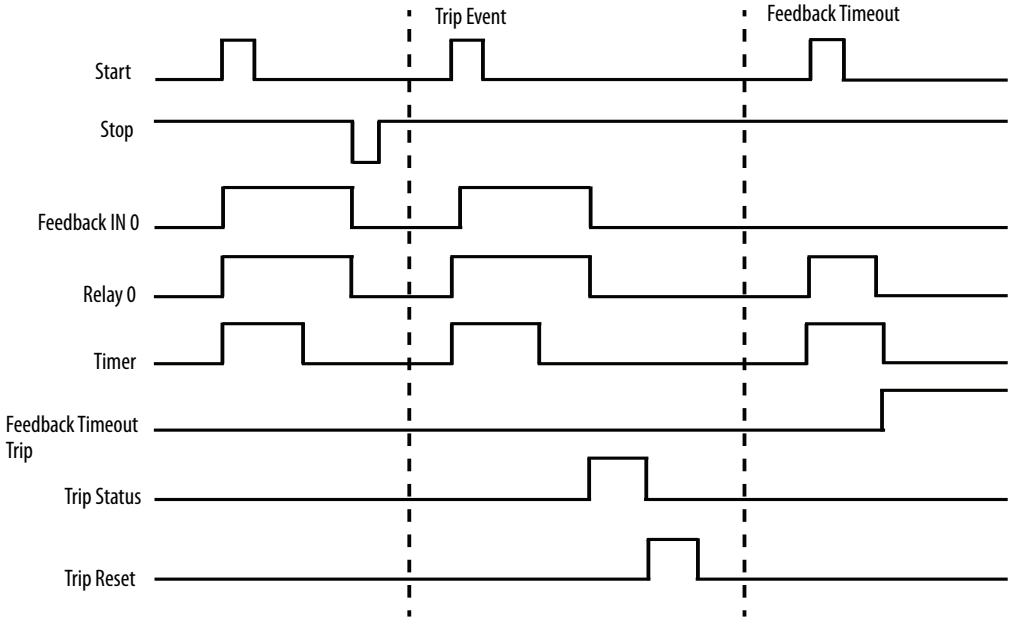


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 28.

Timing Diagram

Figure 16 - Non-reversing Starter (Operator Station) with Feedback Timing Diagram



Non-reversing Starter (Local I/O) – Two-wire Control

Operating Mode *Non-Reversing Starter (Local I/O) – Two Wire Control* (Parameter 195 = 36) uses Input 0 to control Output Relay 0, which controls the contactor coil. Input 0 is a maintained value, so the non-reversing starter remains energized when Input 0 is active.

The reset button of the E200 Operator Station is enabled for this operating mode.

IMPORTANT The Non-reversing Starter (Local I/O) – Two-wire Control operating mode uses the signal from Input 0 to control the starter. When an E200 relay powers up, the starter energizes if Input 0 is active.

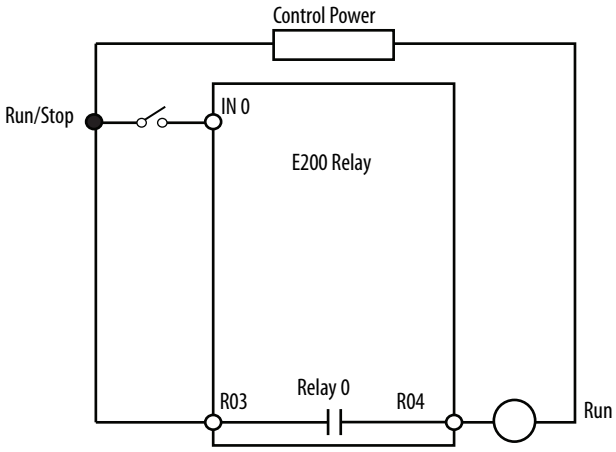
Rules

1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).
3. Communication Fault & Idle Override (Parameter 346) must be enabled.
4. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay in which the relay is controlled by the state of Input 0 and opens when a trip event occurs. Figure 17 is a wiring diagram of a non-reversing starter with Output Relay 0 configured as a control relay.

Figure 17 - Non-reversing Starter (Local I/O) – Two-wire Control Wiring Diagram

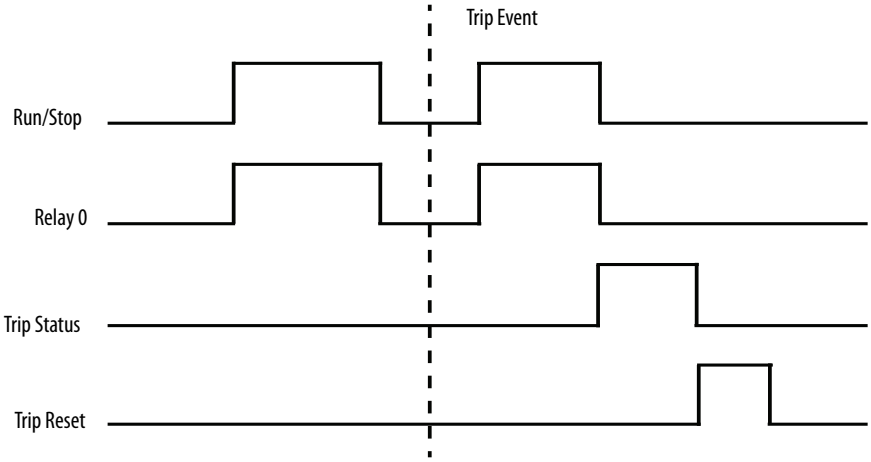


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 36.

Timing Diagram

Figure 18 - Non-reversing Starter (Local I/O) – Two-wire Control Timing Diagram



Non-reversing Starter (Local I/O) – Two-wire Control with Feedback

Operating Mode *Non-Reversing Starter (Local I/O) – Two Wire Control with Feedback* (Parameter 195 = 37) uses the state of Input 1 to control Output Relay 0, which controls the contactor coil. Input 0 is a maintained value, so the non-reversing starter remains energized when Input 1 is active.

The auxiliary contact from the non-reversing starter's contactor is wired into Input 0. If a feedback signal is not received before the time identified in Feedback Timeout (Parameter 213), the E200 Relay issues a trip or warning event.

The reset button of the E200 Operator Station is enabled for this operating mode.

IMPORTANT The Non-reversing Starter (Local I/O) – Two-wire Control with Feedback operating mode uses the state of Input 1 to control the starter. When the E200 relay powers up, the starter energizes if Input 1 is active.

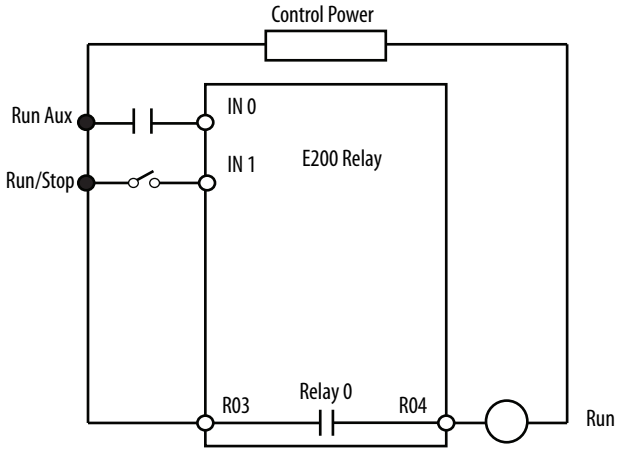
Rules

1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).
3. Feedback Timeout Trip in TripEnableC (Parameter 186) or Feedback Timeout Warning in WarningEnableC (Parameter 192) must be enabled.
4. Communication Fault & Idle Override (Parameter 346) must be enabled.
5. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay in which the relay is controlled by the state if Input 1 and opens when a trip event occurs. Figure 19 is a wiring diagram of a non-reversing starter with Output Relay 0 configured as a control relay.

Figure 19 - Non-reversing Starter (Local I/O) – Two-wire Control with Feedback Wiring Diagram

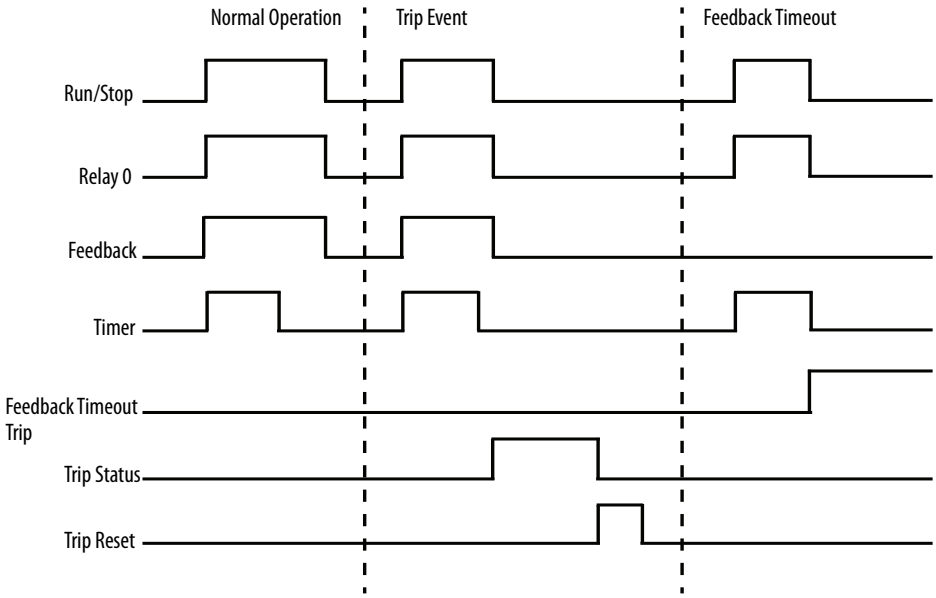


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 37.

Timing Diagram

Figure 20 - Non-reversing Starter (Local I/O) – Two-wire Control with Feedback Timing Diagram



Non-reversing Starter (Local I/O) – Three-wire Control

Operating Mode *Non-Reversing Starter (Local I/O) – Three Wire Control* (Parameter 195 = 38) uses an active state in Input 1 (normally open momentary push button) to energize Output Relay 0, which controls the contactor coil, and a de-active state in Input 0 is used (normally closed push button) to de-energize Output Relay 0. Both Input 0 and Input 1 are momentary values, so the non-reversing starter only energizes if Input 0 is active and Input 1 is momentarily active.

The reset button of the E200 Operator Station is enabled for this operating mode.

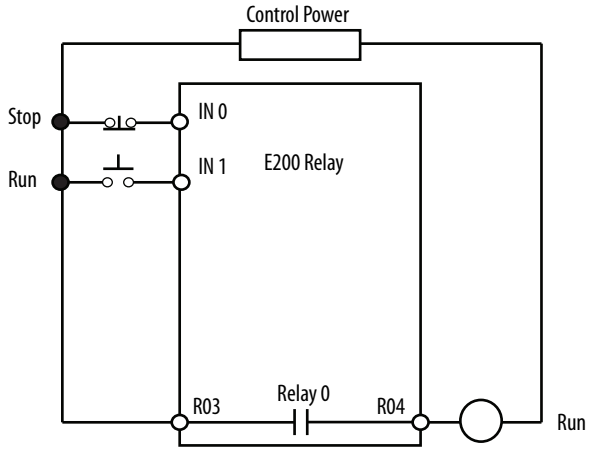
Rules

1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).
3. Communication Fault & Idle Override (Parameter 346) must be enabled.
4. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay in which the relay is energized when Input 0 is active and Input 1 is momentarily active. Output Relay 0 de-energizes when Input 0 is momentarily de-active or when a trip event occurs. Figure 21 is a wiring diagram of a non-reversing starter with three wire control and an Output Relay 0 configured as a control relay.

Figure 21 - Non-reversing Starter (Local I/O) – Three-wire Control Wiring Diagram

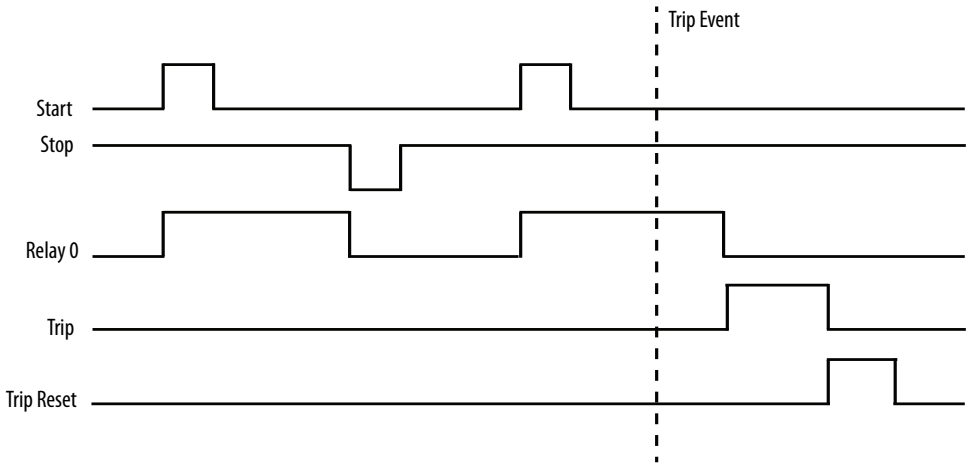


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 38.

Timing Diagram

Figure 22 - Non-reversing Starter (Local I/O) – Three-wire Control Timing Diagram



Non-reversing Starter (Local I/0) – Three-wire Control with Feedback

Operating Mode *Non-Reversing Starter (Local I/O) – Three Wire Control with Feedback* (Parameter 195 = 39) uses an active state in Input 1 (normally open momentary push button) to energize Output Relay 0, which controls the contactor coil, and a de-active state in Input 2 is used (normally closed momentary push button) to de-energize Output Relay 0. Both Input 1 and Input 2 are momentary values, so the non-reversing starter only energizes if Input 2 is active and Input 1 is momentarily active.

The auxiliary contact from the non-reversing starter's contactor is wired into Input 0. If a feedback signal is not received before the time identified in Feedback Timeout (Parameter 213), the E200 Relay issues a trip or warning event.

The reset button of the E200 Operator Station is enabled for this operating mode.

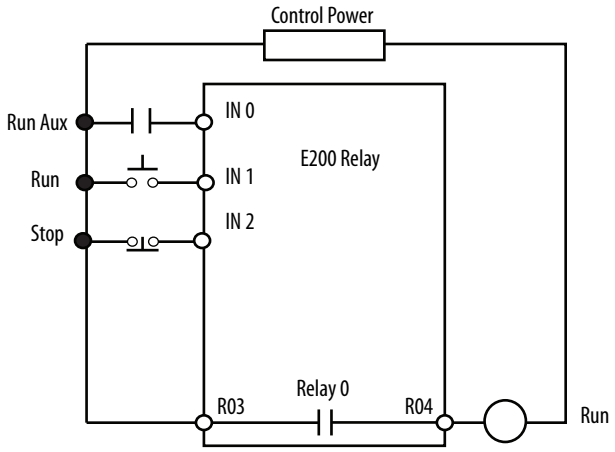
Rules

1. Three digital inputs must be available on the Control Module
2. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).
4. Feedback Timeout Trip in TripEnableC (Parameter 186) or Feedback Timeout Warning in WarningEnableC (Parameter 192) must be enabled.
5. Communication Fault & Idle Override (Parameter 346) must be enabled.
6. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay in which the relay is controlled by the state if Input 1 and opens when a trip event occurs. Figure 23 is a wiring diagram of a non-reversing starter with three wire control and Output Relay 0 configured as a control relay.

Figure 23 - Non-reversing Starter (Local I/0) – Three-wire Control with Feedback Wiring Diagram

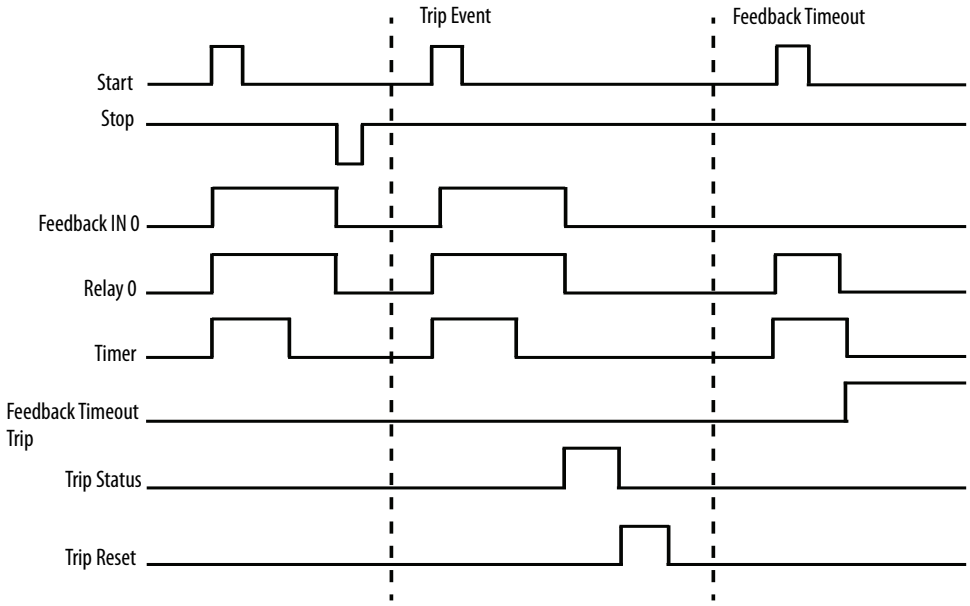


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on powerup or when Operating Mode (Parameter 195) is set to a value of 39.

Timing Diagram

Figure 24 - Non-reversing Starter (Local I/O) – Three-wire Control with Feedback Timing Diagram



Non-reversing Starter (Network & Operator Station)

Operating Mode *Non-Reversing Starter (Network& Operator Station)* (Parameter 195 = 11) uses the network tag *LogicDefinedPt00Data* in Output Assembly 144 in Remote control mode and the E200 Operator Station's "I" and "0" keys in Local control mode to control Relay 0, which controls the contactor coil. LogicDefinedPt00Data is a maintained value, so the non-reversing starter remains energized when LogicDefinedPt00Data has a value of 1 in Remote control mode. Program the appropriate state of the starter by using the Network Communication Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3.

The E200 Operator Station "I", "0", and "Local/Remote" keys are momentary push buttons. Press and release the "I" button in Local control mode to energize the starter. Press and release the "0" button in Local control mode to de-energize the starter.

To change between Local and Remote control mode, press and release the "Local/Remote" button on the E200 Operator Station. The LED above "Local/Remote" button illuminates yellow in Local control mode and red in Remote control mode.

The E200 relay issues a trip or warning event if the E200 Operator Station disconnects from the base relay.

The reset button of the E200 Operator Station is enabled for this operating mode.

Rules

1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).
3. Operator Station Trip must be disabled in TripEnableC (Parameter 186).

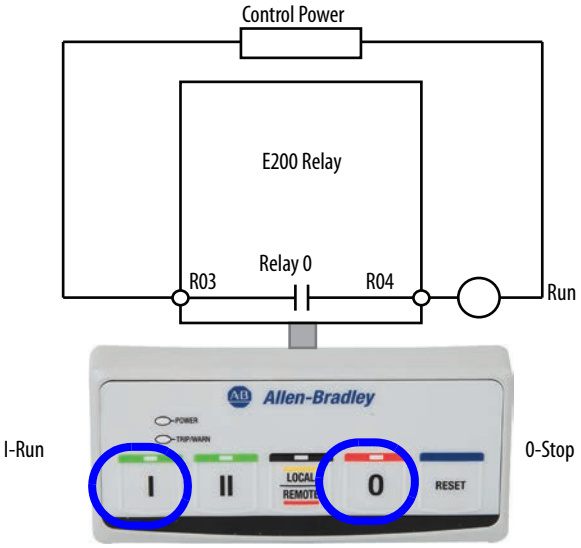
4. Operator Station Option Match Trip or Warning must be enabled.
   - Option Match Trip or must be enabled in TripEnableC (Parameter 186)
   - Operator Station must be enabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)

   Or
   - Option Match Warning must be enabled in WarningEnableC (Parameter 192)
   - Operator Station must be disabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)
5. Communication Fault & Idle Override (Parameter 346) must be enabled.
6. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay in which the relay is controlled locally and opens when a trip event occurs. Figure 25 is a wiring diagram of a non-reversing starter with Output Relay 0 configured as a control relay.

Figure 25 - Non-reversing Starter (Network & Operator Station) Wiring Diagram



DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 11.

Non-reversing Starter (Network & Operator Station) with Feedback

Operating Mode *Non-Reversing Starter (Network& Operator Station) with Feedback* (Parameter 195 = 12) uses the network tag *LogicDefinedPt00Data* in Output Assembly 144 in Remote control mode and the E200 Operator Station's "I" and "0" keys in local control mode to control Relay 0, which controls the contactor coil. LogicDefinedPt00Data is a maintained value, so the non-reversing starter remains energized when LogicDefinedPt00Data has a value of 1 in Remote control mode. Program the appropriate state of the starter by using the Network Communication

Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3.

The E200 Operator Station's "I", "0", and "Local/Remote" keys are momentary push buttons. Press and release the "I" button in Local control mode to energize the starter. Press and release the "0" button in Local control mode to de-energize the starter.

To change between Local and Remote control mode press and release the "Local/Remote" button on the E200 Operator Station. The LED above "Local/Remote" button illuminates yellow in Local control mode and red in Remote control mode.

The auxiliary contact from the non-reversing starter's contactor is wired into Input 0. If a feedback signal is not received before the time identified in Feedback Timeout (Parameter 213), the E200 relay issues a trip or warning event.

The E200 relay issues a trip or warning event if the E200 Operator Station disconnects from the base relay.

The reset button of the E200 Operator Station is enabled for this operating mode.

Rules

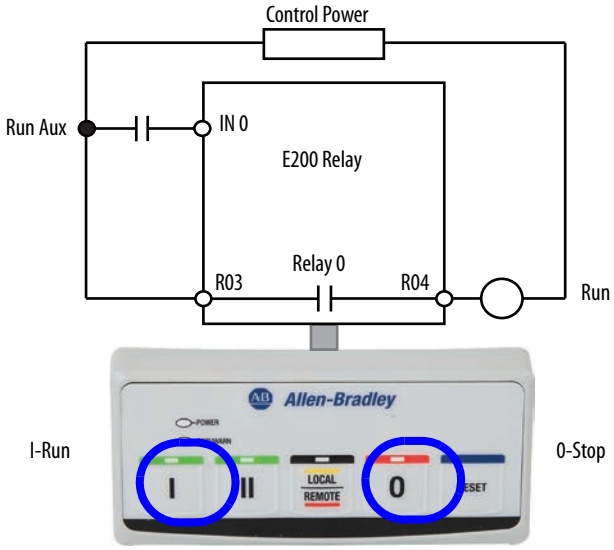
1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).
3. Operator Station Trip must be disabled in TripEnableC (Parameter 186).
4. Operator Station Option Match Trip or Warning must be enabled.
   - Option Match Trip or must be enabled in TripEnableC (Parameter 186)
   - Operator Station must be enabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)

   Or
   - Option Match Warning must be enabled in WarningEnableC (Parameter 192)
   - Operator Station must be disabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)
5. Feedback Timeout Trip in TripEnableC (Parameter 186) or Feedback Timeout Warning in WarningEnableC (Parameter 192) must be enabled.
6. Communication Fault & Idle Override (Parameter 346) must be enabled.
7. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay in which the relay is controlled locally and opens when a trip event occurs. Figure 26 is a wiring diagram of a non-reversing starter with the contactor auxiliary wired into Input 0 and Output Relay 0 configured as a control relay.

Figure 26 - Non-reversing Starter (Network & Operator Station) with Feedback Wiring Diagram



DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 12.

Non-reversing Starter (Network & Local I/O) – Two-wire Control

Operating Mode *Non-Reversing Starter (Network & Local I/O) – Two Wire Control* (Parameter 195 = 16) uses the network tag *LogicDefinedPt00Data* in Output Assembly 144 in Remote control mode and Input 0 in Local control mode to control Relay 0, which controls the contactor coil. Input 1 determines whether the motor starter is in Remote or Local control mode. LogicDefinedPt00Data is a maintained value, so the non-reversing starter remains energized when LogicDefinedPt00Data has a value of 1 in Remote control mode. Program the appropriate state of the starter by using the Network Communication Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3

In Local control mode, the state of Input 0 controls Output Relay 0, which controls the contactor coil. Input 0 is a maintained value, so the non-reversing starter remains energized when Input 0 is active.

Use Input 1 to select between Local and Remote control mode. Activate Input 1 to select Remote control mode. De-activate Input 1 to select Local control mode.

The reset button of the E200 Operator Station is enabled for this operating mode.

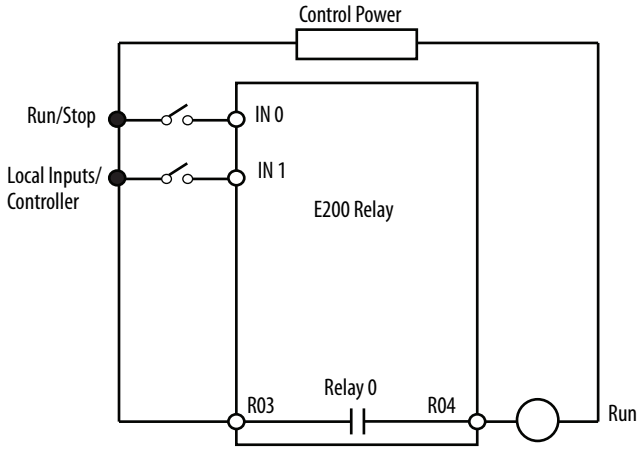
Rules

1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).
3. Communication Fault & Idle Override (Parameter 346) must be enabled.
4. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay in which the relay is controlled locally and opens when a trip event occurs. Figure 27 is a wiring diagram of a non-reversing starter with Output Relay 0 configured as a control relay.

Figure 27 - Non-reversing Starter (Network & Local I/O) – Two-wire Control Wiring Diagram

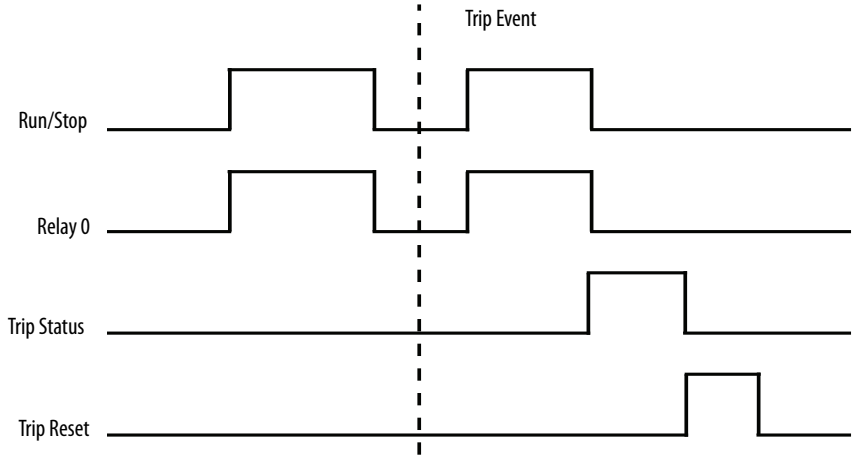


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 16.

Timing Diagram

Figure 28 - Non-reversing Starter (Network & Local I/O) – Two-wire Control Timing Diagram



Non-reversing Starter (Network & Local I/O) with Feedback – Two-wire Control

Operating Mode *Non-Reversing Starter (Network & Local I/O) with Feedback – Two Wire Control* (Parameter 195 = 17) uses the network tag *LogicDefinedPt00Data* in Output Assembly 144 in Remote control mode and Input 2 in Local control mode to control Relay 0, which controls the contactor coil. Input 3 determines whether the motor starter is in Remote or Local control mode. LogicDefinedPt00Data is a maintained value, so the non-reversing starter remains energized when LogicDefinedPt00Data has a value of 1 in Remote control mode. Program the

appropriate state of the starter by using the Network Communication Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3.

In Local control mode, the state of Input 2 controls Output Relay 0, which controls the contactor coil. Input 2 is a maintained value, so the non-reversing starter remains energized when Input 2 is active.

Use Input 3 to select between Local and Remote control mode. Activate Input 3 to select Remote control mode. De-activate Input 3 to select Local control mode.

The auxiliary contact from the non-reversing starter's contactor is wired into Input 0. If a feedback signal is not received before the time identified in Feedback Timeout (Parameter 213), the E200 Relay issues a trip or warning event.

The reset button of the E200 Operator Station is enabled for this operating mode.

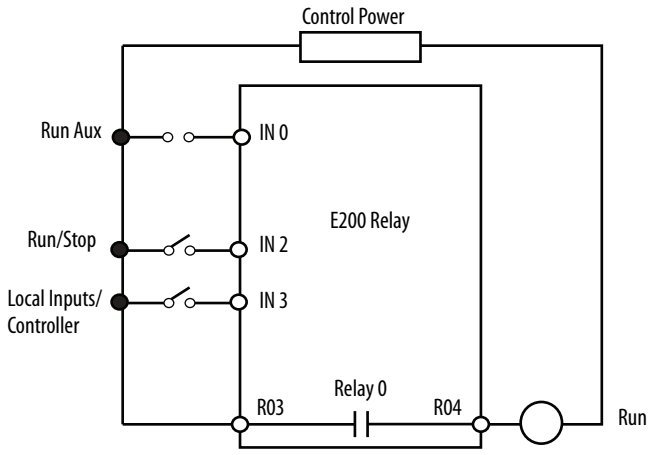
Rules

1. Three digital inputs must be available on the Control Module
2. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).
4. Feedback Timeout Trip in TripEnableC (Parameter 186) or Feedback Timeout Warning in WarningEnableC (Parameter 192) must be enabled.
5. Communication Fault & Idle Override (Parameter 346) must be enabled.
6. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay in which the relay is controlled locally and opens when a trip event occurs. Figure 29 is a wiring diagram of a non-reversing starter with Output Relay 0 configured as a control relay.

Figure 29 - Non-reversing Starter (Network & Local I/O) with Feedback – Two-wire Control Wiring Diagram

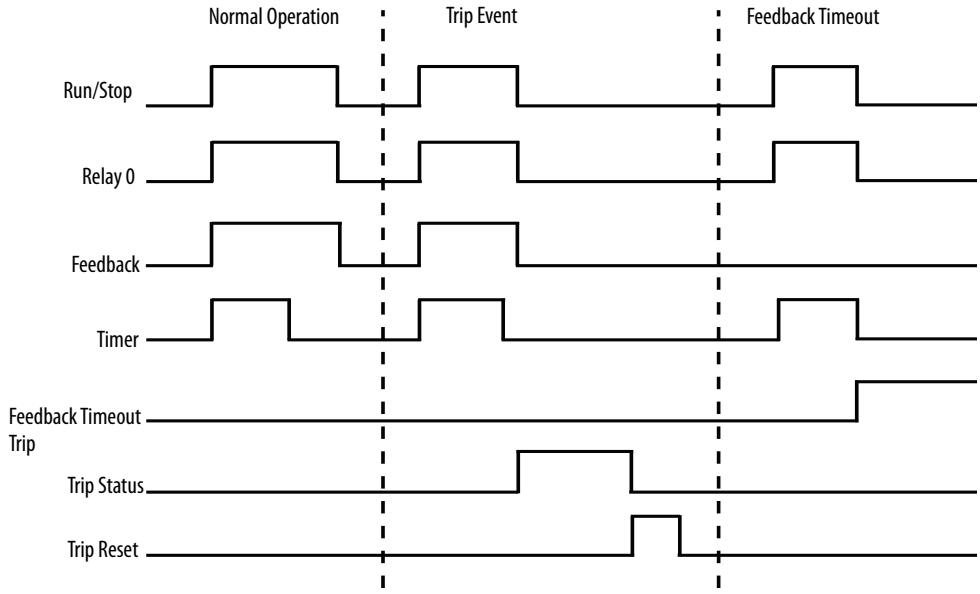


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 17.

Timing Diagram

Figure 30 - Non-reversing Starter (Network & Local I/O) with Feedback – Two-wire Control Timing Diagram



Non-reversing Starter (Network & Local I/O) – Three-wire Control

Operating Mode *Non-Reversing Starter (Network& Operator Station) – Three Wire Control* (Parameter 195 = 18) uses the network tag *LogicDefinedPt00Data* in Output Assembly 144 in Remote control mode and Input 1 & Input 2 in Local control mode to control Relay 0, which controls the contactor coil. LogicDefinedPt00Data is a maintained value, so the non-reversing starter remains energized when LogicDefinedPt00Data has a value of 1 in Remote control mode. Program the appropriate state of the starter by using the Network Communication Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3.

Local control mode uses a normally open momentary push button that is wired to Input 1 to energize Output Relay 0, which controls the contactor coil. A normally closed momentary push button that is wired to Input 2 de-energizes Output Relay 0. The non-reversing starter only energizes if Input 2 is active and Input 1 is momentarily active.

Use Input 3 to select between Local and Remote control mode. Activate Input 3 to select Remote control mode. De-activate Input 3 to select Local control mode.

The reset button of the E200 Operator Station is enabled for this operating mode.

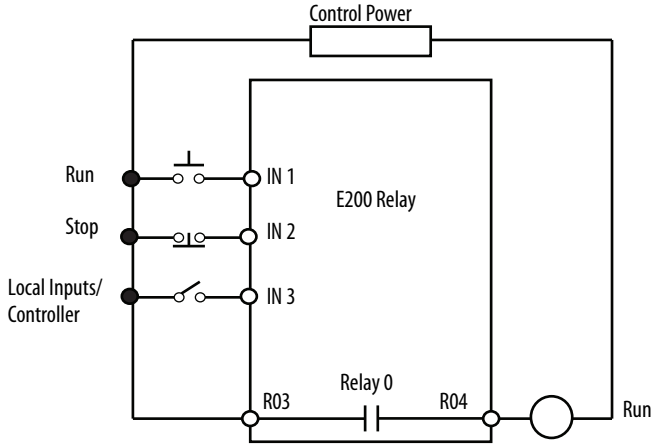
Rules

1. Three digital inputs must be available on the Control Module
2. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).
4. Communication Fault & Idle Override (Parameter 346) must be enabled.
5. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay in which the relay is controlled locally and opens when a trip event occurs. Figure 31 is a wiring diagram of a non-reversing starter with Output Relay 0 configured as a control relay.

Figure 31 - Non-reversing Starter (Network & Local I/O) – Three-wire Control Wiring Diagram



DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 18.

Non-reversing Starter (Network & Local I/O) with Feedback – Three-wire Control

Operating Mode *Non-Reversing Starter (Network& Operator Station) with Feedback – Three Wire Control* (Parameter 195 = 19) uses the network tag *LogicDefinedPt00Data* in Output Assembly 144 in Remote control mode and Input 1 & Input 2 in Local control mode to control Relay 0, which controls the contactor coil. LogicDefinedPt00Data is a maintained value, so the non-reversing starter remains energized when LogicDefinedPt00Data has a value of 1 in Remote control mode. Program the appropriate state of the starter by using the Network Communication Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3.

Local control mode uses a normally open momentary push button that is wired to Input 1 to energize Output Relay 0, which controls the contactor coil. A normally closed momentary push button that is wired to Input 2 de-energizes Output Relay 0. The non-reversing starter only energizes if Input 2 is active and Input 1 is momentarily active.

Use Input 3 to select between Local and Remote control mode. Activate Input 3 to select Remote control mode. De-activate Input 3 to select Local control mode.

The auxiliary contact from the non-reversing starter's contactor is wired into Input 0. If a feedback signal is not received before the time identified in Feedback Timeout (Parameter 213), the E200 Relay issues a trip or warning event.

The reset button of the E200 Operator Station is enabled for this operating mode.

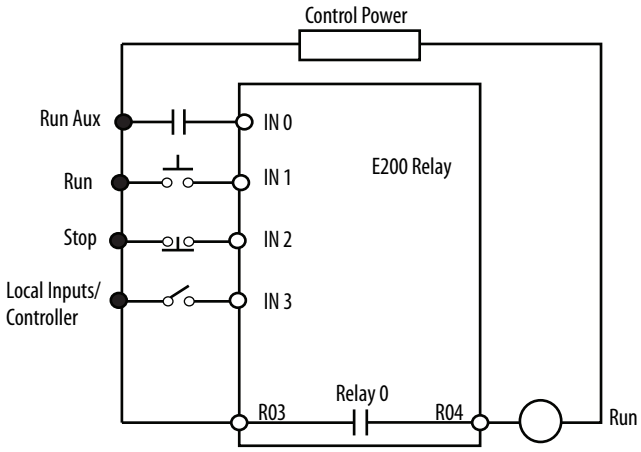
Rules

1. Three digital inputs must be available on the Control Module
2. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).
4. Feedback Timeout Trip in TripEnableC (Parameter 186) or Feedback Timeout Warning in WarningEnableC (Parameter 192) must be enabled.
5. Communication Fault & Idle Override (Parameter 346) must be enabled.
6. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay in which the relay is controlled locally and opens when a trip event occurs. Figure 32 is a wiring diagram of a non-reversing starter with Output Relay 0 configured as a control relay.

Figure 32 - Non-reversing Starter (Network & Local I/O) with Feedback – Three-wire Control Wiring Diagram



DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 19.

Non-reversing Starter (Custom)

Operating Mode *Non-Reversing Starter (Custom)* (Parameter 195 = 50) operates as a non-reversing starter one output relay that is assigned as a normally open control relay. The Non-reversing Starter (Custom) operating mode is used for applications that want customized DeviceLogix programs. This operating mode requires minimal configuration rules.

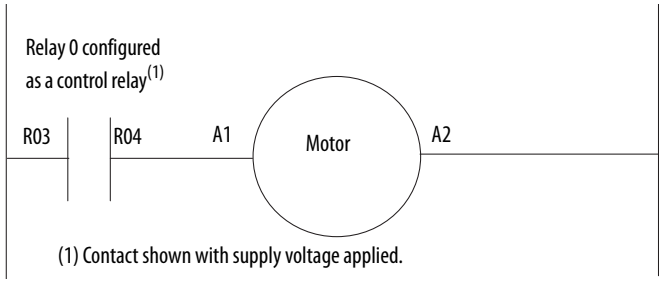
Rules

1. Set any of the Output Ptxx Assignments (Parameters 202...204) to Control Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).

Wiring Diagram

The E200 relay can also be wired as a control relay so that the relay opens when a trip event occurs. Figure 33 is a wiring diagram of a non-reversing starter with Relay 0 configured as a control relay. Relay 0 receives control commands from an automation controller to energize or de-energize the contactor coil. Relay 0 also goes to an open state when there is a trip event.

Figure 33 - Control Relay Wiring Diagram

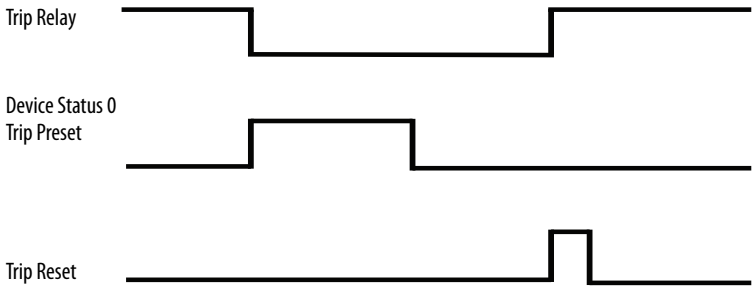


DeviceLogix Program

The last saved DeviceLogix program is executed in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 50.

Timing Diagram

Figure 34 - Non-reversing Starter (Custom) Timing Diagram



Reversing Starter Operating Modes

The non-reversing starter-based operating modes of the E200 relay provide the control logic for a reversing full-voltage starter. Two normally open control relays control the forward and reverse contactor coils. When a trip event occurs, both control relays remain open until the E200 receives a trip reset command. There are 11 reversing starter-based operating modes to choose from:

- Network
- Network with Feedback
- Operator Station
- Operator Station with Feedback
- Local I/O – Two-wire Control
- Local I/O with Feedback – Two-wire Control
- Local I/O – Three-wire Control
- Network & Operator Station
- Network & Local I/O – Two-wire Control
- Network & Local I/O – Three-wire Control
- Custom

Reversing Starter (Network)

Operating Mode *Reversing Starter (Network)* (Parameter 195 = 5) uses network tags *LogicDefinedPt00Data* in Output Assembly 144 to control Relay 0, which controls the forward contactor coil, and *LogicDefinedPt01Data* in Output Assembly 144 to control Relay 1, which controls the reversing contactor coil. Both LogicDefinedPt00Data and LogicDefinedPt01Data are maintained values, so the reversing starter remains energized when LogicDefinedPt00Data or LogicDefinedPt01Data has a value of 1. Program the appropriate state of the starter using the Network Communication Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The reset button of the E200 Operator Station is enabled for this operating mode.

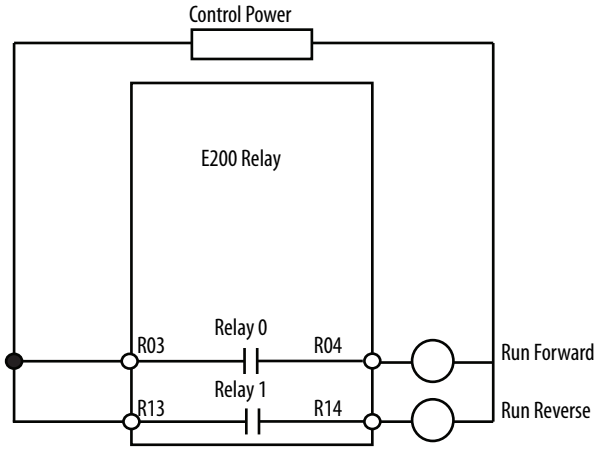
Rules

1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).

Wiring Diagram

Output Relay 0 is wired as a control relay to the forward contactor and Output Relay 1 is wired as a control relay to the reversing contactor. Both relays are controlled locally and open when a trip event occurs. Figure 35 is a wiring diagram of a reversing starter with Output Relay 0 and Output Relay 1 configured as control relays.

