Installation Instructions

Allen-Bradley

Guardmaster EtherNet/IP Network Interface

Catalog Number 440R-ENETR

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Allen-Bradley · *Rockwell Software*

Rockwell Automation

Important User Information

Solid-state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation, and Maintenance of Solid-state Control (publication SGI-IN001 available from your local Rockwell Automation sales office or online at http://www.rockwellautomation.com/literature/) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

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.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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

⚠	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.
⚠	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 consequences.
⚡	Labels may be on or inside the equipment (for example, drive or motor) to alert people that dangerous voltage may be present.
♨	Labels may be on or inside the equipment (for example, drive or motor) to alert people that surfaces may reach dangerous temperatures.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Environment and Enclosure

ATTENTION: This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC 60664-1), at altitudes up to 2000 m (6562 ft) without derating.

This equipment is not intended for use in residential environments and may not provide adequate protection to radio communication services in such environments.

This equipment is supplied as open-type equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present, and appropriately designed to prevent personal injury resulting from accessibility to live parts. The enclosure must have suitable flame-retardant properties to prevent or minimize the spread of flame, complying with a flame spread rating of 5VA or be approved for the application if nonmetallic. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

In addition to this publication, see the following:

- Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1 (available online at http://www.rockwellautomation.com/literature/), for additional installation requirements.
- NEMA Standard 250 and IEC 60529, as applicable, for explanations of the levels of protection provided by enclosures.

Preventing Electrostatic Discharge

⚠️ **ATTENTION:** This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wrist strap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- Use a static-safe workstation, if available.
- Store the equipment in appropriate static-safe packaging when not in use.

Additional Resources

Refer to these related publications, as needed.

Resource	Description
Guardmaster® EtherNet/IP™ Network Interface User Manual, publication 440R-UM009.	A detailed description of module functionality, configuration, installation procedure and information on how to use the Guardmaster EtherNet/IP Network Interface (440R-ENETR).
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.	More information on proper wiring and grounding techniques.

If you would like a manual, you can:

- download a free electronic version from the internet: http://www.rockwellautomation.com/literature/
- purchase a printed manual by contacting your local Allen-Bradley distributor or Rockwell Automation representative.

About the Interface

Read this publication for information about the Guardmaster EtherNet/IP network interface, a communications interface for Guardmaster safety relays.

This interface is designed for the Guardmaster safety relay optical bus that provides connectivity to an EtherNet/IP network with two RJ-45 connectors for two port pass-through to support daisy-chain or ring, and the existing star and tree network topologies.

440R-ENETR Interface
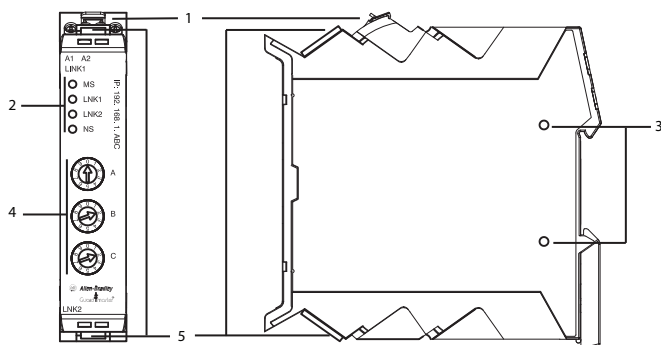
	Description		Description
1	Removable terminal block	4	Network address rotary switches
2	Status indicators	5	Ethernet network RJ-45 connectors
3	Optical communications link		

Before You Begin

To effectively use the interface, note the following considerations.

