



GuardShield 450L EtherNet/IP Module CIP Safety Connection

Catalog Numbers 450L-ENETR, 450L-APR-EN-8



Allen-Bradley

by ROCKWELL AUTOMATION

Guardmaster®

User Manual

Original Instructions

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.

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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.

These 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).

The following icon may appear in the text of this document.



Identifies information that is useful and can help to make a process easier to do or easier to understand.

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Notes:

About This Publication

This manual is a reference guide for the 450L-ENETR Network Interface for 450L GuardShield™ Safety Light Curtains.

This manual describes the procedures to install, wire, configure, and troubleshoot your module. You must be familiar with the following:

- Use of a safety controller in a Logix 5000™ control system
- Use of safety systems
- Use of the Studio 5000 Logix Designer® application environment



ATTENTION: Personnel responsible for the application of safety-related programmable electronic systems (PES) must be aware of the safety requirements in the application of the system and be trained in the use of the system.

Who Should Use this Manual

Use this manual to design, install, program, or troubleshoot systems that use the 450L GuardShield safety light curtain.

You are required to have a basic understanding of electrical circuitry and familiarity with safety-related control systems. If you do not, obtain the proper training before using this product.

IMPORTANT Read and thoroughly understand the manual before installing or operating a system that contains this device.

Download Firmware, AOP, EDS, and Other Files

Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes from the Product Compatibility and Download Center at rok.auto/pcdc.

Terminology

The following terms and abbreviations are used throughout this manual. For definitions of terms not listed here, refer to the Allen-Bradley Industrial Automation Glossary, publication [AG-7.1](#).

Table 1 - Terminology

Term/ Abbreviation	Definition
AOP	Add-on Profile - The AOP is a Logix Designer application file that facilitates the implementation of the 450L-ENETER.
CIP	Common Industrial Protocol: An industrial communication protocol used by Logix 5000-based automation systems on Ethernet, ControlNet®, and DeviceNet® communication networks.
CIP Safety	Safety certified version of CIP™.
DHCP	Dynamic Host Configuration Protocol - A network management protocol used on Internet Protocol networks to assign an IP address and other network configuration parameters to each device on a network dynamically.
HI	The on state of the output of a logic block or the state of an input to a logic block or a voltage level to be above the turn-on threshold. Equivalent to a Boolean value of 1.
LO	Logic state of being off or a voltage level to be below the turn-off threshold. Equivalent to a Boolean value of 0.

Table 1 - Terminology (Continued)

Term/ Abbreviation	Definition
MAC ID	Media Access Control Identification Number: An Ethernet device on a network is assigned a unique physical (or hardware) number. This number must be associated with the IP address that is assigned to the device for proper communication.
NC	No connection.
OSSD	Output Signal Switching Device - Typically, a pair of solid-state signals pulled up to the DC source supply. The signals are tested for short circuits to the DC power supply, short circuits to the DC common, and short circuits between the two signals. The 450L-ENETR network interface does not have OSSD outputs because the safety status is transmitted over the Ethernet network. In the controller input tags, the safety output is called Status.
PAC	Programmable automation controller
PFHD	The probability of failure to danger per hour.
PLC	Programmable logic controller
Reaction Time	The time from when the signal changes on an input terminal to when safety data is sent to the GuardLogix® controller.
Response Time	The time between the initial obstruction of the protective field to the off-state of the output.

Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes.

Topic	Page
Updated Figure 3	12
Updated Figure 4	14
Updated Table 2	15
Updated Power Supply	20
Updated Regulatory Approvals	87

Additional Resources

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

Resource	Description
GuardShield 450L POC and 450L PAC Safety Light Curtain User Manual, publication 450L-UM001	Reference guide for the procedures to install, wire, and troubleshoot the 450L-B and 450L-E POC and the 450L GuardShield PAC safety light curtains.
Ethernet Media Specifications Technical Data, publication 1585-TD001	Provides technical specifications for Ethernet media cables and accessories.
EtherNet/IP Network Devices User Manual, publication ENET-UM006	Describes how to configure and use EtherNet/IP™ devices to communicate on the EtherNet/IP network.
Ethernet Reference Manual, publication ENET-RM002	Describes basic Ethernet concepts, infrastructure components, and infrastructure features.
CIP Security with Rockwell Automation Products Application Technique, publication SECURE-AT001	Explains how to implement the Common Industrial Protocol Security standard in your industrial automation control system.
System Security Design Guidelines Reference Manual, publication SECURE-RM001	Provides guidance on how to conduct security assessments, implement Rockwell Automation products in a secure system, harden the control system, manage user access, and dispose of equipment.
Configure System Security Features User Manual, publication SECURE-UM001	Describes the system-level configuration requirements to use a ControlLogix® 5580 controller.
Industrial Components Preventive Maintenance, Enclosures, and Contact Ratings Specifications, publication IC-TD002	Provides a quick reference tool for Allen-Bradley industrial automation controls and assemblies.
Safety Guidelines for the Application, Installation, and Maintenance of Solid-state Control, publication SGI-1.1	Designed to harmonize with NEMA Standards Publication No. ICS 1.1-1987 and provides general guidelines for the application, installation, and maintenance of solid-state control in the form of individual devices or packaged assemblies incorporating solid-state components.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, rok.auto/certifications .	Provides declarations of conformity, certificates, and other certification details.

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

Product Overview

Overview

450L safety light curtains can make a CIP Safety™ connection over EtherNet/IP™. The CIP Safety connection requires the following:

- 450L-APR-EN-8 plug-in module
- 450L-ENETR network interface

The safety light curtain communicates with a safety-rated programmable logic controller (PLC) or a safety-rated programmable automation controller (PAC) (for example, GuardLogix® and Compact GuardLogix controllers).

The 450L safety light curtain system is certified for use in safety applications up to and including the following:

- SIL CL 3 according to IEC 61508 and IEC 62061
- Performance Level PL_e (Category 4) according to ISO 13849-1

SIL requirements are based on the standards current at the time of certification.

You can use the plug-in module in both the 450L-B and 450L-E safety light curtain receiver sticks, but not on the transmitter sticks. [Figure 1 on page 10](#) shows an example plug-in module. The plug-in module has three 10-position rotary switches. Use these switches to do the following:

- Set the IP address to a private address
- Set the IP address to DHCP
- Reset the IP address to the factory default
- Set or clear Explicit Protection mode

Each plug-in module shows the manufacturing date code, coded in a year-week (YYWW) format.

The safety light curtain must have firmware 5.002 or higher to operate with the 450L-ENETR network interface.

Figure 1 - 450L-APR-EN-8 Plug-in Module

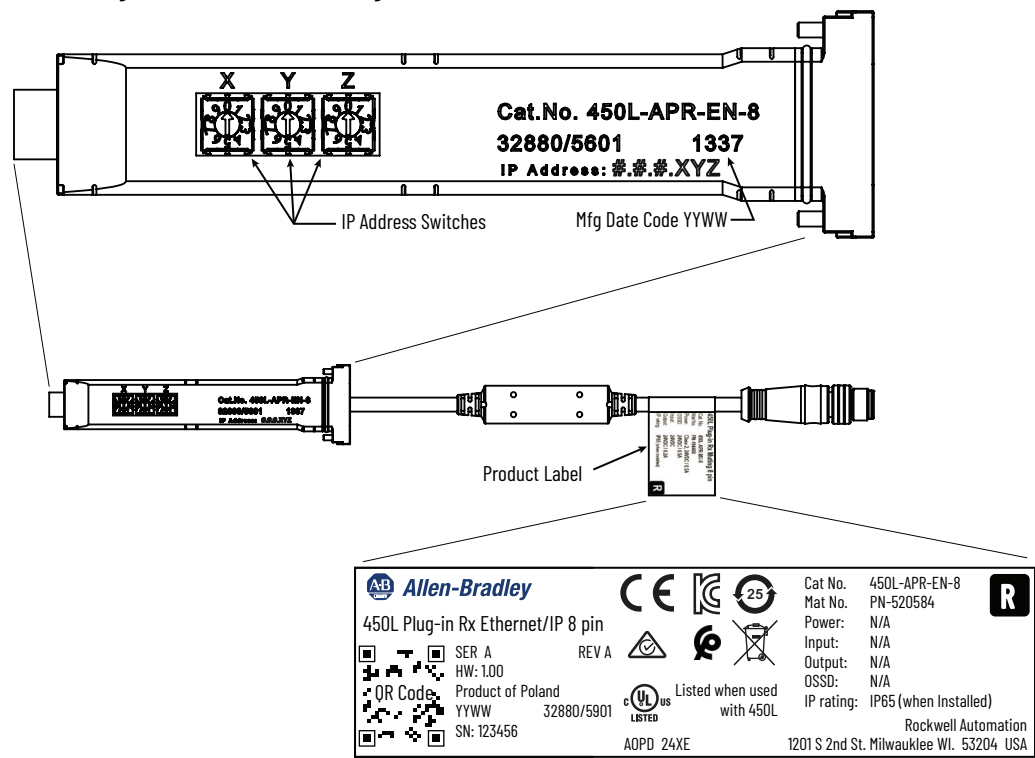
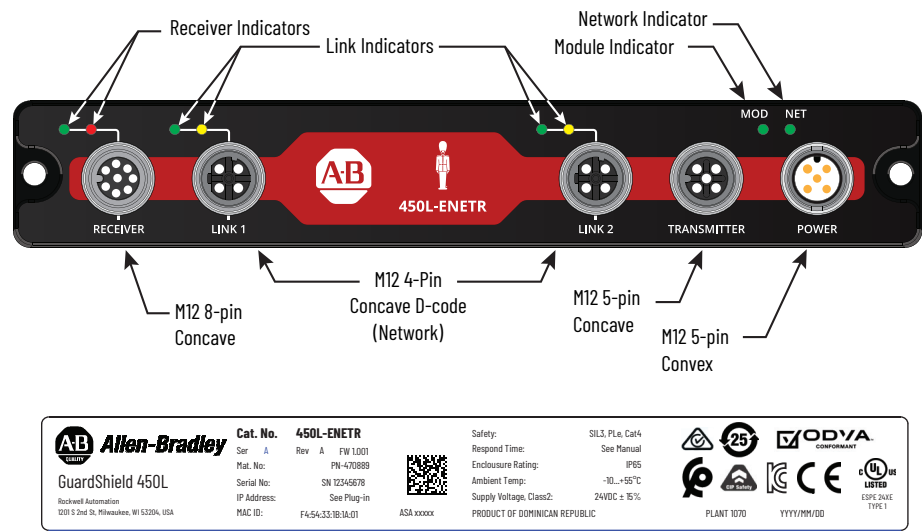


Figure 2 shows the features of the 450L-ENETR network interface. The module has five M12 QD connectors. The M12 D-code network connectors help prevent the standard M12 sensor cables from inadvertently being inserted.

Figure 2 - EtherNet/IP Connection Module



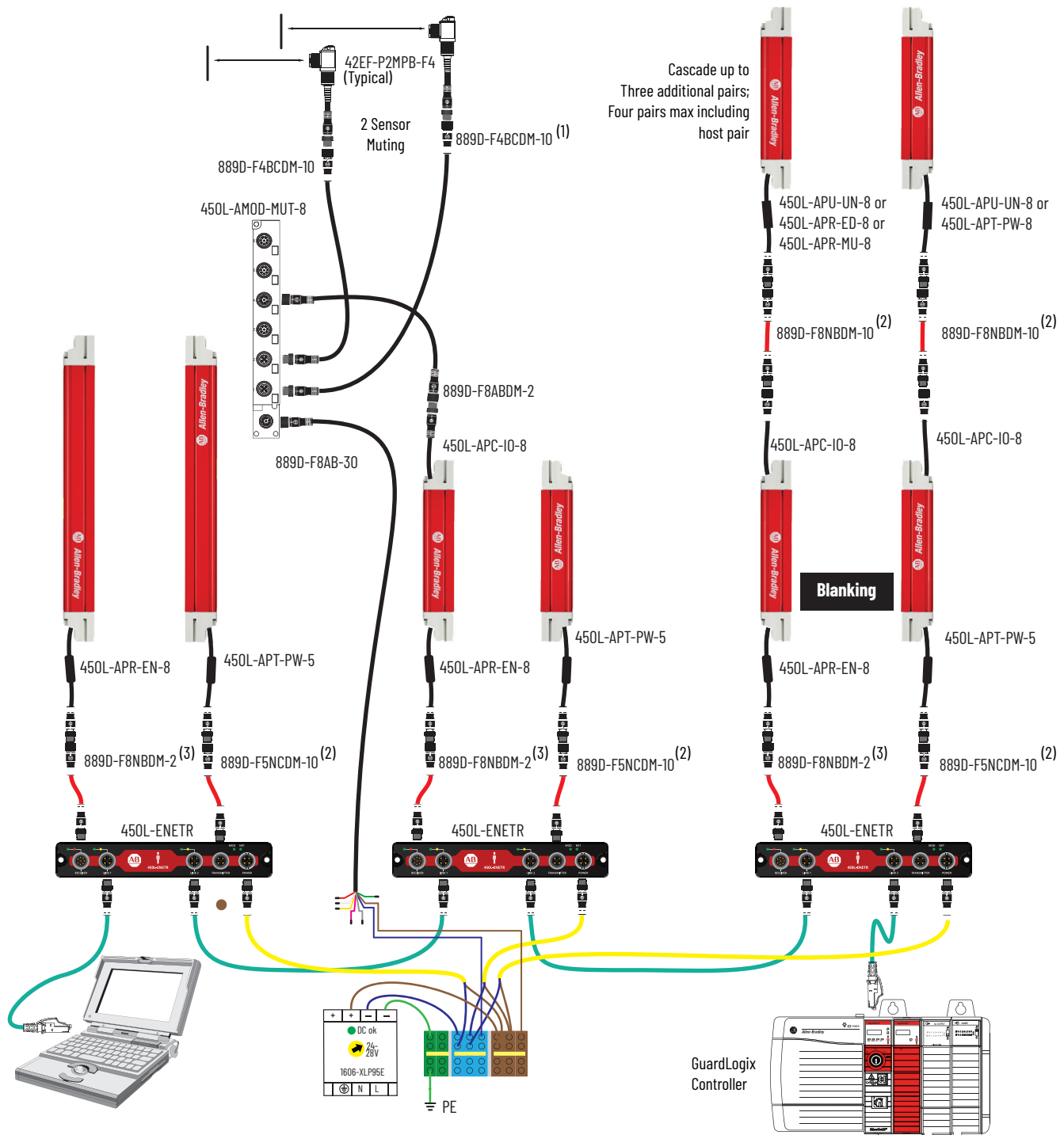
[Figure 3 on page 12](#) shows three example safety light curtain systems. You can use the 450L-ENETR network interface with one host pair of safety light curtains, with muting and blanking, or one host pair with up to three cascaded pairs.

Treat cascaded safety light curtain pairs as separate pairs. OSSD signals are the only shared information among them. The cascaded receiver sticks send the OSSD signal to the host pair. The 450L-ENETR network interface only knows the information of the host pair. The cascaded pairs can be different types, different key certificates, different firmware revisions, and configured differently.

You can only configure the pair of sticks that are connected to the 450L-ENETR network interface through the 450L-ENETR network interface. You can configure the cascaded pairs with the Connected Components Workbench™ application or by the switches on their plug-in modules.

The connection from the 450L-ENETR network interface to the receiver plug-in module must be with one cable. To maintain the approved EMC rating, do not use Y or T-connections between the 450L-ENETR network interface and the receiver safety light curtain sticks.

Figure 3 - Example Systems



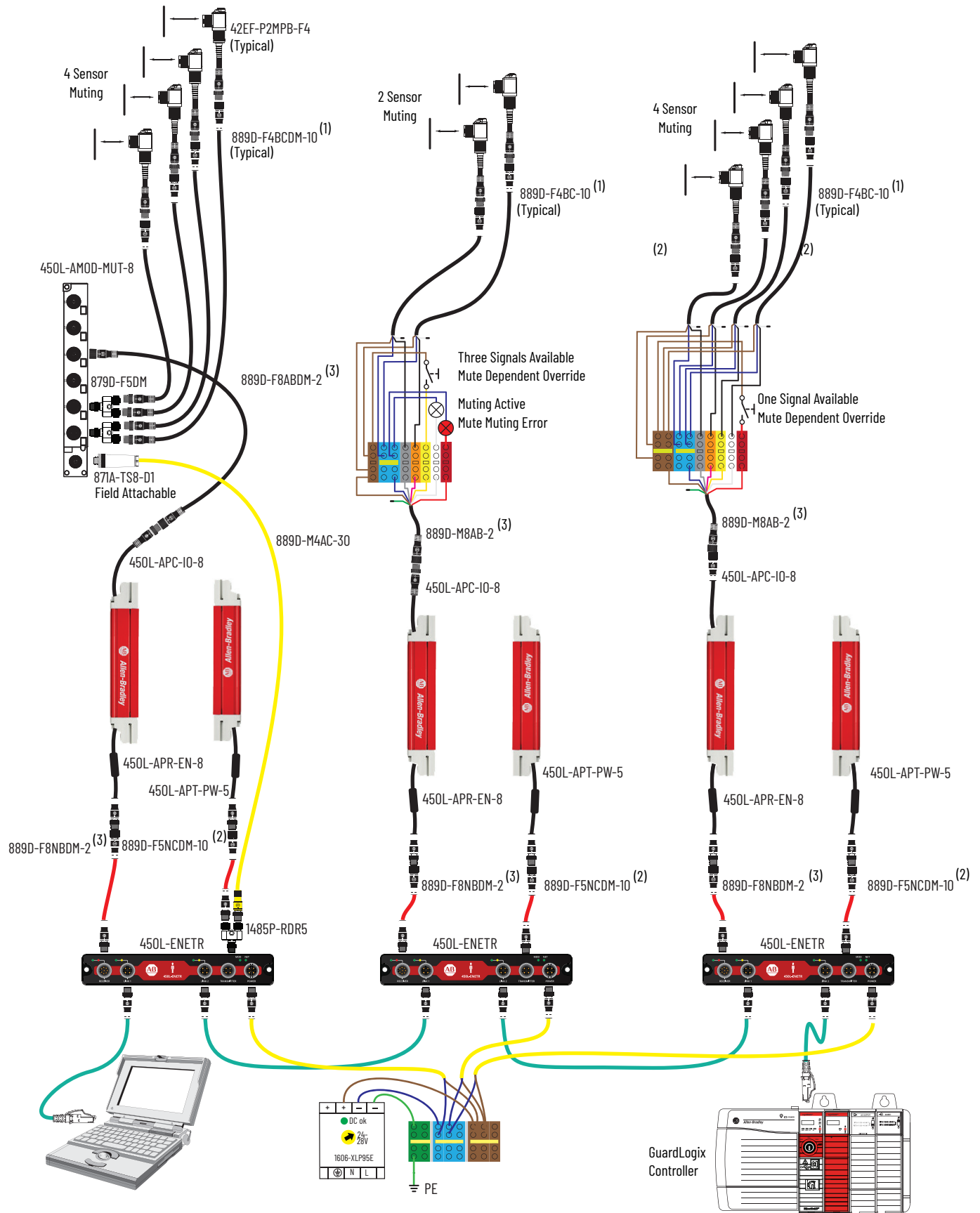
- (1) Max length = 10 m (32.8 ft)
 (2) Max length = 30 m (98.4 ft)
 (3) Max length = 2 m (6.6 ft)

[Figure 4 on page 14](#) shows three additional examples of muting. Use the muting block 450L-AMOD-MUT-8 or terminal blocks. Insulate all unused wire connections from shorting to other wires, power, or ground.