Figure 35 - Reversing Starter (Network) Wiring Diagram

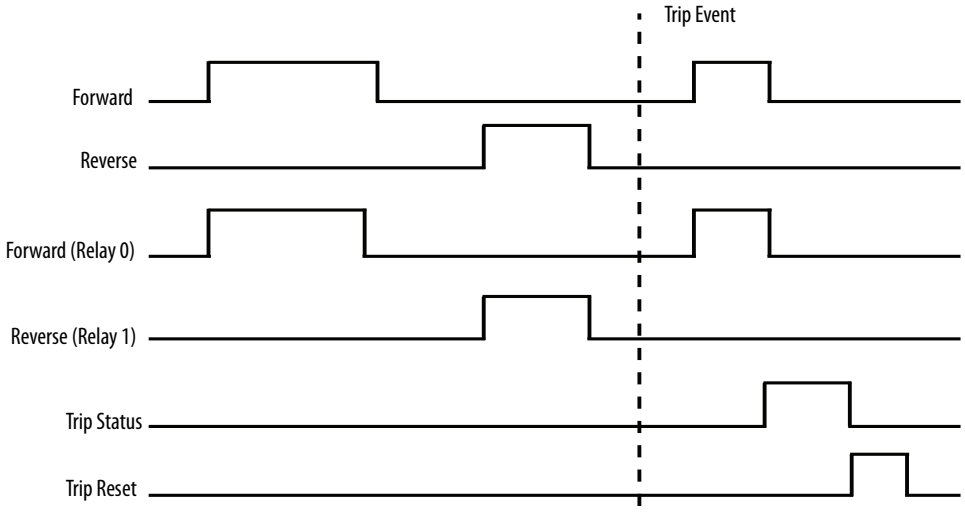


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 5.

Timing Diagram

Figure 36 - Reversing Starter (Network) Timing Diagram



Reversing Starter (Network) with Feedback

Operating Mode *Reversing Starter (Network) with Feedback* (Parameter 195 = 6) uses network tags *LogicDefinedPt00Data* in Output Assembly 144 to control Relay 0, which controls the forward contactor coil, and *LogicDefinedPt01Data* in Output Assembly 144 to control Relay 1, which controls the reversing contactor coil. Both LogicDefinedPt00Data and LogicDefinedPt01Data are maintained values, so the reversing starter remains energized when LogicDefinedPt00Data or LogicDefinedPt01Data has a value of 1. Program the appropriate state of the starter using the Network Communication Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3.

The auxiliary contact from the forward contactor is wired into Input 0, and the auxiliary contact from the reversing contactor is wired into Input 1. If a feedback signal is not received before the time identified in Feedback Timeout (Parameter 213), the E200 Relay issues a trip or warning event.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The reset button of the E200 Operator Station is enabled for this operating mode.

Rules

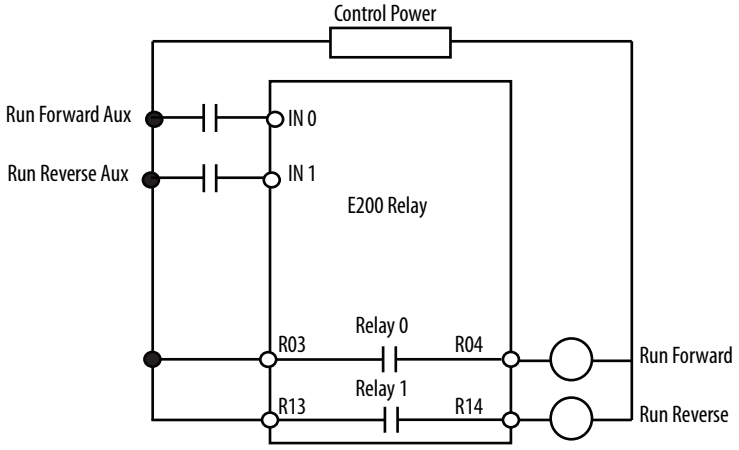
1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).
4. Feedback Timeout Trip in TripEnableC (Parameter 186) or Feedback Timeout Warning in WarningEnableC (Parameter 192) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay to the forward contactor and Output Relay 1 is wired as a control relay to the reversing contactor. Both relays are controlled locally and open when a trip event occurs. Figure 37 is a wiring diagram of a reversing starter

with Output Relay 0 and Output Relay 1 configured as control relays and the contactor auxiliary contacts wired to Input 0 and Input 1.

Figure 37 - Reversing Starter (Network) with Feedback Wiring Diagram

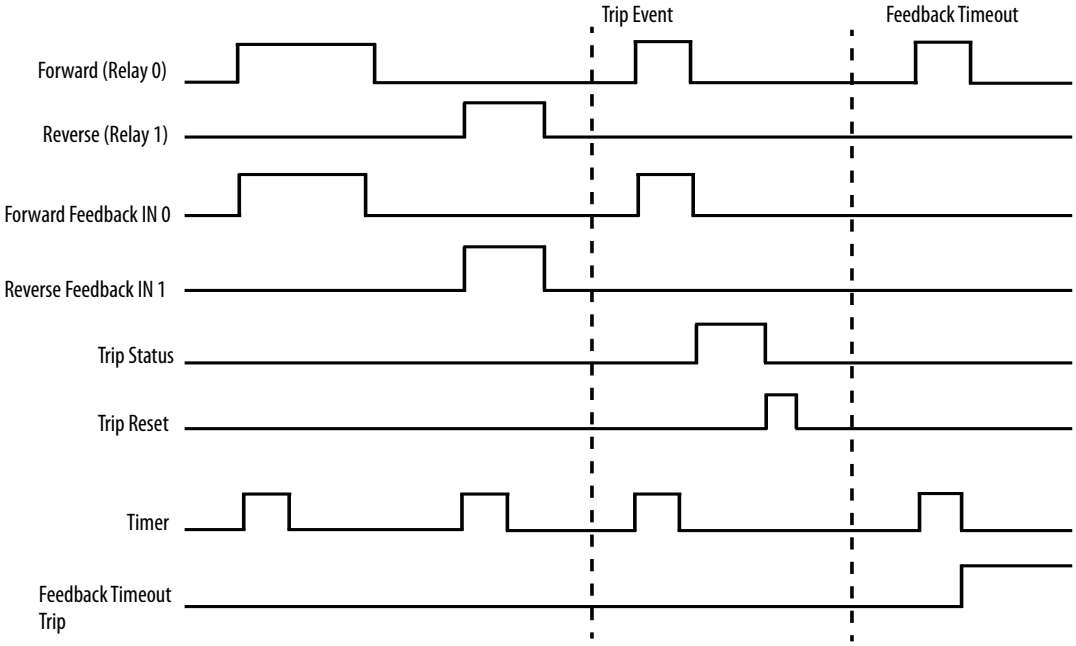


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 6.

Timing Diagram

Figure 38 - Reversing Starter (Network) with Feedback Timing Diagram



Reversing Starter (Operator Station)

Operating Mode *Reversing Starter (Operating Station)* (Parameter 195 = 29) uses the E200 Operator Station's "I" key to control Output Relay 0, which controls the forward contactor coil. The "II" key controls Output Relay 1, which controls the reversing contactor coil. The "0" key de-energizes Output Relay 0 and Output Relay 1. These keys are momentary push buttons, so the reversing starter remains energized when you

release the “I” or “II” button. The “0” button must be pressed before changing to another direction. The E200 relay issues a trip or warning event if the E200 Operator Station disconnects from the base relay.

The E200 Operator Station’s Reset button is enabled, and the Local/Remote yellow LED is illuminated to indicate that the operator station is being used for local control.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

Rules

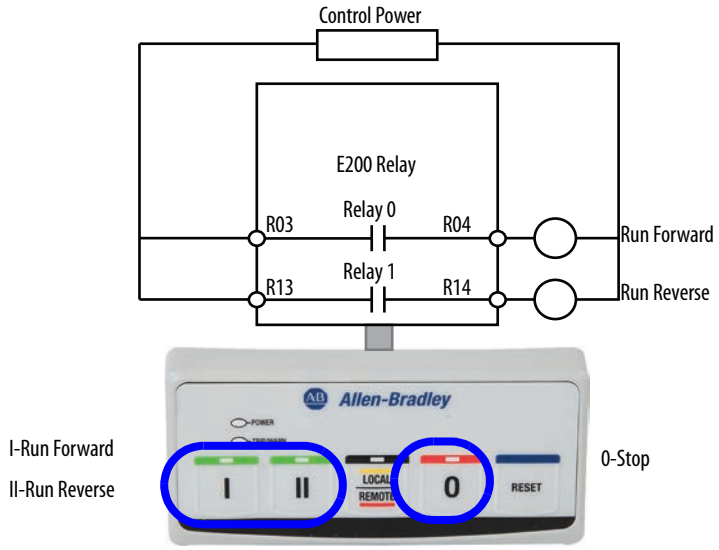
1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).
4. Operator Station Trip must be disabled in TripEnableC (Parameter 186).
5. Operator Station Option Match Trip or Warning must be enabled.
   - Option Match Trip must be enabled in TripEnableC (Parameter 186)
   - Operator Station must be enabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)

   Or
   - Option Match Warning must be enabled in WarningEnableC (Parameter 192)
   - Operator Station must be disabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)
6. Communication Fault & Idle Override (Parameter 346) must be enabled.
7. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay to the forward contactor, and Output Relay 1 is wired as a control relay to the reversing contactor. Both relays open when a trip event occurs. Figure 39 is a wiring diagram of a reversing starter with Output Relay 0 and Output Relay 1 configured as control relays.

Figure 39 - Reversing Starter (Operator Station) Wiring Diagram

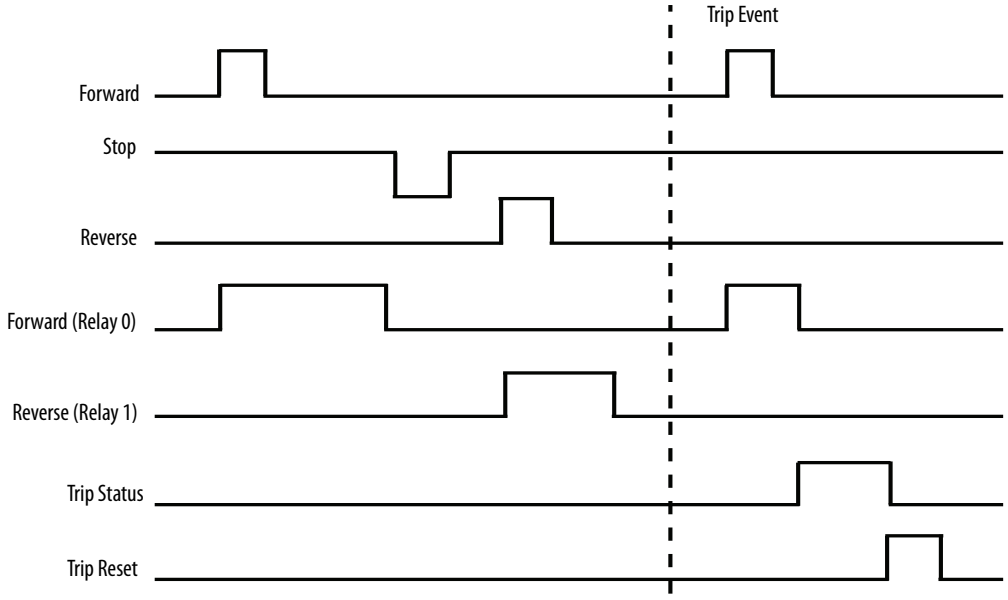


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 29.

Timing Diagram

Figure 40 - Reversing Starter (Operator Station) Timing Diagram



Reversing Starter (Operator Station) with Feedback

Operating Mode *Reversing Starter (Operator Station) with Feedback* (Parameter 195 = 30) uses the E200 Operator Station's "I" and "0" keys to control Relay 0, which controls the contactor coil. These keys are momentary push buttons, so the reversing starter remains energized when you release the "I" button.The "0" button must be pressed before changing to another direction. The E200 relay issues a trip or warning event if the E200 Operator Station disconnects from the base relay.

The auxiliary contact from the reversing starter's contactor is wired into Input 0. If a feedback signal is not received before the time identified in Feedback Timeout (Parameter 213), the E200 Relay issues a trip or warning event.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The E200 Operator Station's Reset button is enabled, and the Local/Remote yellow LED is illuminated to indicate that the operator station is being used for local control.

Rules

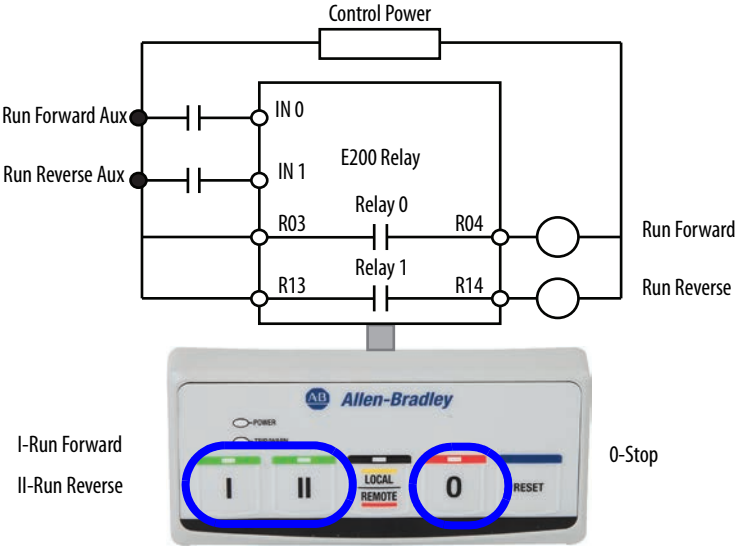
1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).
4. Operator Station Trip must be disabled in TripEnableC (Parameter 186).
5. Operator Station Option Match Trip or Warning must be enabled.
   - Option Match Trip or must be enabled in TripEnableC (Parameter 186)
   - Operator Station must be enabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)

   Or
   - Option Match Warning must be enabled in WarningEnableC (Parameter 192)
   - Operator Station must be disabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)
6. Communication Fault & Idle Override (Parameter 346) must be enabled.
7. Network Fault Override (Parameter 347) must be enabled.
8. Feedback Timeout Trip in TripEnableC (Parameter 186) or Feedback Timeout Warning in WarningEnableC (Parameter 192) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay to the forward contactor and Output Relay 1 is wired as a control relay to the reversing contactor. Both relays open when a trip event occurs. Figure 41 is a wiring diagram of a reversing starter with Output Relay 0 and Output Relay 1 configured as control relays and the contactor auxiliary contacts wired to Input 0 and Input 1.

Figure 41 - Reversing Starter (Operator Station) with Feedback Wiring Diagram

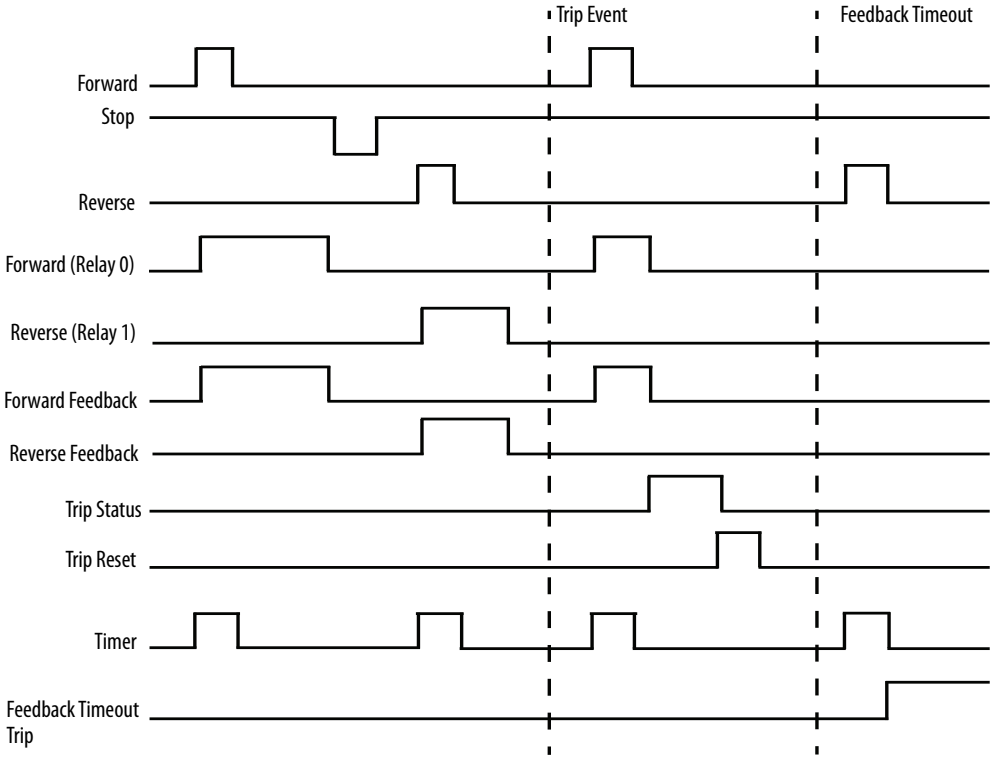


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 30.

Timing Diagram

Figure 42 - Reversing Starter (Operator Station) with Feedback Timing Diagram



Reversing Starter (Local I/O) – Two-wire Control

Operating Mode *Reversing Starter (Local I/O) – Two Wire Control* (Parameter 195 = 40) uses Input 0 to control Output Relay 0, which controls the contactor coil of the forward contactor, and Input 1 to control Output Relay 1, which controls the contactor coil of the reversing contactor. Both Input 0 and Input 1 are maintained signals, so the reversing starter remains energized when either Input 0 or Input 1 is active. Both Input 0 and Input 1 must be in a de-active state before changing to another direction

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The reset button of the E200 Operator Station is enabled for this operating mode.

IMPORTANT The Reversing Starter (Local I/O) – Two-wire Control operating mode uses the signal from Input 0 or Input 1 to control the starter. When an E200 relay powers up, the starter energizes if either Input 0 or Input 1 is active.

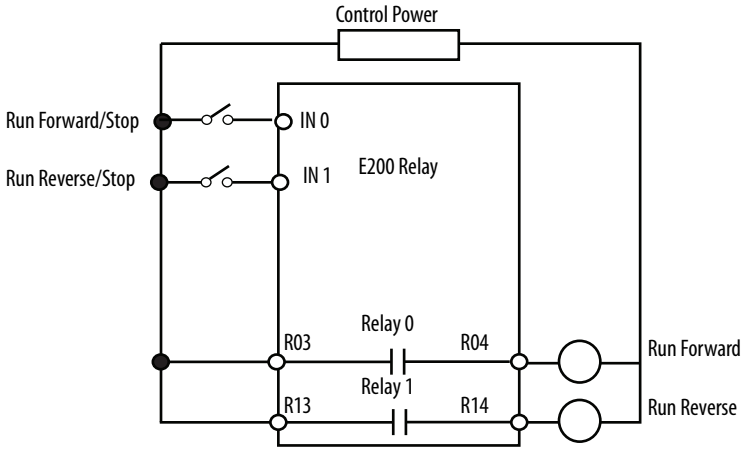
Rules

1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).
4. Communication Fault & Idle Override (Parameter 346) must be enabled.
5. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay to the forward contactor and Output Relay 1 is wired as a control relay to the reversing contactor. Both relays open when a trip event occurs. Figure 43 is a wiring diagram of a reversing starter with Output Relay 0 and Output Relay 1 configured as control relays.

Figure 43 - Reversing Starter (Local I/O) – Two-wire Control Wiring Diagram

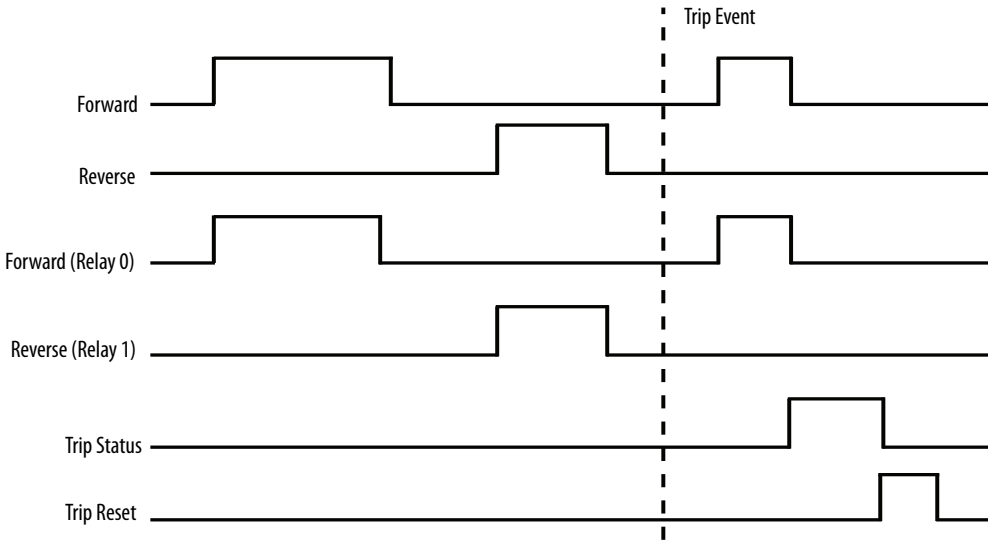


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 40.

Timing Diagram

Figure 44 - Reversing Starter (Local I/0) – Two-wire Control Timing Diagram



Reversing Starter (Local I/0) – Two-wire Control with Feedback

Operating Mode *Reversing Starter (Local I/O) – Two Wire Control* (Parameter 195 = 41) uses Input 0 to control Output Relay 0, which controls the contactor coil of the forward contactor, and Input 1 to control Output Relay 1, which controls the contactor coil of the reversing contactor. Both Input 0 and Input 1 are maintained signals, so the reversing starter remains energized when either Input 0 or Input 1 is active. Both Input 0 and Input 1 must be in a de-active state before changing to another direction.

The auxiliary contact from the starter's forward contactor is wired into Input 0, and the auxiliary contact from the starter's reversing contactor is wired into Input 1. If a feedback signal is not received before the time identified in Feedback Timeout (Parameter 213), the E200 Relay issues a trip or warning event.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The reset button of the E200 Operator Station is enabled for this operating mode.

IMPORTANT The Reversing Starter (Local I/0) – Two-wire Control operating mode uses the signal from Input 0 or Input 1 to control the starter. When an E200 relay powers up, the starter energizes if either Input 0 or Input 1 is active.

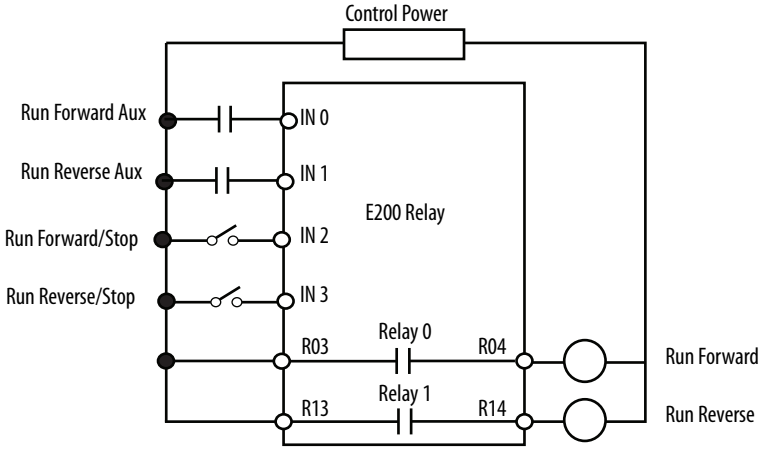
Rules

1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).
4. Feedback Timeout Trip in TripEnableC (Parameter 186) or Feedback Timeout Warning in WarningEnableC (Parameter 192) must be enabled.
5. Communication Fault & Idle Override (Parameter 346) must be enabled.
6. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay to the forward contactor and Output Relay 1 is wired as a control relay to the reversing contactor. Both relays open when a trip event occurs. Figure 45 is a wiring diagram of a reversing starter with Output Relay 0 and Output Relay 1 configured as control relays and the contactor auxiliary contacts wired to Input 0 and Input 1.

Figure 45 - Reversing Starter (Local I/O) – Two-wire Control with Feedback Wiring Diagram

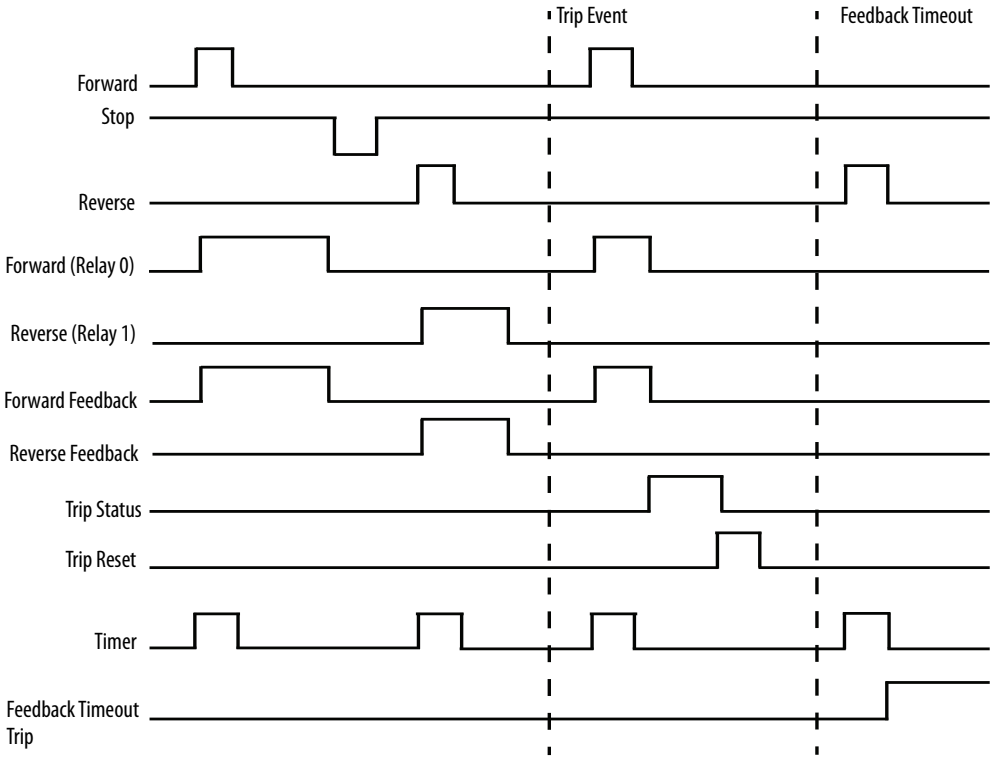


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 41.

Timing Diagram

Figure 46 - Reversing Starter (Operator Station) with Feedback Timing Diagram



Reversing Starter (Local I/O) – Three-wire Control

Operating Mode *Reversing Starter (Local I/O) – Three Wire Control* (Parameter 195 = 42) uses a normally open momentary push button in Input 0 to energize Output Relay 0, which controls the forward contactor coil. A normally open momentary push button in Input 1 energizes Output Relay 1, which controls the reversing contactor coil. A normally closed push button in Input 2 de-energizes Output Relay 0 and Output Relay 1. Both Input 0, Input 1, and Input 2 are momentary signals, so the reversing starter only energizes if Input 2 is active and Input 0 or Input 1 is momentarily active.

Input 2 must be momentarily de-active before changing to another direction.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The reset button of the E200 Operator Station is enabled for this operating mode.

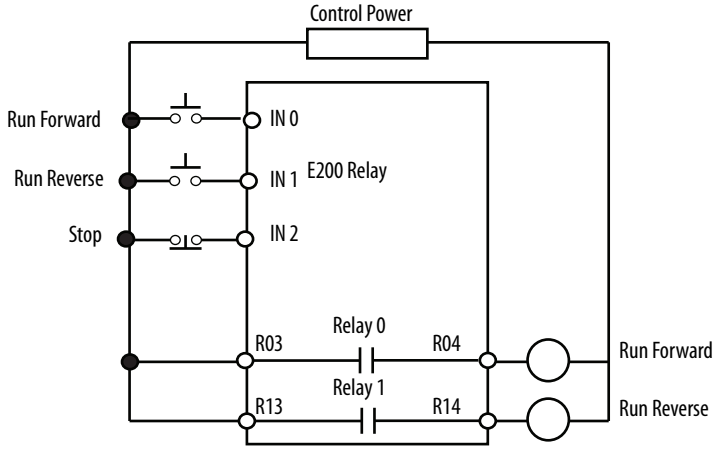
Rules

1. Four digital inputs must be available on the Control Module
2. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
3. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
4. Overload Trip must be enabled in TripEnableI (Parameter 183).
5. Communication Fault & Idle Override (Parameter 346) must be enabled.
6. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Figure 47 is a wiring diagram of a reversing starter with three wire control and Output Relay 0 and Output Relay 1 configured as control relays.

Figure 47 - Reversing Starter (Local I/O) – Three-wire Control Wiring Diagram

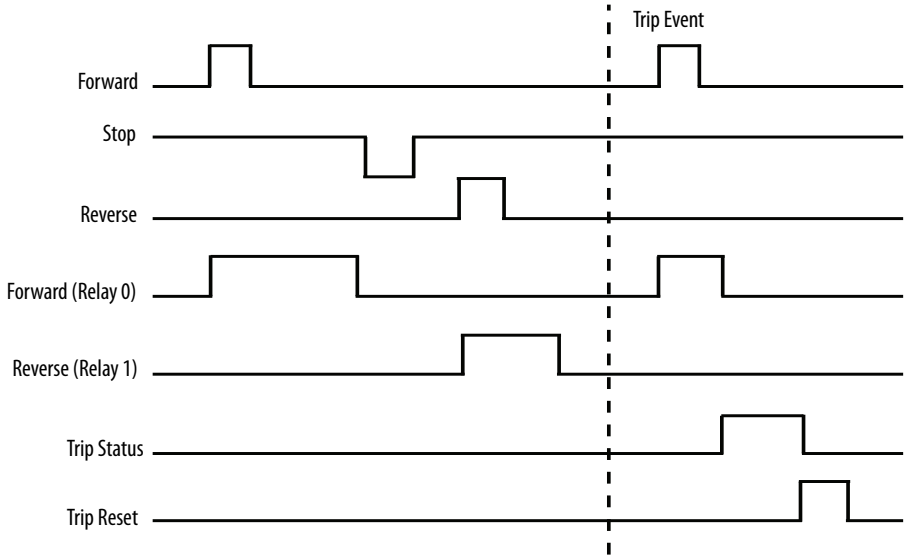


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 42.

Timing Diagram

Figure 48 - Reversing Starter (Local I/O) – Three-wire Control Timing Diagram



Reversing Starter (Network & Operator Station)

Operating Mode *Reversing Starter (Network& Operator Station)* (Parameter 195 = 13) in Remote control mode uses network tags *LogicDefinedPt00Data* in Output Assembly 144 to control Relay 0, which controls the forward contactor coil, and *LogicDefinedPt01Data* in Output Assembly 144 to control Relay 1, which controls the reversing contactor coil. Both LogicDefinedPt00Data and LogicDefinedPt01Data are maintained values, so the reversing starter remains energized when LogicDefinedPt00Data or LogicDefinedPt01Data has a value of 1. Program the appropriate state of the starter using the Network Communication Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3.

In Local control mode, the E200 Operator Station's "I" key is used to control Output Relay 0, which controls the forward contactor coil. The "II" key controls Output Relay 1, which controls the reversing contactor coil. The "0" key de-energizes Output Relay 0 and Output Relay 1. These keys are momentary push buttons, so the reversing starter remains energized when you release the "I" or "II" button. The "0" button must be pressed before changing to another direction.

To change between Local and Remote control mode press and release the "Local/Remote" button on the E200 Operator Station. The LED above "Local/Remote" button illuminates yellow in Local control mode and red in Remote control mode.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The E200 relay issues a trip or warning event if the E200 Operator Station disconnects from the base relay.

The reset button of the E200 Operator Station is enabled for this operating mode.

Rules

1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).

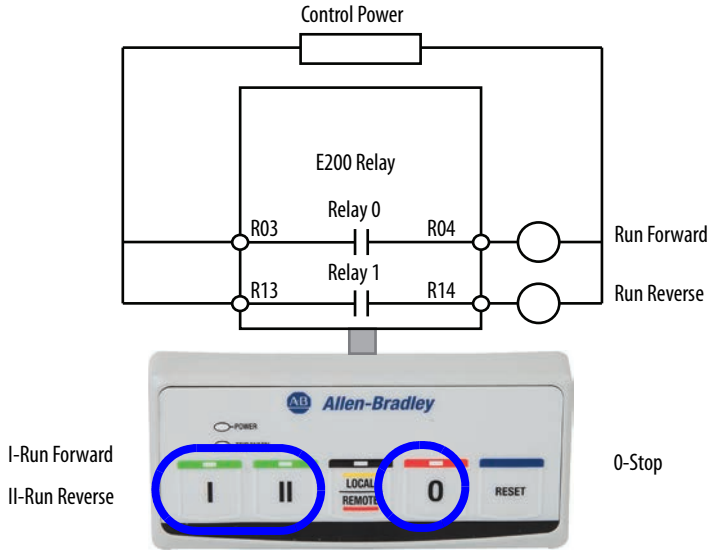
4. Operator Station Trip must be disabled in TripEnableC (Parameter 186).
5. Operator Station Option Match Trip or Warning must be enabled.
   - Option Match Trip or must be enabled in TripEnableC (Parameter 186)
   - Operator Station must be enabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)

   Or
   - Option Match Warning must be enabled in WarningEnableC (Parameter 192)
   - Operator Station must be disabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)
6. Communication Fault & Idle Override (Parameter 346) must be enabled.
7. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 and Output Relay 1 are wired as a control relays in which the relay is controlled by the communication network or E200 Operator Station, and both output relays open when a trip event occurs. Figure 49 is a wiring diagram of a reversing starter with Output Relay 0 and Output Relay 1 configured as control relays.

Figure 49 - Reversing Starter (Network & Operator Station) Wiring Diagram



DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 13.

Reversing Starter (Network & Local I/O) – Two-wire Control

Operating Mode *Reversing Starter (Network& Operator Station)* (Parameter 195 = 20) in Remote control mode uses network tags *LogicDefinedPt00Data* in Output Assembly 144 to control Relay 0, which controls the forward contactor coil, and *LogicDefinedPt01Data* in Output Assembly 144 to control Relay 1, which controls the

reversing contactor coil. Both LogicDefinedPt00Data and LogicDefinedPt01Data are maintained values, so the reversing starter remains energized when LogicDefinedPt00Data or LogicDefinedPt01Data has a value of 1. Program the appropriate state of the starter using the Network Communication Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3.

In Local control mode, Input 0 is used to control Output Relay 0, which controls the contactor coil of the forward contactor, and Input 1 is used to control Output Relay 1, which controls the contactor coil of the reversing contactor. Both Input 0 and Input 1 are maintained signals, so the reversing starter remains energized when either Input 0 or Input 1 is active. Both Input 0 and Input 1 must be in a de-active state before changing to another direction.

Use Input 3 to select between Local and Remote control mode. Activate Input 3 to select Remote control mode. De-activate Input 3 to select Local control mode.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The reset button of the E200 Operator Station is enabled for this operating mode.

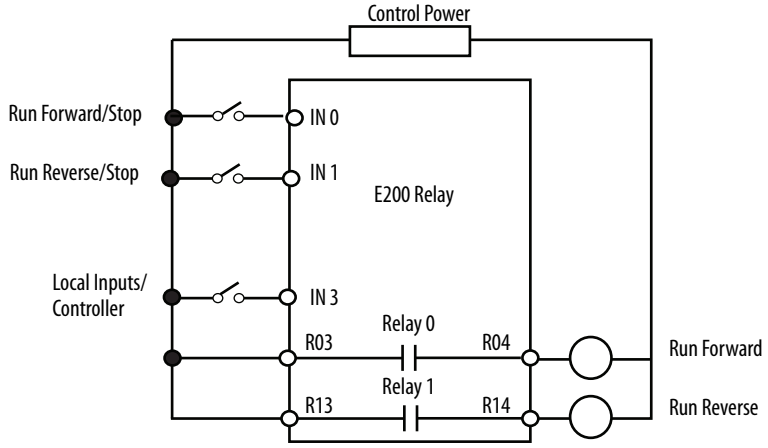
Rules

1. Three digital inputs must be available on the Control Module
2. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
3. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
4. Overload Trip must be enabled in TripEnableI (Parameter 183).
5. Communication Fault & Idle Override (Parameter 346) must be enabled.
6. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 and Output Relay 1 are wired as a control relays in which the relay is controlled by the communication network or Input 0 & Input 1. Both output relays open when a trip event occurs. Figure 50 is a wiring diagram of a reversing starter with Output Relay 0 and Output Relay 1 configured as control relays.

Figure 50 - Reversing Starter (Network & Local I/O) – Two-wire Control Wiring Diagram

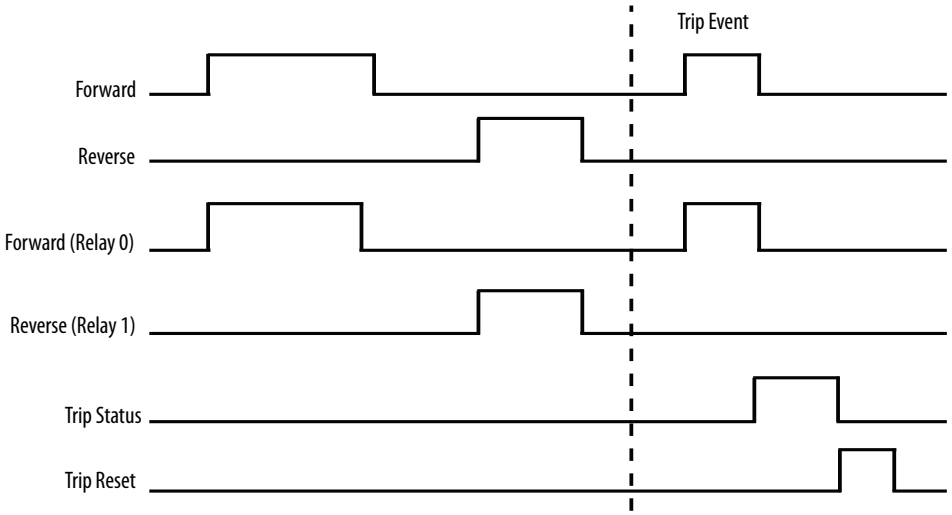


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 20.

Timing Diagram

Figure 51 - Reversing Starter (Network & Local I/0) – Two-wire Control Timing Diagram



Reversing Starter (Network & Local I/0) – Three-wire Control

Operating Mode *Reversing Starter (Network& Operator Station)* (Parameter 195 = 21) in Remote control mode uses network tags *LogicDefinedPt00Data* in Output Assembly 144 to control Relay 0, which controls the forward contactor coil, and *LogicDefinedPt01Data* in Output Assembly 144 to control Relay 1, which controls the reversing contactor coil. Both LogicDefinedPt00Data and LogicDefinedPt01Data are maintained values, so the reversing starter remains energized when LogicDefinedPt00Data or LogicDefinedPt01Data has a value of 1. Program the appropriate state of the starter using the Network Communication Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3.

Local control mode uses a normally open momentary push button in Input 0 to energize Output Relay 0, which controls the forward contactor coil. A normally open momentary push button in Input 1 energizes Output Relay 1, which controls the reversing contactor coil. A normally closed push button in Input 2 de-energizes Output Relay 0 and Output Relay 1. Both Input 0, Input 1, and Input 2 are momentary signals, so the reversing starter only energizes if Input 2 is active and Input 0 or Input 1 is momentarily active.

Input 2 must be momentarily de-active before changing to another direction.

Use Input 3 to select between Local and Remote control mode. Activate Input 3 to select Remote control mode. De-activate Input 3 to select Local control mode.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The reset button of the E200 Operator Station is enabled for this operating mode.

Rules

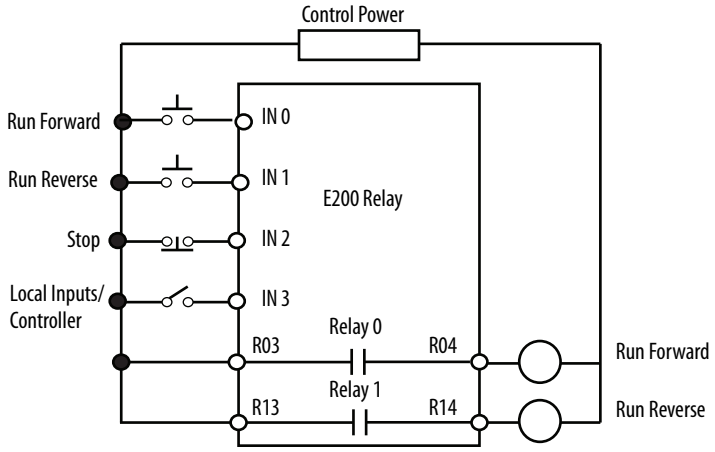
1. Four digital inputs must be available on the Control Module
2. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
3. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
4. Overload Trip must be enabled in TripEnableI (Parameter 183).

5. Communication Fault & Idle Override (Parameter 346) must be enabled.
6. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 and Output Relay 1 are wired as a control relays in which the relay is controlled by the communication network or Input 0, Input 1, and Input 2. Both output relays open when a trip event occurs. Figure 52 is a wiring diagram of a reversing starter with Output Relay 0 and Output Relay 1 configured as control relays.

Figure 52 - Reversing Starter (Network & Local I/O) – Three-wire Control Wiring Diagram



DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 21.

Reversing Starter (Custom)

Operating Mode *Reversing Starter (Custom)* (Parameter 195 = 51) operates as a reversing starter with two output relays that are assigned as normally open control relays. The Reversing Starter (Custom) operating mode is used for applications that want customized DeviceLogix programs. This operating mode requires minimal configuration rules.