Determine Compatibility

RSLogix 5000™ software version 19, or greater, must be used for the 440R-ENETR Add-on Profile. The 440R-ENETR EtherNet/IP network interface can be used with the following Guardmaster safety relays with version 2 (or greater) firmware:

- 440R-D22R2, GSR DI
- 440R-D22S2, GSR DIS
- 440R-EM4R2, GSR EM
- 440R-EM4R2D, GSR EMD
- 440R-GL2S2P, GSR GLP
- 440R-GL2S2T, GSR GLT

If you use the BootP/DHCP utility to assign IP addresses to the interface module, use version 2.3.2 or greater.
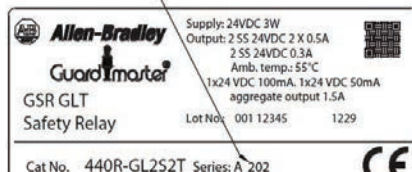
Install the Interface

Follow this procedure to install the interface on the DIN rail.

⚠️ **ATTENTION:** You must only use firmware version 2 (or greater) of optical bus-enabled Guardmaster safety relays with the 440R-ENETR EtherNet/IP network interface. Early versions of the firmware or Guardmaster safety relays not equipped with an embedded optical communication bus will not work.

Firmware Version —

Mount the 440R-ENETR Interface on a DIN Rail

Install the interface to the left of Guardmaster safety relays equipped with an optical communications bus. There must be no more than 5 mm horizontal separation between two adjacent relays for the optical communication bus to operate properly.
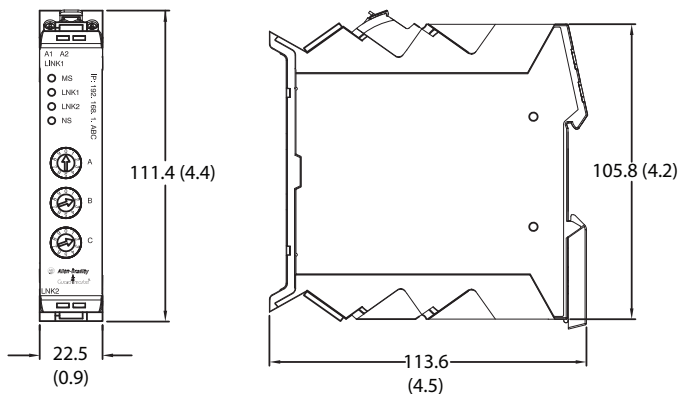
1. Position the interface module on an IEC standard (35 x 7.5 x 1 mm) top-hat DIN rail at a slight angle (DIN rail: Allen-Bradley part number **199-DR1**; **46277-3**; **EN50022**).
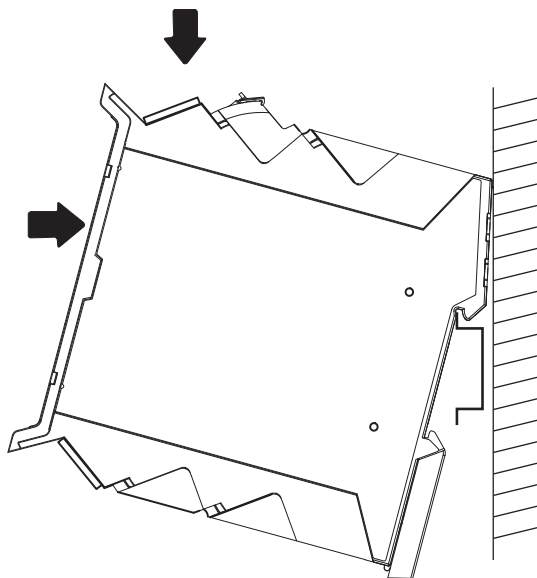
2. Press down firmly to install the interface on a DIN rail.

3. Set the network address rotary switches to the desired value. See for more information on setting the IP address.

ATTENTION: To avoid overheating, the unit must be mounted vertically and requires 37.4 mm (1.5 in) of clearance at the top and the bottom to allow adequate ventilation. The temperature ratings for the unit will be derated if not mounted in this manner.

⚠ **WARNING:** If you connect or disconnect the communications cable with power applied to this module or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations.

Be sure that power is removed or the area is nonhazardous before proceeding.

⚠ **ATTENTION:** Do not remove or replace an interface module while power is applied. Interruption of the device can result in unintentional operation or machine motion.