The muting block is convenient because the wiring is by patchcords and a cordset. However, the muting block has limited functionality when used with the 450L-ENETR network interface. You cannot use the 800F-MUT-2-MS muting station as there are no internal connections for the signals from connector 3 to the 450L-APC-IO-8 plug-in at connector 4.

Terminal blocks offer the flexibility to connect additional signals such as muting lamp, muting error, and mute dependent override. The example signals shown are the more popular signals; other signals are available (see [Safety Light Curtain Configuration on page 42](#)). The number of available signals depends on the number of muting sensors. The connections of signals to pins are configurable (see [Safety Light Curtain Configuration on page 42](#)). Install the terminal block solution in an appropriately rated environmental enclosure (IP54 as a minimum).

Figure 4 - Muting Examples



- (1) Max length = 10 m (32.8 ft)
- (2) Max length = 30 m (98.4 ft)
- (3) Max length = 2 m (6.6 ft)

Firmware Revisions

[Table 2](#) lists the firmware history for the 450L-ENETR network interface and the compatible safety light curtain firmware. Existing 450L safety light curtains with firmware revisions 3.001 and 5.001 can update to 5.002. Existing 450L safety light curtains with firmware revisions 1, 2, and 4 cannot update to 5.002 and cannot be used with the 450L-ENETR network interface.

Table 2 - Firmware Revision History

Component Cat. No.	Level	Description
450L-ENETR	1.001	Initial release - the initial release is only compatible with safety light curtain firmware revision 5.002 or later.
	1.002	Update to support safety light curtain FW 5.004 interference rejection option.
450L-B, -E	5.002	This release has 4K key security certificate and is compatible with the 450L-ENETR network interface, Connected Components Workbench software revision 12.00 or later (with the 450L update pack installed), and the Studio 5000® application version 24 or later. Studio 5000 revisions before version 32 have limited capability to change configurations in Program mode.
	5.003	Update for manufacturing. Same functionality as 5.002.
	5.004	Introduction of interference rejection option.

Firmware Compatibility

In the 450L device family, four objects have firmware:

- Transceivers
- Optical interface device (OID)
- Cascading I/O plug-in
- 450L-ENETR network interface

450L-ENETR Network Interface and Safety Light Curtain

[Table 3](#) shows the firmware compatibility of the 450L-ENETR network interface with the firmware of the 450L safety light curtains. The 450L-ENETR network interface initially releases with firmware revision 1.001 and is only compatible with safety light curtain firmware revision 5.002 (or later).

Table 3 - 450L-ENETR Network Interface and Safety Light Curtain Firmware Revision Compatibility

450L-ENETR Network Interface Firmware	Safety Light Curtain Firmware					
	1.001	2	3	4.001	5.001	5.002
1.001	No	No	No	No	No	Yes

Optical Interface Device and Safety Light Curtain

[Table 4](#) shows the firmware compatibility of the 450L-AD-OID communication interface with the firmware of the 450L safety light curtains.

Table 4 - OID and Safety Light Curtain Firmware Revision Compatibility

450L-AD-OID Communication Interface Firmware	Safety Light Curtain Firmware				
	1.001	2.x	3.x	4.001	5.x
1.001	Yes	No	No	No	No
1.002	Yes	Yes	No	No	No
3.001	Yes	Yes	Yes	No	No
4.001	Yes	Yes	Yes	Yes	Yes
5.001	Yes	Yes	Yes	Yes	Yes

Cascading I/O Plug-in and Safety Light Curtain

[Table 5](#) shows the firmware compatibility of the 450L-APC-IO-8 cascading I/O plug-in with the firmware of the 450L safety light curtains. The only plug-in with firmware is the 450L-APC-IO-8 cascading I/O plug-in. The security encryption level affects this plug-in. The firmware in the 450L-APC-IO-8 cascading I/O plug-in updates automatically when the plug-in is installed in the safety light curtain while the safety light curtain firmware is upgraded.

Table 5 - Cascading I/O Plug-in and Safety Light Curtain Firmware Compatibility

450L-APC-IO-8 Cascading I/O Plug-in Firmware	Safety Light Curtain Firmware			
	2	3	4	5
2	Yes	Yes	No	No
3	Yes	Yes	No	No
4	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes

Cascaded Safety Light Curtain Firmware Revisions

[Table 6](#) summarizes the firmware compatibility of the host and cascaded safety light curtains. Cascaded safety light curtains operate as independent safety light curtains. The cascaded receivers pass down their safety outputs to their hosts; the firmware of the cascaded safety light curtain does not report to the host safety light curtain.

Table 6 - Cascaded Safety Light Curtain Firmware Revision Compatibility

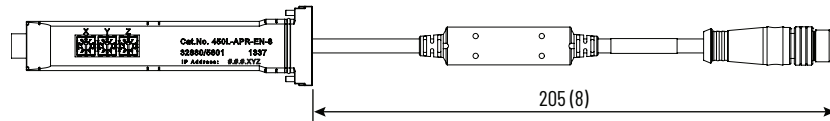
Host Safety Light Curtain Firmware	Cascaded Safety Light Curtain Firmware			
	2	3	4	5
2	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes
5	Yes	Yes	Yes	Yes

Installation

Mounting Dimensions

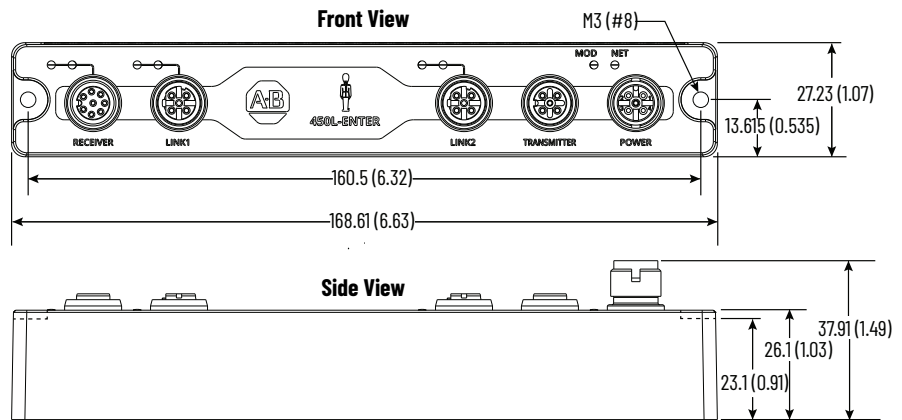
[Figure 5](#) shows the mounting dimension of the 450L-APR-EN-8 plug-in module.

Figure 5 - Plug-in Module Mounting Dimensions [mm (in)]



[Figure 6](#) shows the mounting dimensions of the 450L-ENETR network interface.

Figure 6 - Network Interface Mounting Dimensions [mm (in)]



Installation

See publication [450L-UM001](#) for installation instructions for the 450L-APR-EN-8 plug-in module.

You can use the two M3 mounting holes to mount the 450L-ENETR network interface on any flat surface. The cable from the receiver stick to the 450L-ENETR network interface must have a patchcord length of 2 m (6.6 ft) or less.

Notes:

Power, Ground, and Wire

Wiring Requirements and Recommendations



ATTENTION: Before you install and wire any device, disconnect power to the system. Calculate the maximum current in each power and common wire. Observe all electrical codes that dictate the maximum current allowable for each wire size. Current above the maximum ratings can cause wiring to overheat, which can cause damage.

Do not run signal/communications wiring and power wiring in the same conduit. Route wires with different signal characteristics by separate paths.

Separate wiring by signal type. Bundle together any wiring with similar electrical characteristics.

Label wiring to all devices in the system. Use tape, shrink-tubing, or other means to label wires. Also, use colored insulation to identify wires based on signal characteristics. For example, you can use blue for DC wiring and red for AC wiring.

IMPORTANT Fault exclusions for conductors and wiring must follow the requirements according to EN ISO 13849-2 Table D.3 and D.4. A fault exclusion can reduce the overall safety rating of the related safety function to a maximum of PLd per EN ISO 13849-1.

Figure 7 - Pin Assignments

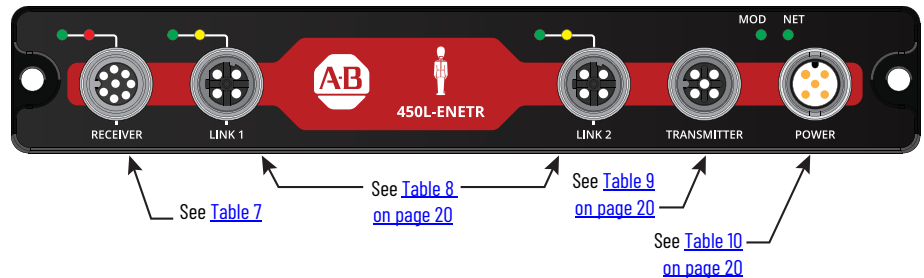


Table 7 - Receiver Pin Assignments


8-pin Concave	Pin	Description
	1	Comm Rx
	2	+24V DC
	3	Functional earth, FE
	4	Comm Tx
	5	14V from safety light curtain
	6	NC
	7	OV (GND)
	8	Safety interrupt

Table 8 - Link Pin Assignments


4-pin Concave	Pin	Description
	1	Tx Data+
	2	Rx Data+
	3	Tx-
	4	Rx-

Table 9 - Transmitter Pin Assignments



5-pin Concave	Pin	Description
	1	+24V DC
	2	NC
	3	0V (GND)
	4	NC
	5	Functional Earth, FE

Table 10 - Power Pin Assignments

5-pin Convex	Pin	Description
	1	+24V DC
	2	NC
	3	0V (GND)
	4	NC
	5	Functional Earth, FE

Power Supply

An external 24V DC power supply source supplies power for the network interface. To comply with the European Low Voltage Directive (LVD), power must come from a protected extra low voltage (PELV) DC source.

To comply with UL restrictions, power must come from DC sources with secondary circuits that are isolated from the primary circuit by double insulation or reinforced insulation. The DC power supply must satisfy the requirements for the National Electric Code (NEC) Class 2.

Many of the Bulletin 1606 power supplies from Rockwell Automation are both PELV and NEC Class 2 compliant. The following is a list of some of the compliant catalog numbers:

- 2080-PS120-240VAC
- 1606-XLP30E
- 1606-XLP50E
- 1606-XLP50EZ
- 1606-XLP72E
- 1606-XLP95E
- 1606-XLSDNET4

IMPORTANT

The 450L-ENETR network interface is not powered until you apply +24V DC and connect the 450L receiver stick.


The +24V DC signal applied to 450L-ENETR network interface via the power connector goes directly into the 450L safety light curtain and returns as +14V DC on the 450L-ENETR network interface receiver connector (pin 5) to power the 450L-ENETR network interface.

Diagnostic Status Indicators

Indicator Status

[Table 11](#) lists the diagnostic status indicators on the 450L-ENETR network interface.

Table 11 - Diagnostic Status Indicators

		
Indicator	Status	Description
Module Status (MOD)	Off	Module is not powered.
	Flashing red/green	Module is not configured.
	Flashing green	Module is configured, but not in Running mode. Module connection can be inhibited. See Connection on page 36 .
	Steady green	Module is powered, configured, and operating correctly (Running mode).
	Flashing red	Update in progress. (Configuration mode). IP/ Target Unique Network Identifier (TUNID) mismatch - reset ownership with controller.
	Steady red	Unrecoverable fault detected (Critical Fault mode).
EtherNet/IP Network Status (NET)	Off	The module does not have an IP address and is operating in DHCP mode.
	Flashing green	The module has an IP address, but no CIP™ connections are established. Module connection can be inhibited. See Connection on page 36 .
	Steady green	The module has an IP address and CIP connections (any transport class) are established.
	Flashing red	An exclusive owner connection has timed out.
LINK1 or LINK2 Status	Off	No link/no activity
	Steady green	Link established
	Flashing yellow	Port activity
Receiver Status	Green	Communication OK
	Flashing red	Safety light curtain is in lockout.
	Red	No communication

Notes:

Assign an IP Address

Overview

Before you use the 450L-ENETR network interface in an EtherNet/IP™ network, you must configure the interface with an IP address, subnet mask, and optional Gateway address.

The 450L-ENETR network interface must be assigned a fixed (static) IP address to maintain continued communication with its network.

There are four ways to assign a fixed IP address.

- Use the XYZ rotary switches to set a fixed private IP address.
- Use the Rockwell Automation® BOOTP/DHCP tool, revision 2.3 or later, which ships with Studio 5000® (RSLogix 5000®).
- Have your network administrator configure the 450L-ENETR network interface via the network DHCP server.
- Use RSLinx® or Studio 5000 to change a dynamic (DHCP) address to a static address.

You can also set the 450L-ENETR network interface to DHCP, which allows the network DHCP server to assign and lease an IP address to the 450L-ENETR network interface automatically. We do not recommend this configuration for long-term use, as the IP address can change after its lease expires. Upon power-up, the 450L-ENETR network interface reads the switches to determine what actions to take.

Set an IP Address

[Figure 8](#) shows the three address switches, X, Y, and Z on the 450L-APR-EN-8 plug-in module. Each switch has 10 positions, labeled 0...9. Switch settings dictate how the IP address is determined. Use a small screwdriver to rotate the switches to the desired values. Align the small arrow on the switch with the number setting that you wish to use.

Figure 8 - 450L-APR-EN-8 Plug-in Module Address Switches

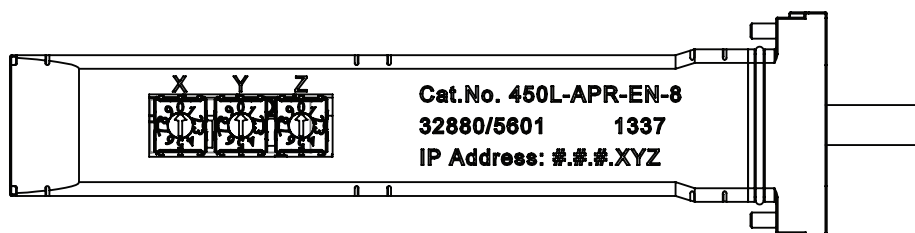


Table 12 describes the settings for the values set by switches X, Y, and Z. For example, the XYZ switches set to a value of 123 assigns a fixed private IP address of #.#.#.123.

Table 12 - IP Address Settings

Value	Description
000	Clear Explicit Protection mode
001...254	Private address (for example, #.#.#.XYZ)
888	Factory Reset
900	Set Explicit Protection mode
999	DHCP
All others	Do not use.

When Explicit Protection mode is set, explicit messages that affect the operation of the device are blocked. Examples of block messages are changes to the IP address, reset of the module, and update of the firmware. Explicit messages can still fetch diagnostic information.

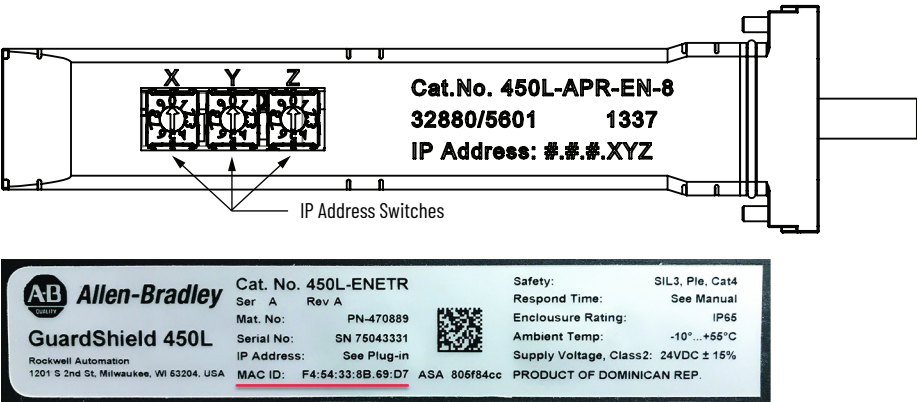
Table 13 - Example Setup Procedures

Step	XYZ Setting	Description
1	888	Reset to factory default.
2	001...254	Stop here to allow your private address to accept all explicit messages.
3	900	Set Explicit Protected mode.
4	001...254	Stop here and your private address is in Explicit Protected mode.
5	000	Clears Explicit Protected mode.
6	001...254	Your private address accepts all explicit messages.

Replacements and Changes

Figure 9 shows the location of the two parameters that are required for communication. The IP address setting is made on the 450L-APR-EN-8 plug-in module. The IP address must be associated with a MAC ID, which is assigned to the 450L-ENETR network interface.

Figure 9 - IP Address Components



Replacement and changes of components determines what actions are necessary to return the system to an operational state. See Table 14 on page 25 for guidelines.

Table 14 - Replacement and Change Guidelines

Cat. No.	Conditions	Action
450L-APR-EN-8	Use the same private address.	No further action.
	Change to another private address.	Adjust the IP address in the controller (see General on page 32) and reset ownership (see Configure/Reset Ownership on page 39).
	<ul style="list-style-type: none"> Change from private to non-private address. Retain the existing non-private address. 	<ol style="list-style-type: none"> Reset to factory default. Use the BOOTP/DHCP tool to assign an appropriate non-private address to the MAC-ID. Disable DHCP. Adjust the IP address in the controller (see General on page 32) and reset ownership (see Configure/Reset Ownership on page 39).
	Change from a non-private to a private address.	Adjust the IP address in the controller (see General on page 32) and reset ownership (see Configure/Reset Ownership on page 39).
450L-ENETR	Plug-in module is assigned a private address.	No action required.
	Plug-in module is assigned a non-private address.	Run the BOOTP/DHCP tool to associate the IP address with the new MAC ID. Reset ownership (see Configure/Reset Ownership on page 39) in the controller.