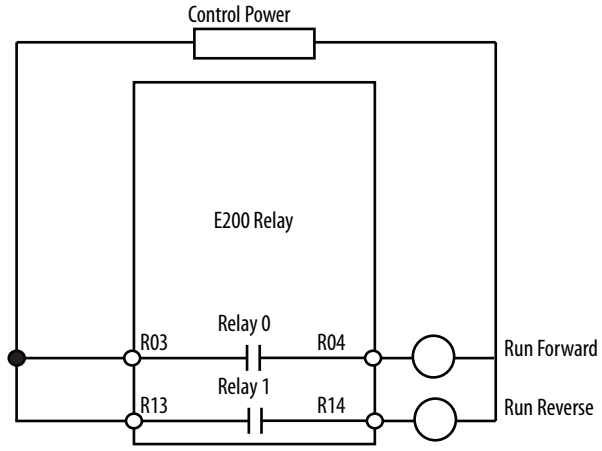
Rules

1. Set two of the Output Ptxx Assignments (Parameters 202...204) to Control Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).

Wiring Diagram

Figure 53 is a wiring diagram of a reversing starter with Output Relay 0 and Output Relay 1 configured as control relays. Both Output Relay 0 and Output Relay 1 go to an open state when there is a trip event.

Figure 53 - Reversing Starter (Custom) Wiring Diagram

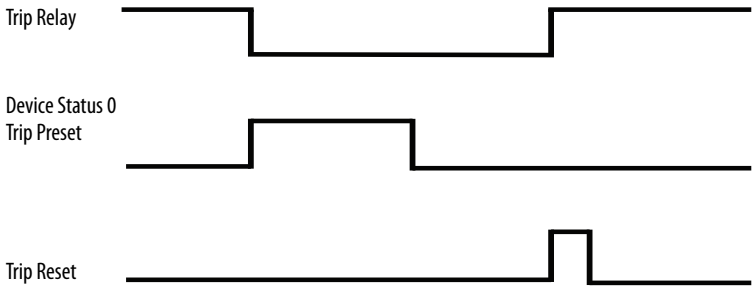


DeviceLogix Program

The last saved DeviceLogix program is executed in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 50.

Timing Diagram

Figure 54 - Reversing Starter (Custom) Timing Diagram



Two-speed Starter Operating Modes

The two-speed starter-based operating modes of the E200 relay provide the control logic for a two-speed full-voltage starter. Two normally open control relays control the high-speed and low-speed contactor coils. When a trip event occurs, both control relays remain open until the E200 receives a trip reset command. There are 11 two-speed starter-based operating modes to choose from:

- Network
- Network with Feedback
- Operator Station
- Operator Station with Feedback
- Local I/O – Two-wire Control
- Local I/O with Feedback – Two-wire Control
- Local I/O – Three-wire Control
- Network & Operator Station
- Network & Local I/O – Two-wire Control
- Network & Local I/O – Three-wire Control
- Custom

Two-speed Starter (Network)

Operating Mode *Two Speed Starter (Network)* (Parameter 195 = 9) uses network tags *LogicDefinedPt00Data* in Output Assembly 144 to control Relay 0, which controls the high-speed contactor coil, and *LogicDefinedPt01Data* in Output Assembly 144 to control Relay 1, which controls the low-speed contactor coil. Both LogicDefinedPt00Data and LogicDefinedPt01Data are maintained values, so the two-speed starter remains energized when LogicDefinedPt00Data or LogicDefinedPt01Data has a value of 1. Program the appropriate state of the starter using the Network Communication Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The reset button of the E200 Operator Station is enabled for this operating mode.

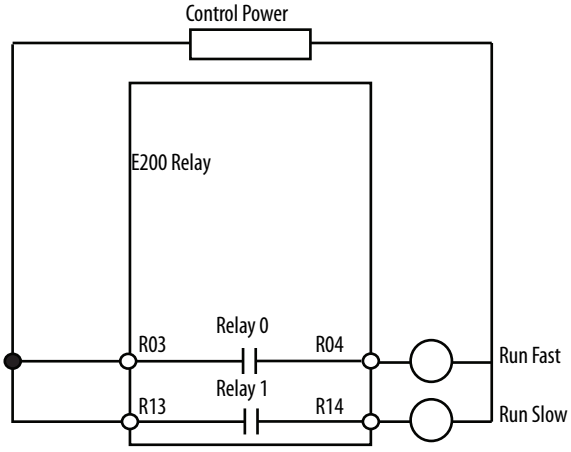
Rules

1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).

Wiring Diagram

Output Relay 0 is wired as a control relay to the high-speed contactor and Output Relay 1 is wired as a control relay to the low-speed contactor. In this configuration, both relays are controlled locally and open when a trip event occurs. Figure 55 is a wiring diagram of a two-speed starter with Output Relay 0 and Output Relay 1 configured as control relays.

Figure 55 - Two-speed Starter (Network) Wiring Diagram

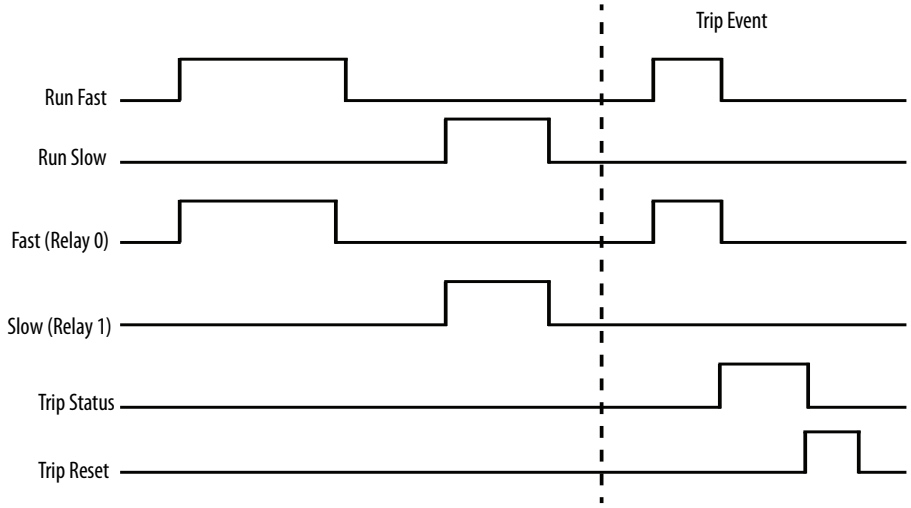


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 9.

Timing Diagram

Figure 56 - Two-speed Starter (Network) Timing Diagram



Two-speed Starter (Network) with Feedback

Operating Mode *Two-speed Starter (Network) with Feedback* (Parameter 195 = 10) uses network tags *LogicDefinedPt00Data* in Output Assembly 144 to control Relay 0, which controls the high-speed contactor coil and *LogicDefinedPt01Data* in Output Assembly 144 to control Relay 1, which controls the low-speed contactor coil. Both LogicDefinedPt00Data and LogicDefinedPt01Data are maintained values, so the two-speed starter remains energized when LogicDefinedPt00Data or LogicDefinedPt01Data has a value of 1. Program the appropriate state of the starter using the Network Communication Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3.

The auxiliary contact from the high-speed contactor is wired into Input 0, and the auxiliary contact from the low-speed contactor is wired into Input 1. If a feedback signal is not received before the time identified in Feedback Timeout (Parameter 213), the E200 Relay issues a trip or warning event.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The reset button of the E200 Operator Station is enabled for this operating mode.

Rules

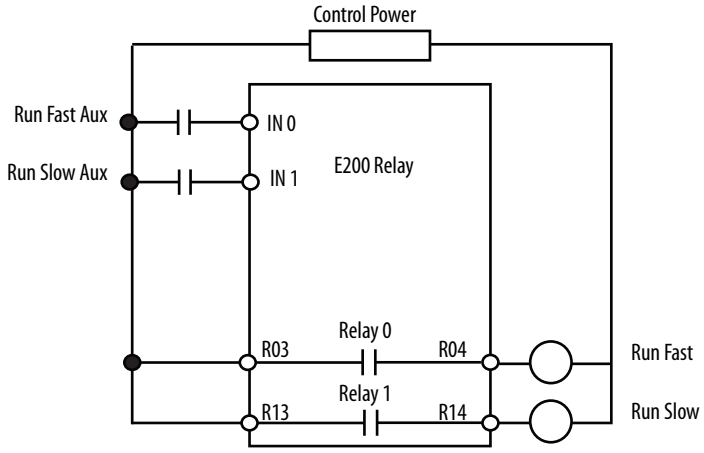
1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).
4. Feedback Timeout Trip in TripEnableC (Parameter 186) or Feedback Timeout Warning in WarningEnableC (Parameter 192) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay to the high-speed contactor and Output Relay 1 is wired as a control relay to the low-speed contactor. In this configuration, both relays are controlled locally and open when a trip event occurs. Figure 57 is a wiring diagram of a Two-speed Starter with Output Relay 0 and Output Relay 1

configured as control relays and the contactor auxiliary contacts wired to Input 0 and Input 1.

Figure 57 - Two-speed Starter (Network) with Feedback Wiring Diagram

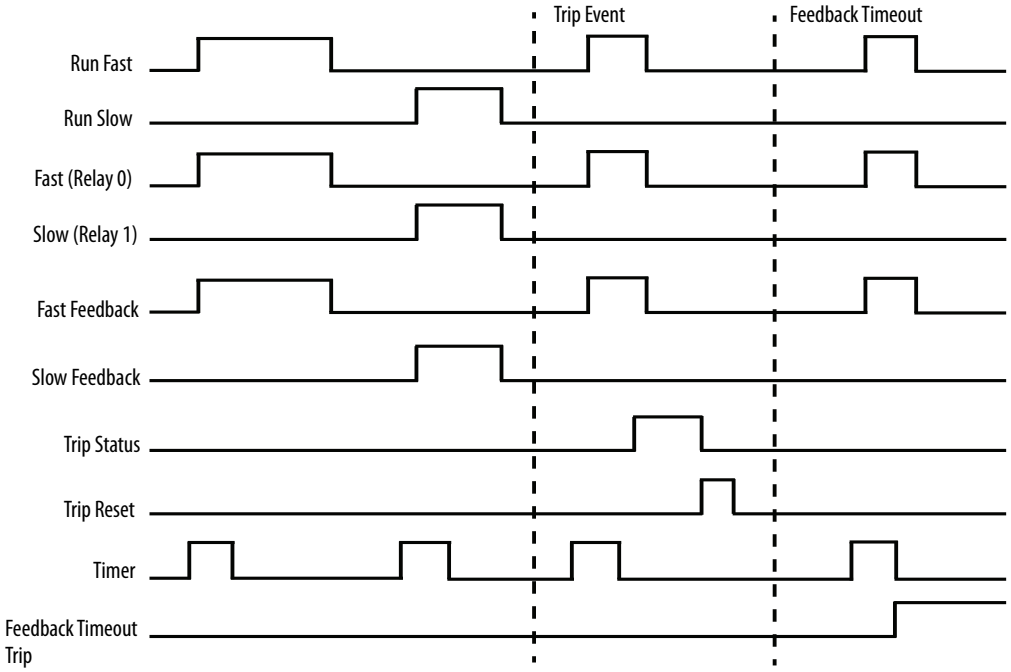


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 10.

Timing Diagram

Figure 58 - Two-speed Starter (Network) with Feedback Timing Diagram



Two-speed Starter (Operator Station)

Operating Mode *Two Speed Starter (Operating Station)* (Parameter 195 = 33) uses the E200 Operator Station's "I" key to control Output Relay 0, which controls the high-speed contactor coil. The "II" key controls Output Relay 1, which controls the low-speed contactor coil. The "0" key de-energizes Output Relay 0 and Output Relay 1.

These keys are momentary push buttons, so the two-speed starter remains energized when you release the “I” or “II” button.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The E200 relay issues a trip or warning event if the E200 Operator Station disconnects from the base relay.

The E200 Operator Station’s Reset button is enabled, and the Local/Remote yellow LED is illuminated to indicate that the operator station is being used for local control.

Rules

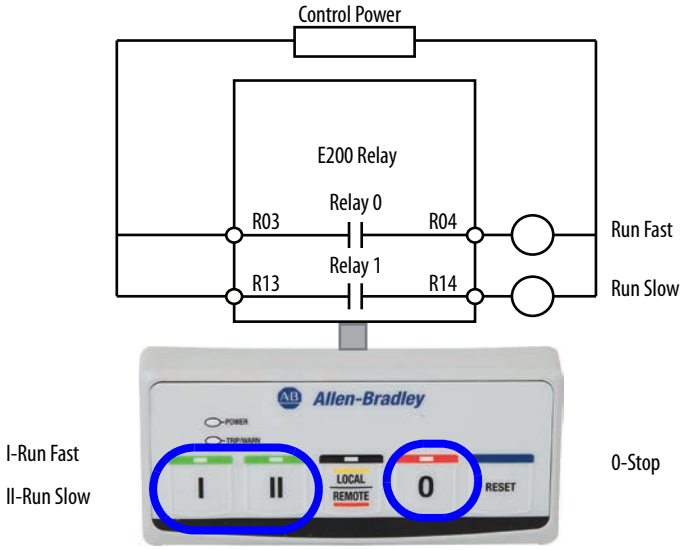
1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).
4. Operator Station Trip must be disabled in TripEnableC (Parameter 186).
5. Operator Station Option Match Trip or Warning must be enabled.
   - Option Match Trip or must be enabled in TripEnableC (Parameter 186)
   - Operator Station must be enabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)

   Or
   - Option Match Warning must be enabled in WarningEnableC (Parameter 192)
   - Operator Station must be disabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)
6. Communication Fault & Idle Override (Parameter 346) must be enabled.
7. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay to the high-speed contactor, and Output Relay 1 is wired as a control relay to the low-speed contactor. Both relays open when a trip event occurs. Figure 59 is a wiring diagram of a two-speed starter with Output Relay 0 and Output Relay 1 configured as control relays.

Figure 59 - Two-speed Starter (Operator Station) Wiring Diagram

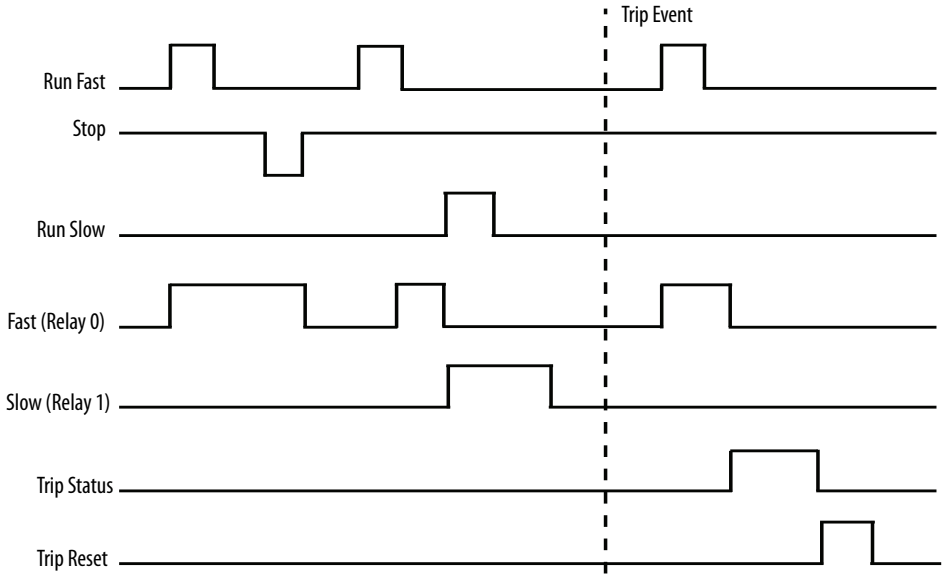


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 33.

Timing Diagram

Figure 60 - Two-speed Starter (Operator Station) Timing Diagram



Two-speed Starter (Operator Station) with Feedback

Operating Mode *Two Speed Starter (Operator Station) with Feedback* (Parameter 195 = 34) uses the E200 Operator Station's "I" and "0" keys to control Relay 0, which controls the contactor coil. These keys are momentary push buttons, so the two-speed starter remains energized when you release the "I" button. The E200 relay issues a trip or warning event if the E200 Operator Station disconnects from the base relay.

The auxiliary contact from the two-speed starter's contactor is wired into Input 0. If a feedback signal is not received before the time identified in Feedback Timeout (Parameter 213), the E200 Relay issues a trip or warning event.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The E200 Operator Station Reset button is enabled, and the Local/Remote yellow LED is illuminated to indicate that the operator station is being used for local control.

Rules

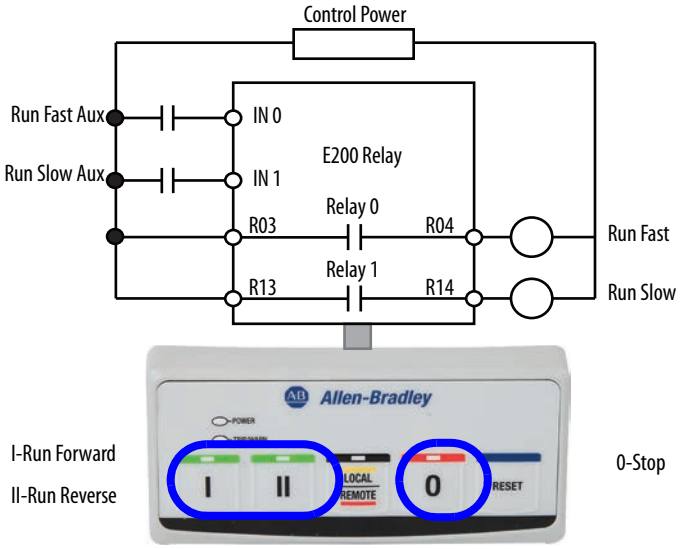
1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).
4. Operator Station Trip must be disabled in TripEnableC (Parameter 186).
5. Operator Station Option Match Trip or Warning must be enabled.
   - Option Match Trip or must be enabled in TripEnableC (Parameter 186)
   - Operator Station must be enabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)

   Or
   - Option Match Warning must be enabled in WarningEnableC (Parameter 192)
   - Operator Station must be disabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)
6. Communication Fault & Idle Override (Parameter 346) must be enabled.
7. Network Fault Override (Parameter 347) must be enabled.
8. Feedback Timeout Trip in TripEnableC (Parameter 186) or Feedback Timeout Warning in WarningEnableC (Parameter 192) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay to the high-speed contactor and Output Relay 1 is wired as a control relay to the low-speed contactor. Both relays open when a trip event occurs. Figure 61 is a wiring diagram of a two-speed starter with Output Relay 0 and Output Relay 1 configured as control relays and the contactor auxiliary contacts wired to Input 0 and Input 1.

Figure 61 - Two-speed Starter (Operator Station) with Feedback Wiring Diagram

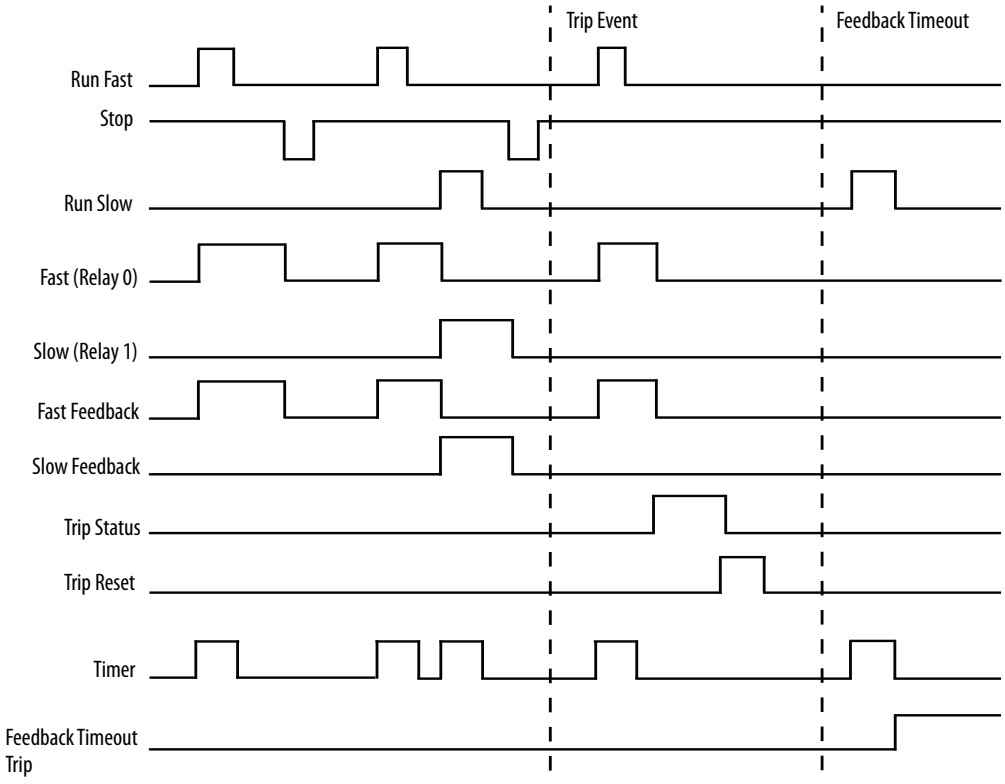


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 34.

Timing Diagram

Figure 62 - Two-speed Starter (Operator Station) with Feedback Timing Diagram



Two-speed Starter (Local I/0) – Two-wire Control

Operating Mode *Two Speed Starter (Local I/O) – Two Wire Control* (Parameter 195 = 46) uses Input 0 to control Output Relay 0, which controls the contactor coil of the high-speed contactor, and Input 1 to control Output Relay 1, which controls the contactor coil of the low-speed contactor. Both Input 0 and Input 1 are maintained signals, so the two-speed starter remains energized when either Input 0 or Input 1 is active.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The reset button of the E200 Operator Station is enabled for this operating mode.

IMPORTANT The Two-speed Starter (Local I/O) – Two-wire Control operating mode uses the signal from Input 0 or Input 1 to control the starter. When an E200 relay powers up, the starter energizes if either Input 0 or Input 1 is active.

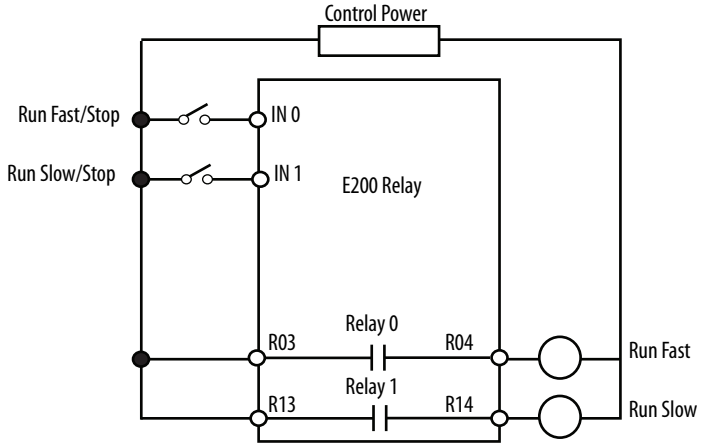
Rules

1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).
4. Communication Fault & Idle Override (Parameter 346) must be enabled.
5. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay to the high-speed contactor and Output Relay 1 is wired as a control relay to the low-speed contactor. Both relays open when a trip event occurs. Figure 63 is a wiring diagram of a two-speed starter with Output Relay 0 and Output Relay 1 configured as control relays.

Figure 63 - Two-speed Starter (Local I/0) – Two-wire Control Wiring Diagram

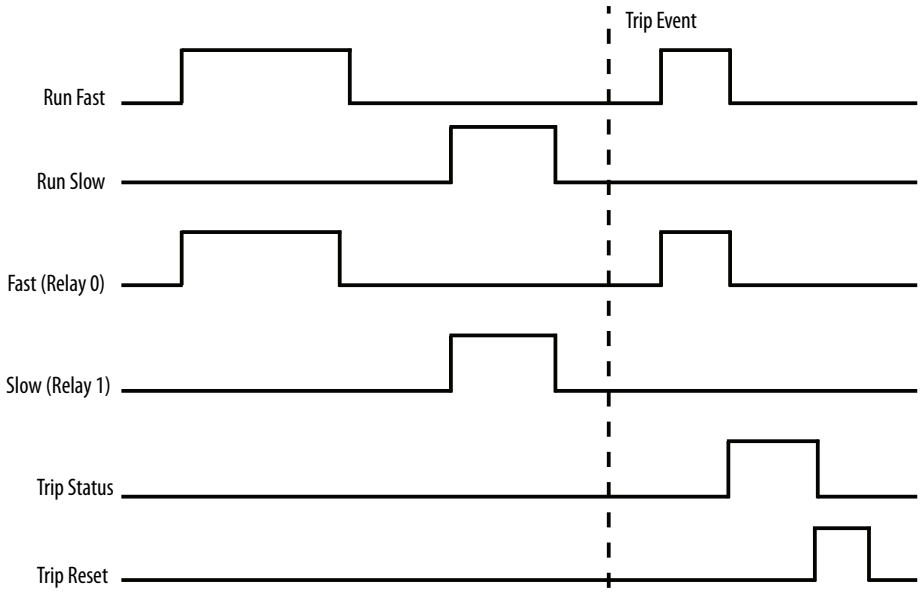


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 46.

Timing Diagram

Figure 64 - Two-speed Starter (Local I/0) – Two-wire Control Timing Diagram



Two-speed Starter (Local I/0) – Two-wire Control with Feedback

Operating Mode *Two Speed Starter (Local I/O) – Two Wire Control* (Parameter 195 = 47) uses Input 0 to control Output Relay 0, which controls the contactor coil of the high-speed contactor and Input 1 to control Output Relay 1, which controls the contactor coil of the low-speed contactor. Both Input 0 and Input 1 are maintained signals, so the two-speed starter remains energized when either Input 0 or Input 1 is active.

The auxiliary contact from the starter's high-speed contactor is wired into Input 0, and the auxiliary contact from the starter's low-speed contactor is wired into Input 1. If a feedback signal is not received before the time identified in Feedback Timeout (Parameter 213), the E200 Relay issues a trip or warning event.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The reset button of the E200 Operator Station is enabled for this operating mode.

IMPORTANT The Two-speed Starter (Local I/0) – Two-wire Control operating mode uses the signal from Input 0 or Input 1 to control the starter. When an E200 relay powers up, the starter energizes if either Input 0 or Input 1 is active.

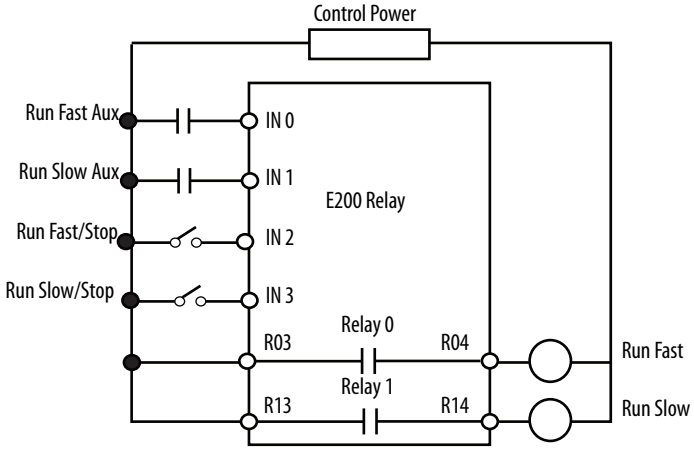
Rules

1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).
4. Feedback Timeout Trip in TripEnableC (Parameter 186) or Feedback Timeout Warning in WarningEnableC (Parameter 192) must be enabled.
5. Communication Fault & Idle Override (Parameter 346) must be enabled.
6. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 is wired as a control relay to the high-speed contactor and Output Relay 1 is wired as a control relay to the low-speed contactor. Both relays open when a trip event occurs. Figure 65 is a wiring diagram of a Two-speed Starter with Output Relay 0 and Output Relay 1 configured as control relays and the contactor auxiliary contacts wired to Input 0 and Input 1.

Figure 65 - Two-speed Starter (Local I/O) – Two-wire Control with Feedback Wiring Diagram

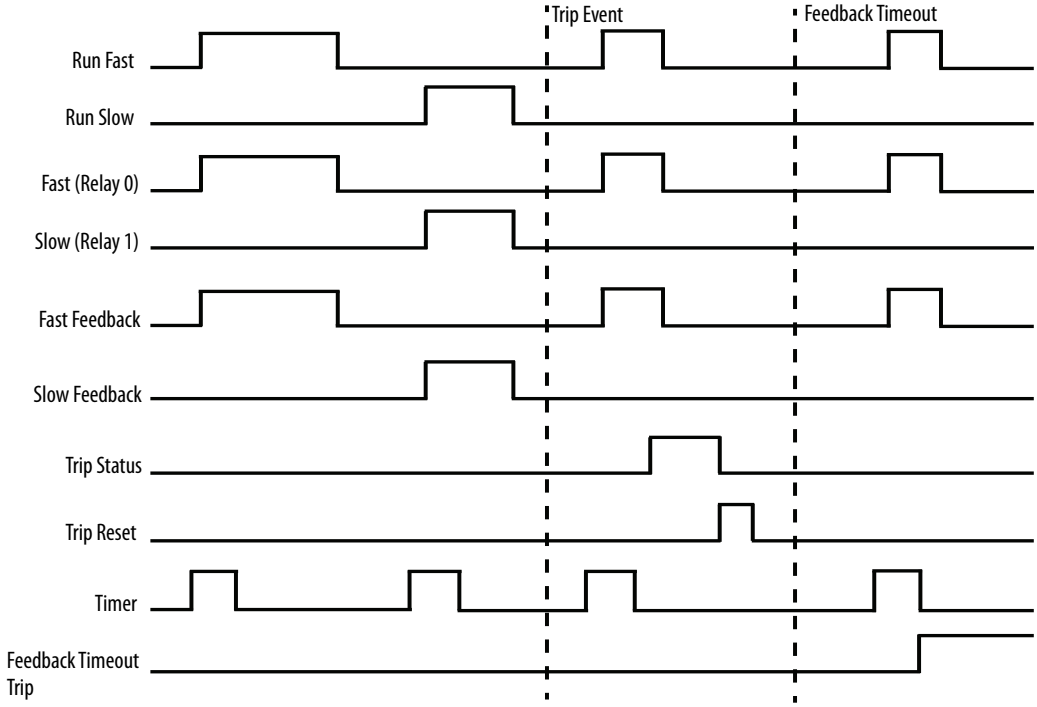


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 47.

Timing Diagram

Figure 66 - Two-speed Starter (Local I/O) – Two-wire Control with Feedback Timing Diagram



Two-speed Starter (Local I/0) – Three-wire Control

Operating Mode *Two Speed Starter (Local I/O) – Three Wire Control* (Parameter 195 = 48) uses a normally open momentary push button in Input 0 to energize Output Relay 0, which controls the high-speed contactor coil. A normally open momentary push button in Input 1 energizes Output Relay 1, which controls the low-speed contactor coil. A normally closed push button in Input 2 de-energizes Output Relay 0 and Output Relay 1. Both Input 0, Input 1, and Input 2 are momentary signals, so the two-speed starter only energizes if Input 2 is active and Input 0 or Input 1 is momentarily active.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The reset button of the E200 Operator Station is enabled for this operating mode.

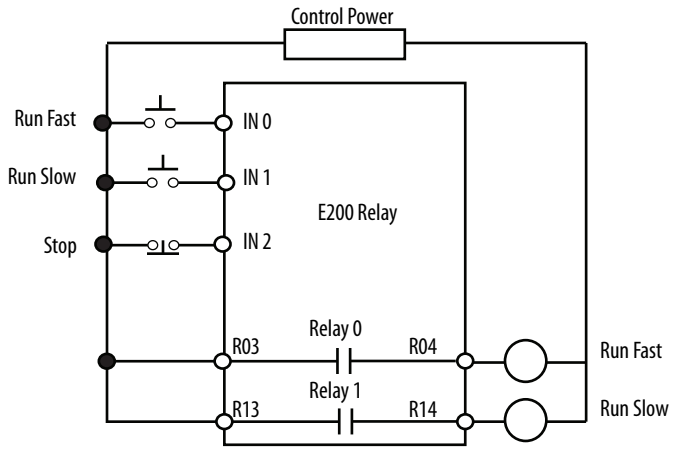
Rules

1. Four digital inputs must be available on the Control Module
2. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
3. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
4. Overload Trip must be enabled in TripEnableI (Parameter 183).
5. Communication Fault & Idle Override (Parameter 346) must be enabled.
6. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Figure 67 is a wiring diagram of a Two-speed Starter with three-wire control and Output Relay 0 and Output Relay 1 configured as control relays.

Figure 67 - Two-speed Starter (Local I/0) – Three-wire Control Wiring Diagram

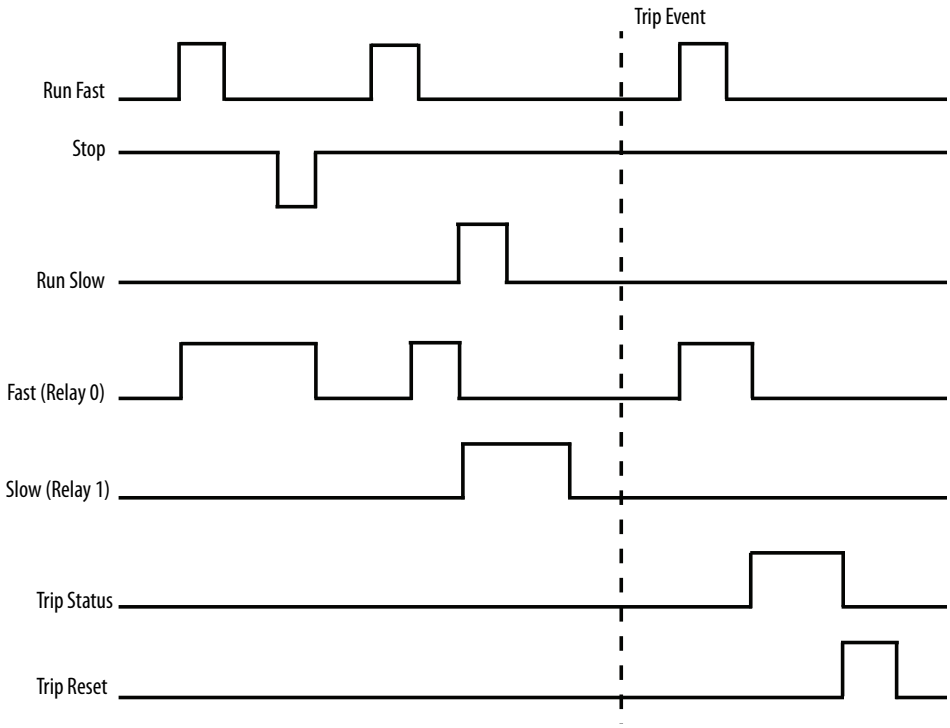


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 48.

Timing Diagram

Figure 68 - Two-speed Starter (Local I/0) – Three-wire Control Timing Diagram



Two-speed Starter (Network & Operator Station)

Operating Mode *Two Speed Starter (Network& Operator Station)* (Parameter 195 = 15) in Remote control mode uses network tags *LogicDefinedPt00Data* in Output Assembly 144 to control Relay 0, which controls the high-speed contactor coil, and *LogicDefinedPt01Data* in Output Assembly 144 to control Relay 1, which controls the low-speed contactor coil. Both LogicDefinedPt00Data and LogicDefinedPt01Data are maintained values, so the two-speed starter remains energized when LogicDefinedPt00Data or LogicDefinedPt01Data has a value of 1. Program the appropriate state of the starter using the Network Communication Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3.

In Local control mode, the E200 Operator Station's "I" key is used to control Output Relay 0, which controls the high-speed contactor coil. The "II" key controls Output Relay 1, which controls the low-speed contactor coil. The "0" key de-energizes Output Relay 0 and Output Relay 1. These keys are momentary push buttons, so the two-speed starter remains energized when you release the "I" or "II" button.

To change between Local and Remote control mode press and release the "Local/Remote" button on the E200 Operator Station. The LED above "Local/Remote" button illuminates yellow in Local control mode and red in Remote control mode.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The E200 relay issues a trip or warning event if the E200 Operator Station disconnects from the base relay.

The reset button of the E200 Operator Station is enabled for this operating mode.

Rules

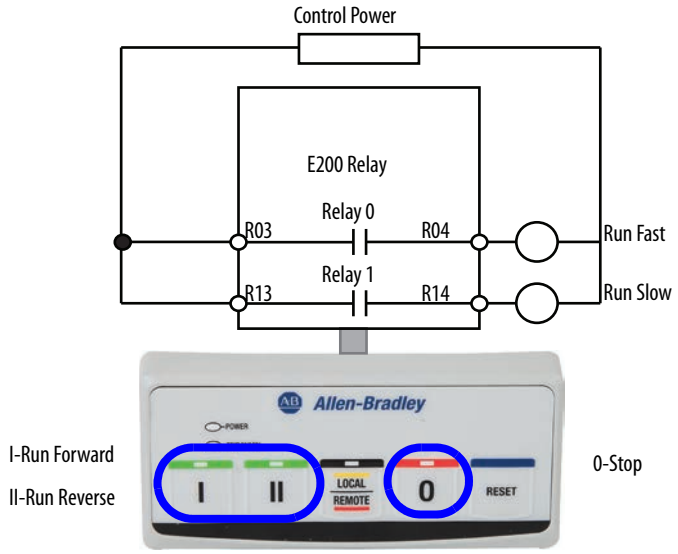
1. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
2. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
3. Overload Trip must be enabled in TripEnableI (Parameter 183).
4. Operator Station Trip must be disabled in TripEnableC (Parameter 186).
5. Operator Station Option Match Trip or Warning must be enabled.
   - Option Match Trip or must be enabled in TripEnableC (Parameter 186)
   - Operator Station must be enabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)

   Or
   - Option Match Warning must be enabled in WarningEnableC (Parameter 192)
   - Operator Station must be disabled in Mismatch Action (Parameter 233)
   - An operator station must be selected in Operator Station Type (Parameter 224)
6. Communication Fault & Idle Override (Parameter 346) must be enabled.
7. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 and Output Relay 1 are wired as a control relays in which the relay is controlled by the E200 Operator Station. Both output relays open when a trip event occurs. Figure 69 is a wiring diagram of a two-speed starter with Output Relay 0 and Output Relay 1 configured as control relays.

Figure 69 - Two-speed Starter (Network & Operator Station) Wiring Diagram



DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 15.

Two-speed Starter (Network & Local I/O) – Two-wire Control

Operating Mode *Two Speed Starter (Network& Operator Station)* (Parameter 195 = 24) in Remote control mode uses network tags *LogicDefinedPt00Data* in Output Assembly 144 to control Relay 0, which controls the high-speed contactor coil, and *LogicDefinedPt01Data* in Output Assembly 144 to control Relay 1, which controls the low-speed contactor coil. Both LogicDefinedPt00Data and LogicDefinedPt01Data are maintained values, so the two-speed starter remains energized when LogicDefinedPt00Data or LogicDefinedPt01Data has a value of 1. Program the appropriate state of the starter using the Network Communication Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3.

In Local control mode, Input 0 is used to control Output Relay 0, which controls the contactor coil of the high-speed contactor, and Input 1 is used to control Output Relay 1, which controls the contactor coil of the low-speed contactor. Both Input 0 and Input 1 are maintained signals, so the two-speed starter remains energized when either Input 0 or Input 1 is active.

Use Input 3 to select between Local and Remote control mode. Activate Input 3 to select Remote control mode. De-activate Input 3 to select Local control mode.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The reset button of the E200 Operator Station is enabled for this operating mode.

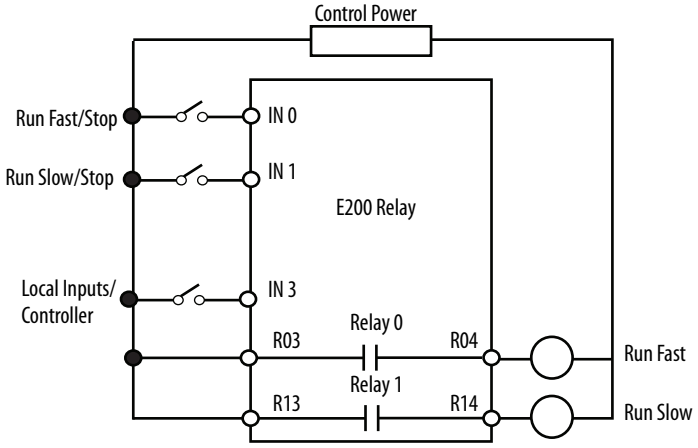
Rules

1. Three digital inputs must be available on the Control Module
2. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
3. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
4. Overload Trip must be enabled in TripEnableI (Parameter 183).
5. Communication Fault & Idle Override (Parameter 346) must be enabled.
6. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 and Output Relay 1 are wired as a control relays in which the relay is controlled by Input 0 and Input 1. Both output relays open when a trip event occurs. Figure 70 is a wiring diagram of a Two-speed Starter with Output Relay 0 and Output Relay 1 configured as control relays.

Figure 70 - Two-speed Starter (Network & Local I/O) – Two-wire Control Wiring Diagram

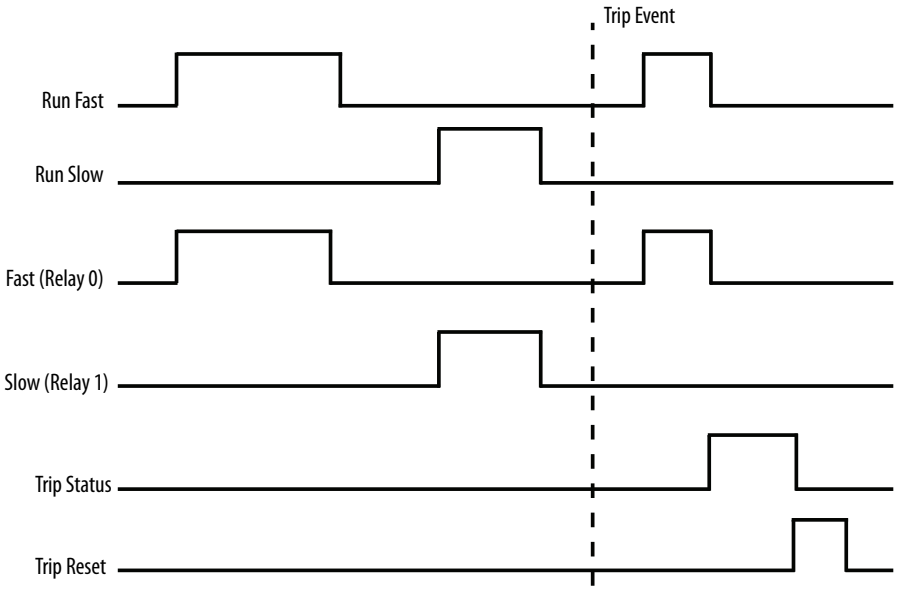


DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 24.