Set the Network Address

By default, the rotary switches are set to 999 and DHCP is enabled. You can set the network Internet Protocol (IP) address in the following ways:

- Use a Dynamic Host Configuration Protocol (DHCP) server, such as Rockwell Automation BootP/DHCP.
- Retrieve the IP address from nonvolatile memory.

The interface reads the rotary switches first to determine if the switches are set to a valid number. You set the network address by using the three rotary switches on the front bezel of the interface. Use a small flat blade screwdriver to rotate the switches. Line up the arrow on the switch with the number setting you wish to use. Valid settings range from **001…254**.

This example shows the
network address set at 163.

A

B

C
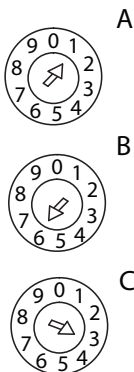
When you use the rotary switches to assign an address and set it to **001**, the
interface gateway address is set to **0.0.0.0**, and the subnet mask is
255.255.255.0. When you use the switches to assign an address and set it
between **002…254**, the interface gateway address is set to **192.168.1.1**.

No host name is assigned to the interface, nor do you need to use a Domain Name
System when using the switch settings.

Network Address Rotary Switches

See publication 440R-UM009, Guardmaster EtherNet/IP Network Interface User
Manual, for more information.

If you set the switches to an invalid number (for example: 000 or a value greater
than 254 excluding 888), the interface checks if you have previously enabled
DHCP.

DHCP Enabled and Not Enabled

| DHCP State	Interface Action
Enabled	Asks for an address from a DHCP server. The DHCP server also assigns other Transport Control Protocol (TCP) parameters.
Not enabled	Uses the IP address (along with other TCP configurable parameters) stored in nonvolatile memory.

⚠️ **WARNING:** When you change switch settings while power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations.

Be sure that power is removed or the area is nonhazardous before proceeding.

Replace the Interface

Use these procedures to install a replacement interface to an existing system.

1. Disconnect the Ethernet connector(s) from the interface.

2. With a small flat blade screwdriver, slowly pull up on the Removable Terminal Block (RTB) handle as shown in the following illustration.
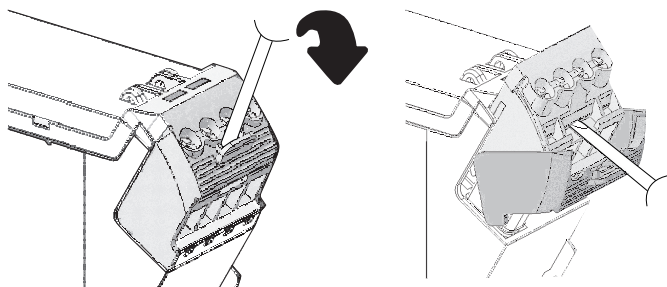
⚠️ **WARNING:** When you connect or disconnect the Removable Terminal Block (RTB) with field-side power applied, an electrical arc can occur. This could cause an explosion in hazardous location installations.

Be sure that power is removed or the area is nonhazardous before proceeding.

⚠ **WARNING:** If you connect or disconnect the communications cable while power is applied to this module or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations.

Be sure that power is removed or the area is nonhazardous before proceeding.

3. Use a small flat blade screwdriver to pull down the DIN rail locking clip and lift the module off the DIN rail.

4. Position the replacement interface vertically above the DIN rail.

5. Slide the interface down, positioning it within 5mm of the adjacent Guardmaster safety relay.

6. Press firmly to seat the interface on the DIN rail, until the module locks into position.

7. Set the network address on the network address rotary switches.

8. Insert the removable terminal block into the interface.

9. Reconnect the Ethernet cable(s) to the interface.

10. Set the IP address for this module.

Wire the Interface

A1 = Supply
A2 = Common
Ethernet RJ-45 connector

TOP VIEW
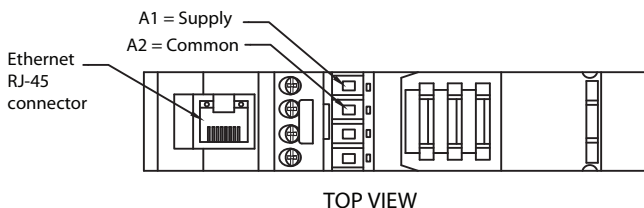
⚠ **ATTENTION:** Do not connect 120/240V AC power to the A1/A2 DC supply.