Reset to Factory Default and Protection Mode

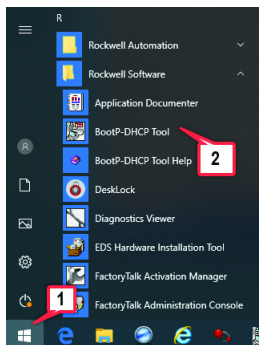
At any time, you can set the 450L-ENETR network interface to the factory default or you can set/clear the Protection mode by following these steps:

- Turn off power to the 450L-ENETR network interface.
- Remove the 450L-APR-EN-8 plug-in module from the receiver stick.
- Set the XYZ rotary switches on the 450L-APR-EN-8 plug-in module:
 - 888 to reset to factory default
 - 900 to set Explicit Protection mode
 - 000 to clear Explicit Protection mode
- Insert the 450L-APR-EN-8 plug-in module into the receiver stick.
- Apply 24V DC to the 450L-ENETR network interface.
- Wait at least 5 seconds. After 5 seconds, the MOD indicator flashes red. All other indicators are off.
- Remove power from the 450L-ENETR network interface.
- Remove the 450L-APR-EN-8 plug-in module from the receiver stick.
- Assign the new IP address by setting the XYZ rotary switches.
- Insert the 450L-APR-EN-8 plug-in module into the receiver stick.
- Apply 24V to the 450L-ENETR network interface.

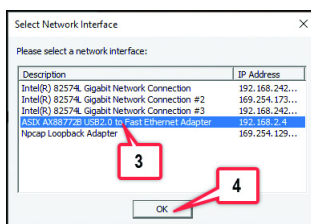
BOOTP/DHCP

Follow these steps to use the BOOTP/DHCP tool to assign a non-private address (XYZ are set to 999).

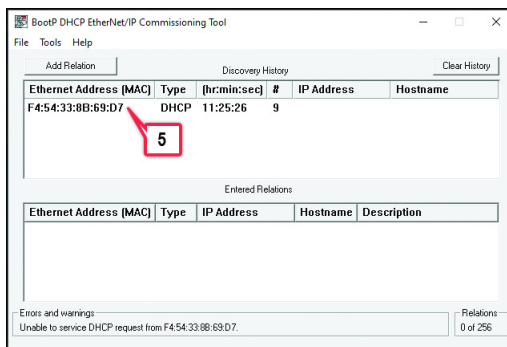
1. Click the Windows® Start icon.
2. Scroll down to R. Expand Rockwell Software® and click the BOOTP-DHCP Tool.



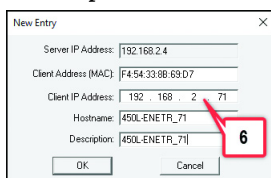
3. If multiple network interfaces exist, select the desired interface. If only one interface is detected, this window does not appear.
4. Click OK.



5. The MAC ID has been discovered. Double-click the MAC ID.

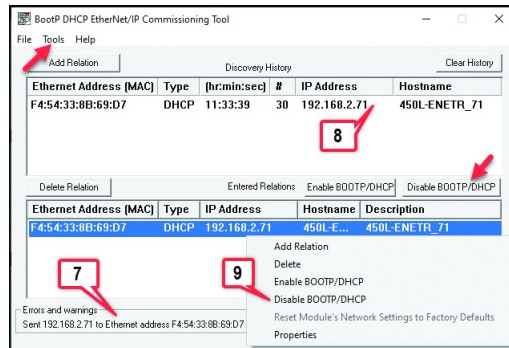


6. Type in the desired IP address. The Hostname and Description fields are optional.

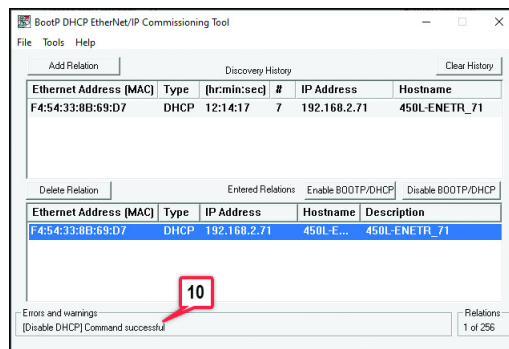


Wait several seconds. On the next discovery request, the IP address is assigned to the MAC ID.

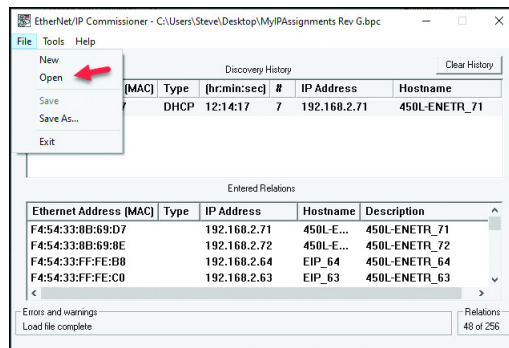
7. The IP address was sent to the MAC ID.
8. The IP address now appears in the Discovery History listing.
9. In the Entered Relations listing, right-click the device and select Disable BOOTP/DHCP. Disable also can be accomplished under the Tools menu and by use of the button.



10. The Disable command was successful. The IP address is now static.



We recommend that you save the IP assignments to track your assignments. If you must reassign an IP address, you can open this file and the BOOTP/DHCP tool automatically assigns the IP address to the MAC ID.

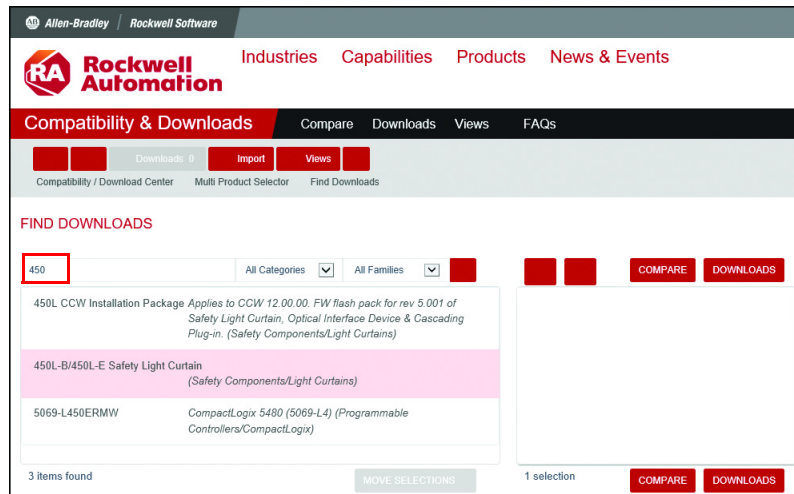


Notes:

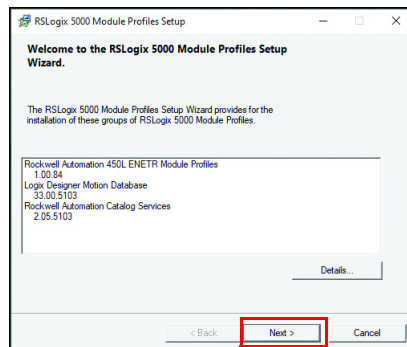
Download and Install the Add-on Profile

Procedure

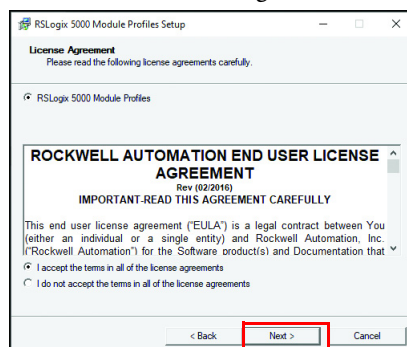
1. Go to the Rockwell Automation download webpage: rok.auto/pcdc
2. Type 450 in the search field. Highlight the 450L-B/450L Safety Light Curtain to select the 5.002 (or later) revision of the firmware to download.



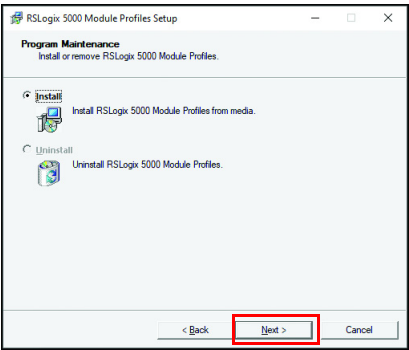
3. Before you run the installer, close and exit Studio 5000® and RSLinx®.
4. Run the MPSetup.exe program. Confirm the module profile and click Next.



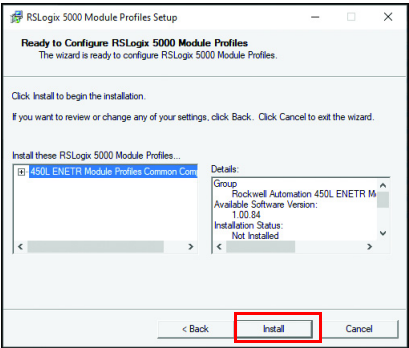
5. At the license agreement, accept the terms and click Next.



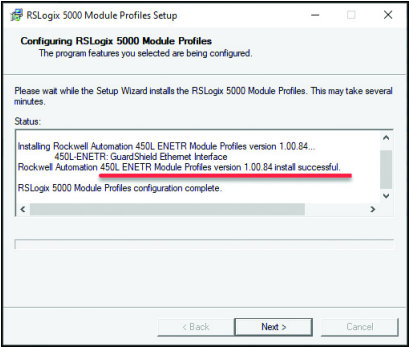
6. At the Program Maintenance screen, click Next.



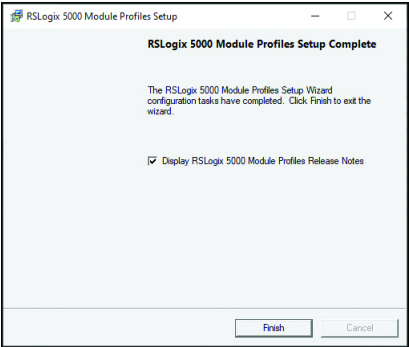
7. Click Install.



8. The installation of the module profile was successful. Click Next.



9. Click Finish



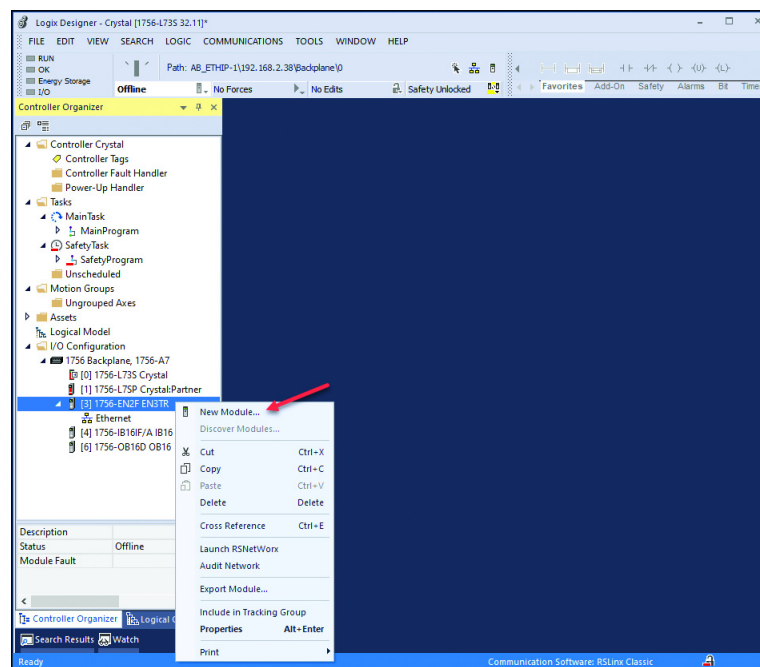
Add the Module Profile to a Studio 5000 Project

This chapter describes how to add the 450L-ENETR network interface Add-on Profile (AOP) to a Studio 5000® Project. In this example, version 32 of Studio 5000 is used.

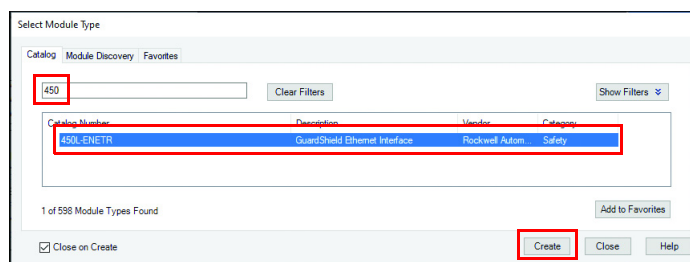
Add New Module

1. Right-click the Ethernet module of the controller to which you want to communicate. Then, click New Module.

Alternatively, go online with the controller and select Discover Modules.



2. The Select Module Type window opens. In the filter field, type 450. The list of available catalog numbers reduces to the 450L-ENETR catalog number.
3. Click the 450L-ENETR (the selection highlights in blue).
4. Click Create to open the module window.

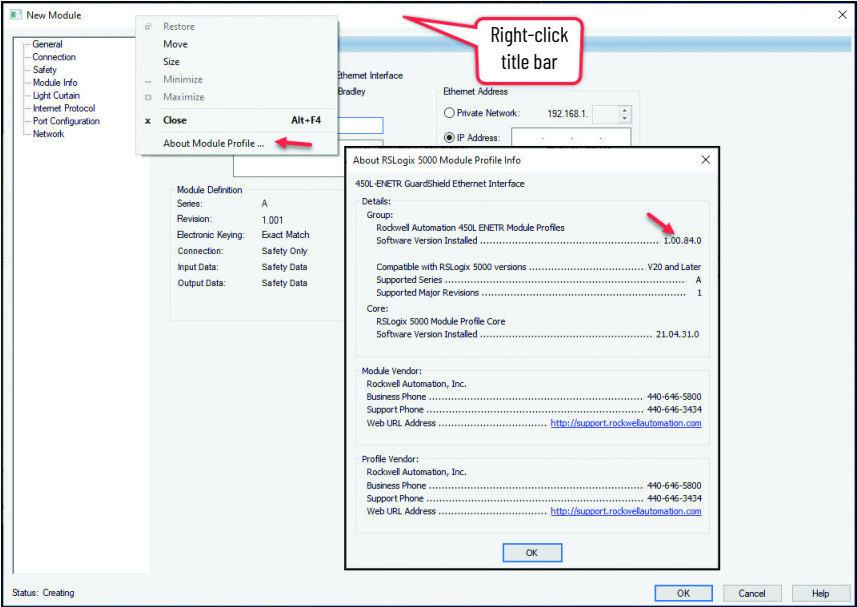


About the Module Profile

To view information about the module profile, right-click the New Module title bar (or Module Properties after installation) and then click About Module Profile.

In [Figure 10](#), the specific software version of the profile in this example is 1.00.84.0.

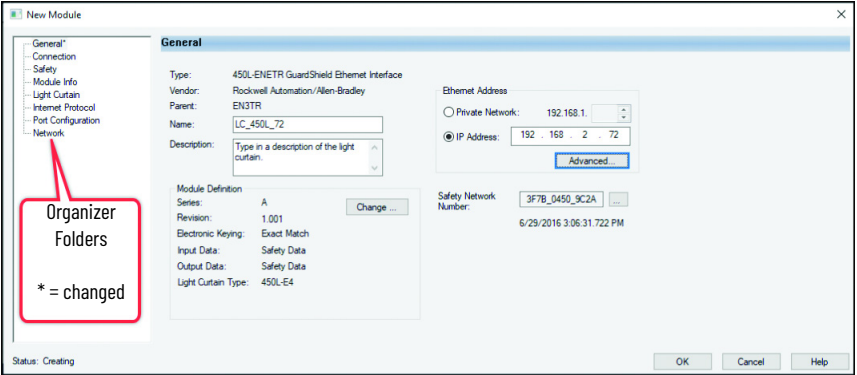
Figure 10 - Software Version Installed



General

[Figure 11](#) shows the general setup folder for the 450L-ENETR network interface. The column lists the folders that apply to the module. An asterisk shows that a change is made; click the OK button to accept the change.

Figure 11 - New Module - General Setup



Item	Description
Name	The name of the module (required) must be entered. This name is used to identify the controller tags.
Description	Type in a description, if desired (optional).
Ethernet Address	<ul style="list-style-type: none">Select a Private Network address and specify the last octet orType in a custom IP address.Click the Advanced button if you must use Network Address Translation.

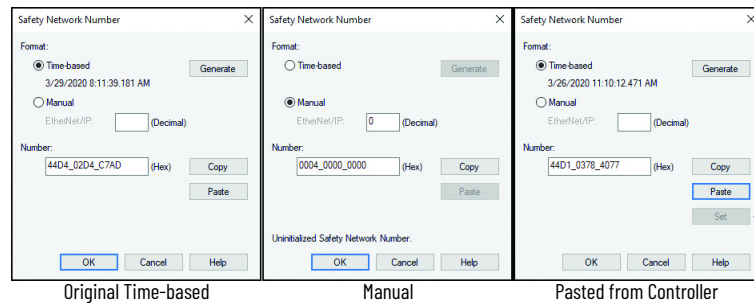
Safety Network Number (SNN)

When the 450L-ENETR network interface is added to the project, the 450L-ENETR network interface adopts a time-based safety network number.

Use the Ellipsis button to modify the SNN, if desired. In [Figure 12](#), the original SNN for the 450L-ENETR network interface is assigned a unique time-based number. You can modify this number to be the same as the controller SNN if you must have all SNN on one network be the same, or if you establish another numbering scheme. This modification is not necessary; the SNN can be different. The number can be changed in two ways:

- Check the Manual format and edit the number.
- Paste the safety controller SNN into the number field.

Figure 12 - Safety Network Number



You can get this module status and fault message after download and Remote Run.

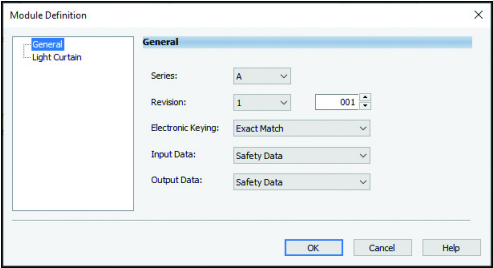
Status	IO Faulted
Module Fault	(Code 16#080e) safety network number mismatch.