Timing Diagram

Figure 71 - Two-speed Starter (Network & Local I/O) – Two-wire Control Timing Diagram



Two-speed Starter (Network & Local I/O) – Three-wire Control

Operating Mode *Two Speed Starter (Network& Operator Station)* (Parameter 195 = 25) in Remote control mode uses network tags *LogicDefinedPt00Data* in Output Assembly 144 to control Relay 0, which controls the high-speed contactor coil, and *LogicDefinedPt01Data* in Output Assembly 144 to control Relay 1, which controls the low-speed contactor coil. Both LogicDefinedPt00Data and LogicDefinedPt01Data are maintained values, so the two-speed starter remains energized when LogicDefinedPt00Data or LogicDefinedPt01Data has a value of 1. Program the appropriate state of the starter using the Network Communication Fault and Network Communication Idle parameters (Parameters 569 – 573) described in Chapter 3.

Local control mode uses a normally open momentary push button in Input 0 to energize Output Relay 0, which controls the high-speed contactor coil. A normally open momentary push button in Input 1 energizes Output Relay 1, which controls the low-speed contactor coil. A normally closed push button in Input 2 de-energizes Output Relay 0 and Output Relay 1. Both Input 0, Input 1, and Input 2 are momentary signals, so the two-speed starter only energizes if Input 2 is active and Input 0 or Input 1 is momentarily active.

Use Input 3 to select between Local and Remote control mode. Activate Input 3 to select Remote control mode. De-activate Input 3 to select Local control mode.

InterlockDelay (Parameter 215) defines the minimum time delay when switching direction.

The reset button of the E200 Operator Station is enabled for this operating mode.

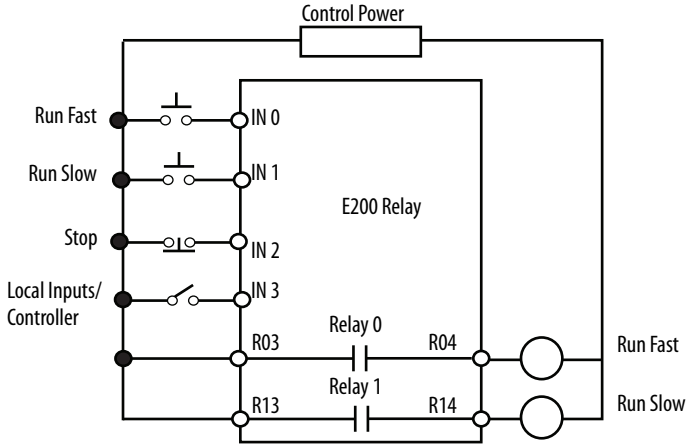
Rules

1. Four digital inputs must be available on the Control Module
2. Output Pt00 Assignment (Parameter 202) must be set to Control Relay.
3. Output Pt01 Assignment (Parameter 203) must be set to Control Relay.
4. Overload Trip must be enabled in TripEnableI (Parameter 183).
5. Communication Fault & Idle Override (Parameter 346) must be enabled.
6. Network Fault Override (Parameter 347) must be enabled.

Wiring Diagram

Output Relay 0 and Output Relay 1 are wired as a control relays in which the relay is controlled by the communication network or Input 0, Input 1, and Input 2. Both output relays open when a trip event occurs. Figure 72 is a wiring diagram of a two-speed starter with Output Relay 0 and Output Relay 1 configured as control relays.

Figure 72 - Two-speed Starter (Network & Local I/O) – Three-wire Control Wiring Diagram



DeviceLogix Program

The DeviceLogix program is automatically loaded and enabled in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 25.

Two-Speed Starter (Custom)

Operating Mode *Two Speed Starter (Custom)* (Parameter 195 = 53) operates as a two-speed starter with two output relays that are assigned as normally open control relays. The Two-speed Starter (Custom) operating mode is used for applications that require customized DeviceLogix programs. This operating mode requires minimal configuration rules.

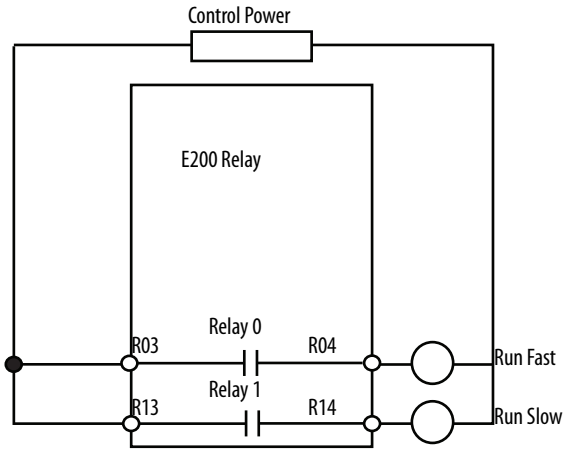
Rules

1. Set two of the Output Ptxx Assignments (Parameters 202...204) to Control Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).

Wiring Diagram

Figure 73 is a wiring diagram of a Two-speed Starter with Output Relay 0 and Output Relay 1 configured as control relays. Both Output Relay 0 and Output Relay 1 go to an open state when there is a trip event.

Figure 73 - Two-Speed Starter (Custom) Wiring Diagram

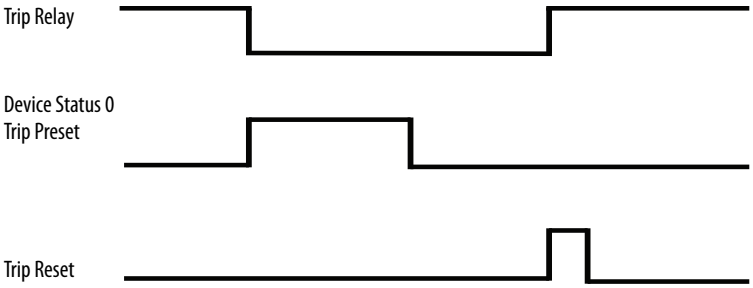


DeviceLogix Program

The last saved DeviceLogix program is executed in the E200 relay on power-up or when Operating Mode (Parameter 195) is set to a value of 53.

Timing Diagram

Figure 74 - Two-Speed Starter (Custom) Timing Diagram



Monitor Operating Mode

The monitor-based operating mode of the E200 relay lets you disable all protection features of the E200 relay. Use the E200 relay as a monitoring device to report current, voltage, power, and energy information.

There is one monitor based operating mode – Custom.

Monitor (Custom)

Operating Mode *Monitor (Custom)* (Parameter 195 = 54) lets you use the E200 relay as a monitoring device. No configuration rules apply in this operating mode if all motor protection features are disabled.

Rules

1. If any protection trip events are enabled (excluding Configuration, NVS, and Hardware Fault trip), then set any of the Output Ptxx Assignments (Parameters 202...204) to the appropriate value of Trip Relay, Control Relay, Monitor Lx Trip Relay, or Monitor Lx Control Relay.

Wiring Diagram

Not Applicable

Notes:

Protective Trip and Warning Functions

This chapter provides detailed information about the protective trip and warning functions of the E200 Electronic Overload Relay. The protective trip and warning functions are organized into five sections:

- Current-based
- Voltage-based
- Power-based
- Control-based
- Analog-based

This chapter explains the trip and warning protection features of the E200 relay and the associated configuration parameters.

Current Protection

The E200 relay digitally monitors the electrical current that is consumed by an electric motor. This electric current information is used for the following protective trip and warning functions:

- Overload Trip/Warning
- Phase Loss Trip
- Ground Fault Trip/Warning
- Stall Trip
- Jam Trip/Warning
- Underload Trip/Warning
- Current Imbalance Trip/Warning
- Line Under Current Trip/Warning
- Line Over Current Trip/Warning
- Line Loss Trip/Warning

Current Trip Enable (Parameter 183) and Current Warning Enable (Parameter 189) are used to enable the respective current-based protective trip and warning functions.

Current Trip Status (Parameter 4) and Current Warning Status (Parameter 10) are used to monitor the respective current-based protective trip and warning functions.

Current Trip

The E200 relay trips with an current-based indication if:

- No trip currently exists
- Overload trip protection is enabled
- Current is present
- % Thermal Capacity Utilized reaches 100%

If the E200 relay trips, the:

- TRIP/WARN LED status indicator flashes a red 5-short blink pattern
- Bit 4 in Current Trip Status (Parameter 4) sets to 1
- Bit 0 in Device Status 0 (Parameter 20) sets to 1
- Any relay outputs configured as a Trip Relay open
- Any relay outputs configured as a Control Relay open
- Any relay outputs configured as a Trip Alarm close
- Any relay outputs configured as a Normal Relay are placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Current Warning

The E200 relay indicates an current-based warning if:

- No warning currently exists
- Overload warning is enabled
- Current is present
- % Thermal Capacity Utilized is equal to or greater than the warning level

When the overload warning conditions are satisfied, the:

- TRIP/WARN LED status indicator flashes a yellow short-1 blink pattern
- Bit 0 in Current Warning Status (Parameter 10) sets to 1
- Bit 1 in Device Status 0 (Parameter 20) sets to 1
- Any relay outputs configured as warning alarm close

Overload Protection

The E200 relay provides overload protection through true RMS current measurements of the individual phase currents of the connected motor. Based on the highest current measured, the programmed FLA Setting, and Trip Class, a thermal model that simulates the actual heating of the motor is calculated. Percent Thermal Capacity Utilized

(Parameter 1) reports this calculated value and can be read via the communication network

Parameter Name	Parameter Number	Description
Overload Trip	4 20	Indicate a trip
Full Load Amps Setting	171	Define the motor's full-load current rating.
	177	Define the high-speed FLA value in two-speed motor applications. Activating FLA2 is described in Chapter 3.
Trip Class	172	Trip Class is the second of two parameters that affect the thermal capacity utilization algorithm of the E200 relay. Trip class is defined as the maximum time (in seconds) for an overload trip to occur when the motor's operating current is six times its rated current. The E200 relay offers an adjustable trip class range of 5…30. Enter the application trip class into Trip Class (Parameter 172).
Automatic/Manual Reset	173	Select the reset mode for the E200 relay after an overload or thermistor (PTC) trip. If an overload trip occurs and automatic reset mode is selected, the E200 relay automatically resets when the value stored in % Thermal Capacity Utilized (Parameter 1) falls below the value stored in Overload Reset Level (Parameter 174). If manual reset mode is selected, the E200 Overload Relay can be manually reset after the % Thermal Capacity Utilized is less than the OL Reset Level.
Overload Warning	10 20	Indicate a warning
Overload Warning Level	175	Define an alert for an impending overload trip and is adjustable from 0…100% TCU.
Time to Trip	2	When the measured motor current exceeds the trip rating of the E200 relay, Overload Time to Trip (Parameter 2) indicates the estimated time remaining before an overload trip occurs. When the measured current is below the trip rating, the Overload Time to Trip value is reported as 9,999 seconds.
Time to Reset	174	After an overload trip, the E200 relay reports the time remaining until the device can be reset through Overload Time to Reset (Parameter 3). When the % Thermal Capacity Utilized value falls to or below the Overload Reset Level (Parameter 174), the Overload Time to Reset value indicates zero until the overload trip is reset. After an overload trip is reset, the Overload Time to Reset value is reported as 0 seconds.
Nonvolatile Thermal Memory	1	The E200 relay includes a nonvolatile circuit to provide thermal memory. The time constant of the circuit corresponds to a Trip Class 20 setting. During normal operation, the thermal memory circuit is continuously monitored and updated to accurately reflect the thermal capacity utilization of the connected motor. If power is removed, the thermal memory of the circuit decays at a rate equivalent to the cooling of a Trip Class 20 application. When the power is re-applied, the E200 relay checks the thermal memory circuit voltage to determine the initial value of % Thermal Capacity Utilized (Parameter 1).

Full Load Current Guidelines

USA and Canada Guidelines

- Motor Service Factor ≥ 1.15: For motors with a service factor rating of 1.15 or greater, program the FLA setting to the full-load current rating on the printed nameplate.
- Motor Service Factor < 1.15: For motors with a service factor rating less than 1.15, program the FLA setting to 90% of the full-load current rating on the printed nameplate.
- Wye-Delta (Y-Δ) Applications: Follow the application's service factor instructions, except divide the full-load current rating on the printed nameplate by 1.73.

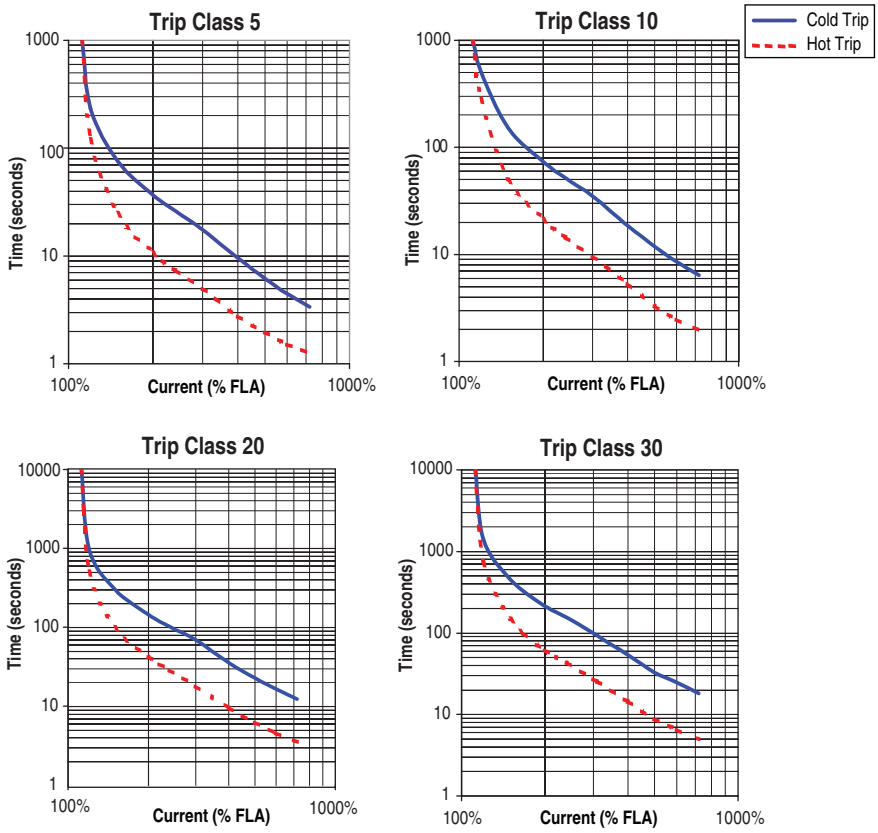
Outside USA and Canada Guidelines

- Maximum Continuous Rated (MCR) Motors: Program the FLA setting to the full-load current rating on the printed nameplate.
- Star-Delta (Y-Δ) Applications: Follow the MCR instructions, except divide the full-load current rating on the printed nameplate by 1.73.

Trip Curves

The following figures illustrate the time-current characteristics for trip classes 5, 10, 20, and 30 of the E200 relay.

Figure 75 - Time-Current Characteristics for Trip Classes 5, 10, 20, and 30



For trip class time-current characteristics other than 5, 10, 20, or 30, scale the Class 10 trip time according to the following table:

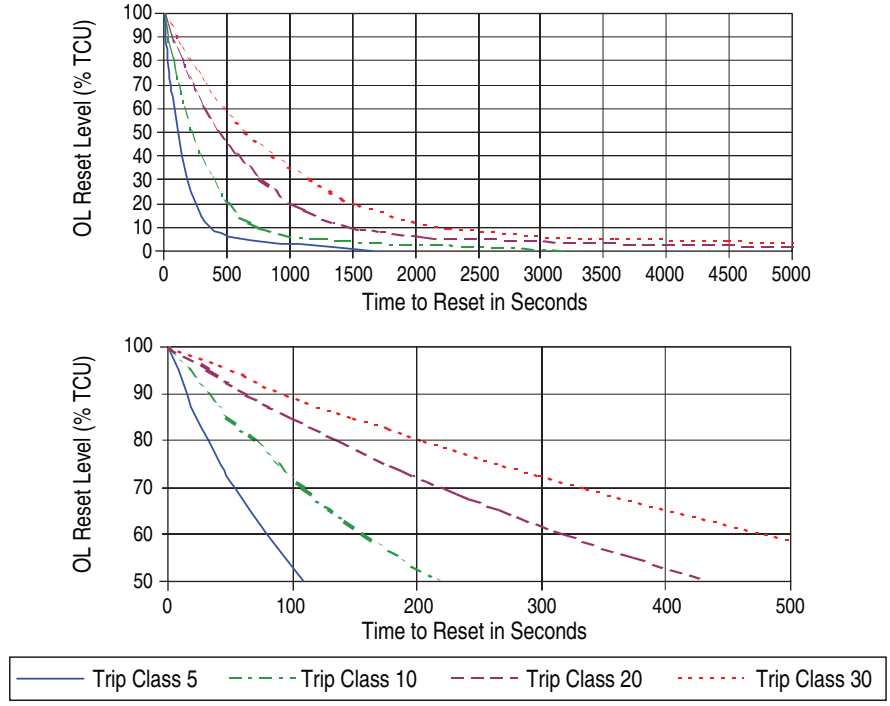
Table 24 - Time-Current Characteristic Scaling Factors

Trip Class	Trip Class 10 Multiplier	Trip Class	Trip Class 10 Multiplier	Trip Class	Trip Class 10 Multiplier
5	0.5	14	1.4	23	2.3
6	0.6	15	1.5	24	2.4
7	0.7	16	1.6	25	2.5
8	0.8	17	1.7	26	2.6
9	0.9	18	1.8	27	2.7
10	1.0	19	1.9	28	2.8
11	1.1	20	2.0	29	2.9
12	1.2	21	2.1	30	3.0
13	1.3	22	2.2		

Automatic/Manual Reset Times

Overload Reset Level (Parameter 174) is adjustable from 1...100% TCU. The following figures illustrate the typical overload reset time delay when Overload Reset Level is set to 75% TCU.

Figure 76 - Overload Reset Times



ATTENTION: In explosive environment applications, Overload Reset Mode (Parameter 173) must be set to Manual.

ATTENTION: In an explosive environment application, Overload Reset Level (Parameter 174) must be set as low as possible or in accordance with the motor thermal time constant.

Phase Loss Protection

A high current imbalance, or phase failure, can be caused by defective contacts in a contactor or circuit breaker, loose terminals, blown fuses, sliced wires, or faults in the motor. When a phase failure exists, the motor can experience an additional temperature rise or excessive mechanical vibration. This may result in a degradation of the motor insulation or increased stress on the motor bearings. Rapid phase loss detection helps to minimize the potential damage and loss of production.

Parameter Name	Parameter Number	Description
Phase Loss Trip	4 20	Indicate a trip
Phase Loss Inhibit Time	239	Inhibit a phase loss trip from occurring during the motor starting sequence. It is adjustable from 0…250 s. **IMPORTANT** The phase loss inhibit timer starts after the maximum phase of load current transitions from 0 A to 30% of the minimum FLA setting of the device. The E200 relay does not begin monitoring for a phase loss condition until the Phase Loss Inhibit Time expires.
Phase Loss Trip Delay	240	Define the time period for which a phase loss condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.

Ground Fault Current Protection

In isolated or high impedance-grounded systems, core-balanced current sensors are typically used to detect low-level ground faults caused by insulation breakdowns or entry of foreign objects. Detection of such ground faults can be used to interrupt the system to prevent further damage or to alert the appropriate personnel to perform timely maintenance.

The E200 relay provides core-balanced ground fault current detection capability, with the option of enabling Ground Fault Trip, Ground Fault Warning, or both. The ground fault detection method and range depends upon the catalog number of the E200 Sensing Module and Control Module ordered.

Table 25 - Ground Fault Capabilities

Catalog Number	Ground Fault Method	Ground Fault Trip/Warning Range
193-ESM-IG-__-__	Internal	0.5…5.0 A
592-ESM-IG-__-__		
193-ESM-VIG-__-__		
592-ESM-VIG-__-__		
193-EIOGP-22-____	External(1)	0.02…5.0 A
193-EIOGP-42-____		

(1) You must use one of the following Catalog Number 193-CBCT_ Core Balance Ground Fault Sensors :

1 — Ø 20 mm window
2 — Ø 40 mm window
3 — Ø 65 mm window
4 — Ø 85 mm window

ATTENTION: The E200 relay is not a ground fault circuit interrupter for personnel protection (or Class I) as defined in Article 100 of the NEC.

ATTENTION: The E200 relay is not intended to signal a disconnecting means to open the faulted current. A disconnecting device must be capable of interrupting the maximum available fault current of the system on which it is used.

Parameter Name	Parameter Number	Description
Ground Fault Trip	4 20	Indicate a trip
Ground Fault Type‘	241	Select the internal option or the external option with the appropriate measurement range.
Ground Fault Maximum Inhibit	248	Inhibits a ground fault trip from occurring when the ground fault current exceeds the maximum range of the core-balance sensor (approximately 6.5 A). Ground faults can quickly rise from low-level arcing levels to short circuit magnitudes. A motor starting contactor may not have the necessary rating to interrupt a high magnitude ground fault. In these circumstances it is desirable for an upstream circuit breaker with the proper rating to interrupt the ground fault.
Ground Fault Filter	247	An E200 relay can filter ground fault currents for High Resistance Grounded (HRG) systems from its current-based protection trip and warning functions, which include: • Thermal overload • Current imbalance • Jam • Stall The Ground Fault Filter is useful for smaller-sized motors that trip unexpectedly due to a controlled ground fault current that is significant relative to the current draw of the electric motor. This filter only disables the effects of the ground fault current from the current-based motor protection trip and warning functions. Current-based diagnostic data is reported unfiltered when this feature is enabled.
Ground Fault Inhibit Time	242	Inhibit a ground fault trip and warning from occurring during the motor starting sequence and is adjustable from 0…250 s. The ground fault inhibit time begins when the Current Present (bit 3) or Ground Fault Current Present (bit 4) is set in Device Status 0 (Parameter 20).
Ground Fault Trip Delay	243	Define the time period a ground fault condition must be present before a trip occurs and is adjustable from 0.0…25.0 s.
Ground Fault Trip Level	244	Ground Fault Trip Level (Parameter 244) lets you define the ground fault current in which the E200 relay trips and is adjustable from: • 0.500…5.00 A (Internal) • 0.020…5.00 A (External) **IMPORTANT** The ground fault inhibit timer starts after the maximum phase load current transitions from 0 A to 30% of the minimum FLA rating of the device or the ground fault current is greater than or equal to 50% of the minimum ground fault current rating of the device. The E200 relay does not begin monitoring for a ground fault condition until the Ground Fault Current Inhibit Time expires.
Ground Fault Warning	10 20	Indicate a warning
Ground Fault Warning Level	246	Define the ground fault current at which the E200 relay indicates a warning and is adjustable from 0.20…5.00 A.
Ground Fault Warning Delay	245	Define the time period (adjustable from 0.0…25.0 s) for which a ground fault condition must be present before a warning occurs.

Stall Protection

A motor stalls when its inrush current lasts for a longer than normal period of time during its starting sequence. As a result, the motor heats up rapidly and reaches the temperature limit of its insulation. Rapid stall detection during the starting sequence can extend the motor’s life, and minimize potential damage and loss of production. The E200 relay can monitor for this condition with its Stall Trip function and stop the motor before damage and loss of production can occur.

Parameter Name	Parameter Number	Description
Stall Trip	4 20	Indicate a trip
Stall Enabled Time	249	Adjust the time the E200 relay monitors for a stall condition during the motor starting sequence and is adjustable from 0…250 s.
Stall Trip Level	250	Define the locked rotor current and is adjustable from 100…600% of the FLA Setting (Parameter 171). **IMPORTANT** Stall Protection is only enabled during the motor starting sequence. If the maximum phase of load current falls below the programmed Stall Trip Level before the Stall Enabled Time elapses, the E200 relay disables Stall Protection until the next motor starting sequence. **IMPORTANT** The E200 relay considers a motor to have begun its starting sequence if the maximum phase of motor current transitions from 0A to approximately 30% of the minimum FLA setting of the device.

Jam Protection

A motor goes into a jam condition when a running motor begins to consume current greater than50% of the motor's nameplate rating. An example of this condition could be an overloaded conveyor or jammed gear. These conditions can result in the overheating of the motor and equipment damage. The E200 relay can monitor for this condition with its Jam Trip and Warning function to detect for a rapid jam fault to minimize damage and loss of production.

Parameter Name	Parameter Number	Description
Jam Trip	4 20	Indicate a trip
Jam Inhibit Time	251	Inhibit a jam trip and warning from occurring during the motor starting sequence. It is adjustable from 0…250 s.
Jam Trip Delay	252	Define the time period a jam condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
Jam Trip Level	253	Define the current at which the E200 relay trips on a jam. It is user adjustable from 50…600% of the FLA Setting (Parameter 171). **IMPORTANT** The Jam Inhibitor timer starts after the maximum phase of load current transitions from 0 A to 30% of the minimum FLA SETTING of the device. The E200 relay does not begin monitoring for a jam condition until the Jam Inhibit Time expires.
Jam Warning	10 20	Indicate a warning
Jam Warn Level	254	Define the current at which the E200 relay indicates a warning. It is user adjustable from 50…600% for the FLA Setting (Parameter 171). **IMPORTANT** The Jam Warning function does not include a time delay feature. After the Jam Inhibit Time has expired, the Jam Warning indication is instantaneous.

Underload Protection

Motor current less than a specific level may indicate a mechanical malfunction in the installation, such as a torn conveyor belt, damaged fan blade, broken shaft, or worn tool. Such conditions may not harm the motor, but they can lead to loss of production. Rapid underload fault detection helps to minimize damage and loss of production.

The E200 relay can monitor for this condition with its Underload Trip and Warning function to detect for a rapid underload fault to minimize damage and loss of production.

Parameter Name	Parameter Number	Description
Underload Trip	4 20	Indicate a trip
Underload Inhibit Time	255	Inhibit an underload trip and warning from occurring during the motor starting sequence. It is adjustable from 0…250 s.
Underload Trip Delay	256	Define the time period an underload condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
Underload Trip Level	257	Define the current at which the E200 relay trips on an underload. It is user adjustable from 10…100% of the FLA Setting (Parameter 171). **IMPORTANT** The Underload Inhibit Timer starts after the maximum phase of load current transitions from 0 A to 30% of the minimum FLA SETTING of the device. The E200 relay does not begin monitoring for an underload condition until the Underload Inhibit Time expires. **IMPORTANT** For any given application, the practical limit of the Underload Trip Level (Parameter 246) is dependent on the FLA Setting and the lower limit of the E200 relay's current measurement capability.
Underload Warning	10 20	Indicate a warning
Underload Warning Level	258	Define the current at which the E200 relay indicates a warning. It is user adjustable from 10…100% for the FLA Setting (Parameter 171). **IMPORTANT** The Underload Warning function does not include a time delay feature. After the Underload Inhibit Time has expired, the Underload Warning indication is instantaneous.

Current Imbalance Protection

A current imbalance can be caused by an imbalance in the voltage supply, unequal motor winding impedance, or long and varying wire lengths. When a current imbalance exists, the motor can experience an additional temperature rise, resulting in degradation of the motor insulation and reduction of life expectancy. The E200 relay can monitor for this condition with its Current Imbalance Trip and Warning function to detect for a rapid current imbalance fault to minimize damage and loss of production.

Current Imbalance can be defined by the following equation:

$$\%CI = 100\% * (I_d/I_a)$$

where

%CI = Percent Current Imbalance
I_d = Maximum Deviation from the Average Current
I_a = Average Current

Parameter Name	Parameter Number	Description
Current Imbalance Trip	4 20	Indicate a trip
Current Imbalance Inhibit Time	259	Inhibit a current imbalance trip and warning from occurring during the motor starting sequence. It is adjustable from 0…250 s.
Current Imbalance Trip Delay	260	Define the time period a current imbalance condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
Current Imbalance Trip Level	261	Current Imbalance Trip Level (Parameter 261) lets you define the percentage at which the E200 relay trips on a current imbalance. It is user adjustable from 10…100%. **IMPORTANT** The Current Imbalance Inhibit Timer starts after a phase of load current transitions from 0 A to 30% of the minimum FLA setting of the device. The E200 relay does not begin monitoring for a current imbalance condition until the Current Imbalance Inhibit Time expires.
Current Imbalance Warning	10 20	Indicate a warning
Current Imbalance Warning Level	262	Define the percentage at which the E200 relay indicates a warning. It is user adjustable from 10…100%. **IMPORTANT** The Current Imbalance Warning function does not include a time delay feature. After the Current Imbalance Inhibit Time has expired, the Current Imbalance Warning indication is instantaneous.

Line Undercurrent Protection

For non-motor applications, if the measured current is less than a specific level for a specific phase, it may indicate an electrical malfunction, such as bad resistive heater element or non-operating incandescent light bulb. Such conditions may not harm the power system, but it can lead to loss of production or certification noncompliance.

The E200 relay can monitor for an undercurrent condition per phase with its Line Under Current Trip and Warning function to detect for a rapid under current in a specific phase to minimize damage and loss of production.

Parameter Name	Parameter Number	Description
Under Current Trip	4 20	Indicate a trip for L1, L2, or L3
Under Current Inhibit Time	265	Inhibit an L1, L2, or L3 Under Current trip and warning from occurring during a load starting sequence. It is adjustable from 0…250 s.
L1 Under Current Trip Delay L2 Under Current Trip Delay L3 Under Current Trip Delay	266 269 272	Define the time period an L1 Under Current condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
L1 Under Current Trip Level L2 Under Current Trip Level L3 Under Current Trip Level	267 270 273	Define the current at which the E200 relay trips on a L1 Under Current. It is user adjustable from 10…100% of the FLA Setting (Parameter 171). **IMPORTANT** The Under Current Inhibit Timer starts after the maximum phase of load current transitions from 0 A to 30% of the minimum FLA setting of the device. The E200 relay does not begin monitoring for an undercurrent condition until the Under Current Inhibit Time expires. **IMPORTANT** For any given application, the practical limit of the L1 Under Current Trip Level (Parameter 267) is dependent on the FLA Setting and the lower limit of the E200 relay's current measurement capability
Under Current Warning	10 20	Indicate a warning
L1 Under Current Warning Level L2 Under Current Warning Level L3 Under Current Warning Level	268 271 274	Define the current at which the E200 relay indicates a L1 Under Current warning. It is user adjustable from 10…100% for the FLA Setting (Parameter 171). **IMPORTANT** The Under Current Warning function does not include a time delay feature. After the Under Current Inhibit Timer has expired, the L1 Under Current Warning indication is instantaneous.

Line Overcurrent Protection

For non-motor applications when the measured current is greater than a specific level for a specific phase may indicate an electrical malfunction, such as bad resistive heater element. Such conditions could harm the power system over time, which could lead to loss of production.

The E200 relay can monitor for an overcurrent condition per phase with its Line Over Current Trip and Warning function to detect for a rapid over current in a specific phase to minimize damage and loss of production.

Parameter Name	Parameter Number	Description
Over Current Inhibit Time	275	Over Current Inhibit Time (Parameter 275) lets you inhibit an L1, L2, and L3 Over Current trip and warning from occurring during a load starting sequence. It is adjustable from 0…250 s.
Over Current Trip	4 20	Indicates a trip forL1, L2, or L3
L1 Over Current Trip Delay L2 Over Current Trip Delay L3 Over Current Trip Delay	276 279 282	Define the time period an L1 Over Current condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
L1 Over Current Trip Level L2 Over Current Trip Level L3 Over Current Trip Level	277 280 283	Define the current at which the E200 relay trips on a L1 Over Current. It is user adjustable from 10…100% of the FLA Setting (Parameter 171). **IMPORTANT** The Over Current Inhibit Timer starts after the maximum phase of load current transitions from 0 A to 30% of the minimum FLA setting of the device. The E200 relay does not begin monitoring for an overcurrent condition until the Over Current Inhibit Time expires.
Over Current Warning	10 20	Indicate a warning
L1 Over Current Warning Level L2 Over Current Warning Level L3 Over Current Warning Level	278 281 284	Define the current at which the E200 relay indicates a L1 Over Current warning. It is user adjustable from 10…100% for the FLA Setting (Parameter 171). **IMPORTANT** The L1 Over Current Warning function does not include a time delay feature. After the Over Current Inhibit Timer has expired, the L1 Over Current Warning indication is instantaneous.

Line Loss Protection

For non-motor applications when the measured current is 0 amps a specific phase, this may indicate an electrical malfunction such as bad resistive heater element or non-operating incandescent light bulb. Such conditions may not harm the power system, but it can lead to loss of production or certification noncompliance.

The E200 relay can monitor for a current-based line loss per phase with its Line Loss Trip and Warning function to detect for a rapid line loss in a specific phase to minimize damage and loss of production.

Parameter Name	Parameter Number	Description
Line Loss Trip	4 20	Indicates a trip for L1, L2, or L3
Line Loss Inhibit Time	285	Inhibit an L1, L2, and L3 Line Loss trip and warning from occurring during a load starting sequence. It is adjustable from 0…250 s.
L1 Line Loss Trip Delay L2 Line Loss Trip Delay L3 Line Loss Trip Delay	286 287 288	L1 Line Loss Trip Delay (Parameter 276) lets you define the time period an L1 Line Loss condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s. **IMPORTANT** The Line Loss Inhibit Timer starts when L1, L2, or L3 Line Loss protection is activated by a programmed digital input (see Input Assignment Parameters 196-201). The E200 relay does not begin monitoring for Line Loss condition until the Line Loss Inhibit Timer expires.
Line Loss Warning	4 20	Indicate a warning **IMPORTANT** The Line Loss Warning function does not include a time delay feature. After the Line Loss Inhibit Timer has expired, the L1 Line Loss Warning indication is instantaneous.

Voltage Protection

The E200 relay can digitally monitor the voltage supplied to an electric motor to help protect against poor voltage quality. You can prevent a contactor from energizing if the voltage is either too high, too low, or wrong rotation. The following E200 Sensing Modules provide voltage monitoring capabilities.

Table 26 - Voltage Capabilities

Catalog Number	Measurement Method	L-L Voltage Trip/Warning Range
193-ESM-VIG-__-__	Internal	20…800V
592-ESM-VIG-__-__	Internal	20…800V
193-ESM-VIG-30A-CT	External	20…6500V

This voltage information is used for the following protective trip and warning functions:

- Undervoltage trip/warning
- Overvoltage trip/warning
- Voltage imbalance trip/warning
- Phase rotation mismatch trip
- Under frequency trip/warning
- Over frequency trip/warning

Voltage Trip Enable (Parameter 184) and Voltage Warning Enable (Parameter 190) are used to enable the respective voltage-based protective trip and warning functions.

Voltage Trip Status (Parameter 5) and Voltage Warning Status (Parameter 11) are used to view the status of the respective voltage-based protective trip and warning functions.

Voltage Trip

The E200 relay trips with a voltage indication if:

- No trip currently exists
- A voltage trip is enabled
- Voltage is present
- A voltage inhibit time has expired
- The minimum phase voltage is less than the trip level for a time period greater than the trip delay.

If the E200 relay trips on a voltage, the:

- TRIP/WARN LED status indicator flashes a red 1-long / 1-short blink pattern
- Bit 0 in Voltage Trip Status (Parameter 5) sets to 1
- Bit 0 in Device Status 0 (Parameter 20) sets to 1
- Any relay outputs configured as a Trip Relay open
- Any relay outputs configured as a Control Relay open
- Any relay outputs configured as a Trip Alarm close
- Any relay outputs configured as a Normal Relay are placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Voltage Warning

The E200 relay indicates a voltage warning if:

- No warning currently exists
- A voltage warning is enabled
- Voltage is present
- A voltage condition exists
- Inhibit Time has expired

When the voltage warning conditions are satisfied, the:

- TRIP/WARN LED flashes a yellow 1-long / 1-short blink pattern
- Bit 0 in Voltage Warning Status (Parameter 11) sets to 1
- Bit 1 in Device Status 0 (Parameter 20) sets to 1
- Any relay outputs configured as a warning alarm close

Undervoltage Protection

Electric motors consume more electric current when the voltage supplied to the motor is lower than the motor nameplate rating. This can damage to an electric motor over an extended period of time. The E200 relay can monitor for this condition with its Under Voltage Trip and Warning function to detect for low voltage levels to minimize motor damage and loss of production.

Parameter Name	Parameter Number	Description
Under Voltage Trip	5 20	Indicate a trip
Under Voltage Inhibit Time	355	Inhibit an under voltage trip and warning from occurring during the motor starting sequence. It is adjustable from 0…250 s.
Under Voltage Trip Delay	356	Define the time period an under voltage condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
Under Voltage Trip Level	357	Define the voltage at which the E200 relay trips on an under voltage. It is user adjustable from 0…6553.5V. **IMPORTANT** The Under Voltage Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L. The E200 relay does not begin monitoring for an under voltage condition until the Under Voltage Inhibit Time expires.
Under Voltage Warning	11 20	Indicate a warning
Under Voltage Warn Level	358	Under Voltage Warn Level (Parameter 358) lets you define the voltage at which the E200 relay indicates a warning. It is user adjustable from 0…6553.5 V. **IMPORTANT** The Under Voltage Warning function does not include a time delay feature. After the Under Voltage Inhibit Time has expired, the Under Voltage Warning indication is instantaneous.

Overvoltage Protection

The winding insulation for electric motors degrades faster when more voltage is supplied to the motor than the motor nameplate rating. This can damage to an electric motor over an extended period of time. The E200 relay can monitor for this condition with its Over Voltage Trip and Warning function to detect for high voltage levels to minimize motor damage and loss of production.

Parameter Name	Parameter Number	Description
Over Voltage Trip	5 20	Indicate a trip
Over Voltage Inhibit Time	359	Inhibit an over voltage trip and warning from occurring during the motor starting sequence. It is adjustable from 0…250 s.
Over Voltage Trip Delay	360	Define the time period an over voltage condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
Over Voltage Trip Level	361	Define the voltage at which the E200 relay trips on an over voltage. It is user adjustable from 0…6553.5V. **IMPORTANT** The Over Voltage Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L. The E200 relay does not begin monitoring for an over voltage condition until the Over Voltage Inhibit Time expires.
Over Voltage Warning	11 20	Indicate a warning
Over Voltage Warn Level	362	Define the voltage at which the E200 relay indicates a warning. It is user adjustable from 0…6553.5V. **IMPORTANT** The Over Voltage Warning function does not include a time delay feature. After the Over Voltage Inhibit Time has expired, the Over Voltage Warning indication is instantaneous.

Voltage Imbalance Protection

A voltage imbalance can be caused by poor power quality and unequal distribution of power. When a voltage imbalance exists, the motor can experience an additional temperature rise, resulting in degradation of the motor insulation and reduction of life expectancy. The E200 relay can monitor for this condition with its Voltage Imbalance Trip and Warning function to detect for a rapid voltage imbalance fault to minimize damage and loss of production.

Voltage Imbalance can be defined by the following equation:

$$\%V_{Imb} = 100\% * (V_d/V_a)$$

where

$\%V_{Imb}$ = Percent Voltage Imbalance

V_d = Maximum Deviation from the Average Voltage

V_a = Average Voltage

Parameter Name	Parameter Number	Description
Voltage Imbalance Trip	5 20	Indicate a trip
Voltage Imbalance Inhibit Time	365	Inhibit a voltage imbalance trip from occurring during the motor starting sequence. It is adjustable from 0…250 s.
Voltage Imbalance Trip Delay	366	Define the time period a voltage imbalance condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
Voltage Imbalance Trip Level	367	Define the percentage at which the E200 relay trips on a voltage imbalance. It is user adjustable from 10…100%. **IMPORTANT** The Voltage Imbalance Inhibit Timer starts after a phase voltage transitions from 0V to 20V L-L. The E200 relay does not begin monitoring for a voltage imbalance condition until the Voltage Imbalance Inhibit Time expires.
Voltage Imbalance Warning	11 20	Indicate a warning
Voltage Imbalance Warning Level	368	Define the percentage at which the E200 relay indicates a warning. It is user adjustable from 10…100%. **IMPORTANT** The Voltage Imbalance Warning function does not include a time delay feature. After the Voltage Imbalance Inhibit Time has expired, the Voltage Imbalance Warning indication is instantaneous.

Phase Rotation Protection

Wiring of a three-phase voltage system can affect the rotational direction of an electric motor. The E200 relay can help protect against the improper phase rotation so that an electric motor rotates in the proper direction, ABC or ACB, to prevent equipment from being damaged.

Parameter Name	Parameter Number	Description
Phase Rotation Trip	5 20	Indicate a trip
Phase Rotation Inhibit Time	363	Inhibit a phase rotation mismatch trip and warning from occurring. It is adjustable from 0…250 s.
Phase Rotation Trip Type	364	Define the required voltage phase rotation for the motor application. E200 relay trips on a phase rotation mismatch when this parameter does not match the measured voltage phase rotation. It is user adjustable, ABC or ACB. **IMPORTANT** The Phase Rotation Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L. The E200 relay does not begin monitoring for a phase rotation mismatch condition until the Phase Rotation Inhibit Time expires.

Frequency Protection

The E200 relay can help protect against poor voltage quality by offering frequency-based protection. This protection is used when electric power is provided by stand-alone electric generators. You can prevent a contactor from energizing if the voltage frequency is either too high or too low. The E200 relay can monitor for this condition with its Over and Under Frequency Trip and Warning function, and it can detect for an improper voltage frequency to minimize motor damage and loss of production.