⚠ **WARNING:** Do not wire more than two conductors on any single terminal.

⚠ **WARNING:** To comply with the CE Low Voltage Directive (LVD), this equipment must be powered from a Safety Extra Low Voltage (SELV) or Protected Extra Low Voltage (PELV) compliant source.

⚠ **WARNING:** If you connect or disconnect wiring while the field-side power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

Meaning of Status Indicators

Refer to the following diagram and table for information on how to interpret the status indicators.

440R-ENETR Interface Module
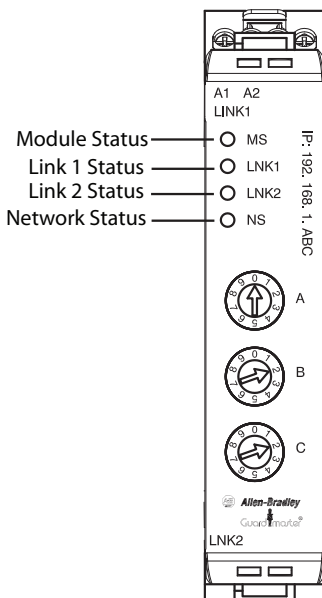
Indicator Status for Interface Module

Indicator	Status	Description
Module Status	Off	No power applied to device
	Flashing green	Device needs commissioning due to missing, incomplete, or incorrect configuration.
	Solid green	Device operating normally
	Flashing red	Recoverable fault. Complete firmware update, verify address switches.
	Solid red	Unrecoverable fault, may require device replacement

Indicator Status for Interface Module

Network Status	Off	Device is not on-line: - Device has not completed dup_MAC_id test. - Device not powered - check module status indicator
	Flashing green	Device is on-line but has no CIP connections in the established state.
	Solid green	Device on-line and has CIP connections in the established state.
	Flashing red	One or more CIP connections in timed-out state. Check for Guardmaster safety relay failure and controller operation.
	Solid red	Duplicate IP address detected. Verify IP address setting and correct, as needed.
Link 1 or Link 2 Status	Off	No link established.
	Solid green	One of the following conditions exists: - A 100 Mbps (full or half duplex) link exists. - The ring network is operating normally.
	Flashing green	Transmit or receive activity present on indicated port @ 100 Mbps.
	Solid yellow	One of the following conditions exists: - A 10 Mbps (full or half duplex) link exists. - The ring network is operating normally.
	Flashing yellow	Transmit or receive activity present on indicated port @ 10 Mbps.

Specifications

Guardmaster EtherNet/IP Network Interface

Attribute	Value
Safety classification value	Not applicable. This product is not intended for safety-related control or diagnostics.
Guardmaster Safety Relay capacity	Six Guardmaster safety relays
Supported modules (FW Rev 2.xx or greater)	• GSR DI (Catalog number 440R-D22R2) • GSR DIS (Catalog number 440R-D22S2) • GSR EM (Catalog number 440R-EM4RR2) • GSR EMD (Catalog number 440R-EM4R2D) • GSR GLP (Catalog number 440R-GL2S2P) • GSR GLT (Catalog number 440R-GL2S2T)
Location	Left side of the Guardmaster safety relay system

Power Supply

Attribute	Value
Input voltage rating	24V DC
Input voltage, range	11…26.4V DC
Input overvoltage protection	Reverse polarity protected