This fault occurs because the SNN that resides in the 450L-ENETR network interface is not the same as the SNN that resides in the controller. To download the SNN to the 450L-ENETR network interface, reset ownership of the network interface in the Safety folder (see [Configure/Reset Ownership on page 39](#)).

Module Definition

On the General setup window, click the Change button to open the Module Definition window. The Module Definition window describes the safety light curtain that is connected to the 450L-ENETR network interface (see [Figure 13](#)).

Figure 13 - Module Definition - General



Item	Description
Series	Select the series letter of the 450L-ENETR network interface.
Revision	Select the revision level of the 450L-ENETR network interface.
Electronic Keying	Select the desired electronic keying for the 450L-ENETR network interface. <ul style="list-style-type: none">Compatible Module - The series letter must be correct, and the revision level is ignored.Exact Match - Both the series letter and revision level must be correct to use the 450L-ENETR network interface.
Input Data	The only choice is Safety Data.
Output Data	The only choice is Safety Data.

Module Definition - Safety Light Curtain

[Figure 14](#) defines the safety light curtain.

Figure 14 - Module Definition - Safety Light Curtain

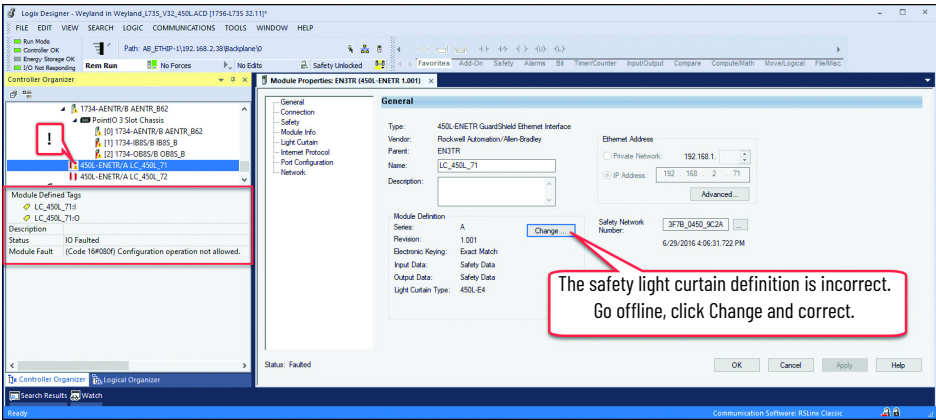
Item	Description
Light Curtain Type	Select the safety light curtain type, either 450L-B4 (the basic type) or 450L-E4 (the type with enhanced features).
Light Curtain Series	Select the series letter that matches the series letter of the safety light curtain stick.
Light Curtain Revision	Select and verify that the Revision number matches the revision number of the safety light curtain stick.
Length	Select the length of the safety light curtain.
Resolution	Select the resolution as either 14 mm (0.55 in.) (finger detection) or 30 mm (1.18 in.) (hand detection).
Catalog	The previous parameters determine the catalog number automatically. You must confirm the actual catalog number with the generated number.
Cascading	Select either None or 450L-APC-IO-8. The 450L-APC-IO-8 is required for applications that require cascaded safety light curtains or muting. If the safety light curtain type selected is 450L-B, the only choice is None.

In [Figure 15](#), verify the module properties and confirm the change to the module definition. Click Yes.

Figure 15 - Confirm Module Change

Figure 16 shows an example of a configuration error in the safety light curtain module definition. The safety light curtain configuration does not match the actual safety light curtain that is connected to the controller. Take the project offline, click the Change button, and adjust the safety light curtain settings.

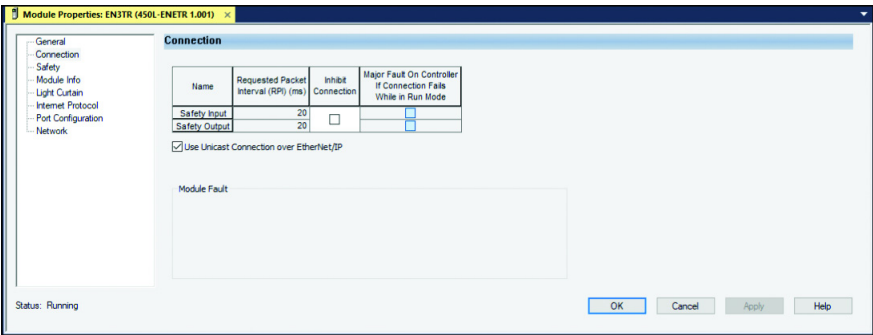
Figure 16 - Configuration Error



Connection

Figure 17 shows an example of the Connection folder when Studio 5000 is online with the controller.

Figure 17 - Connection Folder

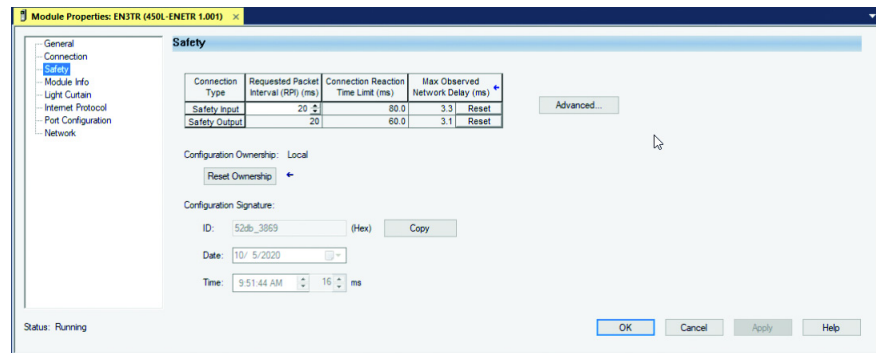


Item	Description
Requested Packet Interval (RPI)	This item is a read-only field. The input RPI can be changed in the Safety folder (Safety on page 37). The Safety Task sets the output RPI (see Requested Packet Interval (RPI)(ms) on page 37).
Inhibit the module	Leave this box unchecked to allow a connection to the module. Check this box to inhibit connection to this module.
Major Fault if Connection Fails	Check these boxes if you want the controller to show a major fault when a safety input or output connection is lost while the controller is in the Run mode.
Use Unicast Connection	This box must be checked. Connection is from the controller to one specific device - the 450L-ENETR network interface.
Module Fault	This box shows the description of a module fault.

Safety

[Figure 18](#) shows an example of the safety folder with Studio 5000 online.

Figure 18 - Safety Folder



Item	Description
Connection Type	Allows you to configure various parameters for the Safety Input and Safety Output. See Connection Type on page 37 .
Configuration Ownership	Options include Not Owned and Local. See Configure/Reset Ownership on page 39 .
Configuration Signature	Defines the configuration of the module. See Configuration Signature on page 40 .

Connection Type

Requested Packet Interval (RPI) (ms)

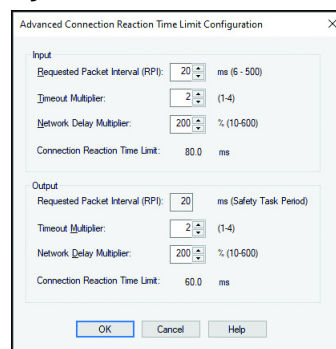
The RPI is the interval in which the controller inquires the status of the module inputs and outputs.

When you select a small RPI, it consumes network bandwidth and can cause spurious trips because other devices cannot get access to the network. Applications that use a safety light curtain to guard a hazard need the fastest response possible. When the appropriate RPI is selected, the system has maximum performance.

- Safety Input - The RPI can be adjusted directly here between 6...500 ms. Alternatively, click the Advanced button. Apply the changes.

[Figure 19](#) shows the Advanced Connection Reaction Time Limit Configuration window, which allows additional adjustments to the reaction time. The RPI, timeout multiplier, and network delay multiplier can be changed to modify the reaction time.

Figure 19 - Advanced Connection Reaction Time Limit Configuration



The default value for Timeout Multiplier is 2. The default value for Network Delay Multiplier is 200.

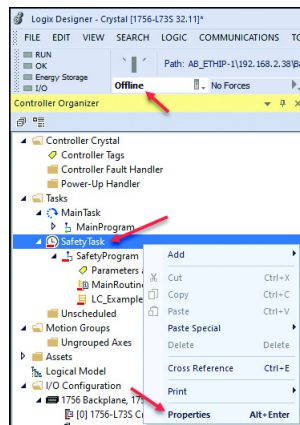
IMPORTANT To determine what is appropriate, analyze each safety channel. The default Timeout Multiplier of 2 and Network Delay Multiplier of 200 create a worst-case input connection-reaction time limit of four times the RPI, and an output connection-reaction time limit of three times the RPI. Only approve changes to these parameters after a safety administrator reviews them thoroughly.

If the RPI and connection reaction time limit for the network are set appropriately, then the Connected tag must always remain low. Monitor the connection status bit to verify that it is not going high intermittently due to timeouts.

- Safety Output - The safety output RPI is always equal to the Safety Task period.

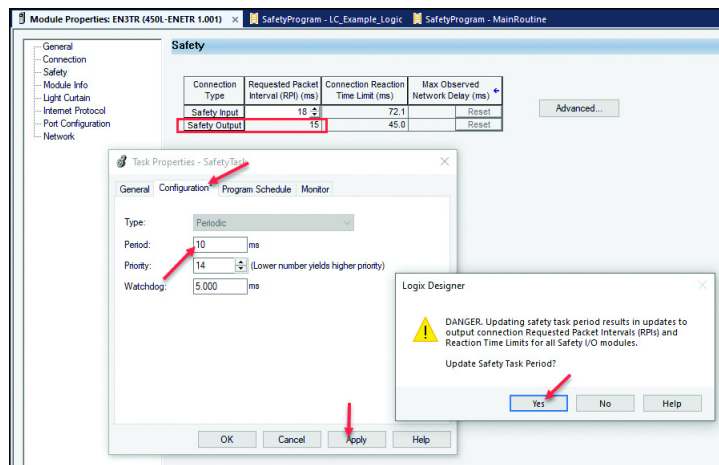
As shown in [Figure 20](#), go offline, right-click the Safety Task, and select the properties.

Figure 20 - Open Safety Task Properties



As shown in [Figure 21](#), the safety output RPI is 15 ms. On the Configuration tab, enter a new number (10 in this example) in the period field and click Apply. Read the danger message and click Yes to confirm. Afterwards, download the new configuration to the controller.

Figure 21 - Adjust Output RPI



Connection Reaction Time Limit (ms)

This field is calculated automatically and the RPI time influences it.



ATTENTION: Add the connection reaction time limits to the total response time in the safety light curtain to calculate the safety distance. See publication [450L-UM001](#) to calculate the response time of the safety light curtain.

The time from when the safety light curtain stops sending the safety signal to the 450L-ENETR network interface to when the 450L-ENETR network interface changes the safety bit to be sent out is less than 7 ms.

$$\text{Reaction Time} = \text{Safety Input Connection Reaction Time Limit} + \text{Safety Light Curtain Response Time} + \text{Safety Output Connection Reaction Time} + 7 \text{ ms}$$

Max Observed Network Delay (ms)

This field shows the maximum network delay in milliseconds when the controller is online and the module is connected. Click the Reset button to clear the values and restart the observations.

Configure/Reset Ownership

The Reset Ownership button only works if the connection to the module is inhibited and the controller is online (see [Connection on page 36](#)). The controller can be in Program, Run, or Test mode. If the module is not inhibited, a message (Failed to perform required operation) displays.

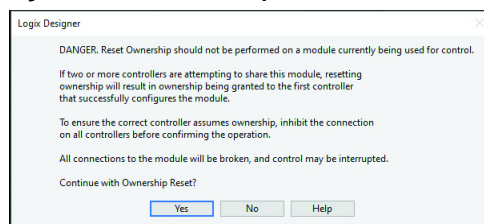
- Not Owned - the controller cannot send messages to or receive messages from the 450L-ENETR network interface.

Click Reset Ownership. The SNN passes to the device, which allows the controller to own the 450L-ENETR network interface. [Figure 22](#) shows the message box to reset ownership.

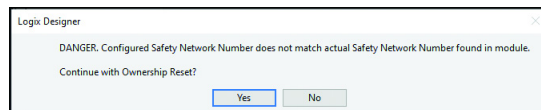
- Local - this status is desired. The controller in the project is the only controller that can send message instructions to the 450L-ENETR network interface.
- Remote (SNN: #####_####_####, Address: xxx.xxx.xxx.xxx) - another controller on the network owns the 450L-ENETR network interface and you cannot reassign to the local controller by simply clicking the Reset Ownership button. To take control, do one of the following:
 - Open the project on the original controller, remove the 450L-ENETR network interface connection (see [Appendix E on page 93](#)), and then reset ownership to the new local controller
 - Temporarily remove the original controller from the network, reset ownership to the new local controller, and then reconnect the original controller back onto the network.



When you see this message (Ownership cannot be reset until pending edits are applied), click the Apply button in the lower-right corner.

Figure 22 - Reset Ownership

In [Figure 23](#), you are prompted to continue. Click Yes to pass the SNN to the device. Now the SNN of the controller and 450L-ENETR network interface match, and the ownership is set to Local.

Figure 23 - Continue with Ownership Reset

Configuration Signature

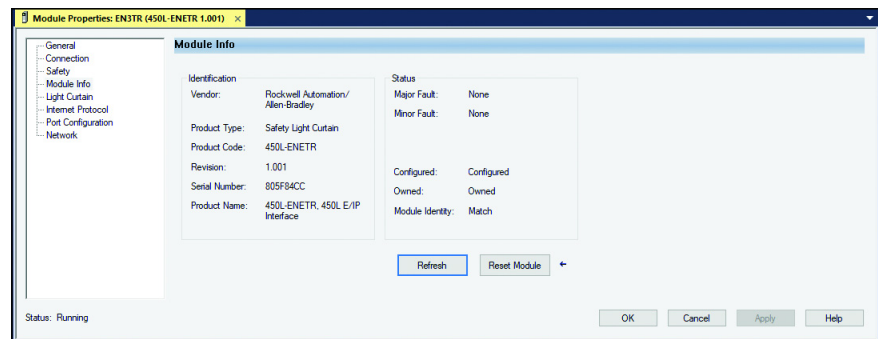
The configuration signature uniquely identifies the configuration of the module. When you use a GuardLogix® controller, you do not need to monitor this signature, as the GuardLogix controller monitors the signature automatically.

Module Info

The module info window is only populated when Studio 5000 is online. The controller can be in Program, Run, or Test mode. The information that is displayed is read-only.

[Figure 24 on page 41](#) shows an example of the module info folder with Studio 5000 online. In this figure, the safety light curtain is in a running state with no major or minor faults. The module is configured and owned; and the module identity is a match.

Figure 24 - Module Info

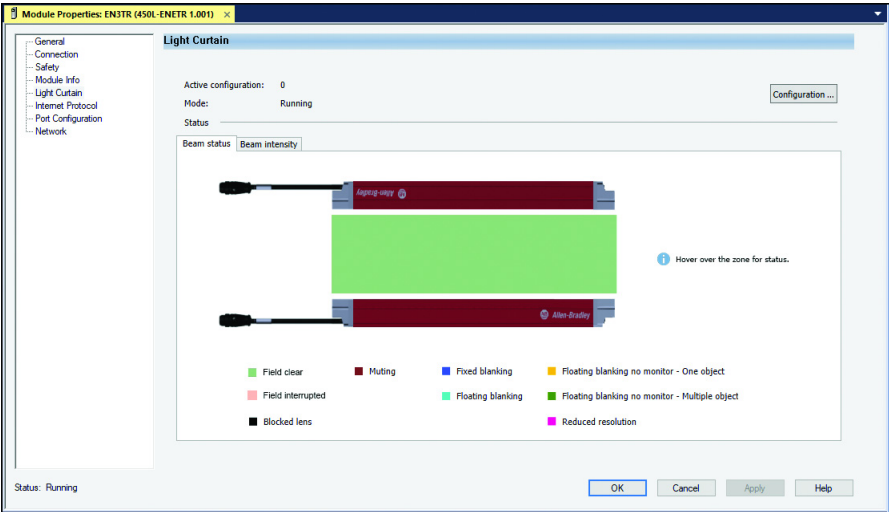


Item	Description	
Identification	These fields identify the product and are read-only. Use these fields to confirm the attributes of the device.	
Status	These fields identify the operating status of the module and are read-only.	
	• Faults	The major and minor faults can have three states:
	- None	The 450L-ENETR network interface is functioning properly.
	- Recoverable	Actions can be taken to clear the fault without having to cycle power to the 450L-ENETR network interface.
	- Unrecoverable	Cycle power to the 450L-ENETR network interface.
	• Configured	Indicates whether the 450L-ENETR network interface is configured.
	- Configured	The 450L-ENETR network interface is properly configured.
	- No	The 450L-ENETR network interface is not properly configured.
	• Owned	Indicates whether a controller owns the 450L-ENETR network interface.
	- Owned	The controller owns the 450L-ENETR network interface.
	- No	Go to the safety folder and reset ownership.
	• Module Identity	Indicates whether the series letter and revision in the controller match the values in the 450L-ENETR network interface
	- Match	The 450L-ENETR network interface matches the identity in the controller.
	- No	The 450L-ENETR network interface does not match the identity in the controller.
Refresh	Updates the fields while maintaining the connection to the 450L-ENETR network interface.	
Reset Module	The Reset Module button only works when the connection is inhibited (see Connection on page 36). The module is temporarily disconnected from the controller, which is equivalent to a power cycle of the 450L-ENETR network interface (and also the safety light curtain). If the module is not inhibited, a message (Failed to perform required operation) displays.	

Safety Light Curtain Configuration

Figure 25 shows an example of the safety light curtain configuration folder, with a connection to the controller. The window shows that the active configuration is Subconfig 1, and the Operating mode is running.