Parameter Name	Parameter Number	Description
Under Frequency Trip	5 20	Indicate a trip
Under Frequency Inhibit Time	369	Inhibit an under frequency trip and warning from occurring during the motor starting sequence. It is adjustable from 0…250 s.
Under Frequency Trip Delay	370	Define the time period an under frequency condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
Under Frequency Trip Level	371	Define the frequency at which the E200 relay trips on an under frequency. It is user adjustable from 46…65 Hz. **IMPORTANT** The Under Frequency Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L. The E200 relay does not begin monitoring for an under frequency condition until the Under Frequency Inhibit Time expires.
Under Frequency Warning	11 20	Indicate a warning
Under Frequency Warn Level	372	Define the frequency at which the E200 relay indicates a warning. It is user adjustable from 46…65 Hz. **IMPORTANT** The Under Frequency Warning function does not include a time delay feature. After the Under Frequency Inhibit Time has expired, the Under Frequency Warning indication is instantaneous.

Parameter Name	Parameter Number	Description
Over Frequency Trip	5 20	Indicate a trip
Over Frequency Inhibit Time	373	Inhibit an over frequency trip and warning from occurring during the motor starting sequence. It is adjustable from 0…250 s.
Over Frequency Trip Delay	374	Define the time period an over frequency condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
Over Frequency Trip Level	375	Define the frequency at which the E200 relay trips on an over frequency. It is user adjustable from 46…65 Hz. **IMPORTANT** The Over Frequency Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L. The E200 relay does not begin monitoring for an over frequency condition until the Over Frequency Inhibit Time expires.
Over Frequency Warning	11 20	Indicate a warning
Over Frequency Warn Level	376	Over Frequency Warn Level (Parameter 376) lets you define the frequency at which the E200 relay indicates a warning. It is user adjustable from 46…65 Hz. **IMPORTANT** The Over Frequency Warning function does not include a time delay feature. After the Over Frequency Inhibit Time has expired, the Over Frequency Warning indication is instantaneous.

Power Protection

The E200 relay can digitally monitor the power that is supplied to an electric motor to help protect against poor power quality or alert you when power consumed by the motor differs from what is expected. This protection is useful for pump cavitation and pump material change detection. The following E200 Sensing Modules provide power monitoring capabilities.

Table 27 - Power Capabilities

Catalog Number	Measurement Method	L-L Voltage Trip/Warning Range
193-ESM-VIG-__-__	Internal	20…800V
592-ESM-VIG-__-__	Internal	20…800V
193-ESM-VIG-30A-CT	External	20…6500V

This power information is used for the following protective trip and warning functions:

- Under Real Power (kW) Trip/Warning
- Over Real Power (kW) Trip/Warning
- Under Reactive Power (kVAR) Trip/Warning

- Over Reactive Power (kVAR) Trip/Warning
- Under Apparent Power (kVA) Trip/Warning
- Over Apparent Power (kVA) Trip/Warning
- Under Power Factor Trip/Warning
- Over Power Factor Trip/Warning

Power Trip Enable (Parameter 185) and Power Warning Enable (Parameter 191) are used to enable the respective power-based protective trip and warning functions.

Power Trip Status (Parameter 6) and Power Warning Status (Parameter 12) are used to view the status of the respective power-based protective trip and warning functions.

Power Trip

The E200 relay trips with power indication if:

- No trip currently exists
- A power trip is enabled
- Current is present
- Voltage is present
- Power inhibit time has expired
- The total power is less than the trip level for a time period greater than the trip delay.

If the E200 relay trips on power, the:

- TRIP/WARN LED status indicator flashes a red 2-long / 1-short blink pattern
- Bit 0 in Power Trip Status (Parameter 6) sets to 1
- Bit 0 in Device Status 0 (Parameter 20) sets to 1
- Any relay outputs configured as a Trip Relay open
- Any relay outputs configured as a Control Relay open
- Any relay outputs configured as a Trip Alarm close
- Any relay outputs configured as a Normal Relay are placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Power Warning

The E200 relay indicates a power warning if:

- No warning currently exists
- A Power warning is enabled
- Current is present
- Voltage is present
- Power inhibit time has expired
- The power is equal to or less than the warning level

When the power warning conditions are satisfied, the:

- TRIP/WARN LED flashes a yellow 2-long / 1-short blink pattern
- Bit 0 in Power Warning Status (Parameter 12) sets to 1
- Bit 1 in Device Status 0 (Parameter 20) sets to 1
- Any relay outputs configured as a Warning Alarm close

Real Power (kW) Protection

The E200 relay can help protect against real power (kW) for specific applications that require the monitoring of both voltage and current. You can help protect or issue a warning if the real power (kW) consumption of an electric motor is either too high or too low.

Parameter Name	Parameter Number	Description
Under kW Trip	6 20	Indicate a trip
Under kW Inhibit Time	378	Inhibit an under real power (kW) trip and warning from occurring during the motor starting sequence. It is adjustable from 0…250 s.
Under kW Trip Delay	379	Define the time period an under real power (kW) condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
Under kW Trip Level	380	Define the real power (kW) at which the E200 relay trips on an under real power (kW). It is user adjustable from 0…2,000,000 kW. **IMPORTANT** The Under kW Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0 A to 30% of the minimum FLA setting of the device. The E200 relay does not begin monitoring for an under real power (kW) condition until the Under kW Inhibit Time expires.
Under kW Warning	12 20	Indicate a warning
Under kW Warn Level	381	Define the real power (kW) at which the E200 relay indicates a warning. It is user adjustable from 0…2,000,000 kW. **IMPORTANT** The Under kW Warning function does not include a time delay feature. After the Under kW Inhibit Time has expired, the Under kW Warning indication is instantaneous.

Parameter Name	Parameter Number	Description
Over kW Trip	6 20	Indicate a trip
Over kW Inhibit Time	382	Inhibit an over real power (kW) trip and warning from occurring during the motor starting sequence. It is adjustable from 0…250 s.
Over kW Trip Delay	383	Define the time period an over real power (kW) condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
Over kW Trip Level	384	Define the total real power (kW) at which the E200 relay trips on over real power (kW). It is user adjustable from 0…2,000,000 kW. **IMPORTANT** The Over kW Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0 A to 30% of the minimum FLA setting of the device. The E200 relay does not begin monitoring for an over real power (kW) condition until the Over kW Inhibit Time expires.
Over kW Warning	12 20	Indicate a warning
Over kW Warn Level	385	Define the real power (kW) at which the E200 relay indicates a warning. It is user adjustable from 0…2,000,000 kW. **IMPORTANT** The Over kW Warning function does not include a time delay feature. After the Over kW Inhibit Time has expired, the Over kW Warning indication is instantaneous.

Reactive Power (kVAR) Protection

The E200 relay can help protect against reactive power (kVAR) for specific applications that require the monitoring of both voltage and current. You can help protect or issue a warning if the reactive power (kVAR) of an electric motor is either too high or too low.

Parameter Name	Parameter Number	Description
Under kVAR Consumed Trip	6 20	Indicate a trip
Under kVAR Consumed Inhibit Time	386	Inhibit an under reactive power (kVAR) consumed trip and warning from occurring during the motor starting sequence. It is adjustable from 0…250 s.
Under kVAR Consumed Trip Delay	387	Define the time period an under reactive power (kVAR) consumed condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
Under kVAR Consumed Trip Level	388	Define the reactive power (kVAR) consumed at which the E200relay trips on an under reactive power (kVAR) consumed. It is user adjustable from 0…2,000,000 kW. **IMPORTANT** The Under kVAR Consumed Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0 A to 30% of the minimum FLA setting of the device. The E200 relay does not begin monitoring for an under reactive power (kVAR) consumed condition until the Under kVAR Consumed Inhibit Time expires.
Under kVAR Consumed Warning	12 20	Indicate a warning
Under kVAR Consumed Warn Level	389	Define the reactive power (kVAR) consumed at which the E200 relay indicates a warning. It is user adjustable from 0…2,000,000 kW. **IMPORTANT** The Under kVAR Consumed Warning function does not include a time delay feature. After the Under kVAR consumed Inhibit Time has expired, the Under kVAR Consumed Warning indication is instantaneous.
Under kVAR Generated Trip	6 20	Indicate a trip
Under kVAR Generated Inhibit Time	394	Inhibit Time (Parameter 394) lets you inhibit an under power factor leading trip and warning from occurring during the motor starting sequence. It is adjustable from 0…250 s.
Under kVAR Generated Trip Delay	395	Define the time period an under reactive power (kVAR) generated condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
Under kVAR Generated Trip Level	396	Define the reactive power (kVAR) generated at which the E200 relay trips on an under reactive power (kVAR) generated. It is user adjustable from 0…2,000,000 kW. **IMPORTANT** The Under kVAR Generated Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0 A to 30% of the minimum FLA setting of the device. The E200 relay does not begin monitoring for an under reactive power (kVAR) generated condition until the Under kVAR Generated Inhibit Time expires.
Under kVAR Generated Warning	12 20	Indicate a warning
Under kVAR Generated Warn Level	397	Under kVAR Generated Warn Level (Parameter 397) lets you define the reactive power (kVAR) generated at which the E200 relay indicates a warning. It is user adjustable from 0…2,000,000 kW. **IMPORTANT** The Under kVAR Generated Warning function does not include a time delay feature. After the Under kVAR generated Inhibit Time has expired, the Under kVAR Generated Warning indication is instantaneous.

Apparent Power (kVA) Protection

The E200 relay can help protect against apparent power (kVA) for specific applications that require the monitoring of both voltage and current. You can help protect or issue a warning if the apparent power (kVA) consumption of an electric motor is either too high or too low.

Parameter Name	Parameter Number	Description
Under kVA Trip	6 20	Indicate a trip
Under kVA Inhibit Time	402	Inhibit an under apparent power (kVA) trip and warning from occurring during the motor starting sequence. It is adjustable from 0…250 s.
Under kVA Trip Delay	403	Define the time period an under apparent power (kVA) condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
Under kVA Trip Level	404	Under kVA Trip Level (Parameter 404) lets you define the apparent power (kVA) at which the E200 relay trips on an under apparent power (kVA). It is user adjustable from 0…2,000,000 kVA. **IMPORTANT** The Under kVA Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0 A to 30% of the minimum FLA setting of the device. The E200 relay does not begin monitoring for an under apparent power (kVA) condition until the Under kVA Inhibit Time expires.
Under kVA Warning	12 20	Indicate a warning
Under kVA Warn Level	405	Under kVA Warn Level (Parameter 405) lets you define the apparent power (kVA) at which the E200 relay indicates a warning. It is user adjustable from 0…2,000,000 kVA. **IMPORTANT** The Under kVA Warning function does not include a time delay feature. After the Under kVA Inhibit Time has expired, the Under kVA Warning indication is instantaneous.

Power Factor Protection

The E200 relay can help protect against power factor for specific applications that require the monitoring of both voltage and current. You can help protect or issue a warning if the power factor of an electric motor is either too high or too low.

Parameter Name	Parameter Number	Description
Under Power Factor Lagging Trip	6 20	Indicate a trip
Under Power Factor Lagging Inhibit Time	410	Inhibit an under power factor lagging trip and warning from occurring during the motor starting sequence. It is adjustable from 0…250 s.
Under Power Factor Lagging Trip Delay	411	Define the time period an under power factor lagging condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
Under Power Factor Lagging Trip Level	412	Define the power factor lagging at which the E200 relay trips on an under power factor lagging. It is user adjustable from 0…2,000,000 kW. **IMPORTANT** The Under Power Factor Lagging Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0 A to 30% of the minimum FLA setting of the device. The E200 relay does not begin monitoring for an under power factor lagging condition until the Under Power Factor Lagging Inhibit Time expires.
Under Power Factor Lagging Warning	12 20	Indicate a warning
Under Power Factor Lagging Warn Level	413	Define the power factor lagging at which the E200 relay indicates a warning. It is user adjustable from 0…2,000,000 kW. IMPORTANT The Under Power Factor Lagging Warning function does not include a time delay feature. After the Under Power Factor Lagging Inhibit Time has expired, the Under Power Factor Lagging Warning indication is instantaneous.
Under Power Factor Leading Trip	6 20	Indicate a trip
Under Power Factor Leading Inhibit Time	418	Inhibit an under power factor leading trip and warning from occurring during the motor starting sequence. It is adjustable from 0…250 s.
Under Power Factor Leading Trip Delay	419	Define the time period an under power factor leading condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
Under Power Factor Leading Trip Level	420	Define the power factor leading at which the E200 relay trips on an under power factor leading. It is user adjustable from 0…2,000,000 kW. **IMPORTANT** The Under Power Factor Leading Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0 A to 30% of the minimum FLA setting of the device. The E200 relay does not begin monitoring for an under power factor leading condition until the Under Power Factor Leading Inhibit Time expires.
Under Power Factor Leading Warning	12 20	Indicate a warning
Under Power Factor Leading Warn Level	421	Define the power factor leading at which the E200 relay indicates a warning. It is user adjustable from 0…2,000,000 kW. **IMPORTANT** The Under Power Factor Leading Warning function does not include a time delay feature. After the Under Power Factor Leading Inhibit Time has expired, the Under Power Factor Leading Warning indication is instantaneous.

Control Protection

The E200 relay provides a number of control-based protection functions including:

- Test Trip
- Operator Station Trip
- Remote Trip
- Start Inhibit
- Preventive Maintenance
- Configuration Trip
- Option Match Trip/Warning
- Expansion Bus Trip/Warning
- Non Volatile Storage Trip
- Test Mode Trip

Control Trip Enable (Parameter 186) and Control Warning Enable (Parameter 192) are used to enable the respective control-based protective trip and warning functions.

Control Trip Status (Parameter 7) and Control Warning Status (Parameter 13) are used to monitor the respective current-based protective trip and warning functions.

Control Trip

The E200 relay trips with a control-based indication if:

- No trip currently exists
- A control-based protection is enabled
- You press the blue reset button on the Communication Module for more than 3 seconds.

If the E200 relay trips on a control, the following occurs:

- The TRIP/WARN LED flashes a red 3-long / 1-short blink pattern
- Bit 0 in Control Trip Status (Parameter 7) sets to 1
- Bit 0 in Device Status 0 (Parameter 20) sets to 1
- Any relay outputs configured as a Trip Relay open
- Any relay outputs configured as a Control Relay open
- Any relay outputs configured as a Trip Alarm close
- Any relay outputs configured as a Normal Relay are placed in their Protection Fault state (if so programmed)

Control Warning

The E200 relay provides a warning indication if:

- No trip currently exists
- Warning condition exists

If the E200 relay warns, the following occurs:

- The TRIP/WARN LED flashes a yellow 3-long / 2-short blink pattern
- Bit 1 in Control Warning Status (Parameter 13) sets to 1
- Bit 1 in Device Status 0 (Parameter 20) sets to 1
- Any relay outputs configured as a warning alarm closes

Test Trip

The E200 relay provides the capability to put the overload relay into a Test Trip state. You can implement this feature when commissioning a motor control circuit to verify the response of the E200 relay, its associated Expansion I/O modules, and the networked automation system.

Parameter Name	Parameter Number	Description
Test Trip	7 20	Indicate a trip

Thermistor (PTC) Protection

The following E200 relay control modules can accept up to 6 thermistors (PTC) temperature sensors wired in series to monitor the temperature of a motor's windings, rotor, and/or bearings.

- 193-EIOGP-42-24D
- 193-EIOGP-22-120
- 193-EIOGP-22-240

The thermistor (PTC) based temperature sensors connect to the IT1 and IT2 terminals of the E200 Control Module.If the E200 relay trips on a thermistor.

Parameter Name	Parameter Number	Description
Thermistor (PTC) Trip	7 20	Indicate a trip
Thermistor (PTC) Warning	13 20	Indicate a warning

DeviceLogix Protection

An E200 relay is equipped with a DeviceLogix logic engine. You can create custom logic programs for distributed motor control applications. See Chapter 8 for more information on DeviceLogix. DeviceLogix provides you with the capability to create a customized protection algorithm that can generate a trip or warning event.

Parameter Name	Parameter Number	Description
DeviceLogix Trip	7 20	Indicate a trip
DeviceLogix Warning	13 20	Indicate a warning

Operator Station Trip

The E200 relay provides the capability to plug and play its optional operator stations. The operator station protection feature trips the E200 relay when you press the red 0 (stop) button. This feature is a failsafe mechanism to let you de-energize a contactor coil anytime the red 0 (stop) button is pressed.

Operator Station Trip should be disabled when an operator station is being used to send start and stop signals to an automation control system.

Parameter Name	Parameter Number	Description
Operator Station Trip	7 20	Indicate a trip You can also press the red 0 button on an operator station to trigger a trip.

Remote Trip

The E200 relay provides the capability to remotely cause the E200 relay to trip via a network command or assigned digital input on the Control Module (see Chapter 3 for

digital input assignments). This feature allows the capability of tripping the E200 relay from a remote source such as a vibration switch or external monitoring relay.

Parameter Name	Parameter Number	Description
Remote Trip	7 20	Indicate a trip A trip can also occur when a Control Module's digital input with a remote trip assignment is activated or the Communication Module receives a remote trip command from the communication network

Start Inhibit Protection

This protective function lets you limit the number of starts in a given time period and limit the operating hours for an electric motor. A start is defined as the E200 relay sensing a transition in current from 0 A to 30% of the minimum FLA rating of the device. The Blocked Start protective function is set by Starts Per Hour (Parameter 205) and/or Starts Interval (Parameter 206).

Parameter Name	Parameter Number	Description
Blocked Start Trip	7 20	Indicate a trip
Starts Per Hour	205	Number of starts within the last hour (60 minutes). This value is adjustable from 0…120 starts.
Starts Interval	206	Time that you must wait between starts. This value is adjustable from 0…3600 seconds.
Starts Available	30	Number of starts currently available based on the blocked start settings and the actual motor starting events.
Time to Start	31	Amount of the time remaining until a new start can be issued. If the Time to Start time has elapsed, this parameter reports zero until the next Blocked Start trip occurs.

Preventive Maintenance

The E200 relay offers preventive maintenance warnings based on the number of start cycles and the number of operating hours. These warnings can be used to alert you that the number of starts or number of operating hours has been reached, and it is time to perform preventive maintenance.

Parameter Name	Parameter Number	Description
Number of Starts Warning	13 20	Indicate a warning
Total Starts	207	Set the number of starts until the starts counter warning occurs.
Starts Counter	29	Number of times a motor has been started. This value can be reset to zero using the Clear Command (Parameter 165) function *Clear Operating Statistics*.
Operating Hours Warning	13 20	Indicate a warning
Total Operating Hours	208	Set the number operating hours that a motor can operate until the operating hours warning occurs.
Operating Time	28	Number hours that a motor has been running. This value can be reset to zero using the Clear Command (Parameter 165) function *Clear Operating Statistics*.

Hardware Fault

The E200 relay continuously monitors the status of the Control, Sensing, and Communication Modules. The E200 relay issues a hardware fault trip if there is an issue with the Control, Sensing, and Communication Modules or if one of the modules is missing or incompatible. The Hardware Fault Trip is always enabled.

Parameter Name	Parameter Number	Description
Hardware Fault Trip	7 20	Indicate a trip

Contactor Feedback Protection

An E200 relay can control motors using its Operating Modes. Select one of the pre-programmed Operating Modes that monitor the feedback status of a contactor by wiring the auxiliary contacts of the contactor into one of the digital inputs of the E200 relay. See Chapter 4 for more information on Operating Modes.

Parameter Name	Parameter Number	Description
Feedback Timeout	213	Amount time in milliseconds a Feedback based Operating Mode waits to receive a contactor feedback signal after the contactor has been issued an energize command.
Contactor Feedback Trip	7 20	Indicate a trip
Contactor Feedback Warning	13 20	Indicate a warning

Nonvolatile Storage Fault

The E200 relay continuously monitors the status of its nonvolatile storage. The E200 relay issues a nonvolatile storage fault trip if there is an issue with its nonvolatile storage or if it becomes corrupt. The Nonvolatile Storage Fault Trip is always enabled.

Parameter Name	Parameter Number	Description
Nonvoltaile Storage Fault Trip	7 20	Indicate a trip

Test Mode Trip

Some motor control center enclosures include a Test Position in which the motor power is disconnected from the enclosure, but the control power is still active. This allows motor control center commissioning staff to verify that the motor starter is mechanically working and communication is established with the automation control system. The E200 relay provides the capability to put the overload relay into a Test Mode Trip state if motor control center enclosure is in a test position, and the E200 relay detects motor current and/or voltage is present.

Parameter Name	Parameter Number	Description
Test Mode Trip	7 20	Indicate a trip **IMPORTANT** Motor current is detected when a phase of load current transitions from 0 A to 30% of the minimum FLA setting of the device

Analog Protection

The Analog I/O Expansion Modules of the E200 relay scan up to three analog signals per module. This information can be used to trigger an over analog level Trip or Warning. The analog-based protection features can be used with the following analog applications:

- Monitoring motor winding and bearing temperatures that are measured by RTD sensors
- Monitoring liquid, air, or steam flow
- Monitoring temperature
- Monitoring weight
- Monitoring levels
- Monitoring a potentiometer
- Monitoring PTC or NTC thermistor sensors

Analog Trip Enable (Parameter 187) and Analog Warning Enable (Parameter 193) are used to enable the respective analog-based protective trip and warning functions.

Analog Trip Status (Parameter 8) and Analog Warning Status (Parameter 14) are used to monitor the respective analog-based protective trip and warning functions.

Analog Trip

The E200 relay trips with an analog module trip indication if:

- No trip currently exists
- The trip is enabled
- The measured analog input signal is greater than the trip level for a time period greater than the level trip delay.

If the E200 relay trips on an analog module channel, the:

- TRIP/WARN LED status indicator flashes a red 4-long / 1-short blink pattern
- Bit 0 in Analog Trip Status (Parameter 8) sets to 1
- Bit 0 in Device Status 0 (Parameter 20) sets to 1
- Any relay outputs configured as a Trip Relay open
- Any relay outputs configured as a Control Relay open
- Any relay outputs configured as a Trip Alarm close
- Any relay outputs configured as a Normal Relay are placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Analog Warning

The E200 relay indicates an analog warning if:

- No warning currently exists
- Analog Module 1 – Channel 00 Over Level Warning is enabled
- The maximum phase current is equal to or greater than the Analog Module 1 – Channel 00 Warning Level

When the warning conditions are satisfied, the:

- TRIP/WARN LED flashes a yellow 4-long / 1-short blink pattern
- Bit 0 in Analog Warning Status (Parameter 14) sets to 1
- Bit 1 in Device Status 0 (Parameter 20) sets to 1
- Any relay outputs configured as a Warning Alarm close

Analog Module

The E200 supports as many as 4 analog modules. Analog I/O Expansion Module scans up to three analog signals. An over level trip or warning can be configured for each input channel.

Parameter Name	Parameter Number	Description
Analog Module Over Level Trip	8 20	Indicate a trip
Analog Module 1 – Channel 00 Over Level Trip Delay Analog Module 1 – Channel 01 Over Level Trip Delay Analog Module 1 – Channel 02 Over Level Trip Delay Analog Module 2 – Channel 00 Over Level Trip Delay Analog Module 2 – Channel 01 Over Level Trip Delay Analog Module 2 – Channel 02 Over Level Trip Delay Analog Module 3 – Channel 00 Over Level Trip Delay Analog Module 3 – Channel 01 Over Level Trip Delay Analog Module 3 – Channel 02 Over Level Trip Delay Analog Module 4 – Channel 00 Over Level Trip Delay Analog Module 4 – Channel 01 Over Level Trip Delay Analog Module 4 – Channel 02 Over Level Trip Delay	443 452 461 474 483 492 505 514 523 536 545 554	Define the time period a level condition must be present before a trip occurs. It is adjustable from 0.1…25.0 s.
Analog Module 1 – Channel 00 Trip Level Analog Module 1 – Channel 01 Trip Level Analog Module 1 – Channel 02 Trip Level Analog Module 2 – Channel 00 Trip Level Analog Module 2 – Channel 01 Trip Level Analog Module 2 – Channel 02 Trip Level Analog Module 3 – Channel 00 Trip Level Analog Module 3 – Channel 01 Trip Level Analog Module 3 – Channel 02 Trip Level Analog Module 4 – Channel 00 Trip Level Analog Module 4 – Channel 01 Trip Level Analog Module 4 – Channel 02 Trip Level	444 453 462 475 484 493 506 515 524 537 546 555	Define the magnitude of the analog signal in which the E200 relay trips on a level trip. It is user adjustable from -32768…+32767.
Analog Module Over Level Warning	14 20	Indicate a warning
Analog Module 1 – Channel 00 Warning Level Analog Module 1 – Channel 01 Warning Level Analog Module 1 – Channel 02 Warning Level Analog Module 2 – Channel 00 Warning Level Analog Module 2 – Channel 01 Warning Level Analog Module 2 – Channel 02 Warning Level Analog Module 3 – Channel 00 Warning Level Analog Module 3 – Channel 01 Warning Level Analog Module 3 – Channel 02 Warning Level Analog Module 4 – Channel 00 Warning Level Analog Module 4 – Channel 01 Warning Level Analog Module 4 – Channel 02 Warning Level	445 454 463 476 485 494 507 516 525 538 547 556	Define the magnitude of the analog signal in which the E200 relay trips on a warning. It is user adjustable from -32768…+32767.

Notes:

Commands

This chapter provides detailed information about the reset, clear, and pre-configuration functions of the E200 Electronic Overload Relay. The E200 relay provides three types of commands:

- Trip reset
- Configuration preset
- Clear command

Trip Reset

Trip Reset (Parameter 163) lets you reset an E200 relay when it is in a tripped state.

Trip Reset has the same functionality as pressing the blue reset button on E200 communication module and using the Trip Reset bit in the consumed output assemblies of a communication network.

A trip reset can only be performed when all conditions for the trip event have been cleared. For an overload trip event, the % Thermal Capacity Utilized (Parameter 1) must be below the value that is specified in Overload Reset Level (Parameter 174).

Configuration Preset

The E200 relay has a number of preset configurations that let you quickly configure all configuration parameters that are needed for a specific operating mode in one command. This also lets you restore the factory default values for all configuration parameters in the E200 relay.

The following pages list the available configuration presets and the values for the associated pre-configured configuration values.

Factory Defaults

When the Factory Defaults configuration preset command is selected, the E200 relay restores all configuration parameters back to their original factory default values.

Figure 77 - Factory Default Values

No.	Parameter Name	Default Value	Units
139	TripHistoryMaskI	0xFFFF	
140	TripHistoryMaskV	0x003F	
141	TripHistoryMaskP	0x0FFF	
142	TripHistoryMaskC	0x27FF	
143	TripHistoryMaskA	0x0FFF	
145	WarnHistoryMaskI	0xFFFF	
146	WarnHistoryMaskV	0x003F	
147	WarnHistoryMaskP	0x0FFF	
148	WarnHistoryMaskC	0x1FFF	

No.	Parameter Name	Default Value	Units
304	OutPt00PrFltAct	Goto Value	
305	OutPt00PrFltVal	Open	
306	OutPt00ComFltAct	Goto Value	
307	OutPt00ComFltVal	Open	
308	OutPt00ComIdlAct	Goto Value	
309	OutPt00ComIdlVal	Open	
310	OutPt01PrFltAct	Goto Value	
311	OutPt01PrFltVal	Open	
312	OutPt01ComFltAct	Goto Value	

No.	Parameter Name	Default Value	Units
428	Screen1Param1	1	
429	Screen1Param2	50	
430	Screen2Param1	2	
431	Screen2Param2	3	
432	Screen3Param1	51	
433	Screen3Param2	52	
434	Screen4Param1	38	
435	Screen4Param2	39	
436	DisplayTimeout	300	Seconds

No.	Parameter Name	Default Value	Units
149	WarnHistoryMaskA	0x0FFF	
171	FLASetting	0.50	Amps
172	TripClass	10	
173	OLPTCResetMode	Automatic	
174	OLResetLevel	75	%TCU
175	OLWarningLevel	85	%TCU
176	SingleOrThreePh	Three Phase	
177	FLA2Setting	0.50	Amps
183	TripEnableI	0x0003	
184	TripEnableV	0	
185	TripEnableP	0	
186	TripEnableC	0x20C9	
187	TripEnableA	0	
189	WarningEnableI	0	
190	WarningEnableV	0	
191	WarningEnableP	0	
192	WarningEnableC	0	
193	WarningEnableA	0	
195	SetOperatingMode	Net Overload	
196	InPt00Assignment	Normal	
197	InPt01Assignment	Normal	
198	InPt02Assignment	Normal	
199	InPt03Assignment	Normal	
200	InPt04Assignment	Normal	
201	InPt05Assignment	Normal	
202	OutPt0Assignment *	Trip Relay	
203	OutPt1Assignment	Normal	
204	OutPt2Assignment	Normal	
205	StartsPerHour	2	
206	StartsInterval	600	Seconds
207	PMTotalStarts	0	
208	PMOperatingHours	0	Hrs
209	ActFLA2wOutput	Disable	
211	SecurityPolicy	0x801F	
212	Language	English	
213	FeedbackTimeout	500	
214	TransitionDelay	10000	
215	InterlockDelay	100	
216	EmergencyStartEn	Disable	
221	ControlModuleTyp	Ignore	
222	SensingModuleTyp	Ignore	
223	CommsModuleType	Ignore	
224	OperStationType	Ignore	
225	DigitalMod1Type	Ignore	
226	DigitalMod2Type	Ignore	
227	DigitalMod3Type	Ignore	
228	DigitalMod4Type	Ignore	
229	AnalogMod1Type	Ignore	

No.	Parameter Name	Default Value	Units
313	OutPt01ComFltVal	Open	
314	OutPt01ComIdlAct	Goto Value	
315	OutPt01ComIdlVal	Open	
316	OutPt02PrFltAct	Goto Value	
317	OutPt02PrFltVal	Open	
318	OutPt02ComFltAct	Goto Value	
319	OutPt02ComFltVal	Open	
320	OutPt02ComIdlAct	Goto Value	
321	OutPt02ComIdlVal	Open	
322	OutDig1PrFltAct	Goto Value	
323	OutDig1PrFltVal	Open	
324	OutDig1ComFltAct	Goto Value	
325	OutDig1ComFltVal	Open	
326	OutDig1ComIdlAct	Goto Value	
327	OutDig1ComIdlVal	Open	
328	OutDigp2PrFltAct	Goto Value	
329	OutDig2PrFltVal	Open	
330	OutDig2ComFltAct	Goto Value	
331	OutDig2ComFltVal	Open	
332	OutDig2ComIdlAct	Goto Value	
333	OutDig2ComIdlVal	Open	
334	OutDig3PrFltAct	Goto Value	
335	OutDig3PrFltVal	Open	
336	OutDig3ComFltAct	Goto Value	
337	OutDig3ComFltVal	Open	
338	OuDig3ComIdlAct	Goto Value	
339	OutDig3ComIdlVal	Open	
340	OutDig4PrFltAct	Goto Value	
341	OutDig4PrFltVal	Open	
342	OutDig4ComFltAct	Goto Value	
343	OutDig4ComFltVal	Open	
344	OutDig4ComIdlAct	Goto Value	
345	OutDig4ComIdlVal	Open	
346	CommOverride	Disable	
347	NetworkOverride	Disable	
350	PtDevOutCOSMask	0x0000	
352	VoltageMode	Delta	
353	PTPrimary	480	
354	PTSecondary	480	
355	UVInhibitTime	10	Seconds
356	UVTripDelay	1.0	Seconds
357	UVTripLevel	100.0	Volt
358	UVWarningLevel	400.0	Volt
359	OVInhibitTime	10	Seconds
360	OVTripDelay	1.0	Seconds
361	OVTripLevel	500.0	Volt
362	OVWarningLevel	490.0	Volt
363	PhRotInhibitTime	10	Seconds

No.	Parameter Name	Default Value	Units
437	InAnMod1Ch00Type	Disable	
438	InAMod1Ch0Format	Eng Units	
439	InAMod1C0TmpUnit	Degrees C	
440	InAMod1C0FiltFrq	17 Hz	
441	InAMod1C0OpCktSt	Upscale	
442	InAnMod1Ch0RTDEn	3-Wire	
443	InAMod1C0TripDly	1.0	Seconds
444	InAMod1C0TripLvl	0	
445	InAMod1C0WarnLvl	0	
446	InAnMod1Ch01Type	Disable	
447	InAMod1Ch1Format	Eng Units	
448	InAMod1C1TmpUnit	Degrees C	
449	InAMod1C1FiltFrq	17 Hz	
450	InAMod1C1OpCktSt	Upscale	
451	InAnMod1Ch1RTDEn	3-Wire	
452	InAMod1C1TripDly	1.0	Seconds
453	InAMod1C1TripLvl	0	
454	InAMod1C1WarnLvl	0	
455	InAnMod1Ch02Type	Disable	
456	InAMod1Ch2Format	Eng Units	
457	InAMod1C2TmpUnit	Degrees C	
458	InAMod1C2FiltFrq	17 Hz	
459	InAMod1C2OpCktSt	Upscale	
460	InAnMod1Ch2RTDEn	3-Wire	
461	InAMod1C2TripDly	1.0	Seconds
462	InAMod1C2TripLvl	0	
463	InAMod1C2WarnLvl	0	
464	OutAnMod1Type	Disable	
465	OutAnMod1Select	Ave %FLA	
466	OutAnMod1FltActn	Zero	
467	OutAnMod1IdlActn	Zero	
468	InAnMod2Ch00Type	Disable	
469	InAMod2Ch0Format	Eng Units	
470	InAMod2C0TmpUnit	Degrees C	
471	InAMod2C0FiltFrq	17 Hz	
472	InAMod2C0OpCktSt	Upscale	
473	InAnMod2Ch0RTDEn	3-Wire	
474	InAMod2C0TripDly	1.0	Seconds
475	InAMod2C0TripLvl	0	
476	InAMod2C0WarnLvl	0	
477	InAnMod2Ch01Type	Disable	
478	InAMod2Ch1Format	Eng Units	
479	InAMod2C1TmpUnit	Degrees C	
480	InAMod2C1FiltFrq	17 Hz	
481	InAMod2C1OpCktSt	Upscale	
482	InAnMod2Ch1RTDEn	3-Wire	
483	InAMod2C1TripDly	1.0	Seconds
484	InAMod2C1TripLvl	0	

No.	Parameter Name	Default Value	Units
230	AnalogMod2Type	Ignore	
231	AnalogMod3Type	Ignore	
232	AnalogMod4Type	Ignore	
233	MismatchAction	0x0000	
239	PLInhibitTime	0	Seconds
240	PLTripDelay	1	Seconds
241	GroundFaultType	Internal	
242	GFInhibitTime	10	Seconds
243	GFTripDelay	0.5	Seconds
244	GFTripLevel	2.50	Amps
245	GFWarningDelay	0	Seconds
246	GFWarningLevel	2.00	Amps
247	GFFilter	Disable	
248	GFMaxInhibit	Disable	
249	StallEnabledTime	10	Seconds
250	StallTripLevel	600	%FLA
251	JamInhibitTime	10	Seconds
252	JamTripDelay	5.0	Seconds
253	JamTripLevel	250	%FLA
254	JamWarningLevel	150	%FLA
255	ULInhibitTime	10	Seconds
256	ULTripDelay	5.0	Seconds
257	ULTripLevel	50	%FLA
258	ULWarningLevel	70	%FLA
259	CIInhibitTime	10	Seconds
260	CITripDelay	5.0	Seconds
261	CITripLevel	35	%
262	CIWarningLevel	20	%
263	CTPrimary	5	
264	CTSecondary	5	
265	UCInhibitTime	10	Seconds
266	L1UCTripDelay	1.0	Seconds
267	L1UCTripLevel	35	%
268	L1UCWarningLevel	40	%
269	L2UCTripDelay	1.0	Seconds
270	L2UCTripLevel	35	%
271	L2UCWarningLevel	40	%
272	L3UCTripDelay	1.0	Seconds
273	L3UCTripLevel	35	%
274	L3UCWarningLevel	40	%
275	OCInhibitTime	10	Seconds
276	L1OCTripDelay	1.0	Seconds
277	L1OCTripLevel	100	%
278	L1OCWarningLevel	90	%
279	L2OCTripDelay	1.0	Seconds
280	L2OCTripLevel	100	%
281	L2OCWarningLevel	90	%
282	L3OCTripDelay	1.0	Seconds
283	L3OCTripLevel	100	%

No.	Parameter Name	Default Value	Units
364	PhaseRotTripType	ABC	
365	VIBInhibitTime	10	Seconds
366	VIBTripDelay	1.0	Seconds
367	VIBTripLevel	15	%
368	VIBWarningLevel	10	%
369	UFInhibitTime	10	Seconds
370	UFTripDelay	1.0	Seconds
371	UFTripLevel	57	Hz
372	UFWarningLevel	58	Hz
373	OFInhibitTime	10	Seconds
374	OFTripDelay	1.0	Seconds
375	OFTripLevel	63	Hz
376	OFWarningLevel	62	Hz
377	PowerScale	kW	
378	UWInhibitTime	10	Seconds
379	UWTripDelay	1.0	Seconds
380	UWTripLevel	0.000	kW
381	UWWarningLevel	0.000	kW
382	OWInhibitTime	10	Seconds
383	OWTripDelay	1.0	Seconds
384	OWTripLevel	0.000	kW
385	OWWarningLevel	0.000	kW
386	UVARCInhibitTime	10	Seconds
387	UVARCTripDelay	1.0	Seconds
388	UVARCTripLevel	0.000	kVAR
389	UVARCWarnLevel	0.000	kVAR
390	OVARCInhibitTime	10	Seconds
391	OVARCTripDelay	1.0	Seconds
392	OVARCTripLevel	0.000	kVAR
393	OVARCWarnLevel	0.000	kVAR
394	UVARGInhibitTime	10	Seconds
395	UVARGTripDelay	1.0	Seconds
396	UVARGTripLevel	0.000	kVAR
397	UVARGWarnLevel	0.000	kVAR
398	OVARGInhibitTime	10	Seconds
399	OVARGTripDelay	1.0	Seconds
400	OVARGTripLevel	0.000	kVAR
401	OVARGWarnLevel	0.000	kVAR
402	UVAInhibitTime	10	Seconds
403	UVATripDelay	1.0	Seconds
404	UVATripLevel	0.000	kVA
405	UVAWarningLevel	0.000	kVA
406	OVAInhibitTime	10	Seconds
407	OVATripDelay	1.0	Seconds
408	OVATripLevel	0.000	kVA
409	OVAWarningLevel	0.000	kVA
410	UPFLagInhibTime	10	Seconds
411	UPFLagTripDelay	1.0	Seconds
412	UPFLagTripLevel	-90	%

No.	Parameter Name	Default Value	Units
485	InAMod2C1WarnLvl	0	
486	InAnMod2Ch02Type	Disable	
487	InAMod2Ch2Format	Eng Units	
488	InAMod2C2TmpUnit	Degrees C	
489	InAMod2C2FiltFrq	17 Hz	
490	InAMod2C2OpCktSt	Upscale	
491	InAnMod2Ch2RTDEn	3-Wire	
492	InAMod2C2TripDly	1.0	Seconds
493	InAMod2C2TripLvl	0	
494	InAMod2C2WarnLvl	0	
495	OutAnMod2Type	Disable	
496	OutAnMod2Select	Ave %FLA	
497	OutAnMod2FltActn	Zero	
498	OutAnMod2dlActn	Zero	
499	InAnMod3Ch00Type	Disable	
500	InAMod3Ch0Format	Eng Units	
501	InAMod3C0TmpUnit	Degrees C	
502	InAMod3C0FiltFrq	17 Hz	
503	InAMod3C0OpCktSt	Upscale	
504	InAnMod3Ch0RTDEn	3-Wire	
505	InAMod3C0TripDly	1.0	Seconds
506	InAMod3C0TripLvl	0	
507	InAMod3C0WarnLvl	0	
508	InAnMod3Ch01Type	Disable	
509	InAMod3Ch1Format	Eng Units	
510	InAMod3C1TmpUnit	Degrees C	
511	InAMod3C1FiltFrq	17 Hz	
512	InAMod3C1OpCktSt	Upscale	
513	InAnMod3Ch1RTDEn	3-Wire	
514	InAMod3C1TripDly	1.0	Seconds
515	InAMod3C1TripLvl	0	
516	InAMod3C1WarnLvl	0	
517	InAnMod3Ch02Type	Disable	
518	InAMod3Ch2Format	Eng Units	
519	InAMod3C2TmpUnit	Degrees C	
520	InAMod3C2FiltFrq	17 Hz	
521	InAMod3C2OpCktSt	Upscale	
522	InAnMod3Ch2RTDEn	3-Wire	
523	InAMod3C2TripDly	1.0	Seconds
524	InAMod3C2TripLvl	0	
525	InAMod3C2WarnLvl	0	
526	OutAnMod3Type	Disable	
527	OutAnMod3Select	Ave %FLA	
528	OutAnMod3FltActn	Zero	
529	OutAnMod3dlActn	Zero	
530	InAnMod4Ch00Type	Disable	
531	InAMod4Ch0Format	Eng Units	
532	InAMod3C0TmpUnit	Degrees C	
533	InAMod4C0FiltFrq	17 Hz	

No.	Parameter Name	Default Value	Units
284	L3OCWarningLevel	90	%
285	LineLossInhTime	10	Seconds
286	L1LossTripDelay	1.0	Seconds
287	L2LossTripDelay	1.0	Seconds
288	L3LossTripDelay	1.0	Seconds
291	Datalink0	0	
292	Datalink1	0	
293	Datalink2	0	
294	Datalink3	0	
295	Datalink4	0	
296	Datalink5	0	
297	Datalink6	0	
298	Datalink7	0	

No.	Parameter Name	Default Value	Units
413	UPFLagWarnLevel	-95	%
414	OPFLagInhibTime	10	Seconds
415	OPFLagTripDelay	1.0	Seconds
416	OPFLagTripLevel	-95	%
417	OPFLagWarnLevel	-90	%
418	UPFLeadInhibTime	10	Seconds
419	UPFLeadTripDelay	1.0	Seconds
420	UPFLeadTripLevel	90	%
421	UPFLeadWarnLevel	95	%
422	OPFLeadInhibTime	10	Seconds
423	OPFLeadTripDelay	1.0	Seconds
424	OPFLeadTripLevel	95	%
425	OPFLeadWarnLevel	90	%
426	DemandPeriod	15	Min
427	NumberOfPeriods	1	

No.	Parameter Name	Default Value	Units
534	InAMod4C0OpCktSt	Upscale	
535	InAnMod4Ch0RTDEn	3-Wire	
536	InAMod4C0TripDly	1.0	Seconds
537	InAMod4C0TripLvl	0	
538	InAMod4C0WarnLvl	0	
539	InAnMod4Ch01Type	Disable	
540	InAMod4Ch1Format	Eng Units	
541	InAMod4C1TmpUnit	Degrees C	
542	InAMod4C1FiltFrq	17 Hz	
543	InAMod4C1OpCktSt	Upscale	
544	InAnMod4Ch1RTDEn	3-Wire	
545	InAMod4C1TripDly	1.0	Seconds
546	InAMod4C1TripLvl	0	
547	InAMod4C1WarnLvl	0	
548	InAnMod4Ch02Type	Disable	
549	InAMod4Ch2Format	Eng Units	
550	InAMod4C2TmpUnit	Degrees C	
551	InAMod4C2FiltFrq	17 Hz	
552	InAMod4C2OpCktSt	Upscale	
553	InAnMod4Ch2RTDEn	3-Wire	
554	InAMod4C2TripDly	1.0	Seconds
555	InAMod4C2TripLvl	0	
556	InAMod4C2WarnLvl	0	
557	OutAnMod4Type	Disable	
558	OutAnMod4Select	Ave %FLA	
559	OutAnMod4FltActn	Zero	
560	OutAnMod4dlActn	Zero	
561	FnlFltValStDur	Zero	
562	OutPt00FnlFltVal	Open	
563	OutPt01FnlFltVal	Open	
564	OutPt02FnlFltVal	Open	
565	OutDig1FnlFltVal	Open	
566	OutDig2FnlFltVal	Open	
567	OutDig3FnlFltVal	Open	
568	OutDig4FnlFltVal	Open	
569	NetStrtComFltAct	Goto Value	
570	NetStrtComFltVal	Open	
571	NetStrtComIdlAct	Goto Value	
572	NetStrtComIdlVal	Open	
573	NetStrtFnlFltVal	Open	
574	VoltageScale	Volts	

Clear Command

Clear Command (Parameter 165) lets you clear historical logs, operating statistics, and energy data within the nonvolatile memory of the E200 relay.