Ethernet Communication

Attribute	Value
Ethernet communication rate	10/100 Mbits/s, half or full-duplex
Ethernet ports	2, configured as Embedded Switch
Ethernet network topologies supported	Star, Tree, Daisy-chain/Linear, and Ring
Ethernet connectors	RJ-45, Category 5
Ethernet cable	Category 5: shielded or unshielded
Ethernet wire connections, max.	See Wire size on page 17

General Specifications

Attribute	Value
Indicators	2 red/green status indicators: – Module status – Network status (Ports 1 and 2 combined) 2 green/yellow status indicators: – Link 1 status – Link 2 status
Power consumption, max.	2.2 W @ 26.4V DC
Power dissipation, max.	0.8 W @ 26.4V DC
Thermal dissipation, max.	2.7 BTU/hr @ 26.4V DC
Module input	10…28V DC @ 1000 mA
Dimensions (HxWxD), approx.	111.4 x 22.5 x 113.6 mm (4.39 x 0.89 x 4.47 in.)
Enclosure type rating	None (open-style)
Terminal base screw torque	0.8 Nm (7 lb-in)
Weight, approx.	180 g (0.4 lb)
Wiring category[1]	1 – on power ports 1 – on communications ports
Wire size	Power connections: 0.34… 2.1 mm² (22…14 AWG) solid or stranded copper wire rated @ 75 °C (167 °F) or greater, 1.2 mm (3/64 in.) insulation max. Ethernet wiring: RJ45 connector according to IEC 60603-7, 2 or 4 pair Category 5e min cable according to TIA 568-B.1 or Category 5 cable according to ISO/IEC 24702.
North American temp code	T6
IEC temp code	T6

[1] Use this Conductor Category information for planning conductor routing. See Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

Environmental Specifications

Attribute	Value
Temperature, operating	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -20…+55 °C (-4…+131 °F)
Temperature, surrounding air max.	55 °C (131 °F)
Temperature, nonoperating	IEC60068-2-1 (Test Ab, Unpackaged Nonoperating Cold) IEC60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat) IEC60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock): -40…+85 °C (-40…+185 °F)
Relative humidity	IEC 60068-2-30 (Test Db, Unpackaged Damp Heat): 5…95% non-condensing
Vibration	IEC 60068-2-6 (Test Fc, Operating): 5 g @ 10…500 Hz
Shock, operating	IEC60068-2-27 (Test Ea, Unpackaged Shock): 15 g
Emissions	CISPR 11: Group 1, Class A
ESD immunity	IEC61000-4-2: 6 kV contact discharges 8 kV air discharges
Radiated RF immunity	IEC 61000-4-3: 10V/m with 1 kHz sine-wave 80% AM from 80…2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 1890 MHz 10V/m with 1 kHz sine-wave 80% AM from 2000…2700 MHz
EFT/B immunity	IEC 61000-4-4: ±4 kV @ 5 kHz on power ports ±2 kV @ 5 kHz on communications ports
Surge transient immunity	IEC 61000-4-5: ±1 kV line-line (DM) and ±2 kV line-earth (CM) on power ports ±2 kV line-earth (CM) on communications ports
Conducted RF immunity	IEC61000-4-6: 10V rms with 1 kHz sine-wave 80% AM from 150 kHz…80 MHz

Certifications

Certification (when product is marked)[1]	Value
c-UL-us	UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E192904.
CE	European Union 2004/108/EC EMC Directive, compliant with: EN 61326-1; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)
EtherNet/IP	ODVA conformance tested to EtherNet/IP specifications

(1) See the Product Certification link at
http://www.rockwellautomation.com/rockwellautomation/certification/ for Declaration of Conformity, Certificates, and other certification details.

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://www.rockwellautomation.com/support/, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/support/.

Installation Assistance

If you experience a problem within the first 24 hours of installation, please review the information provided in this manual. You can also contact a special Customer Support number for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/support/ or contact your local Rockwell Automation representative.

New Product Satisfaction Return

Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

United States	Contact your distributor. You must provide a Customer Support case number (call the phone number above to obtain one) to your distributor to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

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