Figure 25 - Safety Light Curtain Configuration - Beam Status

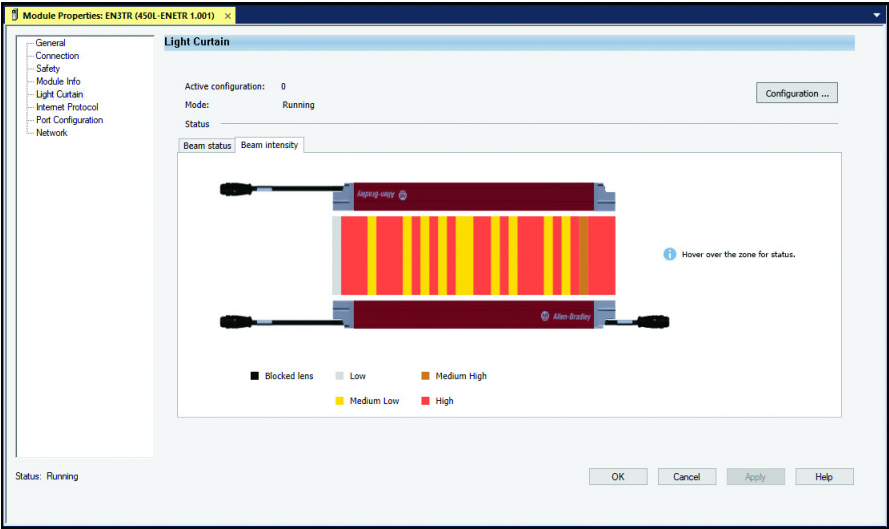


Item	Description
Active configuration	Configuration 1...Configuration 4
Mode	The Operating mode is typically running. The mode can also include information on a configuration error.
Beam Status	Beam status is color-coded with the on-screen codes.
Configuration	Click to create the configurations. This button is only visible for the 450L-E safety light curtain.

Figure 26 shows an example of the beam intensity. In this example, the last beam intensity is low, the two middle beams are medium-low, and the remaining beams are high. This tool allows you to:

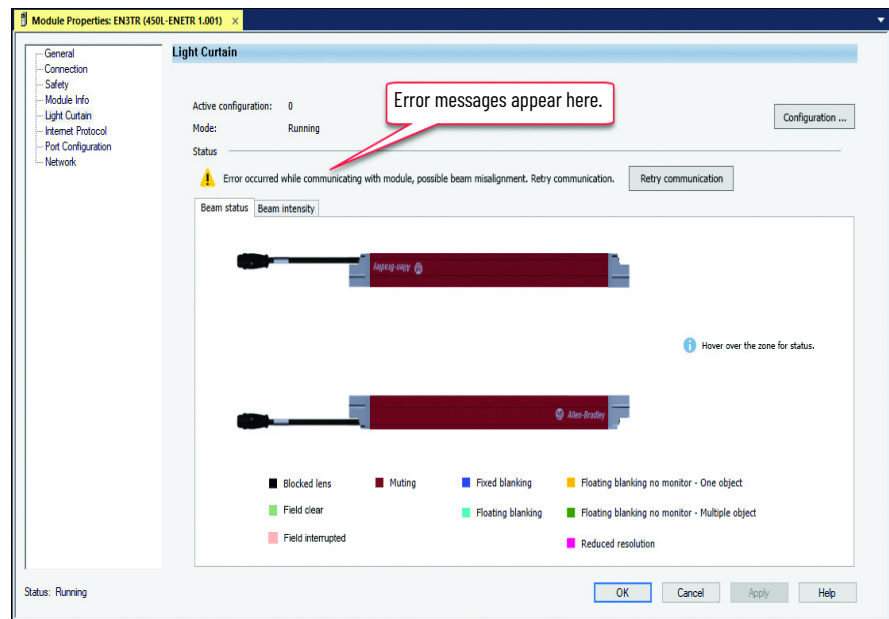
- Adjust the alignment to the highest possible intensity for their application.
- Monitor the degradation of the beam intensity for maintenance and cleaning.

Figure 26 - Beam Intensity Example



[Figure 27](#) shows the location of error messages while viewing the safety light curtain configuration.

Figure 27 - Error Message Location

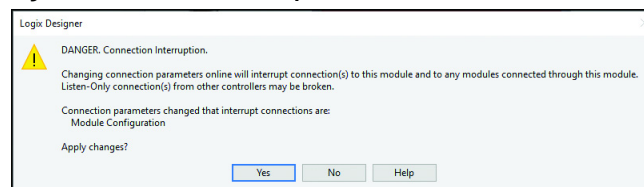


Configuration - General Settings

Changes to the configuration can be initiated while the controller is online and the 450L-ENETR network interface is in a running state. However, the connection breaks and the state changes during the configuration process.

[Figure 28](#) prompts you to acknowledge the connection interruption. Click Yes to apply the changes or No to reject the changes.

Figure 28 - Connection Interruption



[Figure 29](#) provides a message regarding multi-controller systems. Click the Inhibit checkbox if necessary. Click Yes to apply the changes or No to reject the changes.

Figure 29 - Multi-controller Systems

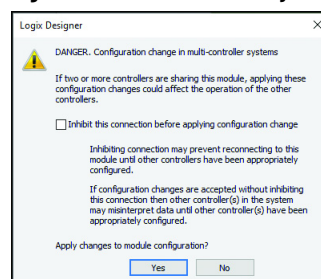
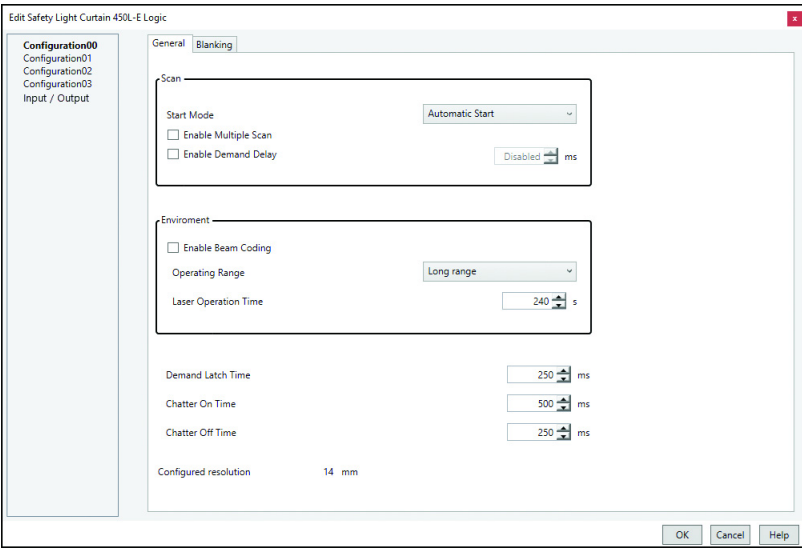


Figure 30 shows an example of the General tab for each subconfiguration. You can adjust the scan, environment, and OSSD timing parameters.

Figure 30 - Configuration - General



Item	Description
Scan	See Scan .
Environment	See Environment on page 45 .
Demand Latch Time	See Demand Latch Time on page 45 .

Item	Description
Chatter On Time	See Chatter On Time on page 46 .
Chatter Off Time	

Scan

- Start Mode - See [Restart Command on page 63](#) to execute the start command on the trailing edge of the command with a delay that helps prevent inadvertent operation. Select the appropriate Start mode from the following choices:
 - Automatic Start - When the beams are aligned and clear, the input tag name:I.Status goes HI without the need for additional actions.
 - Power Up Start Interlock - When power is initially applied to the safety light curtain, the input tag name:I.Status goes HI when the beams are aligned and clear and only after the output tag name:O.Restart goes HI. Afterwards, the name:I.Status goes HI automatically when the safety light curtain is aligned and cleared.
 - Manual Start - Upon power-up, and after every time the protective field is cleared, the input tag name:I.Status goes HI only after the output tag name:O.Restart goes HI.
 - Manual Start with Off Function - Upon power-up, and after every time the protective field is cleared, the input tag name:I.Status goes HI only after the output tag name:O.Restart goes HI. In addition, the name:I.Status can be set LO when the name:O.Restart signal goes HI and then set to HI again then next time the name:O.Restart signal goes HI. The status alternates HI and LO with successive restart signals.
- Enable Multiple Scan - The safety light curtain performs an additional scan before turning the input tag name:I.Status LO. Use this feature to reject spurious trip conditions.



ATTENTION: When you select this feature, the response time of the safety light curtain increases by 33% ($Tr = Tr \times 1.33$). Include this increase in the safety distance calculation. See publication [450L-UM001](#) to calculate the response time of the safety light curtain.

- Enable Demand Delay - When checked, select a time (in milliseconds) that the safety light curtain ignores an obstruction in the protective field. Use this feature to reject spurious trip conditions.
 - Min: 0 ms
 - Max: 174 ms
 - Increment: 1 ms
 - Default: unchecked (10 ms when checked)



ATTENTION: When selected, this feature increases the response time by the addition of the selected time. This increase must be included in the safety distance calculation. See publication [450L-UM001](#) to calculate the response time of the safety light curtain.

Environment

- Enable Beam Coding - used to eliminate crosstalk from neighboring safety light curtains.
- Operating Range - select either long or short range.
 - Long range - widest range of operation.

Safety Light Curtain Cat. No.	Resolution	Range
450L-B	14 mm (0.56 in.) 30 mm (1.19 in.)	0.5...4 m (1.64...13.12 ft) 0.9...7.0 m (2.95...22.97 ft)
450L-E	14 mm (0.56 in.) 30 mm (1.19 in.)	0.5...9 m (1.64...29.53 ft) 0.9...16.2 m (2.95...53.15 ft)

- Short range - narrower range of operation.

Safety Light Curtain Cat. No.	Resolution	Range
450L-B	14 mm (0.56 in.) 30 mm (1.19 in.)	0.9...2 m (2.95...6.56 ft) 1.2...3.5 m (3.94...11.48 ft)
450L-E	14 mm (0.56 in.) 30 mm (1.19 in.)	0.9...4.5 m (2.95...14.76 ft) 1.2...8.0 m (3.94...26.25 ft)

- Laser Operation Time - sets the time (in seconds) that the laser on the receiver stick remains on. When the receiver and transmitter sticks align, the optical switch cannot turn on the laser on the receiver stick. The laser on the transmitter stick can always be turned on and off by the optical switch.
 - Min: 0 s
 - Max: 255 s
 - Increment: 1 s
 - Default: 240 s

Demand Latch Time

Sets the minimum duration (in milliseconds) that the input tag name:I.Status remains in the LO state. This feature is typically used to accommodate electromechanical interfacing devices that require a certain off time to respond to the safety light curtain before returning to an on-state.

- Min: 80 ms
- Max: 5000 ms
- Increment: 1 ms
- Default: 250 ms

Chatter On Time

Sets the minimum duration (in milliseconds) that the protective field must be clear before the input tag name:I.Status goes HI.

- Min: 30 ms
- Max: 5000 ms
- Increment: 1 ms
- Default: 500 ms

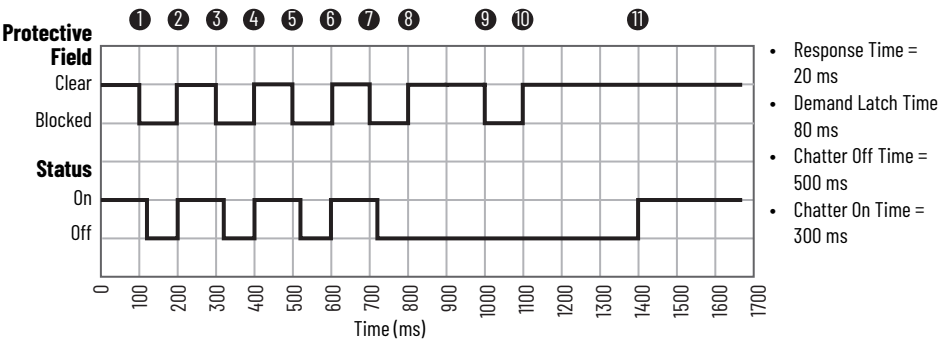
Chatter Off Time

Sets the duration (in milliseconds) that the firmware checks for multiple interruptions of the protective field. If three or more interruptions occur within the Off-Threshold time, the input tag name:I.Status goes LO and remains LO until the protective field is cleared during the Chatter On Time. The input tag name:I.Status remains in the LO state. This feature is typically used to help prevent conditions like electromechanical relay chatter.

- Min: 30 ms
- Max: 5000 ms
(cannot be larger than the name:I.Status On-Threshold Time)
- Increment: 1 ms
- Default: 250 ms

Figure 31 shows an example timing diagram to show the interaction of the chatter times and the minimum name:I.Status Demand Latch Time.

Figure 31 - Threshold Timing Example



Item	Description
1	At 100 ms, the protective field is broken; 20 ms later the status turns off.
2	At 200 ms, the protective field is cleared. The Status turns back on because it has met the 80 ms demand latch time.
3	At 300 ms, the protective field is broken again; 20 ms later the status turns off.
4	At 400 ms, the protective field is cleared. The status turns back on because it has met the 80 ms demand latch time.
5	At 500 ms, the protective field is broken again; 20 ms later the status turns off.
6	At 600 ms, the protective field is cleared. The status turns back on because it has met the 80 ms demand latch time.
7	At 700 ms, the protective field is broken again; 20 ms later the status turns off.
8	At 800 ms, the protective field is cleared, but the status remains off because of the three interruptions occur within the 500 ms chatter off time.
9	At 1000 ms, the protective field is broken again. the status remains off.
10	At 1100 ms, the protective field is cleared and remains clear.
11	At 1400 ms, the status turns on because the 300 ms chatter on time has expired.

If you have this type of behavior, we suggest you increase the chatter off time to 1200. This action eliminates the status from cycling on and off in response to the unwanted 100 ms breaks of the protective field.

Configuration - Blanking Settings

[Figure 32](#) shows the blanking configuration. Blanking configuration must be enabled. Multiple types of muting can apply to an individual configuration with the use of zones. Each configuration can have up to eight zones. Each zone can have only one type of blanking. See [450L-UM001](#) for the requirements of zones.

Figure 32 - Blanking Configuration

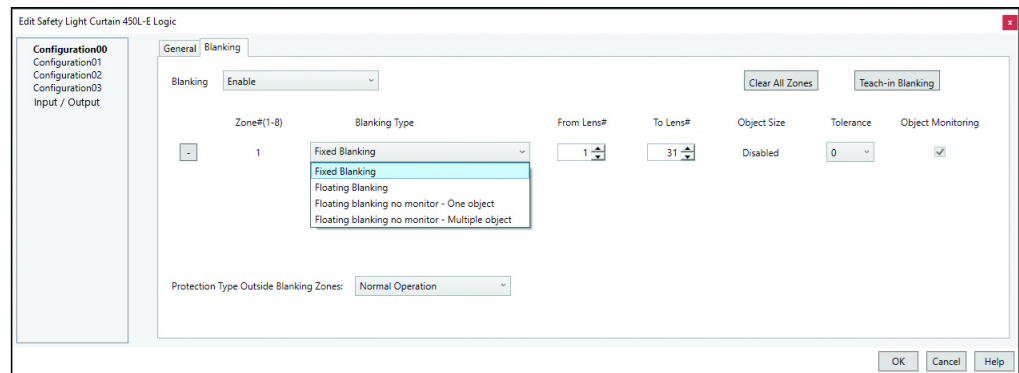


Table 15 - Blanking Settings

Setting	Description
Blanking	Select Enable to create the configuration for blanking
Clear All Zones	Clears the settings for all zones in the configuration
Teach-in Blanking	When online with the controller, the Logix Designer application can learn the fixed blanking setup of the safety light curtain.
+/-	Adds or removes a zone. Additional zones can be added until all lenses are used.
Zones	Identifies the zone number. Up to eight zones can be configured.
Blanking Type	Select the type of blanking to be applied to the zone. <ul style="list-style-type: none"> Fixed Blanking - an object always blocks the safety light curtain in a fixed location. Floating Blanking - an object of a certain size blocks the safety light curtain but can move within a predefined range. The object must always be present in the predefined range. Floating Blanking no Monitor - one object. An object of a certain size can block the safety light curtain and can move within a predefined range. Floating Blanking no Monitor - multiple objects. Two objects of a certain size can block the safety light curtain and can move within a predefined range.
From Lens #	Specify the lens closest to the connection plug-in for the zone. When multiple zones are specified, the From Lens # must be greater than the To Lens # of the previous zone. The lens closest to the connection plug-in is Lens 1. See 450L-UM001 for further lens identification. The Logix Designer application helps prevent incorrect lens selection automatically.
To Lens #	The last lens that participates in the range of lenses.
Object Size	Object size is disabled for fixed blanking. For the other blanking types, the Logix Designer application helps prevent incorrect object size selection automatically.

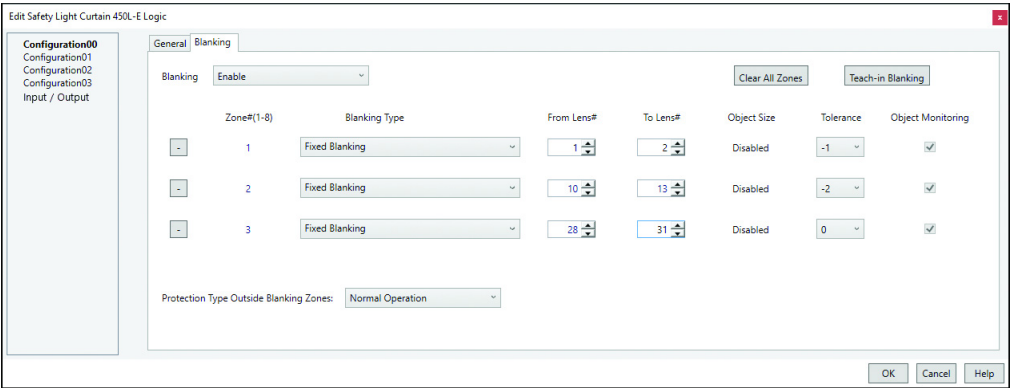
Table 15 - Blanking Settings (Continued)

Setting	Description
Tolerance	The safety light curtain allows the object size to be smaller by either 0, 1, or 2 lenses for finger resolution and 0 or 1 (where 1 = 2 lenses) for hand resolution. Select the number of lenses that accommodates the variation in the object height and location.
Object Monitoring	This field is read-only and automatically adjusted by the Logix Designer application. For fixed and monitored blanking, the box is checked, and the object must always be in the sensing zone. The box is unchecked when monitoring is not required.
Protection Type Outside Blanking Zones	Select how the safety light curtain treats the unspecified zones. <ul style="list-style-type: none">• Normal operation - resolution defined by safety light curtain model• Reduced resolution - 1 beam. One object is allowed to be in the protective field but is not monitored.• Reduced resolution - 2 beams. Two objects are allowed to be in the protective field but are not monitored.

Fixed Blanking

Figure 33 shows an example of three fixed blanking zones. You can configure up to eight zones for fixed blanking or other types of blanking. See 450L-UM001 for the rules for fixed blanking within a zone. The Logix Designer application enforces these blanking rules automatically.