Table 28 - Clear Command Functions

Function Name	Parameter Name	Parameter No.	Description
Clear Operating Statistics	Operating Time	28	sets related parameters to a value of zero (0) when command is issued
	Starts Counter	29	
Clear History Logs	Trip History 0	127	sets related parameters to a value of zero (0) when command is issued
	Trip History 1	128	
	Trip History 2	129	
	Trip History 3	130	
	Trip History 4	131	
	Warning History 0	132	
	Warning History 1	133	
	Warning History 2	134	
	Warning History 3	135	
	Warning History 4	136	
Clear % TCU	Thermal Capacity Utilized	1	sets related parameters to a value of zero (0) when command is issued
Clear kWh	kWh x 10^9	80	sets related parameters to a value of zero (0) when command is issued
	kWh x 10^6	81	
	kWh x 10^3	82	
	kWh x 10^0	83	
	kWh x 10^{-3}	84	
Clear kVARh	kVARh Consumed x 10^9	85	sets related parameters to a value of zero (0) when command is issued
	kVARh Consumed x 10^6	86	
	kVARh Consumed x 10^3	87	
	kVARh Consumed x 10^0	88	
	kVARh Consumed x 10^{-3}	89	
	kVARh Generated x 10^9	90	
	kVARh Generated x 10^6	91	
	kVARh Generated x 10^3	92	
	kVARh Generated x 10^0	93	
	kVARh Generated x 10^{-3}	94	
	kVARh Net x 10^9	95	
	kVARh Net x 10^6	96	
	kVARh Net x 10^3	97	
	kVARh Net x 10^0	98	
	kVARh Net x 10^{-3}	99	
Clear kVAh	kVAh x 10^9	100	sets related parameters to a value of zero (0) when command is issued
	kVAh x 10^6	101	
	kVAh x 10^3	102	
	kVAh x 10^0	103	
	kVAh x 10^{-3}	104	
Clear Max. kW Demand	Max kW Demand	106	sets related parameters to a value of zero (0) when Clear %TCU command is issued
Clear Max kVAR Demand	Max kVAR Demand	108	sets related parameters to a value of zero (0) when Clear %TCU command is issued
Clear Max kVA Demand	Max kVA Demand	110	sets related parameters to a value of zero (0) when Clear %TCU command is issued

Function Name	Parameter Name	Parameter No.	Description
	% Thermal Capacity Utilized	1	
	Operating Time	28	
	Starts Counter	29	
	kWh x 10^{9}	80	
	kWh x 10^{6}	81	
	kWh x 10^{3}	82	
	kWh x 10^{0}	83	
	kWh x 10^{-3}	84	
	kVARh Consumed x 10^{9}	85	
	kVARh Consumed x 10^{6}	86	
	kVARh Consumed x 10^{3}	87	
	kVARh Consumed x 10^{0}	88	
	kVARh Consumed x 10^{-3}	89	
	kVARh Generated x 10^{9}	90	
	kVARh Generated x 10^{6}	91	
	kVARh Generated x 10^{3}	92	
	kVARh Generated x 10^{0}	93	
	kVARh Generated x 10^{-3}	94	
	kVARh Net x 10^{9}	95	
	kVARh Net x 10^{6}	96	
Clear All	kVARh Net x 10^{3}	97	sets related parameters to a value of zero (0) when command is issued
	kVARh Net x 10^{0}	98	
	kVARh Net x 10^{-3}	99	
	kVAh x 10^{9}	100	
	kVAh x 10^{6}	101	
	kVAh x 10^{3}	102	
	kVAh x 10^{0}	103	
	kVAh x 10^{-3}	104	
	Max kW Demand	106	
	Max kVAR Demand	108	
	Max kVA Demand	110	
	Trip History 0	127	
	Trip History 1	128	
	Trip History 2	129	
	Trip History 3	130	
	Trip History 4	131	
	Warning History 0	132	
	Warning History 1	133	
	Warning History 2	134	
	Warning History 3	135	
	Warning History 4	136	

Metering and Diagnostics

This chapter provides detailed information about the metering and diagnostic information that the E200 Electronic Overload Relay generates. The metering and diagnostic functions are organized into seven sections:

- Device Monitor
- Current Monitor
- Voltage Monitor
- Power Monitor
- Energy Monitor
- Trip/Warning History
- Trip Snapshot

Device Monitor

The E200 relay's device monitor diagnostics provides information on the status of the device, which includes:

- Thermal overload protection
- Trip and warning protection functions
- Digital inputs and relay outputs
- Operator station
- Hardware options
- Time and date

Table 29 - Device Monitor Parameters

Parameter Name	Parameter No.	Description
Percent Thermal Capacity Utilized (%TCU)	1	• reports the calculated percent thermal capacity utilization of the motor that is being monitored • when the percent thermal capacity utilization equals 100%, the E200 relay issues an overload trip
Time to Trip	2	• overload Time to Trip indicates the estimated time remaining before an overload trip occurs when the measured motor current exceeds the trip rating of the E200 relay • when the measured current is below the trip rating, the value is reported as 9,999 seconds
Time To Reset	3	• reports the time remaining until the device can be reset after an overload trip • when the %TCU value falls to or below the Overload Reset Level (Parameter 174), the Overload Time to Reset value indicates zero until the overload trip is reset • after an overload trip is reset, the value is reported as 0 seconds
Current Trip Status	4	• reports the status of the current-based protective trip functions
Voltage Trip Status	5	• reports the status of the voltage-based protective trip functions
Power Trip Status	6	• reports the status of the power-based protective trip functions
Control Trip Status	7	• reports the status of the control-based protective trip functions
Current Warning Status	10	• reports the status of the current-based protective warning functions
Voltage Warning Status	11	• reports the status of the control-based protective warning functions
Power Warning Status	12	• reports the status of the control-based protective warning functions
Control Warning Status	13	• reports the status of the control-based protective warning functions
Input Status 0	16	• reports the state of the digital inputs on the E200 relay Control Module

Parameter Name	Parameter No.	Description
Input Status 1	17	• reports the state of the digital inputs on the E200 relay Digital Expansion Modules
Output Status	18	• reports the state of the relay outputs on the E200 relay Control Module and Digital Expansion Modules
Operator Station Status	19	• reports the state of the E200 relay Operator Station input buttons and output LEDs
Device Status 0	20	• reports the general status of the E200 relay and the sensing capabilities that are present • Device Status 0 bit 14, "Ready", is cleared under the following circumstances: – Device Status 0 bit 0, "Trip Present", is set – The E200 relay has not completed its power-up initialization – The processing of data in a configuration assembly is in progress – A CopyCat function is in progress – A Factory Defaults command has been invoked and is in progress.
Device Status 1	21	• reports the specific features of the E200 relay Control and Sensing Modules • reports which Expansion Digital Modules or Analog Modules are present on the E200 relay Expansion Bus
Firmware Revision Number	22	• reports the firmware revision number of the E200 relay system
Control Module ID	23	• identifies which specific Control Module is present in the E200 relay system
Sensing Module ID	24	• identifies which specific Sensing Module is present in the E200 relay system
Operator Station ID	25	• identifies which specific Operator Station is present on the Expansion Bus of the E200 relay system
Expansion Digital Module ID	26	• identifies which specific Expansion Digital Modules are present on the Expansion Bus of the E200 relay system
Expansion Analog Module ID	27	• identifies which specific Expansion Analog Modules are present on the Expansion Bus of the E200 relay system
Operating Time	28	• represents the number of hours that a motor has been running • you can reset this value can be reset to zero using the Clear Command (Parameter 165) function Clear Operating Statistics
Starts Counter	29	• represents the number of times a motor has been started • you can reset this value can be reset to zero using the Clear Command (Parameter 165) function Clear Operating Statistics
Starts Available	30	• reports the number of starts currently available based on the blocked start settings and the actual motor starting events
Time to Start	31	• reports the amount of time remaining until a new start can be issued • if the Time to Start time has elapsed, this parameter reports zero until the next Blocked Start trip occurs
Year	32	• reports the year in the virtual real-time clock of the E200 relay
Month	33	• reports the month in the virtual real-time clock of the E200 relay
Day	34	• reports the day in the virtual real-time clock of the E200 relay
Hour	35	• reports the hour in the virtual real-time clock of the E200 relay
Minute	36	• reports the minute in the virtual real-time clock of the E200 relay
Second	37	• reports the second in the virtual real-time clock of the E200 relay
Invalid Configuration Parameter	38	• reports the parameter number that is causing a configuration trip in the E200 relay • see Chapter 3 for more information about a configuration fault
Invalid Configuration Cause	39	• reports the reason for the configuration trip in the E200 relay • see Chapter 3 for more information about a configuration fault
Mismatch Status	40	• reports the module that is causing a mismatch trip or warning in the E200 relay • see Chapter 3 for more information about a mismatch fault

Current Monitor

The E200 relay current monitor diagnostics provides information on the current consumed by the load that the E200 relay is monitoring, and it provides diagnostics for a three-phase current system including imbalance and ground fault current.

Table 30 - Current Monitor Parameters

Parameter Name	Parameter No.	Description
L1 Current	43	• reports the current in Amperes flowing through the L1 and T1 power terminals of the E200 relay Sensing Module
L2 Current	44	• reports the current in Amperes flowing through the L2 and T2 power terminals of the E200 relay Sensing Module
L3 Current	45	• reports the current in Amperes flowing through the L3 and T3 power terminals of the E200 relay Sensing Module
Average Current	46	• reports the average current of the monitored current • When single or three phase (Parameter 176) is set to three-phase, average current is calculated as follows: – Average Current = (L1 Current + L2 Current + L3 Current) / 3 • When single or three phase (Parameter 176) is set to single phase, average current is calculated as follows: – Average Current = (L1 Current + L2 Current) / 2
L1 Percent FLA	47	• reports the L1 current in comparison to the active Full Load Amps programmed in FLA (Parameter 171) and FLA2 (Parameter 177) – L1 Percent FLA = L1 Current / Full Load Amp

Parameter Name	Parameter No.	Description
L2 Percent FLA	48	• reports the L2 current in comparison to the active Full Load Amps programmed in FLA (Parameter 171) and FLA2 (Parameter 177) – L2 Percent FLA = L2 Current / Full Load Amps
L3 Percent FLA	49	• reports the L3 current in comparison to the active Full Load Amps programmed in FLA (Parameter 171) and FLA2 (Parameter 177) – L3 Percent FLA = L3 Current / Full Load Amps
Average Percent FLA	50	• reports the average current in comparison to the active Full Load Amps programmed in FLA (Parameter 171) and FLA2 (Parameter 177) – Average Percent FLA = Average Current / Full Load Amps
Ground Fault Current	51	• reports the ground fault current measured by the internal core balanced current transformer of the E200 relay Sensing Module or external core balanced current transformer
Current Imbalance	52	• reports the percentage of uneven current consumption in the monitored power system • Current Imbalance is defined by the following equation – Current Imbalance = 100% * (I_d/I_a) where I_d = Maximum Line Current Deviation from the Average Current; I_a = Average Current

Voltage Monitor

The voltage monitor diagnostics of the E200 relay provide information on the voltage being supplied to the load. The voltage diagnostics include three-phase voltage, phase imbalance, phase rotation, and frequency.

Table 31 - Voltage Monitor Parameters

Parameter Name	Parameter No.	Description
L1-L2 Voltage	53	• reports the voltage in volts in reference to the T1 and T2 power terminals of the E200 relay Sensing Module
L2-L3 Voltage	54	• reports the voltage in volts in reference to the T2 and T3 power terminals of the E200 relay Sensing Module
L3-L1 Voltage	55	• reports the voltage in volts in reference to the T3 and T1 power terminals of the E200 relay Sensing Module
Average L-L Voltage	56	• reports the average voltage of the monitored L-L voltages • when Single or Three Phase (Parameter 176) is set to *Three Phase*, Average L-L Voltage is calculated as follows: – Average L-L Voltage = (L1-L2 Voltage + L2-L3 Voltage + L3-L1 Voltage) / 3 • When Single or Three Phase (Parameter 176) is set to *Single Phase*, Average L-L Voltage is calculated as follows: – Average L-L Voltage = (L1-L2 Voltage + L2-L3 Voltage) / 2
L1-N Voltage	57	• reports the voltage in volts in reference to the T1 power terminal of the E200 relay Sensing Module
L2-N Voltage	58	• reports the voltage in volts in reference to the T2 power terminal of the E200 relay Sensing Module
L3-N Voltage	59	• reports the voltage in volts in reference to the T3 power terminal of the E200 relay Sensing Module
Average L-N Voltage	60	• reports the average voltage of the monitored L-N voltages • When Single or Three Phase (Parameter 176) is set to *Three Phase*, Average L-N Voltage is calculated as follows: – Average L-N Voltage = (L1-N Voltage + L2-N Voltage + L3-N Voltage) / 3 • When Single or Three Phase (Parameter 176) is set to *Single Phase*, Average L-N Voltage is calculated as follows: – Average L-N Voltage = (L1-N Voltage + L2-N Voltage) / 2
Voltage Imbalance	61	• reports the percentage of uneven voltage being supplied by the monitored power system • Voltage Imbalance is defined by the following equation: – Voltage Imbalance = 100% * (V_d/V_a); where V_d = Maximum L-L Voltage Deviation from the Average L-L Voltage, V_a = Average L-L Voltage
Frequency	62	• reports the voltage frequency in Hertz of the monitored power system from the E200 relay Sensing Module
Phase Rotation	63	• reports the voltage phase rotation as ABC or ACB of the monitored power system from the E200 relay Sensing Module.

Power Monitor

The power monitor diagnostics of the E200 relay provide information on the power being supplied to the load. The power diagnostics include real power (kW), reactive power (kVAR), apparent power (kVA), and power factor.

Table 32 - Power Monitor Parameters

Parameter Name	Parameter No.	Description
Power Scale	377	• allows the E200 relay to display the values of Parameters 64…75 as Kilowatts or Megawatts – generally used for large medium voltage-based power systems,
L1 Real Power	64	• reports the real power for line 1 in kW or MW depending on the configuration value for Power Scale (Parameter 377) • when Voltage Mode (Parameter 352) is set to any *Delta* base setting, L1 Real Power is set to 0
L2 Real Power	65	• reports the real power for line 2 in kW or MW depending on the configuration value for Power Scale (Parameter 377) • when Voltage Mode (Parameter 352) is set to any *Delta* base setting, L2 Real Power is set to 0
L3 Real Power	66	• reports the real power for line 3 in kW or MW depending on the configuration value for Power Scale (Parameter 377) • when Voltage Mode (Parameter 352) is set to any *Delta* base setting, L3 Real Power is set to 0 • when Single or Three Phase (Parameter 176) is set to *Single Phase*, L3 Real Power is set to 0
Total Real Power	67	• reports the total real power of the monitored power conductors in kW or MW depending on the configuration value for Power Scale (Parameter 377) • when Single or Three Phase (Parameter 176) is set to *Three Phase*, Total Real Power is calculated as follows: – Total Real Power = (L1 Real Power + L2 Real Power + L3 Real Power) • when Single or Three Phase (Parameter 176) is set to *Single Phase*, Total Real Power is calculated as follows: – Total Real Power = (L1 Real Power + L2 Real Power)
L1 Reactive Power	68	• reports the reactive power for line 1 in kVAR or MVAR depending on the configuration value for Power Scale (Parameter 377) • when Voltage Mode (Parameter 352) is set to any *Delta* base setting, L1 Reactive Power is set to 0
L2 Reactive Power	69	• reports the reactive power for line 2 in kVAR or MVAR depending on the configuration value for Power Scale (Parameter 377) • when Voltage Mode (Parameter 352) is set to any *Delta* base setting, L2 Reactive Power is set to 0
L3 Reactive Power	70	• reports the reactive power for line 3 in kVAR or MVAR depending on the configuration value for Power Scale (Parameter 377) • when Voltage Mode (Parameter 352) is set to any *Delta* base setting, L3 Reactive Power is set to 0. • when Single or Three Phase (Parameter 176) is set to *Single Phase*, L3 Reactive Power is set to 0
Total Reactive Power	71	• reports the total Reactive power of the monitored power conductors in kVAR or MVAR depending on the configuration value for Power Scale (Parameter 377) • when Single or Three Phase (Parameter 176) is set to *Three Phase*, Total Reactive Power is calculated as follows: – Total Reactive Power = (L1 Reactive Power + L2 Reactive Power + L3 Reactive Power) • when Single or Three Phase (Parameter 176) is set to *Single Phase*, Total Reactive Power is calculated as follows: – Total Reactive Power = (L1 Reactive Power + L2 Reactive Power)
L1 Apparent Power	72	• reports the apparent power for line 1 in kVA or MVA depending on the configuration value for Power Scale (Parameter 377) • when Voltage Mode (Parameter 352) is set to any *Delta* base setting, L1 Apparent Power is set to 0
L2 Apparent Power	73	• reports the apparent power for line 2 in kVA or MVA depending on the configuration value for Power Scale (Parameter 377) • when Voltage Mode (Parameter 352) is set to any *Delta* base setting, L2 Apparent Power is set to 0
L3 Apparent Power	74	• reports the apparent power for line 3 in kVA or MVA depending on the configuration value for Power Scale (Parameter 377) • when Voltage Mode (Parameter 352) is set to any *Delta* base setting, L3 Apparent Power is set to 0 • when Single or Three Phase (Parameter 176) is set to *Single Phase*, L3 Apparent Power is set to 0
Total Apparent Power	75	• reports the total apparent power of the monitored power conductors in kVA or MVA depending on the configuration value for Power Scale (Parameter 377) • when Single or Three Phase (Parameter 176) is set to *Three Phase*, Total Apparent Power is calculated as follows: – Total Apparent Power = (L1 Apparent Power + L2 Apparent Power + L3 Apparent Power) • when Single or Three Phase (Parameter 176) is set to *Single Phase*, Total Apparent Power is calculated as follows: – Total Apparent Power = (L1 Apparent Power + L2 Apparent Power)
L1 Power Factor	76	• reports the power factor for line 1 in percentage • when Voltage Mode (Parameter 352) is set to any *Delta* base setting, L1 Power Factor is set to 0

Parameter Name	Parameter No.	Description
L2 Power Factor Power	77	• reports the power factor for line 2 in percentage • when Voltage Mode (Parameter 352) is set to any *Delta* base setting, L2 Power Factor is set to 0
L3 Power Factor	78	• reports the power factor for line 3 in percentage • when Voltage Mode (Parameter 352) is set to any *Delta* base setting, L3 Power Factor is set to 0 • when Single or Three Phase (Parameter 176) is set to *Single Phase*, L3 power factor is set to 0
Total Power Factor	79	• reports the total power factor of the monitored power conductors in percentage • when Single or Three Phase (Parameter 176) is set to *Three Phase*, Total Power Factor is calculated as follows: • Total Power Factor = (L1 Power Factor + L2 Power Factor + L3 Power Factor) / 3 • when Single or Three Phase (Parameter 176) is set to *Single Phase*, Total Power Factor is calculated as follows: – Total Power Factor = (L1 Power Factor + L2 Power Factor) / 2

Energy Monitor

The energy monitor diagnostics of the E200 relay provide information on the electrical energy the load is consuming. The energy diagnostics include kWh, kVARh, kVAh, kW Demand, kVAR Demand, and kVA Demand.

Table 33 - Power Monitor Parameters

Parameter Name	Parameter No.	Description
kWh 10^9	80	• reports a component of total real energy (kWh) • multiply this value by 10^9 and add to the other kWh parameters – represents **XXX**,*000,000,000.000* kWh
kWh 10^6	81	• reports a component of total real energy (kWh) • multiply this value by 10^6 and add to the other kWh parameters – represents 000,XXX,000,000.000 kWh
kWh 10^3	82	• reports a component of total real energy (kWh) • multiply this value by 10^3 and add to the other kWh parameters – represents *000,000,***XXX**,*000.000* kWh
kWh 10^0	83	• reports a component of total real energy (kWh) • multiply this value by 10^0 and add to the other kWh parameters – represents *000,000,000,***XXX**.*000* kWh
kWh 10^{-3}	84	• reports a component of total real energy (kWh) • multiply this value by 10^{-3} and add to the other kWh parameters – represents *000,000,000,000.* **XXX** kWh
kVARh Consumed 10^9	85	• reports a component of total reactive energy consumed (kVARh) • multiply this value by 10^9 and add to the other kVARh Consumed parameters – represents **XXX**,*000,000,000.000* kVARh
kVARh Consumed 10^6	86	• reports a component of total reactive energy consumed (kVARh) • multiply this value by 10^6 and add to the other kVARh Consumed parameters – represents *000,***XXX**,*000,000.000* kVARh
kVARh Consumed 10^3	87	• reports a component of total reactive energy consumed (kVARh) • multiply this value by 10^3 and add to the other kVARh Consumed parameters – represents *000,000,***XXX**,*000.000* kVARh
kVARh Consumed 10^0	88	• reports a component of total reactive energy consumed (kVARh) • multiply this value by 10^0 and add to the other kVARh Consumed parameters – represents *000,000,000,***XXX**.*000* kVARh
kVARh Consumed 10^{-3}	89	• reports a component of total reactive energy consumed (kVARh) • multiply this value by 10^{-3} and add to the other kVARh Consumed parameters – represents *000,000,000,000.* **XXX** kVARh
kVARh Generated 10^9	90	• reports a component of total reactive energy generated (kVARh) • multiply this value by 10^9 and add to the other kVARh Generated parameters – represents **XXX**,*000,000,000.000* kVARh
kVARh Generated 10^6	91	• reports a component of total reactive energy generated (kVARh) • multiply this value by 10^6 and add to the other kVARh Generated parameters – represents *000,***XXX**,*000,000.000* kVARh
kVARh Generated 10^3	92	• reports a component of total reactive energy generated (kVARh) • multiply this value by 10^3 and add to the other kVARh Generated parameters – represents *000,000,***XXX**,*000.000* kVARh

Parameter Name	Parameter No.	Description
kVARh Generated 10^0	93	• reports a component of total reactive energy generated (kVARh) • multiply this value by 10^0 and add to the other kVARh Generated parameters – represents *000,000,000,***XXX***.000* kVARh
kVARh Generated 10^{-3}	94	• reports a component of total reactive energy generated (kVARh) • multiply this value by 10^{-3} and add to the other kVARh Generated parameters – represents *000,000,000,000.* **XXX** kVARh
kVARh Net 10^9	95	• reports a component of total reactive energy net (kVARh) • multiply this value by 10^9 and add to the other kVARh Net parameters – represents **XXX***,000,000,000.000* kVARh
kVARh Net 10^6	96	• reports a component of total reactive energy net (kVARh) • multiply this value by 10^6 and add to the other kVARh Net parameters – represents *000,***XXX***,000,000.000* kVARh
kVARh Net 10^3	97	• reports a component of total reactive energy net (kVARh) • multiply this value by 10^3 and add to the other kVARh Net parameters – represents *000,000,***XXX***,000.000* kVARh
kVARh Net 10^0	98	• reports a component of total reactive energy net (kVARh) • multiply this value by 10^0 and add to the other kVARh Net parameters – represents *000,000,000,***XXX***.000* kVARh
kVARh Net 10^{-3}	99	• reports a component of total reactive energy net (kVARh) • multiply this value by 10^{-3} and add to the other kVARh Net parameters – represents *000,000,000,000.* **XXX** kVARh
kVAh 10^9	100	• reports a component of total apparent energy (kVAh) • multiply this value by 10^9 and add to the other kVAh parameters – represents **XXX***,000,000,000.000* kVAh
kVAh 10^6	101	• reports a component of total apparent energy (kVAh) • multiply this value by 10^6 and add to the other kVAh parameters – represents *000,***XXX***,000,000.000* kVAh
kVAh 10^3	102	• reports a component of total apparent energy (kVAh) • multiply this value by 10^3 and add to the other kVAh parameters – represents *000,000,***XXX***,000.000* kVAh
kVAh 10^0	103	• reports a component of total apparent energy (kVAh) • multiply this value by 10^0 and add to the other kVAh parameters – represents *000,000,000,***XXX***.000* kVAh
kVAh 10^{-3}	104	• reports a component of total apparent energy (kVAh) • multiply this value by 10^{-3} and add to the other kVAh parameters – represents *000,000,000,000.* **XXX** kVAh
kW Demand	105	• reports the average real energy usage in kW over a defined period
Max. kW Demand	106	• reports the maximum kW Demand since the last Max kW Demand Reset command
kVAR Demand	107	• reports the average reactive energy usage in kVAR over a defined period
Max kVAR Demand	108	• reports the maximum kVAR Demand since the last Max kVAR Demand Reset command
kVA Demand	109	• reports the average reactive energy usage in kVA over a defined period
Max kVA Demand	110	• reports the maximum kVA Demand since the last Max kVA Demand Reset command

Analog Monitor

The Analog I/O Expansion Modules of the E200 relay scan up to three analog signals per module. This information can be used to monitor the following analog applications:

- Motor winding and bearing temperatures that are measured by RTD sensors
- Liquid, air, or steam flow
- Temperature
- Weight
- Vessel level
- Potentiometer
- PTC or NTC thermistor sensors

Table 34 - Analog Monitor Parameters

Parameter Name	Parameter No.	Description
Analog Module 1 – Input Channel 00	111	• reports the monitored value of Analog Module 1 – Input Channel 00
Analog Module 1 – Input Channel 01	112	• reports the monitored value of Analog Module 1 – Input Channel 01
Analog Module 1 – Input Channel 02	113	• reports the monitored value of Analog Module 1 – Input Channel 02
Analog Module 1 Status	123	• reports the status of Analog Module 1
Analog Module 2 – Input Channel 00	114	• reports the monitored value of Analog Module 2 – Input Channel 00
Analog Module 2 – Input Channel 01	115	• reports the monitored value of Analog Module 2 – Input Channel 01
Analog Module 2 – Input Channel 02)	116	• reports the monitored value of Analog Module 2 – Input Channel 02
Analog Module 2 Status	124	• reports the status of Analog Module 2
Analog Module 3 – Input Channel 00	117	• reports the monitored value of Analog Module 3 – Input Channel 00
Analog Module 3 – Input Channel 01	118	• reports the monitored value of Analog Module 3 – Input Channel 01
Analog Module 3 – Input Channel 02	119	• reports the monitored value of Analog Module 3 – Input Channel 02
Analog Module 3 Status	125	• reports the status of Analog Module 3
Analog Module 4 – Input Channel 00	120	• reports the monitored value of Analog Module 4 – Input Channel 00
Analog Module 4 – Input Channel 01	121	• reports the monitored value of Analog Module 4 – Input Channel 01
Analog Module 4 – Input Channel 02	122	• reports the monitored value of Analog Module 4 – Input Channel 02
Analog Module 4 Status	126	• reports the status of Analog Module 4

Trip / Warning History

The E200 relay provides a trip and warning history in which the last five trips and last five warnings are recorded into nonvolatile storage. A mask is available to limit which trip and warning events are logged to the history's memory.

Trip History Codes

When the E200 relay issues a trip, the reason for the trip is recorded into the Trip History. Table 35 lists the codes that are available for the trip history records.

Table 35 - Trip History Codes

Trip History Code	Description
0	No Fault Conditions Detected
1	Motor current overload condition
2	Phase current Loss is detected in one of the motor phases
3	Power conductor or motor winding is shorting to ground
4	Motor has not reached full speed by the end of Stall Enable Time
5	Motor current has exceeded the programmed jam trip level
6	Motor current has fallen below normal operating levels
7	Phase to phase current imbalance detected
8	L1Current was below L1 Undercurrent Level longer than Trip Delay
9	L2Current was below L2 Undercurrent Level longer than Trip Delay
10	L3Current was below L3 Undercurrent Level longer than Trip Delay
11	L1 Current was over L1 Overcurrent Level longer than Trip Delay
12	L2 Current was over L2 Overcurrent Level longer than Trip Delay
13	L3 Current was over L3 Overcurrent Level longer than Trip Delay
14	L1 Current Lost for longer than the L1 Loss Trip Delay
15	L2 Current Lost for longer than the L2 Loss Trip Delay
16	L3 Current Lost for longer than the L3 Loss Trip Delay
17	Line to Line Under-Voltage condition detected

Trip History Code	Description
18	Line to Line Over-Voltage condition detected
19	Phase to phase voltage imbalance detected
20	The unit detects the supply voltage phases are rotated
21	Line voltage frequency is below trip level
22	Line voltage frequency has exceeded trip level
25	Sensing Module boot loader failed to load firmware
26	Sensing Module output enable open
27	Sensing Module missing interrupts
28	Sensing Module not calibrated
29	Sensing Module frame type failure
30	Sensing Module flash configuration failure
31	Sensing Module detected an overrun error
32	Sensing Module is not responding
33	Total Real Power (kW) is below trip level
34	Total Real Power (kW) has exceeded trip level
35	Under Total Reactive Power Consumed (+kVAR) condition detected
36	Over Total Reactive Power Consumed (+kVAR) condition detected
37	Under Total Reactive Power Generated (-kVAR) condition detected
38	Over Total Reactive Power Generated (-kVAR) condition detected
39	Total Apparent Power (VA or kVA or MVA) is below trip level
40	Total Apparent Power (VA or kVA or MVA) exceeded trip level
41	Under Total Power Factor Lagging (-PF) condition detected
42	Over Total Power Factor Lagging (-PF) condition detected
43	Under Total Power Factor Leading (+PF) condition detected
44	Over Total Power Factor Leading (+PF) condition detected
49	Test trip caused by holding the Test/Reset button for 2 seconds
50	PTC input indicates that the motor stator windings overheated
51	DeviceLogix defined trip was generated
52	The Stop button the Operator Station was pressed
53	Remote trip command detected
54	Maximum starts per hour exceeded
55	Hardware configuration fault. Check for shorts on input terminal
58	DeviceLogix Feedback Timeout Trip was detected
59	Control Module CAN0 initialization failure
60	Control Module CAN0 bus failure
61	Control Module CAN1 initialization failure
62	Control Module CAN1 bus failure
63	Control Module ADC0 failure
64	Control Module detected too many CRC errors
65	Input Channel 00 on Analog Module 1 exceeded its Trip Level
66	Input Channel 01 on Analog Module 1 exceeded its Trip Level
67	Input Channel 02 on Analog Module 1 exceeded its Trip Level
68	Input Channel 00 on Analog Module 2 exceeded its Trip Level
69	Input Channel 01 on Analog Module 2 exceeded its Trip Level
70	Input Channel 02 on Analog Module 2 exceeded its Trip Level
71	Input Channel 00 on Analog Module 3 exceeded its Trip Level
72	Input Channel 01 on Analog Module 3 exceeded its Trip Level
73	Input Channel 02 on Analog Module 3 exceeded its Trip Level
74	Input Channel 00 on Analog Module 4 exceeded its Trip Level
75	Input Channel 01 on Analog Module 4 exceeded its Trip Level

Trip History Code	Description
76	Input Channel 02 on Analog Module 4 exceeded its Trip Level
77	External NVS Chip has detected communication timeout error
78	External NVS Chip has detected a CRC error
79	External NVS Chip has detected data out of range
81	Digital Expansion Module 1 is not operating properly
82	Digital Expansion Module 2 is not operating properly
83	Digital Expansion Module 3 is not operating properly
84	Digital Expansion Module 4 is not operating properly
85	Analog Expansion Module 1 is not operating properly
86	Analog Expansion Module 2 is not operating properly
87	Analog Expansion Module 3 is not operating properly
88	Analog Expansion Module 4 is not operating properly
90	Control Module installed does not match the expected type
91	Sensing Module installed does not match the expected type
92	Comms Module installed does not match the expected type
93	Operator Station installed does not match expected type
94	Digital Module installed does not match the expected type
95	Analog Module installed does not match the expected type
96	Test Mode is engaged and current/voltage was detected
97	Heap memory could not be allocated
98	Vendor ID hardware fault

Trip History Parameters

Table 36 - Trip History Parameters

Parameter Name	Parameter No.	Description
Trip History 0	127	• reports the most recent trip event
Trip History 1	128	• reports the second most recent trip event
Trip History 2	129	• reports the third most recent trip event
Trip History 3	130	• reports the fourth most recent trip event
Trip History 4	131	• reports the fifth most recent trip event
Trip History Mask	You can decide which trip events are recorded into the E200 relay trip history by using the Trip History Masks	
Current Trip History Mask	139	• lets you select which current-based trip events are recorded in the trip history
Voltage Trip History Mask	140	• lets you select which voltage-based trip events are recorded in the trip history
Power Trip History Mask	141	• lets you select which power-based trip events are recorded in the trip history
Control Trip History Mask	142	• lets you select which control-based trip events are recorded in the trip history
Analog Trip History Mask	143	• lets you select which analog-based trip events are recorded in the trip history

Warning History

When the E200 relay issues a warning, the reason for the warning is recorded into the Warning History. Table 37 lists the codes that are available for the warning history records.

Table 37 - Warning History Codes

Warning History Code	Description
0	No Warning Conditions Detected
1	Approaching a motor current overload condition
3	Power conductor or motor winding is shorting to ground
5	Motor current has exceeded the programmed jam warning level
6	Motor current has fallen below normal operating levels
7	Phase to phase current imbalance detected
8	L1 Current was below L1 Undercurrent Warning Level
9	L2 Current was below L2 Undercurrent Warning Level
10	L3 Current was below L3 Undercurrent Warning Level
11	L1 Current was over L1 Overcurrent Warning Level
12	L2 Current was over L2 Overcurrent Warning Level
13	L3 Current was over L3 Overcurrent Warning Level
14	L1 Current Lost for longer than the L1 Loss Trip Delay
15	L2 Current Lost for longer than the L2 Loss Trip Delay
16	L3 Current Lost for longer than the L3 Loss Trip Delay
17	Line to Line Under-Voltage condition detected
18	Line to Line Over-Voltage condition detected
19	Phase to phase voltage imbalance detected
20	The unit detects the supply voltage phases are rotated
21	Line voltage frequency is below the warning level
22	Line voltage frequency has exceeded warning level
33	Total Real Power (kW) is below warning level
34	Total Real Power (kW) has exceeded warning level
35	Under Reactive Power Consumed (+kVAR) condition detected
36	Over Reactive Power Consumed (+kVAR) condition detected
37	Under Reactive Power Generated (-kVAR) condition detected
38	Over Reactive Power Generated (-kVAR) condition detected
39	Total Apparent Power (kVA) is below warning level
40	Total Apparent Power (kVA) exceeded warning level
41	Under Total Power Factor Lagging (-PF) condition detected
42	Over Total Power Factor Lagging (-PF) condition detected
43	Under Total Power Factor Leading (+PF) condition detected
44	Over Total Power Factor Leading (+PF) condition detected
50	PTC input indicates that the motor stator windings overheated
51	DeviceLogix defined warning was generated
56	Invalid parameter config. See parameters 38-39 for details
58	DeviceLogix Feedback Timeout Trip was detected
60	Number of Starts Warning Level Exceeded
61	Operating Hours Warning Level Exceeded
65	Input Channel 00 on Analog Module 1 exceeded its Warning Level
66	Input Channel 01 on Analog Module 1 exceeded its Warning Level
67	Input Channel 02 on Analog Module 1 exceeded its Warning Level
68	Input Channel 00 on Analog Module 2 exceeded its Warning Level
69	Input Channel 01 on Analog Module 2 exceeded its Warning Level
70	Input Channel 02 on Analog Module 2 exceeded its Warning Level
71	Input Channel 00 on Analog Module 3 exceeded its Warning Level
72	Input Channel 01 on Analog Module 3 exceeded its Warning Level
73	Input Channel 02 on Analog Module 3 exceeded its Warning Level

Warning History Code	Description
74	Input Channel 00 on Analog Module 4 exceeded its Warning Level
75	Input Channel 01 on Analog Module 4 exceeded its Warning Level
76	Input Channel 02 on Analog Module 4 exceeded its Warning Level
81	Digital Expansion Module 1 is not operating properly
82	Digital Expansion Module 2 is not operating properly
83	Digital Expansion Module 3 is not operating properly
84	Digital Expansion Module 4 is not operating properly
85	Analog Expansion Module 1 is not operating properly
86	Analog Expansion Module 2 is not operating properly
87	Analog Expansion Module 3 is not operating properly
88	Analog Expansion Module 4 is not operating properly
90	Control Module installed does not match the expected type
91	Sensing Module installed does not match the expected type
92	Comms Module installed does not match the expected type
93	Operator Station installed does not match expected type
94	Digital Module installed does not match the expected type
95	Analog Module installed does not match the expected type
98	A hardware fault condition was detected

Warning History Parameters

Table 38 - Warning History Parameters

Parameter Name	Parameter No.	Description
Warning History 0	133	• reports the most recent warning event
Warning History 1	134	• reports the second most recent warning event
Warning History 2	135	• reports the third most recent warning event
Warning History 3	136	• reports the fourth most recent warning event
Warning History 4	137	• reports the fifth most recent warning event
Warning History Mask	You can decide which warning events are recorded into the E200 relay warning history by using the Warning History Masks	
Current Warning History Mask	145	• lets you select which current-based warning events are recorded in the warning history
Voltage Warning History Mask	146	• lets you select which voltage-based warning events are recorded in the warning history
Power Warning History Mask	147	• lets you select which power-based warning events are recorded in the warning history
Control Warning History Mask	148	• lets you select which control-based warning events are recorded in the warning history
Analog Warning History Mask	149	• lets you select which control-based warning events are recorded in the warning history

Trip Snapshot

The trip snapshot populates the seven parameters within it, to offer some insight into the reason for the trip. This information is available until the unit trips/is tripped again, at which time it is overwritten. This includes doing a test trip.

Table 39 - Trip Snapshot Parameters

Parameter Name	Parameter No.	Description
Trip Snapshot L1-L2 Voltage	156	• reports the voltage in volts in reference to the T1 and T2 power terminals of the E200 relay Sensing Module at the time of the most recent trip event
Trip Snapshot L2-L3 Voltage	157	• reports the voltage in volts in reference to the T2 and T3 power terminals of the E200 relay Sensing Module at the time of the most recent trip event
Trip Snapshot L3-L1 Voltage	158	• reports the voltage in volts in reference to the T3 and T1 power terminals of the E200 relay Sensing Module at the time of the most recent trip event
Trip Snapshot Total Real Power	159	• reports the total real power of the monitored power conductors in kW at the time of the most recent trip event
Trip Snapshot Total Reactive Power	160	• reports the total Reactive power of the monitored power conductors in kVAR at the time of the most recent trip event
Trip Snapshot Total Apparent Power	161	• reports the total apparent power of the monitored power conductors in kVA at the time of the most recent trip event
Trip Snapshot Total Power Factor	162	• reports the total power factor of the monitored power conductors in percentage at the time of the most recent trip event

DeviceLogix Functionality

The E200 Electronic Overload Relay supports DeviceLogix functionality, which is a logic engine that resides within the E200 relay. You can select one of the preprogrammed DeviceLogix programs (see Operating Modes on page 49) embedded in the E200 relay, or you can create a custom program in function block or ladder logic. Access the DeviceLogix interface via the Connected Components Workbench software.

IMPORTANT A DeviceLogix program only runs if the logic has been enabled, which can be done with Connected Component Workbench software.

Output Relay Overrides

Use DeviceLogix functionality to provide specific output relay performance under specific communication or network conditions. Use the following parameters to allow a DeviceLogix program to override the E200 output relay configuration states controlled by the Communication Fault Modes and Communication Idle Modes (see Output Relay Configuration States on page 34).