Figure 33 - Fixed Blanking Example



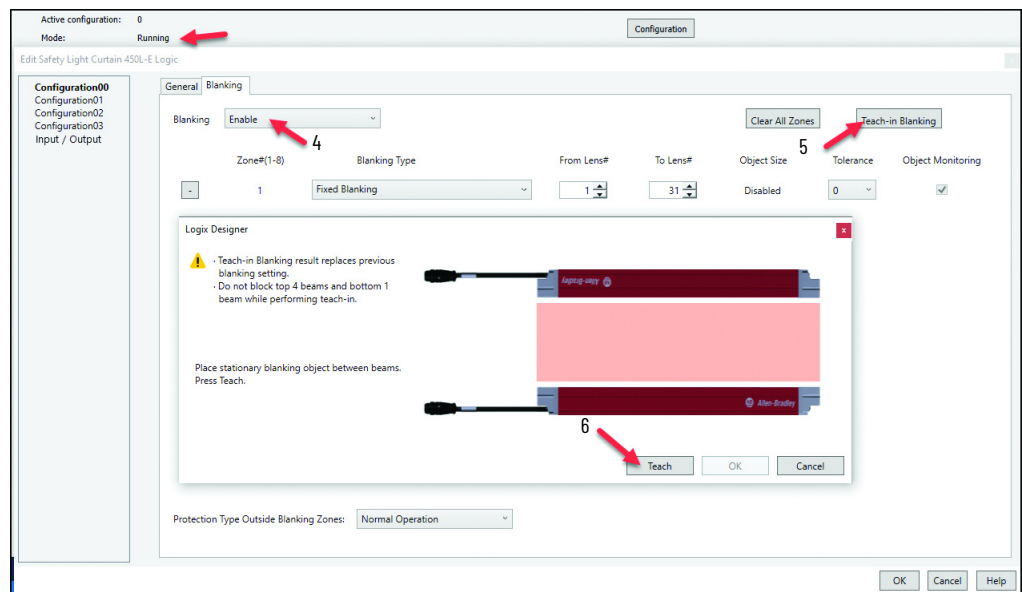
Teach-in Fixed Blanking

IMPORTANT The teach-in blanking feature is only available for Studio 5000 revisions 30.02 and higher.

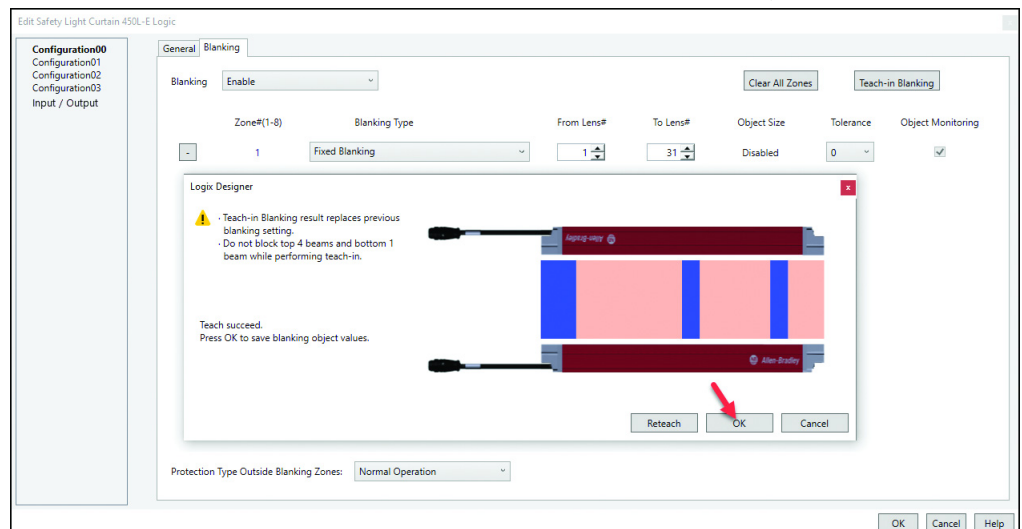
The Logix Designer application can learn new arrangements of fixed blanking. To learn, the application reads the beams, stores the new setting in a project, and then transfers the new settings down to the safety light curtain.

Follow these steps:

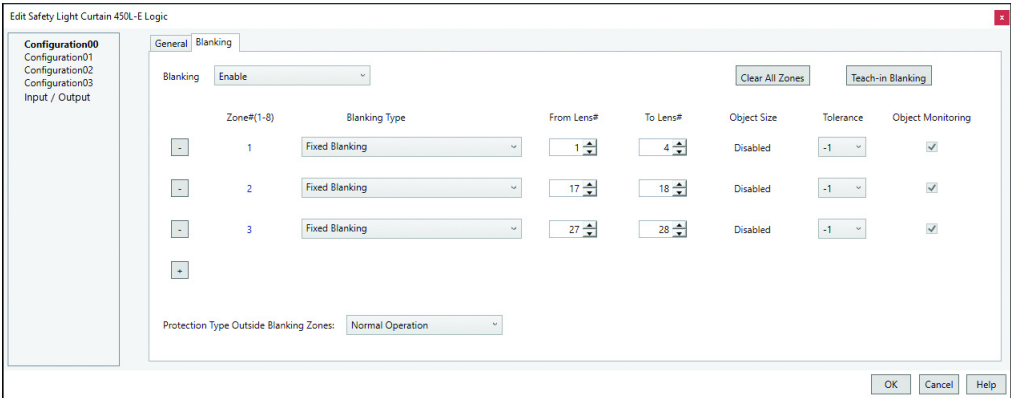
1. Set the fixed objects within the safety light curtain field. You can place multiple fixed objects (up to eight) in the safety light curtain field.
2. Go online with Studio 5000, set the controller to Run mode, and verify that the safety light curtain mode shows as Running.
3. Open the first or next available Configuration panel.
4. Enable Blanking.
5. Click the Teach-in Blanking button.
6. Click the Teach button.



7. The blanked lenses are identified. To save the configuration, click OK.



8. The results show that three fixed zones are created with object tolerance = -1.



Floating Blanking

Figure 34 shows a floating blanking example. Four zones are created. Floating blanking is configured for zones 1 and 2; zone 1 has a 1-beam tolerance, and zone 2 has a 2-beam tolerance.

Zones 1 and 2 are monitored; the object must always be in the zone to allow the name:40L.I.Status tag to go HI.

Zone 3 allows one object to float in the zone. Zone 4 allows multiple objects to float in the zone. Zones 3 and 4 are not monitored; the object can be in the zone and the name:40L.I.Status tag is allowed to go HI.

Figure 34 - Floating Blanking Example Setup

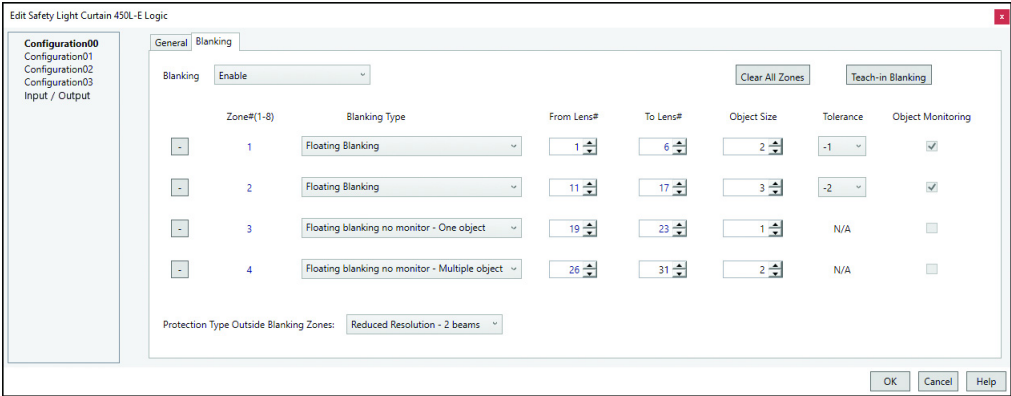
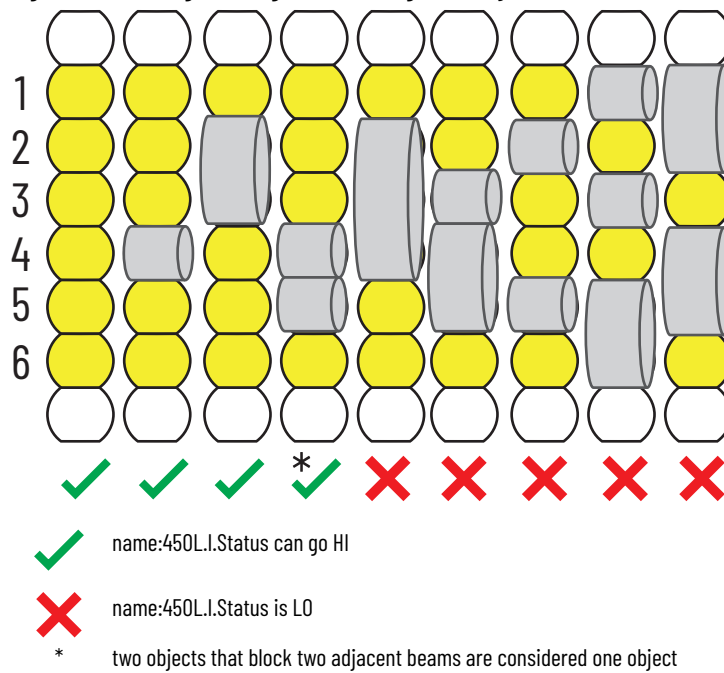
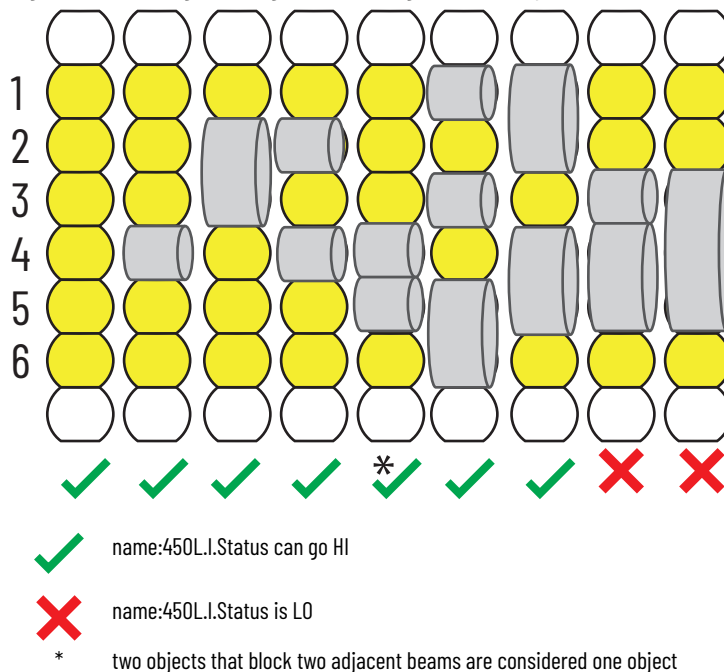


Figure 35 on page 51 shows the conditions that apply to a floating blanking, no monitoring, one object zone. In this example, six beams are configured for the zone. The name:450L.I.Status tag can go HI (depending on the restart) when the object is absent, blocks one beam, or blocks two beams. Multiple objects or objects that block three beams cause the name:450L.I.Status tag to go LO.

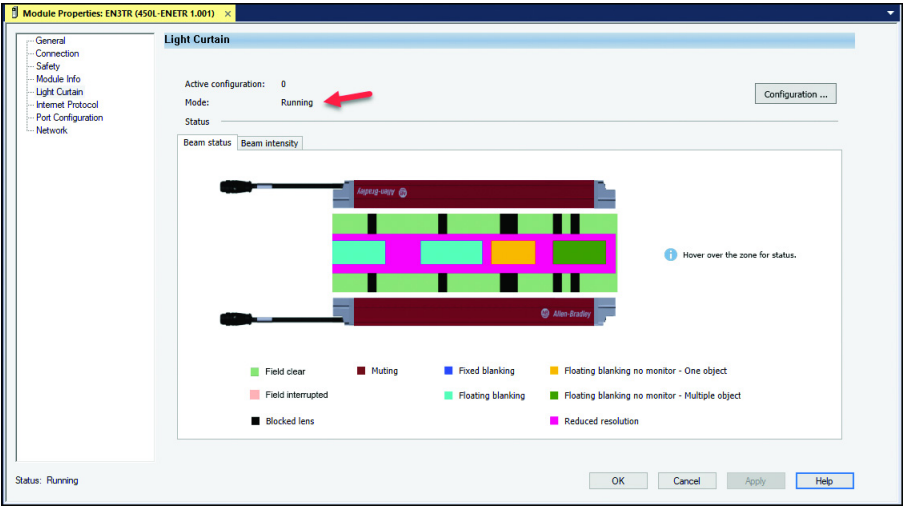
Figure 35 - Floating Blanking No Monitoring - One Object

[Figure 36](#) shows the conditions that apply to a floating blanking, no monitoring, multiple object zone. In this example, six beams are configured for the zone. The name:450L.I.Status tag can go HI (depending on the restart) when the objects are absent, block one beam, or block two beams. Objects that block three beams cause the name:450L.I.Status tag to go LO.

Figure 36 - Floating Blanking No Monitoring - Multiple Objects

[Figure 37 on page 52](#) shows the beam status for the floating blanking configuration. The safety light curtain is in Running mode. Zones 1 and 2 are monitored and have blocked lenses. Zones 3 and 4 are not monitored. Zone 3 allows one object and Zone 4 allows multiple objects. All remaining beams are set to Reduced Resolution. The mode is Running with no error messages.

Figure 37 - Floating Blanking Example Beam Status



Configuration - Muting Settings

The muting settings are only available if the module definition includes the 450L-APC-IO-8 cascading plug-in module (see [Module Definition - Safety Light Curtain on page 35](#)).

[Figure 38...Figure 41](#) show the muting patterns and their default configuration parameters. [Table 16 on page 54](#) describes the muting settings.

The safety light curtain can accommodate four different muting patterns. See publication [450L-UM001](#) for detailed descriptions of the muting patterns and timing diagrams.

After you set the pattern and the appropriate settings, click OK. You are then instructed to select the input/output to meet the pattern requirements.

Figure 38 - Four Sensor Muting Bidirectional

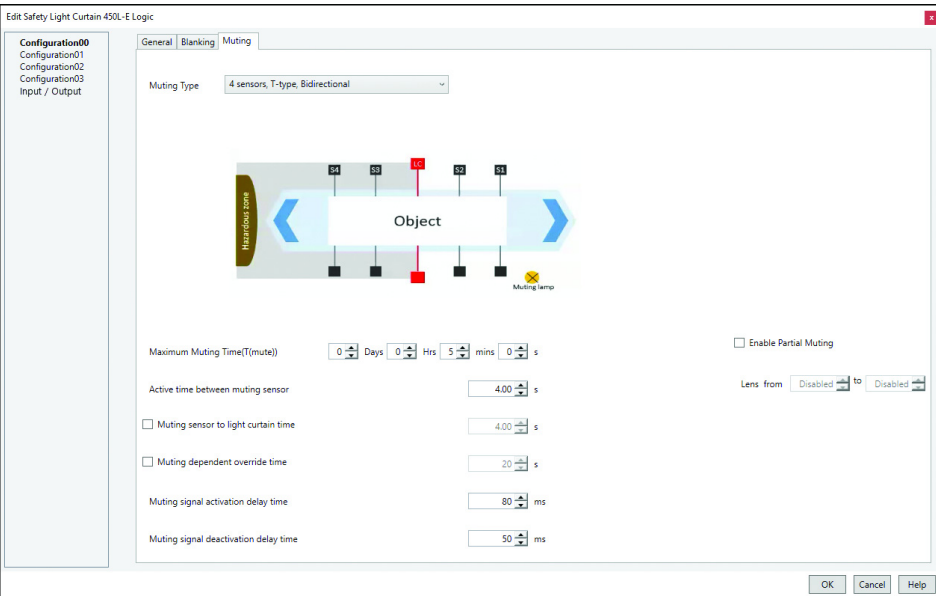


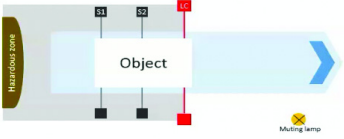
Figure 39 - Two Sensors, L-Type, Unidirectional

Edit Safety Light Curtain 450L-E Logic

Configuration00
Configuration01
Configuration02
Configuration03
Input / Output

General | Blanking | Muting

Muting Type: 2 sensors, L-type, Unidirectional



Maximum Muting Time(T(mute)) 0 Days 0 Hrs 5 mins 0 s

Active time between muting sensor 2.00 s

☒ Muting sensor to light curtain time 2.00 s

☐ Muting dependent override time 20 s

Muting signal activation delay time 80 ms

Muting signal deactivation delay time 50 ms

☐ Enable Partial Muting

Lens from Disabled to Disabled

OK Cancel Help

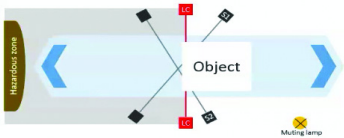
Figure 40 - Two Sensors, T-Type, Bidirectional

Edit Safety Light Curtain 450L-E Logic

Configuration00
Configuration01
Configuration02
Configuration03
Input / Output

General | Blanking | Muting

Muting Type: 2 sensors, T-type, Bidirectional



Maximum Muting Time(T(mute)) 0 Days 0 Hrs 5 mins 0 s

Active time between muting sensor 4.00 s

☐ Muting sensor to light curtain time 4.00 s

☐ Muting dependent override time 20 s

Muting signal activation delay time 80 ms

Muting signal deactivation delay time 50 ms

☐ Enable Partial Muting

Lens from Disabled to Disabled

OK Cancel Help

Figure 41 - Two Sensors, T-Type, Bidirectional with Enable

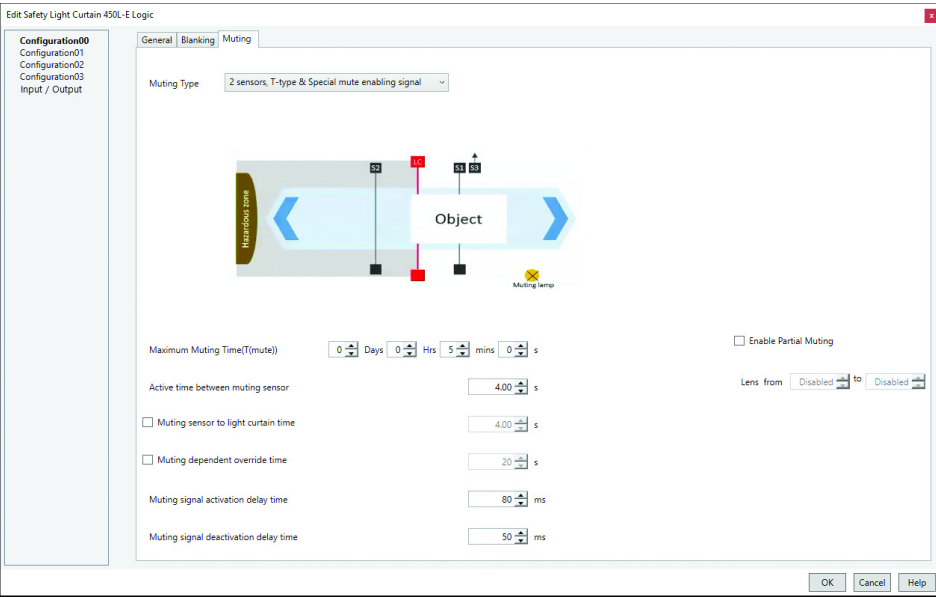


Table 16 - Muting Settings

Setting	Description
Maximum Muting Time (Tmute)	This parameter is the maximum time that the material can occupy the safety light curtain. If the time is exceeded, the name:I.Status tag goes LO and the object can be cleared by using the Mute Dependent Override. <ul style="list-style-type: none">• Max Setting: 10 days• Min Setting: 1 s• Increment: 1 s• Default: 5 min
Active time between muting sensor	Specifies the maximum time between sensors. This maximum is the time in which the object must block both sensors. If the time is exceeded, the muting timing error becomes active and the safety light curtain is not muted. <ul style="list-style-type: none">• Max Setting: 10 s• Min Setting: 0.05 s• Increment: 0.05 s• Default: 4 s
Muting sensor to safety light curtain time	Check to enable, uncheck to disable. If disabled, the time from the start of muting to when the object blocks the safety light curtain is not used in the muting sequence. If enabled, specify the time that the safety light curtain must be interrupted after the muting state has been achieved. If the time is exceeded, the name:I.Status tag goes LO. <ul style="list-style-type: none">• Max Setting: 10 s• Min Setting: 0.05 s• Increment: 0.05 s• Default: 4 s
Muting dependent override time	Check to enable, uncheck to disable. If disabled, the mute dependent override is not used. If enabled, specifies the duration of the muting dependent override signal. Use this function to force the name:I.Status tag HI after a muting error has occurred. The override signal becomes active on the leading edge. Use logic to change the function active on the trailing edge. <ul style="list-style-type: none">• Max setting: 1275 s• Min setting: 0 s• Increment: 5 s• Default: 20 s

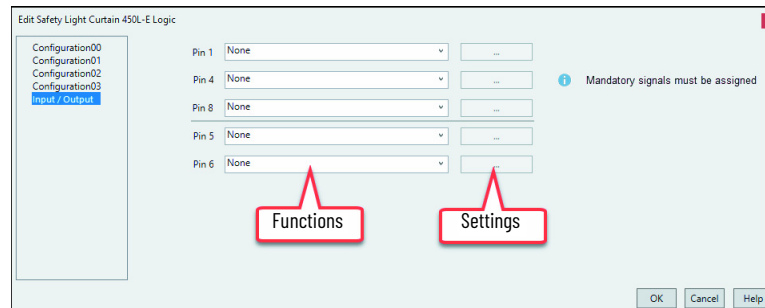
Table 16 - Muting Settings (Continued)

Setting	Description
Muting signal activation delay time	Specifies a delay before muting becomes activate. <ul style="list-style-type: none"> • Max setting: 2550 ms • Min setting: 0 ms • Increment: 10 ms • Default: 80 ms
Muting signal deactivation delay time	Specifies a delay before muting becomes deactivated. <ul style="list-style-type: none"> • Max setting: 2550 ms • Min setting: 0 ms • Increment: 10 ms • Default setting: 50 ms
Enable Partial Muting	Check to enable, uncheck to disable. If disabled, partial muting is not used. If enabled, the safety light curtain can be configured to allow muting of a specified number of lenses. Specify the first lens and last lenses to mute. If the other lenses are blocked, the name:I.Status tag goes LO. Partial muting is only allowed if the configuration does not use blanking. If partial muting is enabled, blanking is disabled for the configuration. At least four beams must not be in the partial muting zone. For example, the beams can be the first four beams, or the last four beams, or two beams on either side of the zone, three beams on one side and one beam on the other side of the beam.

Input/output

Muting requires the cascading plug-in module. If muting was selected and all input/output fields show N/A, then click Cancel. Go to the General folder, [Module Definition - Safety Light Curtain on page 35](#), and select the 450L-APC-IO-8 for the cascading field.

[Figure 42](#) shows the assignments of the input/output configuration. For each pin, the pull-down menu is automatically adjusted for the capability of that pin. Pins 4, 8, and 1 have more options than Pins 5 and 6. Select the appropriate function and settings.

Figure 42 - Input/output Functions and Settings

[Figure 43 on page 56](#) shows the allowable signals for muting. The list is adjusted automatically for the features that are selected in the configuration. Muting requires two to four mandatory sensors, depending on the pattern selected. If mute dependent override is enabled, one of the input/output pins must be assigned this function. All mandatory signals must be assigned to an input/output pin.

IMPORTANT For cascading applications, assign the two cascading OSSD signals to pins 5 and 6.

Figure 43 - Input/output Assignments

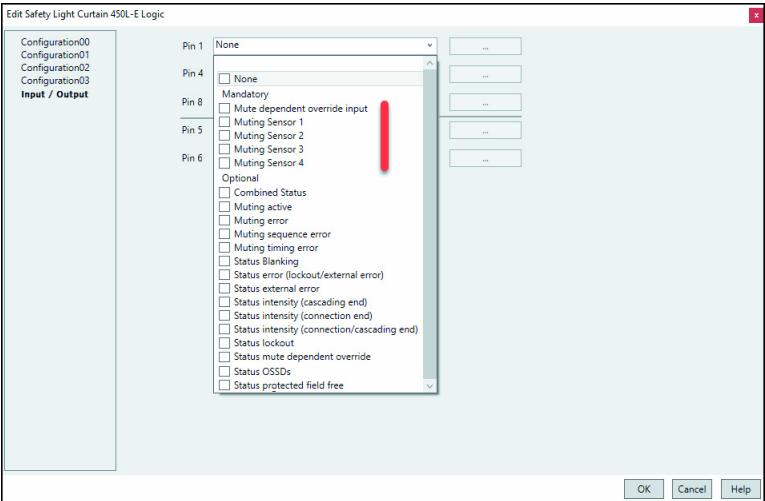
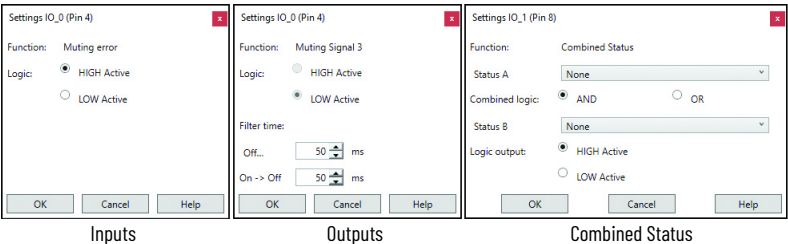


Figure 44 shows the three types of settings:

- Inputs - select whether the logic is high or low active.
- Outputs - select whether the logic is high or low active and set the filter times.
- Combined status - select two statuses (a and b). Select the combined logic (and/or). Select whether the logic output is high or low active.

The module profile disables unacceptable choices.

Figure 44 - Function Settings



When the OK button is clicked, the AOP checks for a match between the configuration and the input/output signals. If a mismatch exists, a message box (Figure 45) appears. Click OK, and the AOP opens the input/output window. Verify that all mandatory signals are assigned to an input/output pin.

Figure 45 - Input/output Setting Mismatch



Internet Protocol

Figure 46 on page 57 shows an example of the Internet Protocol page. This folder is only populated and editable when the controller is online.

Select the setting (Manually configure the IP settings) to change the fields (Address, mask, server, and so on) on this page. When changes are made, the Set button enables. After you make changes, click the Set button.

Figure 46 – Internet Protocol Settings

The screenshot shows the 'Internet Protocol' configuration window for a module (EN3TR 450L-ENETR 1.001). The left sidebar lists configuration categories: General, Connection, Safety, Module Info, Light Curtain Configuration, **Internet Protocol**, Port Configuration, and Network. The main area is titled 'Internet Protocol' and contains the following settings:

- Manually configure IP settings** (selected radio button)
- Obtain IP settings automatically using BOOTP (unselected)
- Obtain IP settings automatically using DHCP (unselected)
- IP settings set by switches on the module (unselected)
- Physical Module IP Address: 192 . 168 . 2 . 72
- Subnet Mask: 255 . 255 . 255 . 0
- Gateway Address: 0 . 0 . 0 . 0
- Domain Name: (empty field)
- Host Name: (empty field)
- Primary DNS Server Address: 0 . 0 . 0 . 0
- Secondary DNS Server Address: 0 . 0 . 0 . 0
- Buttons: Refresh communication, Set, OK, Cancel, Apply, Help
- Status: Running

The ideal basic settings are:

- Manually configure IP settings.
- Physical Module IP address is assigned.
- Subnet mask is set to 255.255.255.0

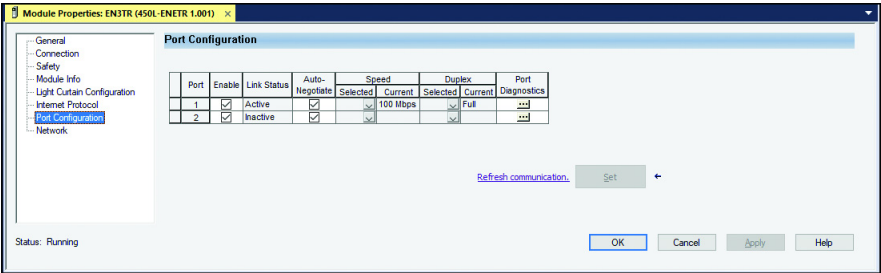
The other settings are for advanced applications:

- Gateway Address - set to 0.0.0.0 unless you must have controllers outside the local network read status data.
- Set - applies the changes that are made to the Internet Protocol settings.

Port Configuration

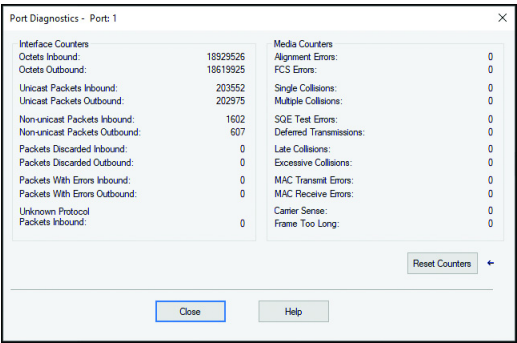
[Figure 47](#) shows an example of the port configuration window.

Figure 47 - Port Configuration



Item	Description
Enable	Click which ports are enabled. For security purposes, disable the unused port.
Link Status	Shows whether the port is active or inactive, if the port is enabled. If the port is not enabled, the link status is blank.
Auto-Negotiate	Typically this option is checked. If unchecked, you must specify the speed of the port. If the port is not enabled, the speed cannot be set.
Speed Selected	If Auto-Negotiate is unchecked, you must select either 10 Mbps or 100 Mbps. The 450L-ENETR network interface does not communicate at 1 Gbps. If Auto-Negotiate is checked, this field is blank. The preferred selection is 100 Mbps.
Speed Current	If Auto-Negotiate is checked, this field shows the current speed, either 10 Mbps or 100 Mbps. If Auto-Negotiate is unchecked, the field is read-only.
Duplex Selected	If Auto-Negotiate is unchecked, you must select either half-duplex (communications in one direction at a time) or full-duplex (communications in both directions simultaneously). Full-duplex is the preferred selection.
Duplex Current	If Auto-Negotiate is checked, this field shows the current duplex. If Auto-Negotiate is unchecked, the field is read-only.
Port Diagnostics	Click the ellipsis (...). Figure 48 shows an example of the port diagnostics.
Set	When Auto-negotiate is checked, the Set button is disabled. When Auto-negotiate is unchecked, the Set button is enabled. After adjusting the configuration, click the Set button to download the changes to the 450L-ENETR network interface.

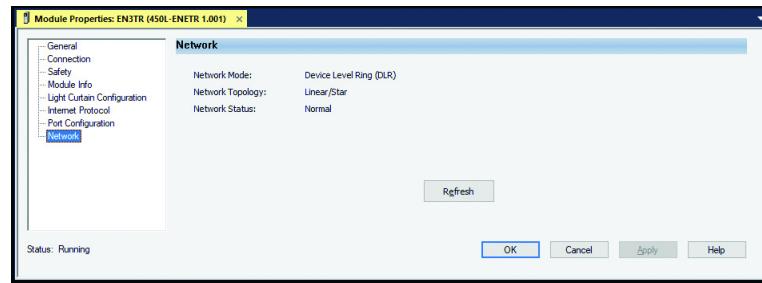
Figure 48 - Port Diagnostics Example



Network

[Figure 49](#) shows an example of the network folder. The information in this window is read-only.

Figure 49 - Network



Item	Description
Network Mode	Device Level Ring (DLR)
Network Topology	Linear/Star
Network Status	Normal

The 450L-ENETR network interface supports linear, ring, and star network topologies:

- A linear topology is a collection of devices that are daisy chained together.
- Device Level Ring (DLR) supports a ring topology. As defined by the Open DeviceNet® Vendor Association (ODVA), Device Level Ring is an EtherNet/IP™ protocol. DLR provides a means to detect, manage, and recover from single faults in a ring-based network.
- The star topology consists of a number of modules that are connected to a central switch. Modules can be added or removed without affecting the rest of the network.

For more information on the supported EtherNet/IP network topologies and other EtherNet/IP features, see publication [ENET-UM006](#).

Notes:

Logix Designer Application (AOP) Controller Tags

This chapter contains the controller tags and nonrecoverable fault codes for the 450L-ENETR network interface.

Input Tags

[Table 17](#) shows the descriptions of the input tags for the 450L-ENETR network interface.

Table 17 - Input Tags

Tag Name	Data Type	Description
Run Mode	BOOL	Indicates whether the safety light curtain is in Run mode. Explicit messages using Attribute T1 in Table 10.1 can retrieve other operating modes. 0 = Not in Run mode. 1 = Run mode.
Connection Faulted	BOOL	Indicates whether the connection between the 450L-ENETR network interface and the controller is in an operating or a faulted state. 0 = Operating 1 = Faulted
Diagnostic Active	BOOL	Indicates whether one or more diagnostic or prognostics thresholds were reached, for example, a muting time is exceeded. 0 = No diagnostics active. 1 = Nonzero diagnostic code or external error is present.
Diagnostic Sequence Count	SINT	Increments for each time a distinct diagnostic condition is detected and each time a distinct diagnostic condition transitions from detected to not detected. Set to zero by a power cycle. Wraps from 255 to 1 skipping zero. For example, if the 24V supply drops momentarily to 16V and returns to 24V. The diagnostic sequence count increments by 2 (by 1 for the transition to 16V and again by 1 for the transition back to 24V).
Status	BOOL	Indicates the safe state of the safety light curtain. This tag is the safety-rated signal. 0 = Safe state - the OUT indicator on the safety light curtain is steady red. 1 = the OUT indicator on the safety light curtain is steady green.
Fault	BOOL	Indicates whether the 450L-ENETR network interface is in faulted state or the safety light curtain is in a lockout state. 0 = No fault present. 1 = Fault present.
Restart Required	SINT	Indicates whether the restart signal is required to change the safety light curtain status from LO to HI. 0 = Restart signal is not required. 1 = Restart signal is required.
Muted	BOOL	Indicates the muting status of the protective field. 0 = Not muted 1 = Muted
Muting Dependent Override On	BOOL	Shows whether the muting dependent override is On. 0 = Muting Dependent Override is off. 1 = Muting Dependent Override is on.
Reset Required	BOOL	Indicates if the safety light curtain is waiting for a fault reset signal. 0 = Off 1 = On
Active Configuration	SINT	The 450L can be configured for up to 4 configurations. This parameter shows the active configuration. 0 = Configuration00 is active. 1 = Configuration01 is active. 2 = Configuration02 is active. 3 = Configuration03 is active.

Output Tags

[Table 18](#) shows the descriptions of the output command tags for the 450L-ENETR network interface.

Table 18 - Output Command Tags

Tag Name	Data Type	Description
Reset Fault	BOOL	Sends a fault reset command to the safety light curtain, which is equivalent to cycling the power to the safety light curtain (but not cycling the power to the 450L-ENETR network interface). The reset fault signal is activated on the leading edge of the signal on the transition from 0 to 1. 0 = The fault reset command is off. 1 = The fault reset command is on.
Restart	BOOL	Sends a restart command to the safety light curtain. The restart signal is activated on the leading edge of the signal on the transition from 0 to 1. 0 = The restart command is off. 1 = The restart command is on.
Active Configuration	SINT	Use this tag to change the active configuration. The safety light curtain can be assigned up to four configurations. Only one configuration can be set at a time. 0 = Activate Configuration00. 1 = Activate Configuration01. 2 = Activate Configuration02. 3 = Activate Configuration03. Valid values are 0....3. Other values activate Configuration00.

Studio 5000 Example Logic Code

This chapter contains examples of logic code that can be used with the 450L safety light curtain.