Table 40 - Output Relay Override Parameters

Parameter Name	Parameter No.	Description
Communication Fault & Idle Override	346	• defines whether or not DeviceLogix functionality controls the E200 output relays when either a communication fault (missing I/O connection) or communication idle (network scanner or programmable logic controller is not in Run mode) condition exists – If DeviceLogix functionality is enabled but Communication Fault & Idle Override is disabled, the operation of the E200 output relays is controlled by the Communication Fault Mode and Communication Idle Mode parameters if a communication fault or communication idle condition occurs. – If DeviceLogix functionality and Communication Fault & Idle Override are both enabled, the E200 outputs relays are controlled by the DeviceLogix program regardless of the Communication Fault Mode or Communication Idle Mode. – If DeviceLogix functionality is not enabled, the E200 output relays are controlled by the Communication Fault Mode or Communication Idle Mode parameters if a communication fault or communication idle condition occurs – regardless of the override configuration of the Communication Fault & Idle Override parameter. – If DeviceLogix functionality is transitioned from enable to disable, the E200 output relays immediately go to the appropriate Communication Fault Mode or Communication Idle Mode.
Network Fault Override	347	• defines whether or not DeviceLogix functionality controls the E200 output relays when either a duplicate node address is detected or a network bus off condition exists – If DeviceLogix functionality is enabled but Network Fault is disabled, the operation of the E200 output relays is controlled by the Communication Fault Mode parameters if a network fault condition occurs. – If DeviceLogix functionality and Network Fault are both enabled, the E200 outputs relays are controlled by the DeviceLogix program regardless of the Communication Fault Mode. – If DeviceLogix functionality is not enabled, the E200 output relays are controlled by the Communication Fault Mode parameters if a network fault condition occurs – regardless of the Network Fault Override configuration. – If DeviceLogix functionality is transitioned from enable to disable, the E200 output relays immediately go to the appropriate Communication Fault Mode.

DeviceLogix Programming

DeviceLogix functionality has many applications and the implementation is only limited to the imagination of the programmer. Remember that the application of DeviceLogix functionality is only designed to handle simple logic routines. Program DeviceLogix functionality by using simple Boolean math operators (such as AND, OR, NOT), timers, counters, and latches. Decision making is made by combining these Boolean operations with any of the available I/O. The inputs and outputs used to interface with the logic can come from the network or from the E200 digital inputs and output relays. There are many reasons to use the DeviceLogix functionality, but some of the most common are listed below:

- Increased system reliability
- Improved diagnostics and reduced troubleshooting
- Operation independent of PLC or Network status
- Continue to run process in the event of network interruptions
- Critical operations can be safely shut down through local logic

See publication RA-UM003 for more information about the capabilities of DeviceLogix functionality and how to use the DeviceLogix program editor(1)

(1) DeviceLogix programs have a maximum limit of 100 instructions.

Connected Components Workbench Software Configuration

This chapter provides the necessary instructions to connect to the E200 Electronic Overload Relay Parameter Configuration Module (PCM) via Universal Serial Bus (USB). The following recommendations are intended to deliver smooth startup and operation.

- Ensure a valid copy of RSLinx Classic is installed on the target computer.
- Download and install the latest version EDS file that supports the E200 Parameter Configuration Module. See Chapter 10 for more information.
- Ensure that you have installed Connected Component Workbench software version 11 or newer on the target computer.

Device Commissioning

Before you can set up a connection, you need to configure the PCM. Figure 78 shows the location of the hardware adjustment switches and dials. Table 41 describes the adjustment dial position settings, and Table 42 describes the DIP switch adjustment settings.

Figure 78 - PCM Hardware Switches

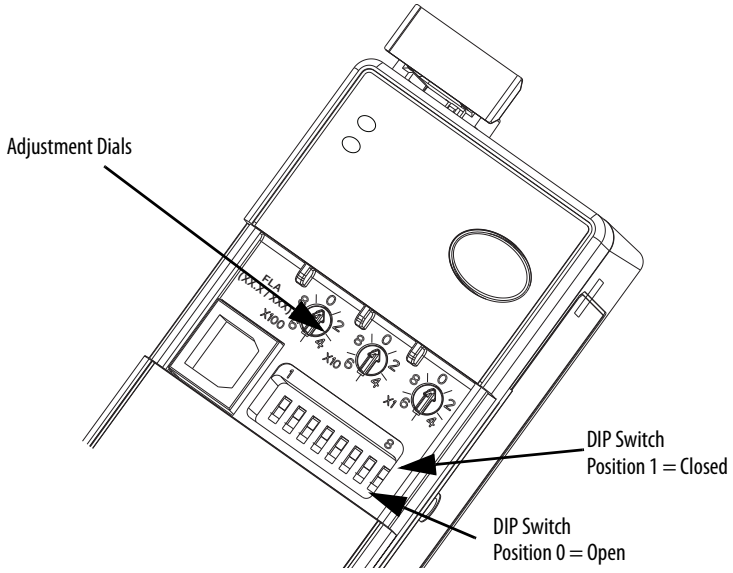


Table 41 - Adjustment Dial Position Settings

Parameter/Value		Dial Position Adjustment Settings			Current Setting [A]
		X100	X10	X1	
USB or 193-EOS-SDS Configuration (DIP must be set to 00000000)		0	0	0	—
FLA xx.x	0.5…30 A Sensing Module	0	0	5	0.5 min.
		3	0	0	30 max.
FLA xxx	6…60 A Sensing Module	0	6	0	6 min.
		6	0	0	60 max.
FLA xxx	10…100 A Sensing Module	0	1	0	10 min.
		1	0	0	100 max.
	20…200 A Sensing Module	0	2	0	20 min.
		2	0	0	200 max.
Administration Mode (DIP must be set to 00000000)		7	7	7	—
Restore Factory Defaults (DIP must be set to 00000000)		8	8	8	—

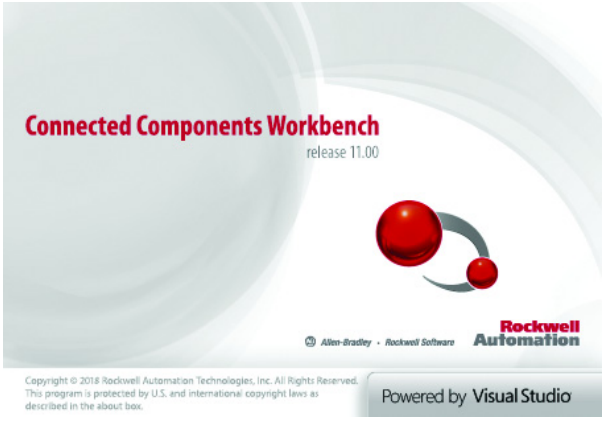
Table 42 - DIP Switch Adjustment Settings

Description	DIP Switch Position Adjustment Settings							
	1	2	3	4	5	6	7	8
Parameter Name	Trip Class		Automatic Reset	Phase Loss	Ground Fault (Internal 2.0 A)	Jam (400% FLA)	Underload (50% FLA)	Undervoltage (350V)
Trip Class 10	0	1	1 = Enable 0 = Disable	1 = Enable 0 = Disable	1 = Enable 0 = Disable	1 = Enable 0 = Disable	1 = Enable 0 = Disable	1 = Enable 0 = Disable
Trip Class 20	1	0						
Trip Class 30	1	1						
USB or 193-EOS-SDS Configuration	0	0	0	0	0	0	0	0

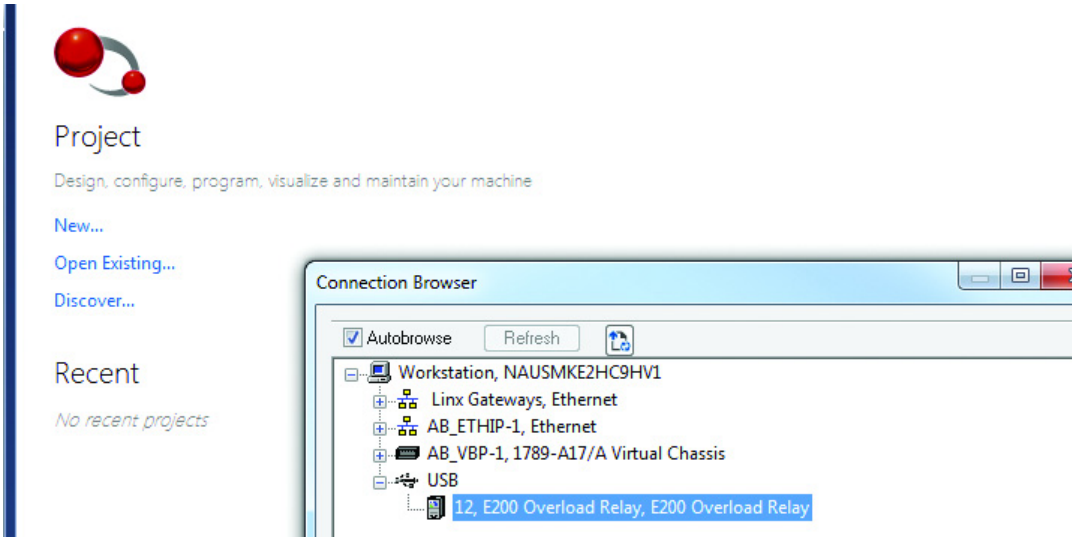
Establish the Connection to Connected Components Workbench Software

Follow these additional steps to interface with the E200 using the Connected Components Workbench software.

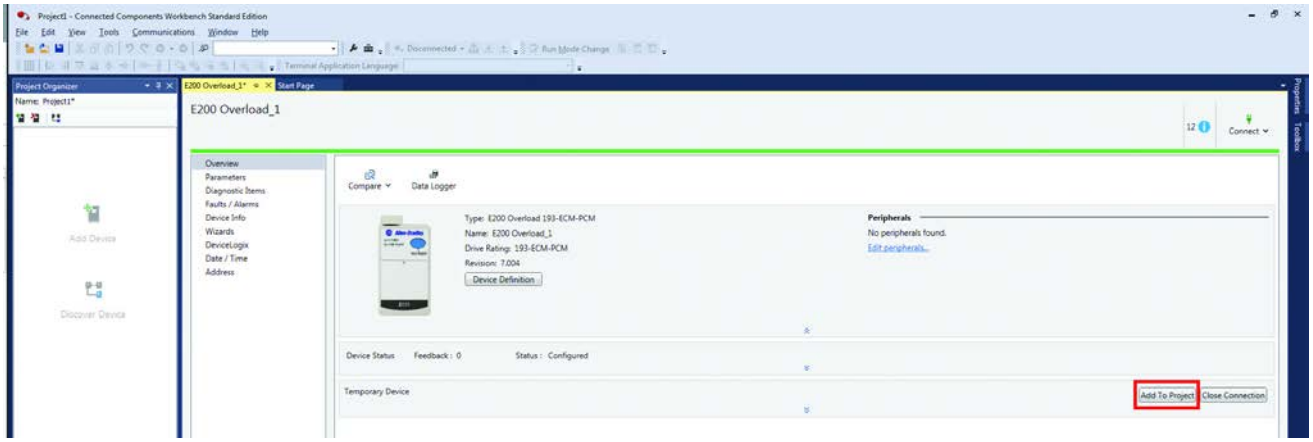
1. Launch the software, then select either “New” project or “Discover” to add the connected E200 module to an active project.



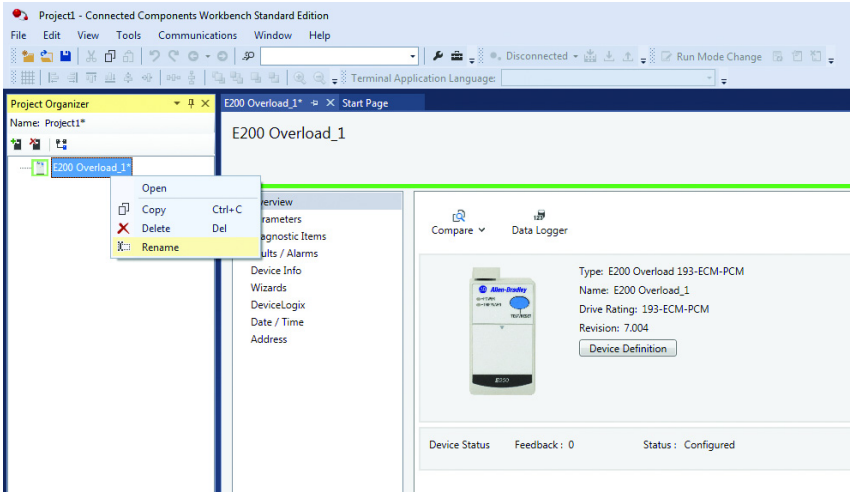
2. Using the “Discover” method will bring up an RSLinx Connection Browser interface. Select the “USB” communication path and browse to the target E200 module. Note: If the E200 relay is not present under the USB communication path, you can also access it via the virtual backplane “AB-VBP” communication path.



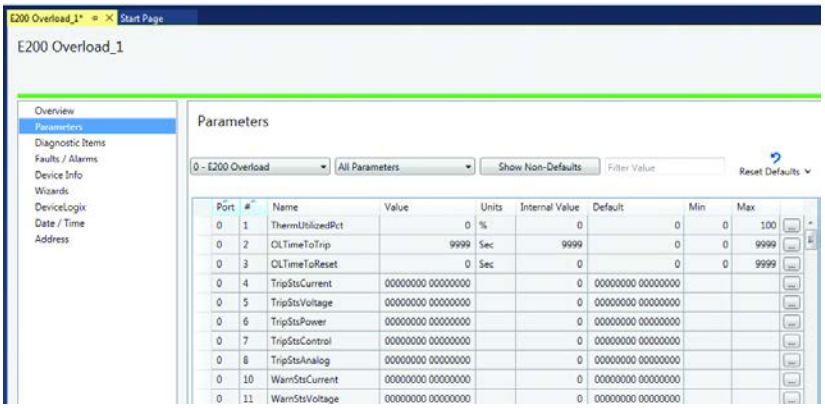
3. The main screen now displays the E200 relay interface. Select “Add To Project” if you have not already done this in step 1.



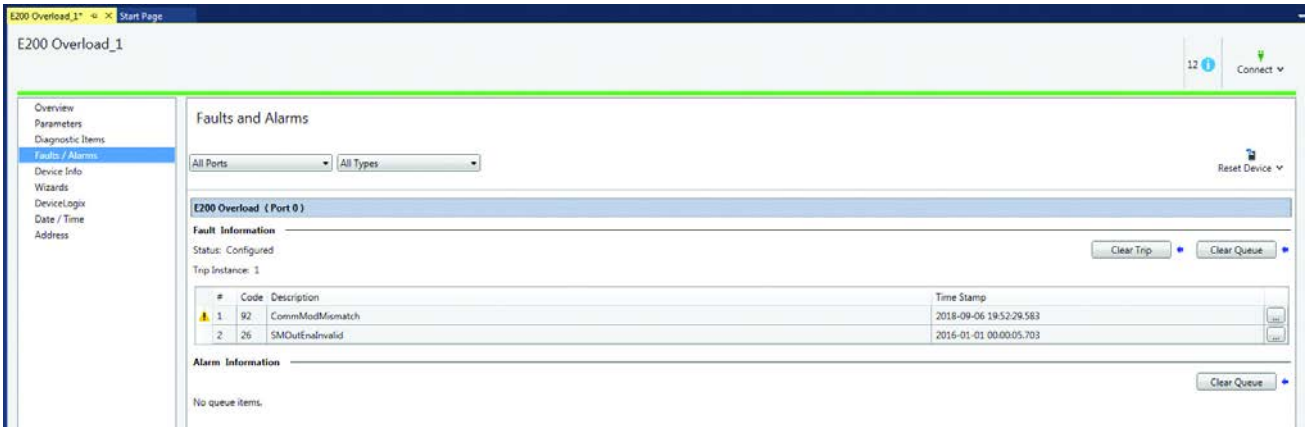
4. The E200 device is now shown under the corresponding main project tree. Right click to copy, delete, or rename the device.



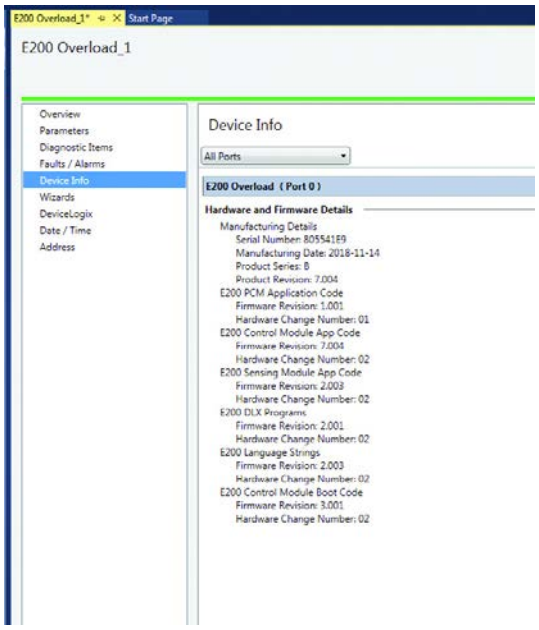
5. By default, the active E200 device displays the "Overview" interface from the left-hand menu. This menu shows basic device level information, including firmware revision number.
6. Navigate to the "Parameters" section to display the corresponding device parameters.



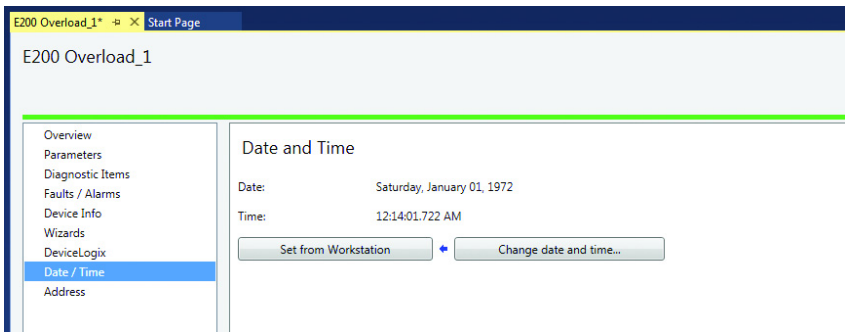
7. The “Faults/Alarms” section displays any active and previous device faults.



8. The “Device Info” section shows much more detailed information about the E200 device manufacturing details and all sub-component firmware versions that are presently installed.



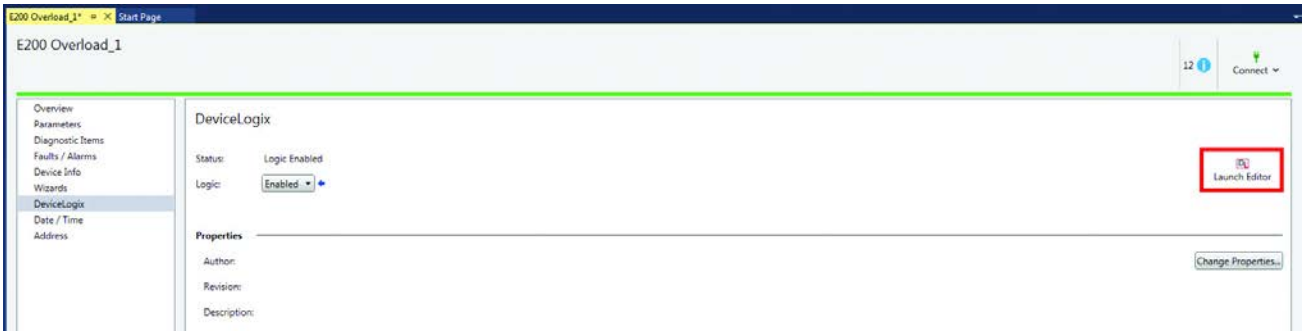
9. You can modify the time and date programmed to the device by selecting the appropriate option from the device menu.



DeviceLogix Interface in Connected Components Workbench Software

Access the DeviceLogix interface from Connected Components Workbench software. Enable or disable the DeviceLogix program by selecting “DeviceLogix” from the left-hand menu.

The “Launch Editor” selection launches the corresponding E200 DeviceLogix editor. Edit the corresponding properties of the DeviceLogix program for enhanced identification.

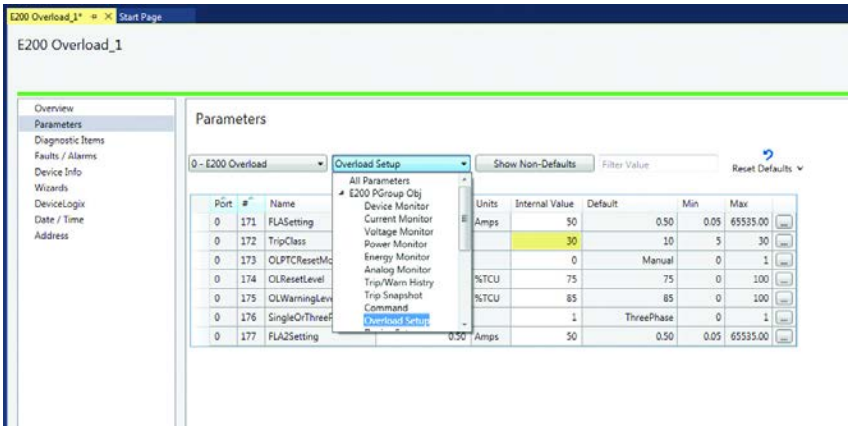


For additional details specific to DeviceLogix functionality, see Chapter 8.

Commissioning the Protection Functions

This section describes how to use the Connected Components Workbench software to configure the function settings of the E200 Overload Relay.

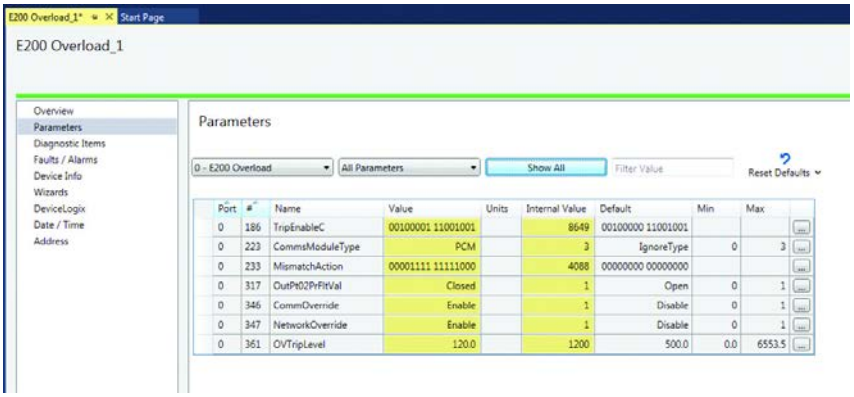
The product should now be configured and communicating via the USB interface. The last step is to program the overload setup parameters 171...177 according to the desired application requirements. Use the Connected Components Workbench software or the E300/E200 Diagnostic Station (see Chapter 2) to program the device.



You can view the E200 parameters in either a complete linear list or grouped by function.

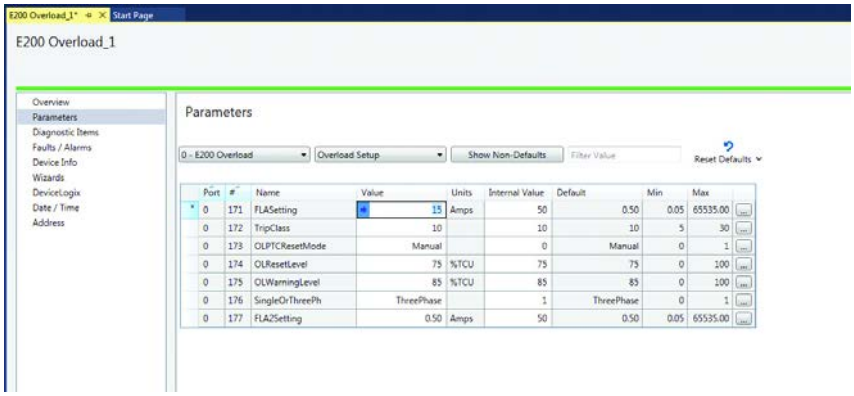
Another useful feature within this particular interface is the option “Show Non-Defaults”. This displays only those parameters that have been modified from their

default setting. This display also highlights parameters that you have changed. To revert to the full list view, select “Show All”.



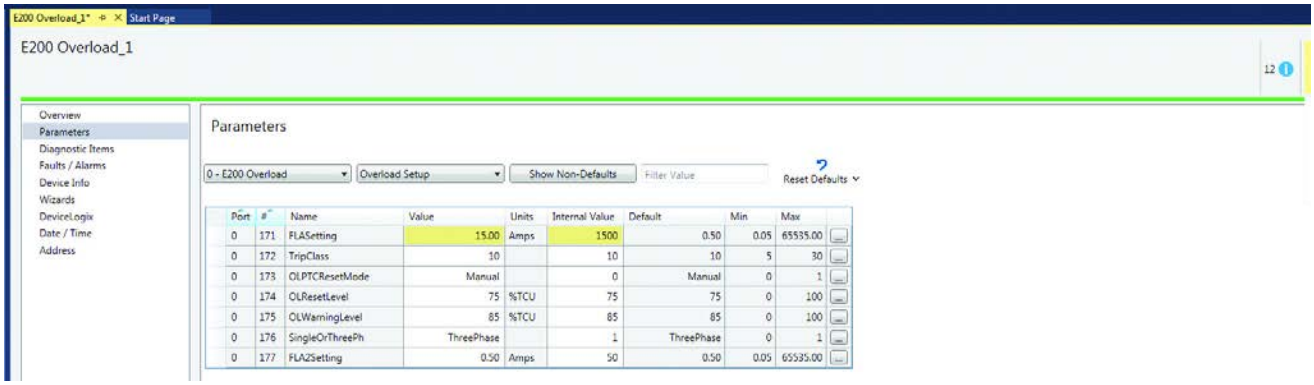
To change a parameter that allows modification, select the “Value” field of the desired parameter and edit this field based on the motor overload application.

Note: parameters that have units are displayed in the “Units” column. Default, minimum, and maximum parameter values are displayed in separate columns.



After you have programmed all necessary parameters for the target motor overload application, select “Upload” from the top right-hand “Connect” option.This command commits the settings to the target device.

See page 9 for information about the complete parameter spreadsheet that is attached to this PDF, which contains a description of each programmable parameter and its intended function.



For additional details about the Connected Component Workbench software, refer to Connected Components Workbench Software Quick Tips, publication 9328-SP002.

Notes:

Firmware and EDS Files

This chapter provides detailed information about firmware compatibility among the E200 Electronic Overload Relay modules and provides instructions on how to update firmware for an E200 relay module.

Firmware Compatibility

The sensing, control, and communication modules of an E200 relay have their own firmware for the functionality of the module and its subsystems. Update each module and its associated subsystems by using the ControlFLASH or ControlFLASH Plus utilities, which are the same utilities that are used to download firmware into a Logix-based controller. The ControlFLASH/ControlFLASH Plus kits use one command to update all E200 relay modules and subsystems for that specific system release. Consult the Product Compatibility and Download Center to find the most current firmware revision.

Updating Firmware

Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

After you have downloaded and installed the firmware, run the ControlFLASH/ControlFLASH Plus application by selecting ControlFLASH from the Microsoft® Windows® Start menu.

Electronic Data Sheet (EDS) File Installation

Before the E200 relay Parameter Configuration Module is configured to communicate via Universal Serial Bus (USB), it must be registered to the software that configures the network (for example, Rockwell Automation RSLinx Classic and Connected Components Workbench software). Register the module by installing an EDS file.

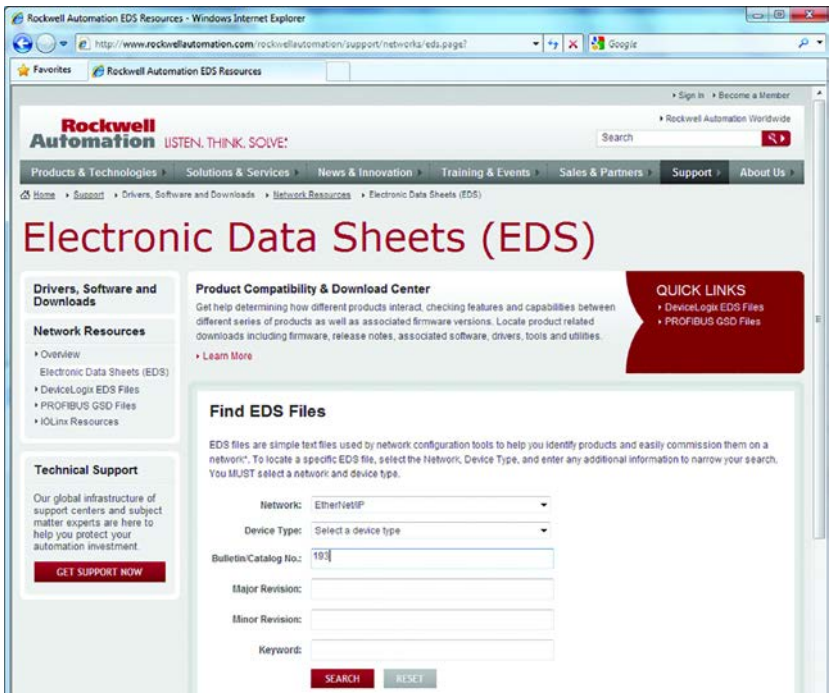
You need the EDS file for the E200 relay Parameter Configuration Module. Get the EDS files from Allen-Bradley EDS file download website.

Download the EDS File

Download the EDS file for the E200 relay Parameter Configuration Module from the Allen-Bradley EDS File download site. Using a web browser on the personal computer that is connected to the internet, download the EDS file by following these steps:

1. Type http://www.rockwellautomation.com/rockwellautomation/support/networks/eds.page? on the address line of the web browser.

2. Enter 193-ECM-PCM for the Bulletin Number, and click Search.

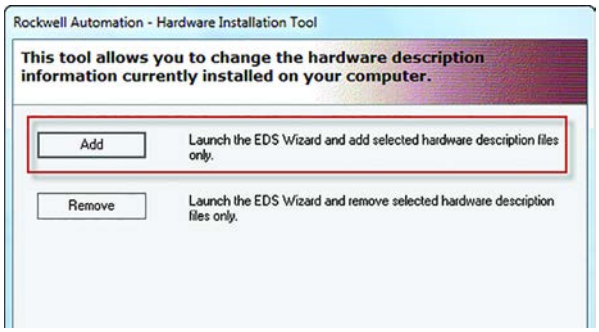


3. Locate the EDS file for the E200 relay Parameter Configuration Module and download it to the personal computer.

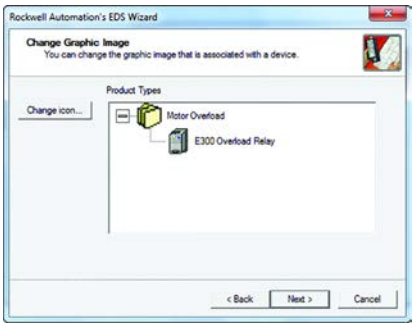
Install the EDS File

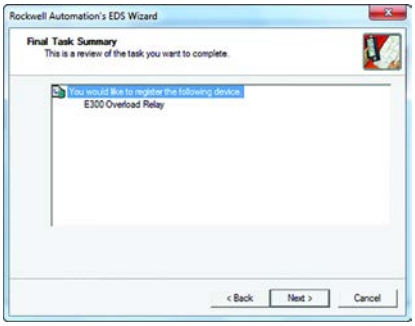
Using RSLinx Classic, install the E200 relay Parameter Configuration Module's EDS file from the RSLinx Classic RSWho screen using these steps.

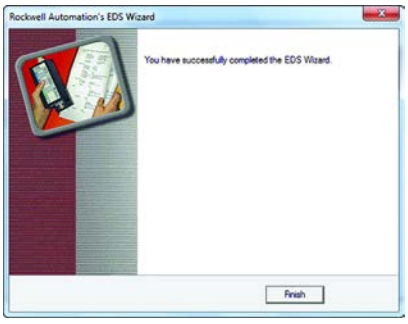
1. Start the EDS Hardware Installation Tool located at Start>Programs>Rockwell Software>RSLinx Tools and Add a new device



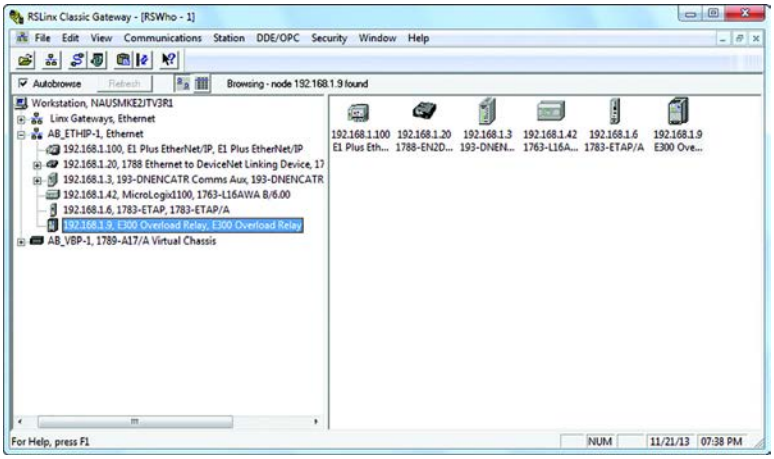
2. Use the EDS Wizard to install the downloaded E200 relay Parameter Configuration ModuleEDS file.







3. When you are finished, RSLinx Classic recognizes the newly registered E200 relay Parameter Configuration Module.



Notes:

Troubleshooting

This chapter helps you troubleshoot the E200 Electronic Overload Relay by using the advisory LEDs and diagnostic parameters.

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.

Status Indicators

All E200 relay Parameter Configuration Modules and Operator Stations have two diagnostic status indicators: Power LED and Trip/Warn LED. Use these diagnostic status indicators to help identify the state of the E200 relay and the reason for the trip or warning event.

Power

The E200 relay Power LED identifies the state of the E200 relay system.

Table 43 - Power LED for Parameter Configuration Module

Blinking Green	Device Ready/ Ready Mode
Solid Green	Device Active (Current Detected) / Run Mode
Solid Red	Device Error
Blinking Red(1)	Communication Error
Blinking Green/Red(1)	CopyCat in Progress

(1) Available on Operator Station.

Trip/Warn

The E200 relay Power LED identifies the reason for the trip or warning event. The E200 relay displays a long and short blinking pattern to identify the reason for the trip or warning event.

Table 44 - Trip / Warn LED for Parameter Configuration Module

Blinking Red	Trip Event
Blinking Yellow	Warning Event

Table 45 lists the blink patterns for the E200 relay trip and warning events.

Table 45 - Blink Patterns for Trip/Warn Events

	Code	Long Blink Pattern	Short Blink Pattern
Current	Overload	0	1
	Phase Loss	0	2
	Ground Fault Current	0	3
	Stall	0	4
	Jam	0	5
	Underload	0	6
	Current Imbalance	0	7
	L1 Under Current	0	8
	L2 Under Current	0	9
	L3 Under Current	0	10
	L1 Over Current	0	11
	L2 Over Current	0	12
	L3 Over Current	0	13
	L1 Line Loss	0	14
	L2 Line Loss	0	15
	L3 Line Loss	0	16
Voltage	Under Voltage	1	1
	Over Voltage	1	2
	Voltage Imbalance	1	3
	Phase Rotation Mismatch	1	4
	Under Frequency	1	5
	Over Frequency	1	6
Power	Under kW	2	1
	Over kW	2	2
	Under kVAR Consumed	2	3
	Over kVAR Consumed	2	4
	Under kVAR Generated	2	5
	Over kVAR Generated	2	6
	Under kVA	2	7
	Over kVA	2	8
	Under PF Lagging	2	9
	Over PF Lagging	2	10
	Under PF Leading	2	11
	Over PF Leading	2	12

	Code	Long Blink Pattern	Short Blink Pattern
Control	Test	3	1
	PTC	3	2
	DeviceLogix	3	3
	Operator Station	3	4
	Remote Trip	3	5
	Blocked Start	3	6
	Hardware Fault	3	7
	Configuration	3	8
	Option Match	3	9
	Feedback Timeout	3	10
	Expansion Bus	3	11
	Number Of Starts	3	12
	Operating Hours	3	13
	Nonvolatile Memory	3	14
	Test Mode	3	15
Analog	Analog Module 1 - Input Channel 00	4	1
	Analog Module 1 - Input Channel 01	4	2
	Analog Module 1 - Input Channel 02	4	3
	Analog Module 2 - Input Channel 00	4	4
	Analog Module 2 - Input Channel 01	4	5
	Analog Module 2 - Input Channel 02	4	6
	Analog Module 3 - Input Channel 00	4	7
	Analog Module 3 - Input Channel 01	4	8
	Analog Module 3 - Input Channel 02	4	9
	Analog Module 4 - Input Channel 00	4	10
	Analog Module 4 - Input Channel 01	4	11
	Analog Module 4 - Input Channel 02	4	12

Reset a Trip

ATTENTION: Resetting a trip does not correct the cause for the trip. Take corrective action before you reset the trip.

Reset the E200 relay trip condition by taking one of the following actions:

- Actuate the Blue Trip/Reset button on the E200 relay Communication Module
- Actuate the Reset button on the E200 relay Operator Station
- Set the Trip Reset bit in the Output Assembly of the E200 relay via the Connected Components Workbench software
- Actuate a reset signal to one of the assigned digital inputs
- Set Overload Reset Mode (Parameter 173) to “Automatic” to allow the unit to automatically reset after an overload trip
- Set Trip Reset (Parameter 163) to a value of 1, “Trip Reset”

IMPORTANT An overload trip cannot be reset until the value of Percent Thermal Capacity Utilized (Parameter 1) is below the value set in Overload Reset Level (Parameter 174).

Trip/Warn LED Troubleshooting

Trip Description	Possible Cause	Corrective Action
Test Trip	1. Operation of the Test/Reset	1. Operate the Test/Reset button to clear
Overload	1. Motor overloaded	1. Check and correct source of overload (load, mechanical transmission components, motor bearings).
	2. Improper parameter settings	2. Set parameter values to match the motor and application requirements.
Phase Loss	1. Missing supply phase	1. Check for open line (for example, blown fuse).
	2. Poor electrical connection	2. Check all power terminations from the branch circuit-protecting device down to the motor for proper tightness. Make sure that the overload connection to the contactor is secure.
	3. Contactor operation	3. Inspect contactor for proper operation.
	4. Improper parameter setting	4. Single-phase applications require that Single/Three Phase (Parameter 176) is set to “single phase”.
Ground Fault	1. Power conductor or motor winding is shorting to ground	1. Check power conductors and motor windings for low resistance to ground.
	2. Motor winding insulation is decayed	2. Check motor winding insulation for low resistance to ground.
	3. Foreign Object short	3. Check for foreign objects.
	4. External ground fault sensor (core balance current transformer) has improper connection	4. Check cable connections.
Stall	1. Motor has not reached full speed by the end of the Stall Enabld Time (Parameter 249)	1. Check for source of stall (for example, excessive load, or mechanical transmission component failure).
	2. Improper parameter settings	2. Stall Enabled Time (Parameter 249) is set too low for the application. Check to make sure that FLA Setting (Parameter 171) is set correctly.
Jam	1. Motor current has exceeded the programmed jam level	1. Check for the source of the jam (i.e., excessive load or mechanical transmission component failure).
	2. Improper parameter settings	2. Jam Trip Level (Parameter 253) is set too low for the application. Check to make sure that FLA Setting (Parameter 171) is set correctly.
PTC	1. Motor stator windings overheated	1. Check for source of motor overtemperature (for example, overload, obstructed cooling, high ambient temperature, excessive starts/hour).
	2. Thermistor leads short-circuited or broken	2. Inspect thermistor leads for short-circuit or open
Current Imbalance	1. Imbalance in incoming power	1. Check power system (for example, blown fuse).
	2. Motor winding imbalance	2. Repair motor, or if acceptable, raise value of Current Imbalance Trip Level (Parameter 261), CI Trip Level
	3. Motor idling	3. Raise value of Current Imbalance Trip Level (Parameter 261) to an acceptable level.
	4. Contactor or circuit breaker operation	4. Inspect contactor and circuit breaker for proper operation.
Nonvolatile Storage Fault	1. Firmware Downgrade corrupted: Nonvolatile memory	1.Execute the Clear Command to the operating Statistics, History Logs, and % TCU
	2. Internal product failure	2. Consult the factory.
Hardware Fault	1. Firmware of sensing module is not compatible with control module firmware	1. Verify firmware revisions of control module and sensing module 2. Update firmware of control module to v2.0 or higher
	2. Hardware configuration failure	3. Consult the factory. 4. Verify that the Sensing, Control, and Communication Module are connected properly. 5. Verify that connection pins between sensing module and control module are not bent.
Configuration Fault	1. Single/Three Phase (Parameter 176) is set to "Single Phase" and current is being sensed in phase L3 during motor operation.	1. For three-phase applications, Single/Three Phase (Parameter 176) should be set to “Three-Phase”; for single-phase applications, verify that current is flowing through L1 and L2 only.
	2. Operating Mode "Overload (Network)" does not have an assigned Trip Relay	2. Verify that one of the Output Assignments (Parameters 202. . .204) is configured as a "Trip Relay"
	3. Illegal configuration value	3. Review Invalid Configuration Parameter (Parameter 38) and Invalid Configuration Cause (Parameter 39) to identify which configuration parameter is illegal and the reason why.
Remote Trip	1. Contact closure of remote sensor (for example, vibration switch).	1. Take corrective action to address the issue that caused the sensor to actuate.
		2. Check sensor for proper operation.
		3. Check wiring.
Total Starts Warning	1. Starts Counter (Parameter 29) is equal to or greater than the value set in Total Starts (Parameter 207)	1. Set Clear Command (Parameter 165) to "Clear Operating Statistics" to reset Starts Counter (Parameter 29)

Trip Description	Possible Cause	Corrective Action
Total Operating Hours Warning	1. Operating Time (Parameter 28) is equal to or greater than the value set in Total Operating Hours (Parameter 208)	1. Clear Command (Parameter 165) to "Clear Operating Statistics" to reset Operating Time (Parameter 28)
Blocked Start	1. The number of starts count within the past hour period equals the value set in the Starts Per Hour (Parameter 205)	1. Check Time to Start (Parameter 31) and wait that amount of time, or change the configuration to allow more starts/hour.
	2. The time expired since the most recent start is less than the value set in the Starts Interval (Parameter 206)	2. Check Time to Start (Parameter 31) and wait that amount of time, or change the configuration to shorten the interval between starts.

Notes:

Wiring Diagrams

E200 Wiring Configurations

The following pages illustrate various wiring configurations for the E200 Electronic Overload Relay

Figure 79 - Delta Configuration with Two Potential Transformers (Open Delta)

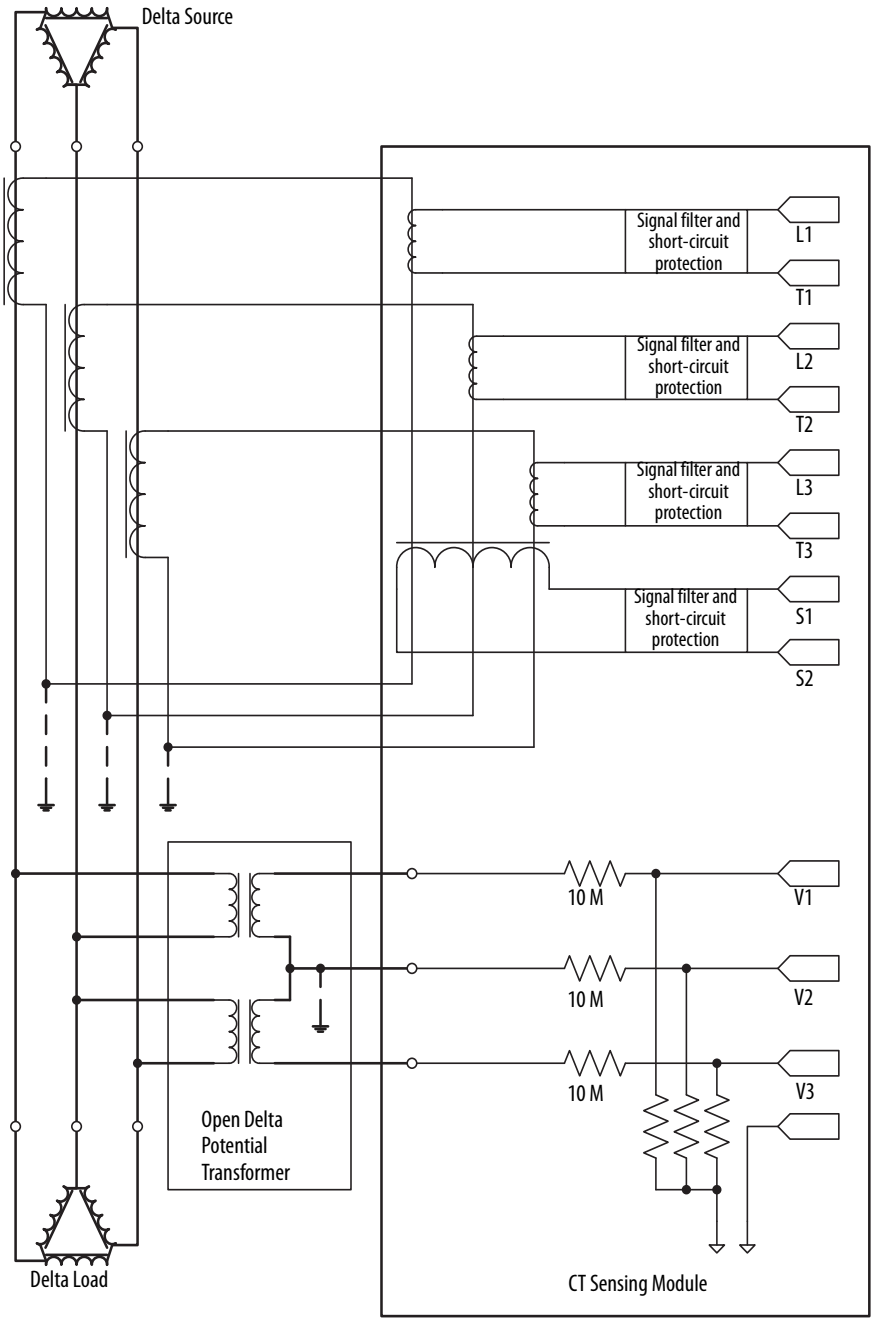


Figure 80 - Wye Configuration with Two Potential Transformers (Open Delta)

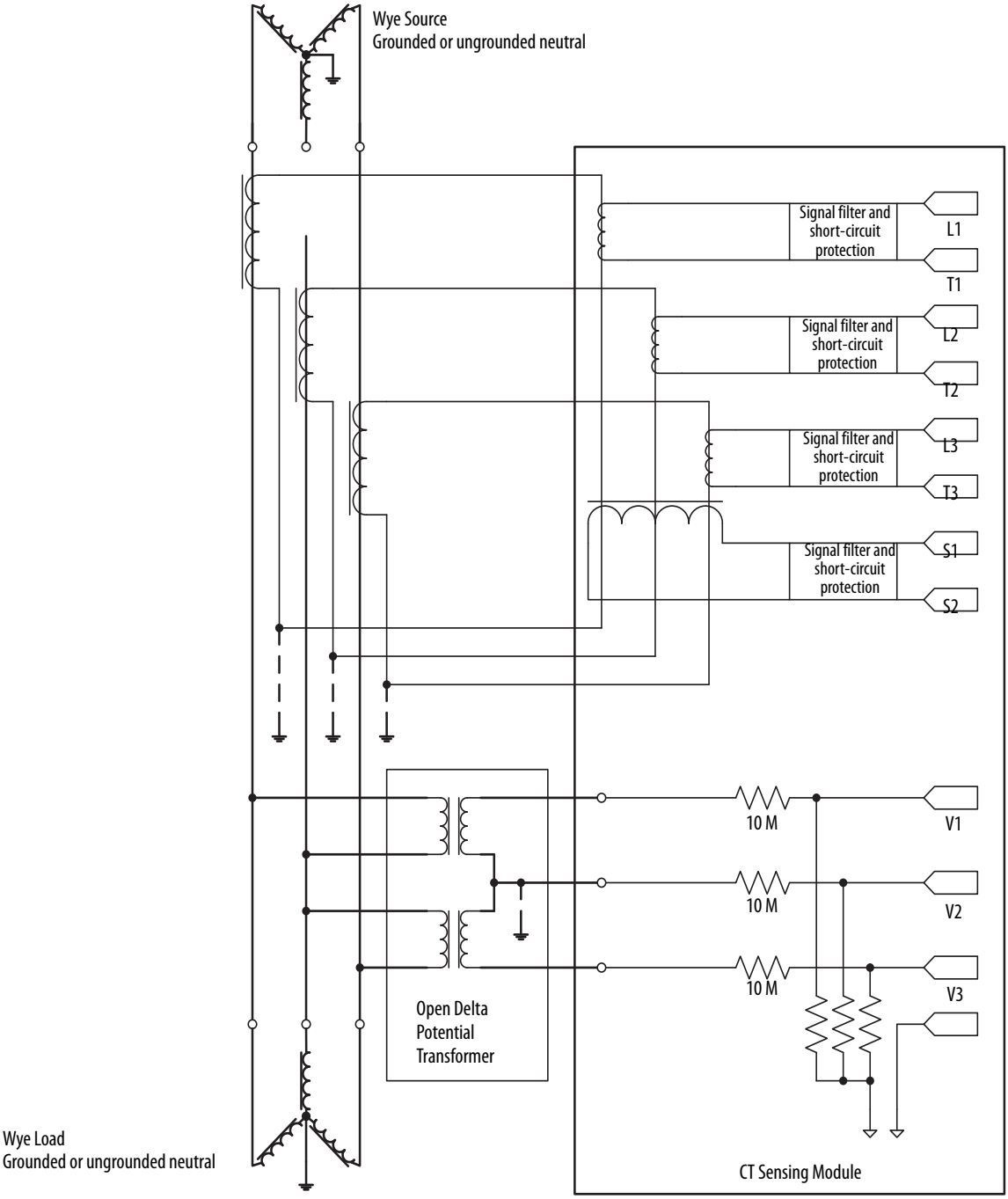


Figure 81 - Grounded B Phase Configuration With Two Potential Transformers (Open Delta)

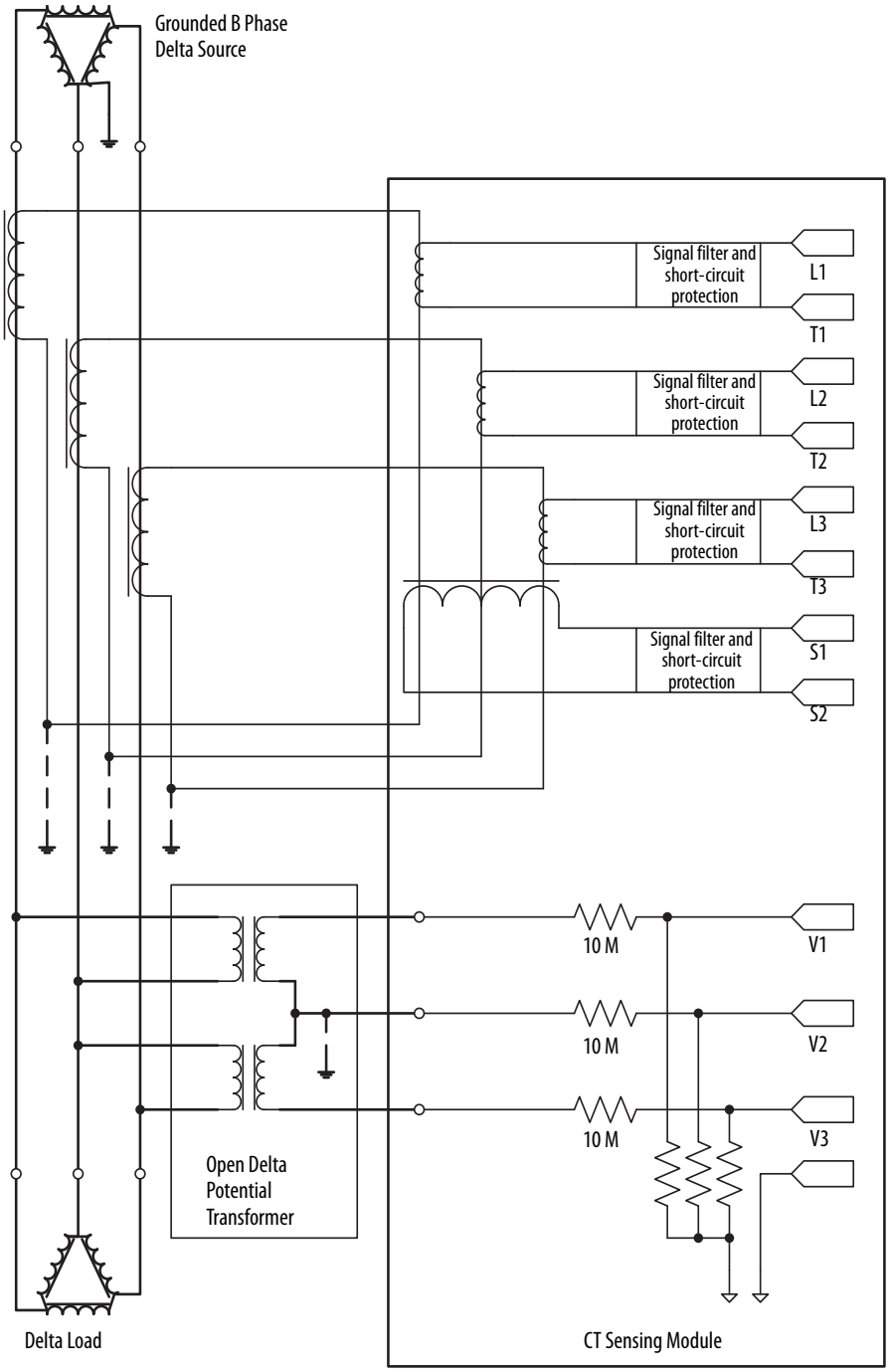


Figure 82 - Delta Configuration with Three Potential Transformers (Delta-to-Delta)

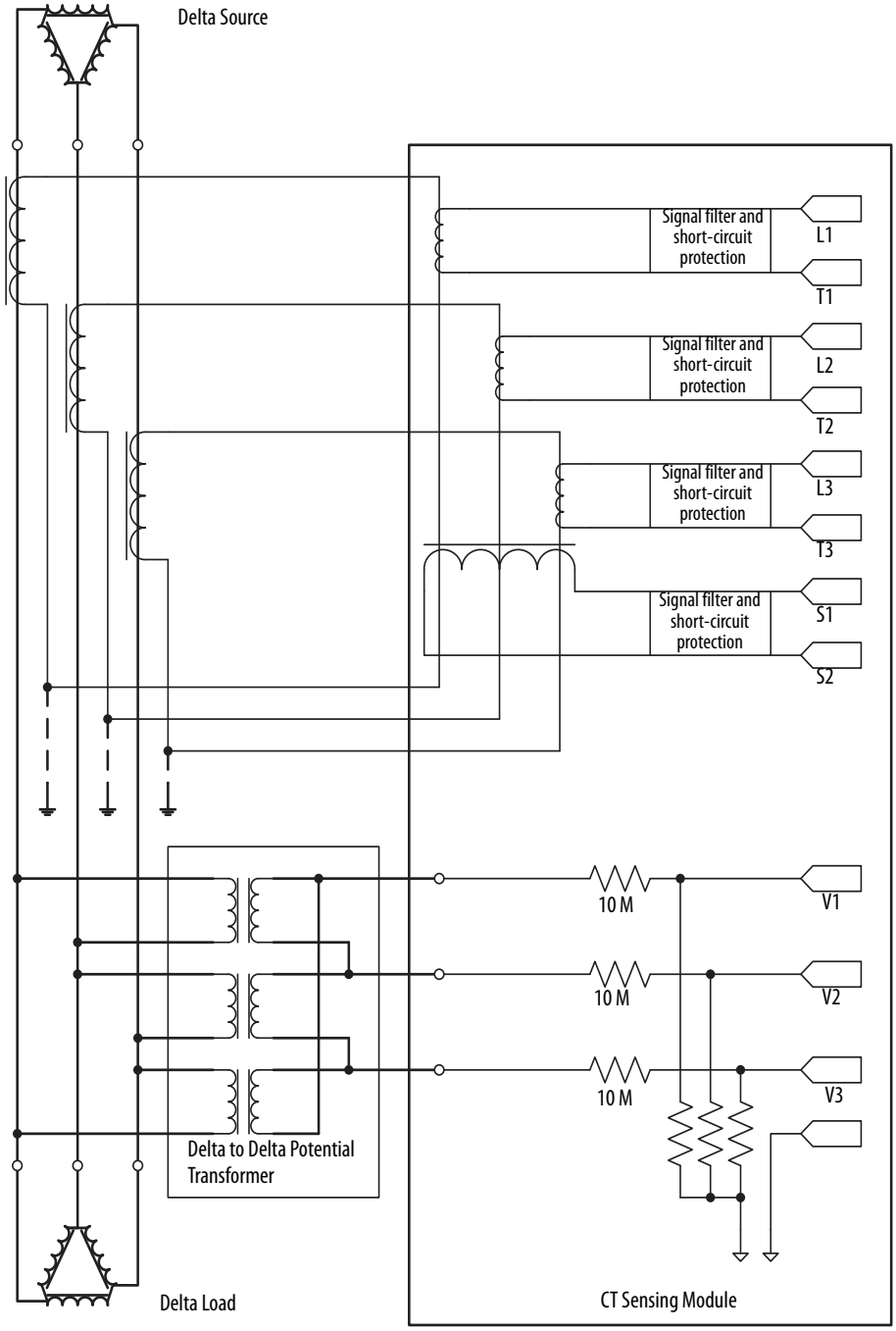


Figure 83 - Wye Configuration with Three Potential Transformers (Delta-to-Delta)

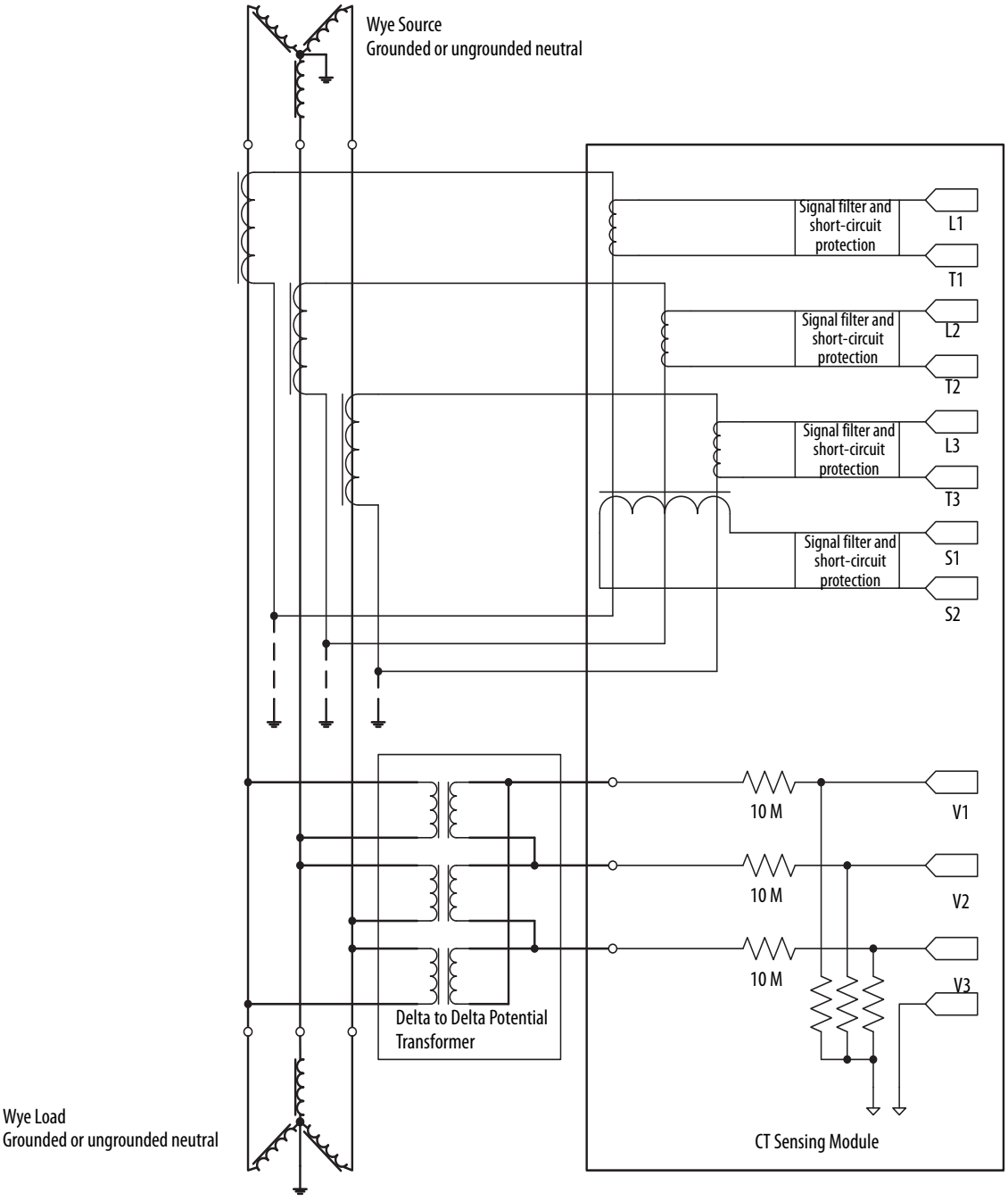


Figure 84 - Delta Configuration with Three Potential Transformers (Wye-to-Wye)

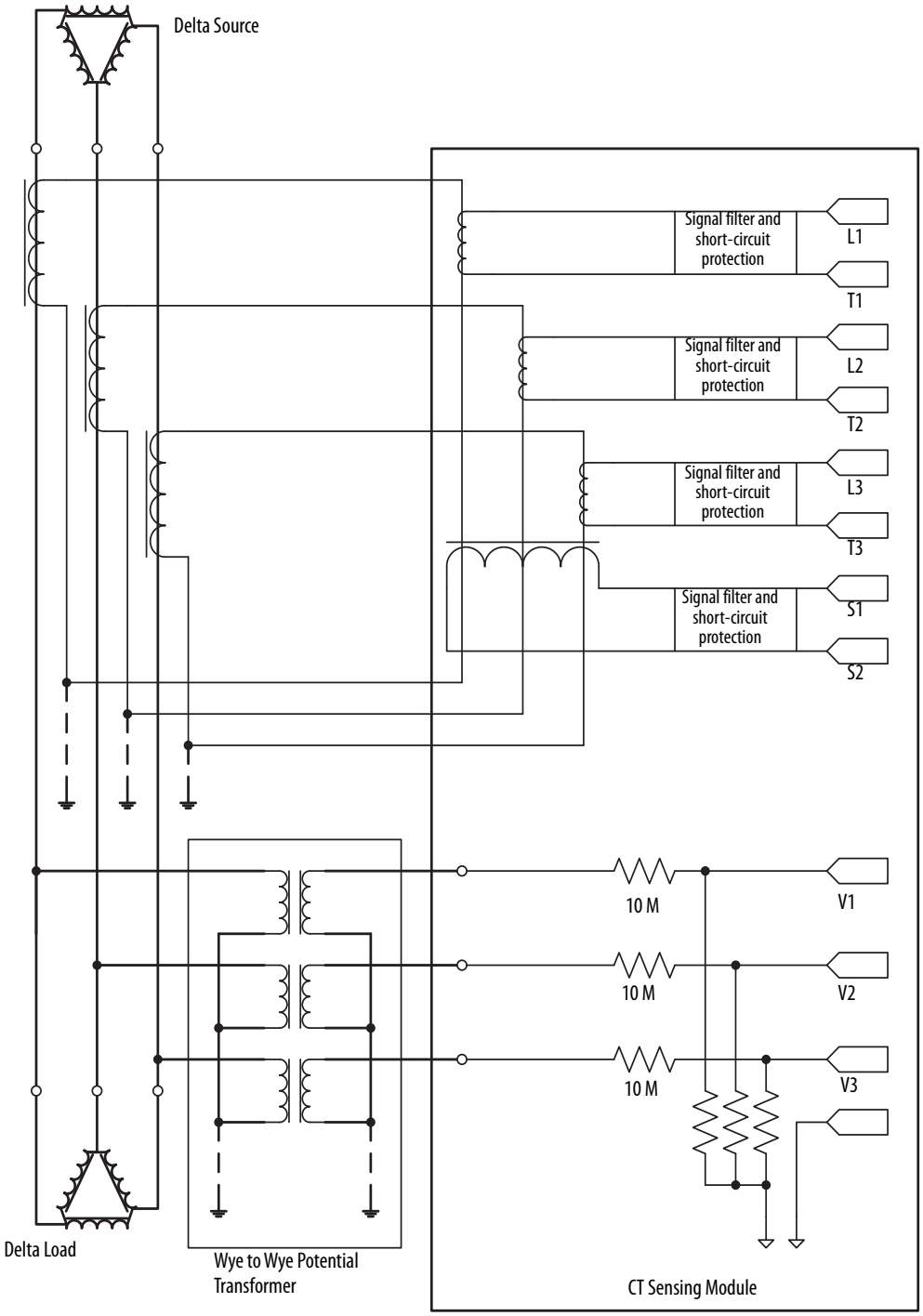


Figure 85 - Wye Configuration with Three Potential Transformers (Wye-to-Wye)

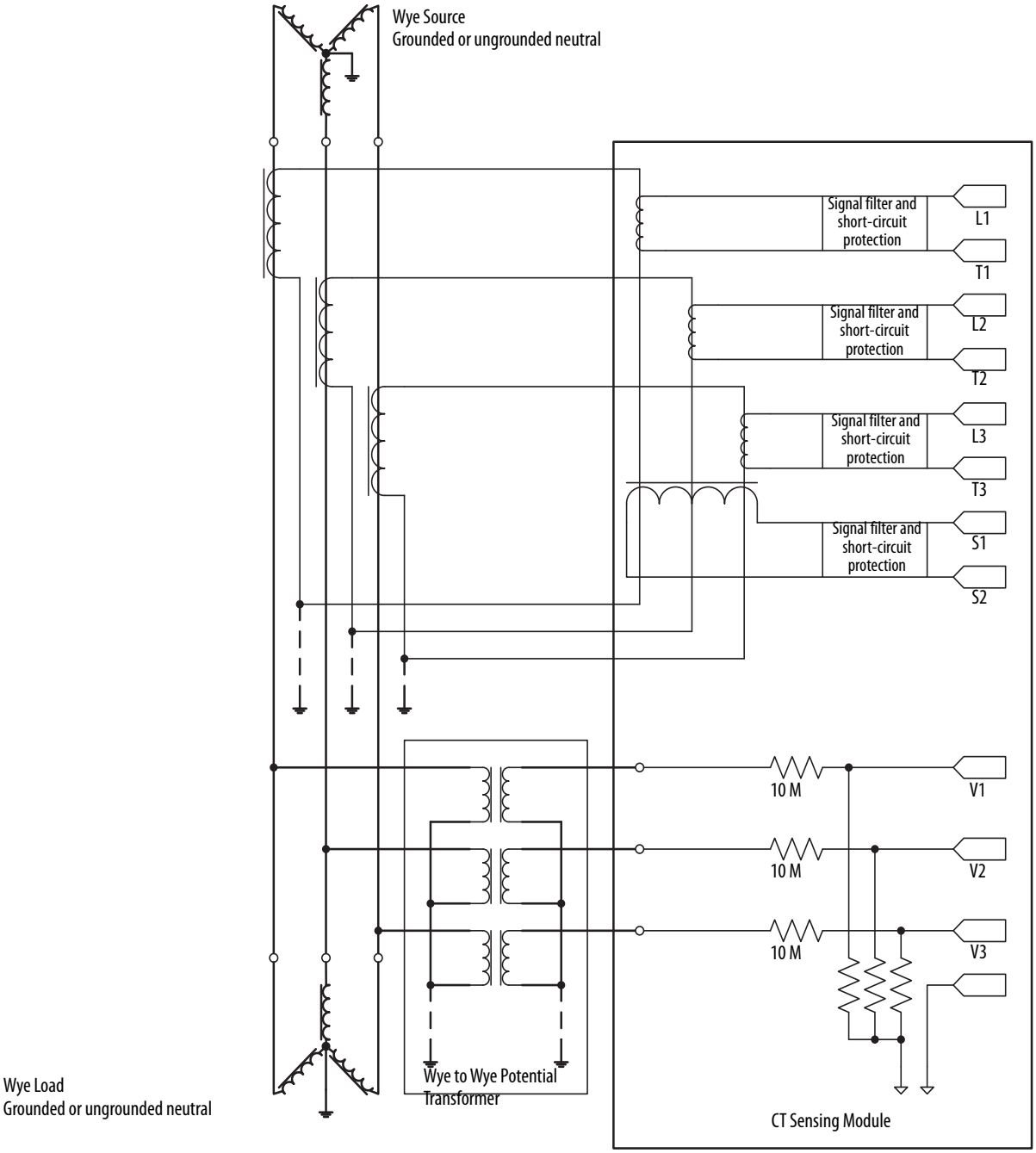


Figure 86 - Delta Configuration with Wye-to-Delta Potential Transformers

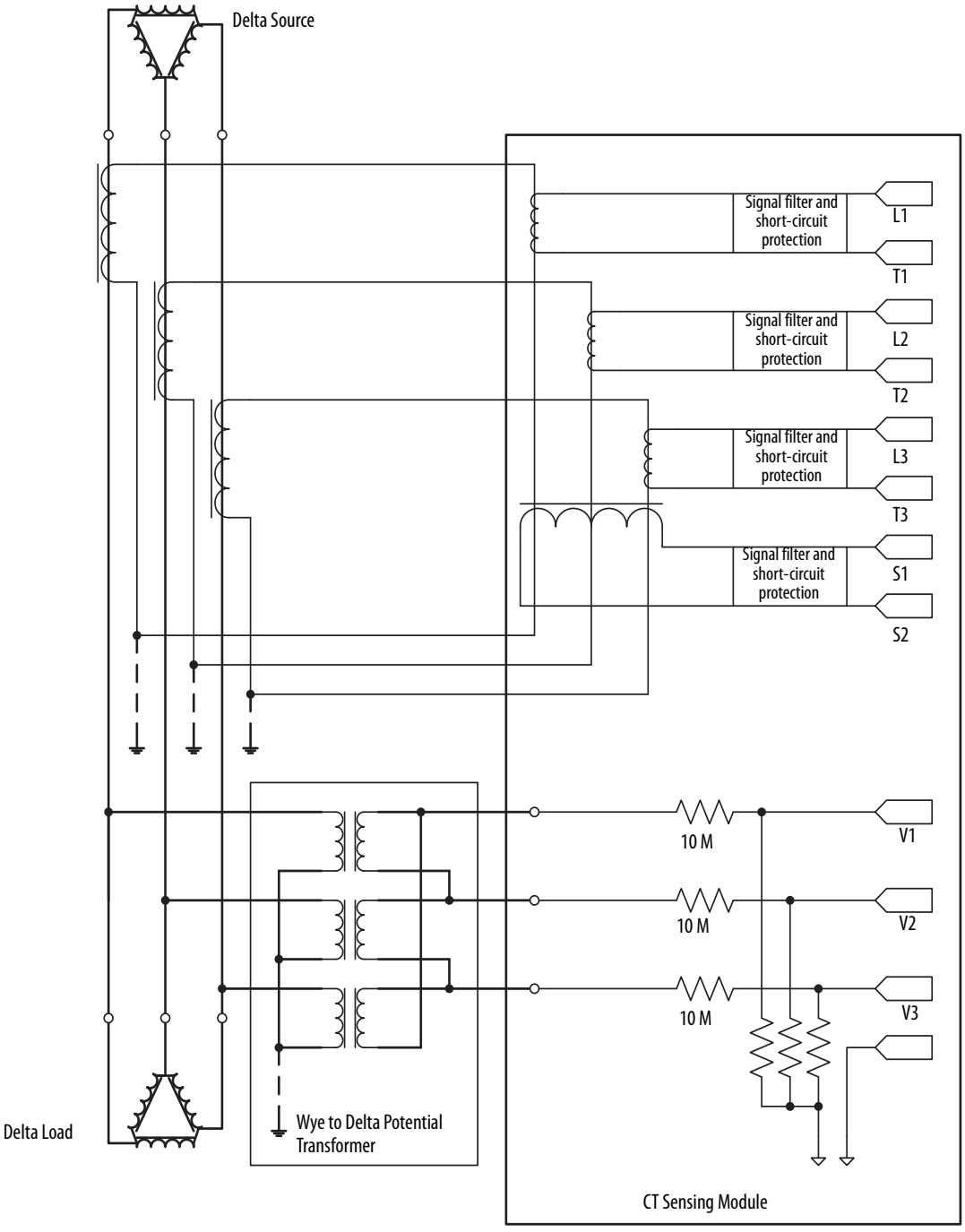


Figure 87 - Wye Configuration with Wye-to-Delta Potential Transformers

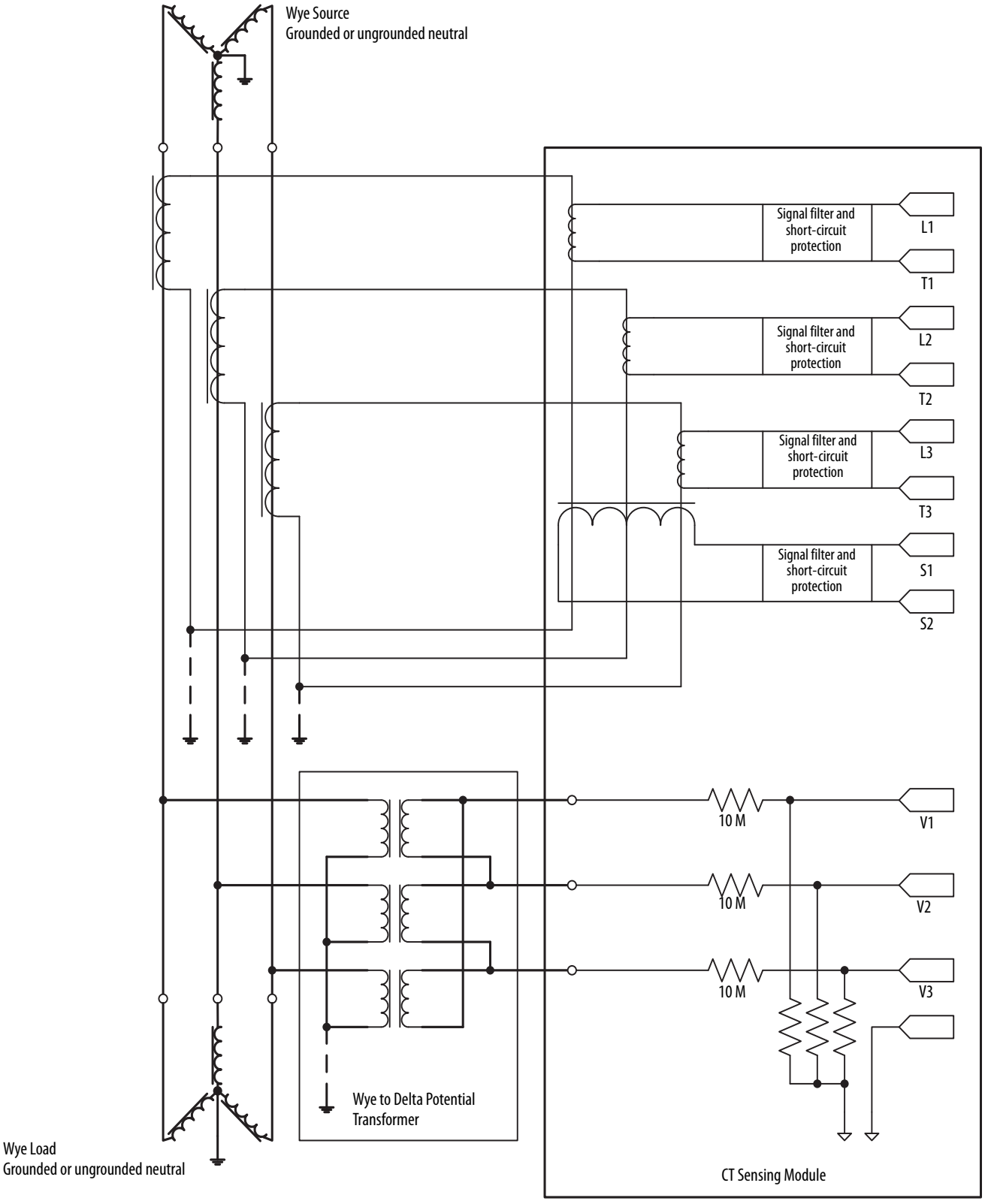


Figure 88 - Delta Configuration with Delta-to-Wye Potential Transformers

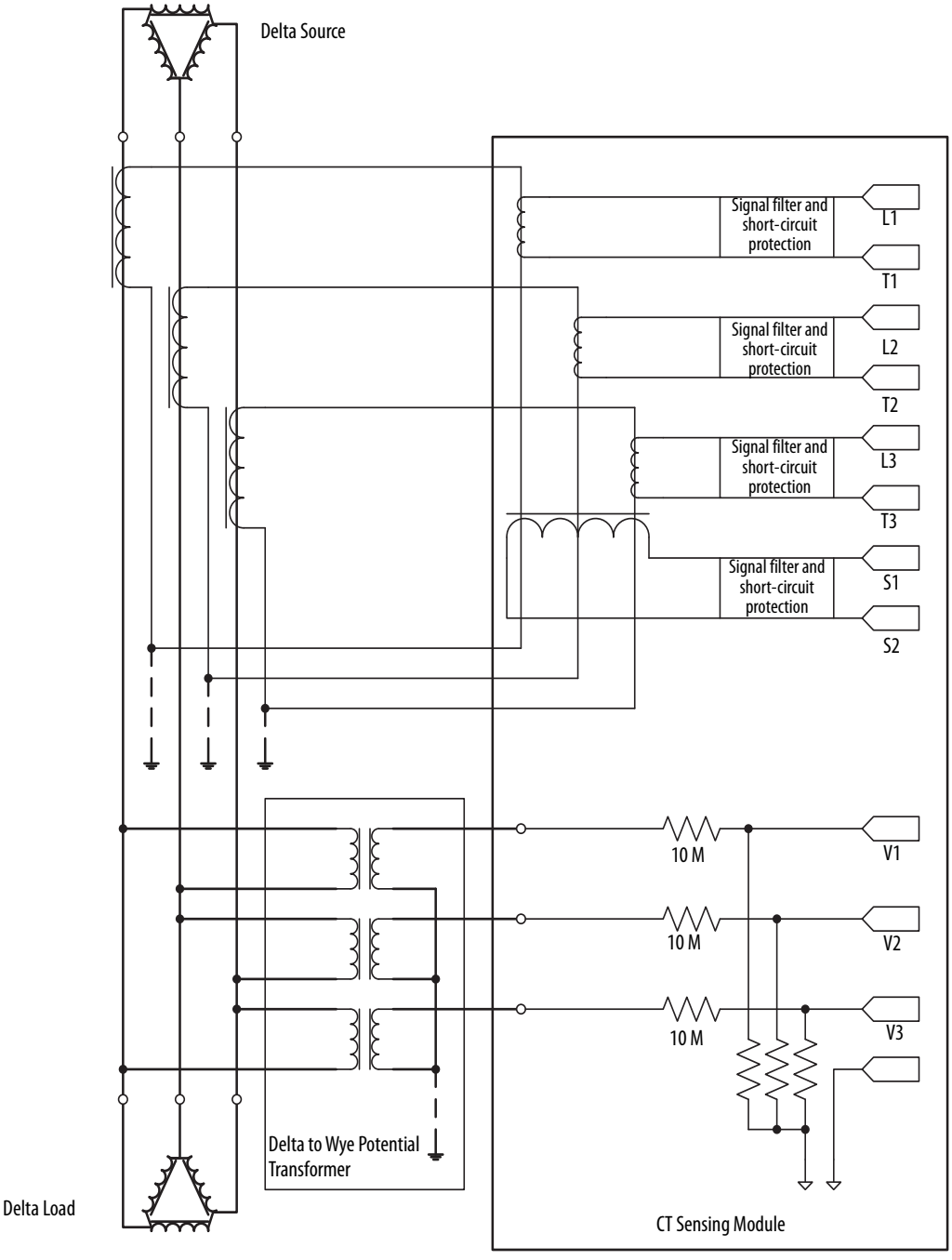
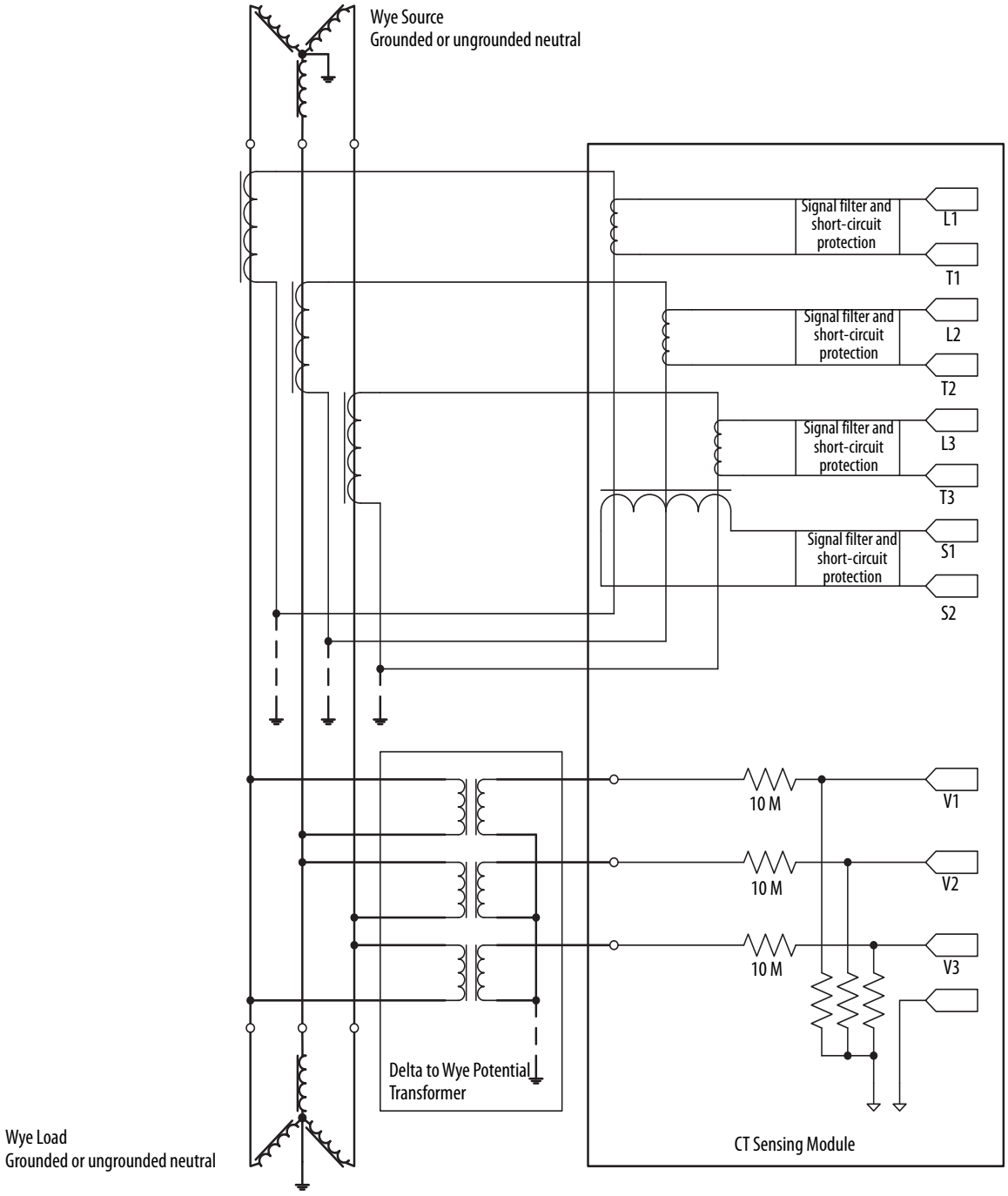


Figure 89 - Wye Configuration with Delta-to-Wye Potential Transformers



Notes:

Symbols

A

C

D

E

M

N

O

P

R

S

T

U

V

W

Y

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.	https://rockwellautomation.custhelp.com/
Local Technical Support Phone Numbers	Locate the phone number for your country.	http://www.rockwellautomation.com/global/support/get-support-now.page
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	http://www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	http://www.rockwellautomation.com/global/literature-library/overview.page
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	http://www.rockwellautomation.com/global/support/pcdc.page

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