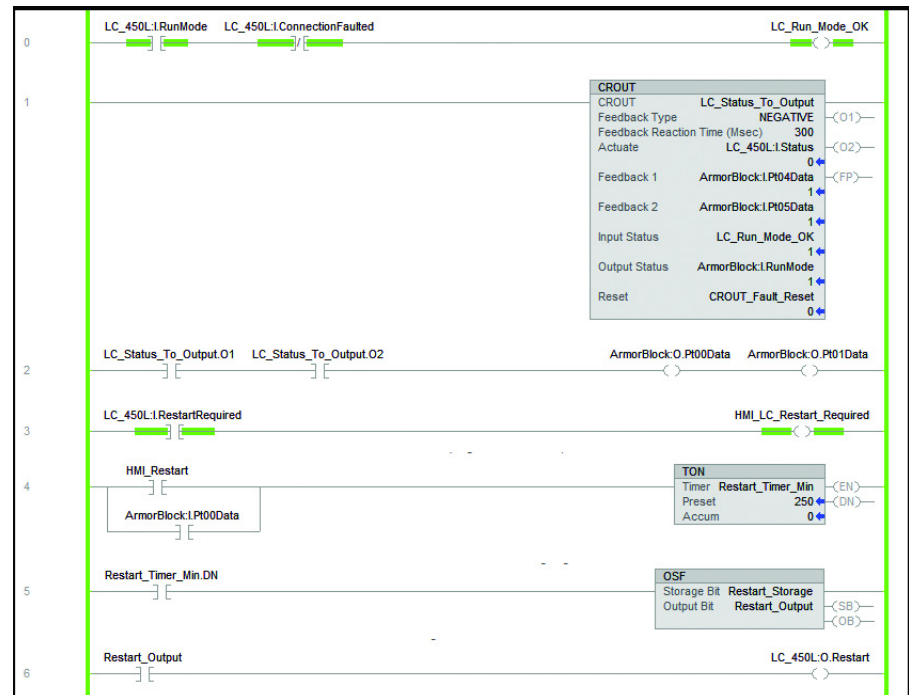
Restart Command

The safety light curtain restart input restarts the safety light curtain on the leading edge of the signal. In this case, the safety system has a secondary reset to energize the safety system outputs. When the safety light curtain restart is used to actuate the safety system outputs, ISO 13849-1 requires the restart to occur on the falling edge.

To help reduce inadvertent restart, a good practice is to use a timer and have the restart signal occur on the falling edge. You can set the timer to your preference.

[Figure 50](#) shows example logic code to help prevent inadvertent restarts and restart on the trailing edge.

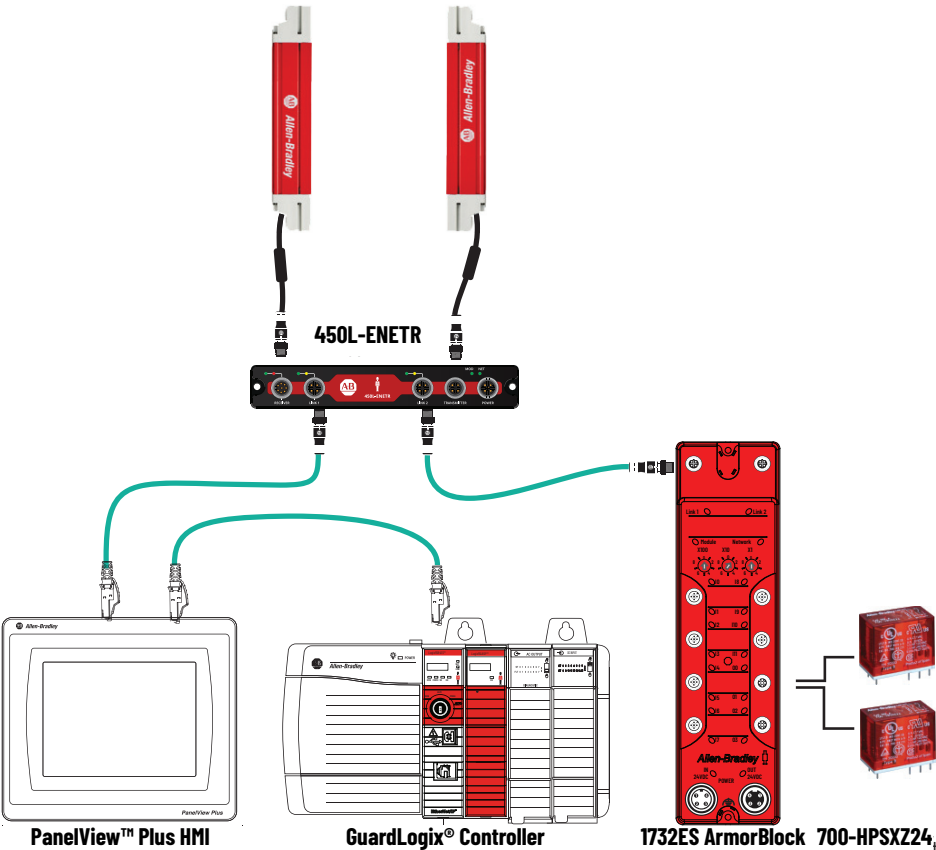
Figure 50 - Example Code for Restart on Falling Edge



Rung	Description
0	The safety light curtain has a connection to the controller and is in Run mode. Monitor the connection status bit to verify that it is not going high intermittently due to timeouts.
1	The safety light curtains status actuates the outputs of a configurable redundant output block. Since the safety light curtain energizes the safety system outputs, the restart is necessary on the falling edge of the restart signal. The CROUT uses the LC_Run_Mode_OK as an input status check to allow the outputs to turn on only when the safety light curtain runs and connects to the controller.
2	The CROUT outputs energize the safety outputs of the ArmorBlock® module.
3	When the safety light curtain requires a restart; a signal is sent to the HMI.
4	The Restart signal can be a momentary input from an HMI device, or a push button connected to an input. The Restart signal starts a timer, whose preset value can be adjusted to suit the application. The Restart signal must be longer the preset value of the timer (longer than of 250 ms).
5	When the timer is done, the DN bit sets the one-shot storage bit HI. When the HMI_Restart goes LO, the timer done bit goes LO, and the One Shot sets its output bit (Restart_Output) HI.
6	On the falling edge of the HMI Restart signal, the Restart signal is sent to the 450L. The safety light curtain status bit goes HI, and the CROUT energizes is output bits O1 and O2.

Figure 51 shows an example setup for the restart logic.

Figure 51 - Restart Logic Example



Change Configurations

Use a momentary, normally open input to move a value into the output tag name:O.ActiveConfiguration. Only one configuration can be active. The allowed values are decimal values 0, 1, 2, and 3.

- 0 = Configuration 0 (default value)
- 1 = Configuration 1
- 2 = Configuration 2
- 3 = Configuration 3

Figure 52 shows the example logic code to set the active configuration.

Figure 52 - Set Active Configuration



Rung	Description
8	Use a MOV command to move a 0 into the output Active Configuration for Configuration 0.
9	Use a MOV command to move a 1 into the output Active Configuration for Configuration 1.
10	Use a MOV command to move a 2 into the output Active Configuration for Configuration 2.
11	Use a MOV command to move a 3 into the output Active Configuration for Configuration 3.

Figure 53 shows the values of the output and input configurations. The active configuration value is read-back from the safety light curtain and appears in the input controller tag name:I.ActiveConfiguration. Input and output configuration must be the same value.

Figure 53 - Input/output Configuration

Name	Value	Style	Data Type
LC_450L:I	{...}		AB:450L_E:0
LC_450L:I.RunMode	1	Decimal	BOOL
LC_450L:I.ConnectionFaulted	0	Decimal	BOOL
LC_450L:I.DiagnosticActive	0	Decimal	BOOL
LC_450L:I.DiagnosticSequenceCount	2	Decimal	SINT
LC_450L:I.Status	0	Decimal	BOOL
LC_450L:I.Fault	0	Decimal	BOOL
LC_450L:I.RestartRequired	1	Decimal	BOOL
LC_450L:I.Muted	0	Decimal	BOOL
LC_450L:I.MutingDependentOverride	0	Decimal	BOOL
LC_450L:I.ResetRequired	0	Decimal	BOOL
LC_450L:I.ActiveConfiguration	3	Decimal	SINT
LC_450L:O	{...}		AB:450L_E:0
LC_450L:O.ResetFault	0	Decimal	BOOL
LC_450L:O.Restart	0	Decimal	BOOL
LC_450L:O.ActiveConfiguration	3	Decimal	SINT

If a value higher than 3 moves into the active configuration output tag, the safety light curtain sets to the active configuration of the two least significant bits. For example, if a value of 19 (binary 10011) moves to the active configuration output tag, the safety light curtain input active configuration sets to 3, because the two least significant bits are binary 11.

Notes:

Explicit Messaging

Use explicit messaging to get the attributes of the 450L safety light curtain. Explicit messaging must be configured for the specific attribute and the programming must request it specifically. The AOP uses implicit messaging automatically.

Explicit messaging is useful in diagnostics and troubleshooting.



ATTENTION: The values that explicit messages return are not safety rated. Only the message instruction name: 450L:I:Status is safety rated and must be used as part of a safety function.

Message Example

The following example shows how to create an explicit message to read the beam intensity.

In [Figure 54](#), two controller tags are established. One tag is for the message and the second is the location where the data is stored.

- Message: Beam_Intensity_Msg
- Data Location: Beam_Intensity_Raw

Figure 54 - Controller Tags

Controller Tags - Crystal_4(controller)						
Scope: Crystal_4		Show: All Tags		Enter Name Filter...		
Name	Data Type	Class	Description	External Access	Style	
Beam_Intensity_Msg	MESSAGE	Standard	Message to Retrieve Beam Intensity	Read/Write		
Beam_Intensity_Raw	SINT[32]	Standard	Beam Intensity Raw Values	Read Only	Decimal	

[Figure 55](#) shows an example rung of a logic. The message control blocks can only be used in the main program; they cannot be used in the safety program. In this example, a simple HMI input is used to send a message to the safety light curtain to retrieve the intensity level of each beam.

Figure 55 - Logic Message Rung

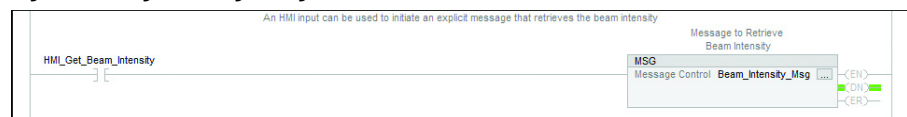


Figure 56 shows the message configuration. Make the following selections and entries.

- Message Time: CIP Generic
- Service Type: Get Attribute Single
- Instance: 1
- Class: 3aa
- Attribute: 36 (see Table 19 on page 69 for list of attributes)
- Destination: Select the tag that you already created, or you can create a tag here. In this example, we select the tag Beam_Intensity_Raw.
- Path: Browse to find the path to your safety light curtain.

Figure 56 - Message Configuration

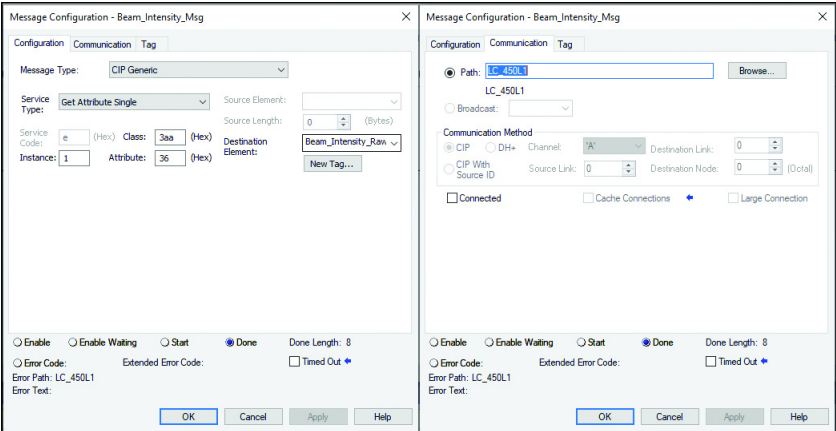


Figure 57 shows an example of the raw data for a 300 mm (11.81 in.) safety light curtain, which has 32 lenses. With each element of the array holding the intensity of four lenses, only eight of the 52 elements of the array are used.

Raw[0] shows the intensity for lenses 29...32. Lens 29 has a value of 10, which is medium-high. The values for lenses 30...32 are 11, which is high.

Raw[3] shows a decimal value of 0. This value means that all four lenses are rated low intensity. In this example, these four lenses are blocked, therefore their intensity must be a low rating.

Raw[7] shows the ratings for lenses 1...4. All four lenses are rated high.

Figure 57 - Beam Intensity Raw Data

Controller Tags - Crystal_4(controller)			
Scope: Crystal_4		Show: All Tags	
Name	Data Type	Value	Style
▶ ArmorBlockI	AB:1732ES_IB12XOB...	{...}	
▶ ArmorBlockO	AB:1732ES_IB12XOB...	{...}	
▶ Beam_Intensity_Count	DINT	32	Decimal
▶ Beam_Intensity_Msg	MESSAGE	{...}	
▲ Beam_Intensity_Raw	SINT[52]	{...}	Decimal
▶ Beam_Intensity_Raw[0]	SINT	2#1011_1111	Binary
▶ Beam_Intensity_Raw[1]	SINT	-69	Decimal
▶ Beam_Intensity_Raw[2]	SINT	63	Decimal
▶ Beam_Intensity_Raw[3]	SINT	0	Decimal
▶ Beam_Intensity_Raw[4]	SINT	-128	Decimal
▶ Beam_Intensity_Raw[5]	SINT	-1	Decimal
▶ Beam_Intensity_Raw[6]	SINT	-65	Decimal
▶ Beam_Intensity_Raw[7]	SINT	2#1111_1111	Binary
▶ Beam_Intensity_Raw[8]	SINT	0	Decimal
▶ Beam_Intensity_Raw[9]	SINT	0	Decimal
▶ Beam_Intensity_Raw[10]	SINT	0	Decimal
▶ Beam_Intensity_Raw[11]	SINT	0	Decimal

Table 19 shows the attributes that explicit messaging can retrieve.

Table 19 - Retrievable Attributes

Attr ID Dec (Hex)	Data Type	Description of Attribute	Values
1 (1)	INT	Demand placed on the safety function of the safety light curtain. This attribute is the same value as the name: 450L:I:Status message instruction attribute in the module profile.	0 = Demand placed on the safety function 1 = No demand
3 (3)	INT	Bit	0: Input/output is inactive. 1: Input/output is active.
		3	
		4	
		5	
		6	
5 (5)	INT	Description	0: Zone interrupted 1: Zone not interrupted
		Input/output Pin 4 Status	
		Input/output Pin 8 Status	
		Input/output Pin 1 Status	
		Input/output Pin 5 Status	
6 (6)	INT	Input/output Pin 6 Status	0: Zone interrupted 1: Zone not interrupted
		Status of the zones of the host safety light curtain. The safety light curtain has two zones. Zone 1 is the half of the safety light curtain closest to the connection plug-in. Zone 2 is the half furthest away from the connection plug-in.	
		Bit	
		Description: Status of the two zones of the host receiver stick	
		0	
9 (9)	INT	Zone 1 of host	0: No error 1: Restart button press 2: OSSD cross-check 3: Muting 4: Blanking teach - too many zones 5: Blanking teach - both ends blanked 6: Blanking Teach - Unblanked field blocked 7: Blanked beams not blocked 8: Safety override pulse test 9: E-stop pulse test 10: Upper plausibility test 11: Safety output test 12: Unknown IOP user error 13: Override time expired 14: Override enabled on startup 15: Upper configuration switch 16: Teach switch activation 17: Safety output short test 18: Restart button pressed too long 19: Plausibility test 20: Configuration switch failure 21: Upper teach switch activation 22: Muting sequence 23: Muting timing 24: 24 voltage supply 25: Upper input/output overrun 26...255: Other
		3	
		Zone 2 of host	
		Interrupted beams	
		First interrupted beam (Number (position) of the lowest interrupted beam counting from the bottom side of the first stick).	
11 (0B)	USINT	Last interrupted Beam (Number (position) of the highest interrupted beam counting from the bottom side of the first stick).	0: no beam interrupted 1: 1 beam interrupted 2: 2 beams interrupted and so on...
		Number of interrupted beams	
		Operational mode of the system	
		The counter that tells how many times that the Lockout mode has happened in the past.	

Table 19 - Retrievable Attributes (Continued)

Attr ID Dec (Hex)	Data Type	Description of Attribute	Values																
35 (23)	INT[10,3]	Array of entries that describe the most recent 10 lockout events.	Dec (Hex)																
	INT[n,0]	Lockout reason	0(0): No error 3(3): OSSD safety output is detected as on when it must be off 4(4): EDM signal does not match the invert state of the OSSD output 5(5): 24V voltage supply check 6(6): OSSD1 short connected to OSSD2 7(7): OSSD safety output shorted to ground or open circuit 8(8): OSSD safety output cross fault test failed 17(11): Invalid DIP switch selection 18(12): Not supported DIP switch selection 19(13): Manufacturing info does not match expected values 20(14): Incorrect Unique Stick ID detected 22(16): I/O Plug-in Firmware mismatch 23(17): I/O Plug-in Detection failure 24(18): I/O Plug-in inserted while system running 25(19): I/O Plug-in is required by configuration, but not found 42(2A): Sticks HW type mismatch in the system 43(2B): Sticks FW mismatch in the system 44(2C): Sticks resolution mismatch in the system 45(2D): Sticks length mismatch in the system 46(2E): Sticks mismatch or other reason																
	INT[n,1]	Lockout off time stamp, reported in 15 minutes increments of operational time. • 1 = 15 minutes • 2 = 30 minutes • 3 = 45 minutes, and so on. This value can be a DINT to capture the longer times.	0...4,294,967,295																
		Example results when the array is INT[10,3]																	
		Array Element	Value	Comment															
		[0,0]	24	I/O Plug-in inserted while system running															
		[0,1]	3516	52,740 minutes (879 hours or 37 days)															
		[0,2]	0	Always 0															
		[1,0]	20	Incorrect Unique Stick ID detected															
		[1,1]	3187	47,805 minutes (797 hours or 33 days)															
		[1,2]	0	Always 0															
		[2,0]	5	24V voltage supply check															
		[2,1]	2436	36,540 minutes (609 hours or 25 days)															
[2,2]	0	Always 0																	
52 (34)	INT	The number of beams in the host receiver.	8...208																
53 (35)	INT[n]	Array that contains a 1-bit status of all beams. Array length = Count of Beams/16 A value of n=13 contains all beams of a 1950 mm (76.77 in.) stick For example, a 300 mm (1.18 in.) finger protection safety light curtain has n=2. In this example, beams 6 and 32 are not detected. <table><tr><th>Name</th><th>Data Type</th><th>Value</th><th>Style</th></tr><tr><td>! _53_Beam_Status_Data</td><td>INT[2]</td><td></td><td>(...) Decimal</td></tr><tr><td>▶ _53_Beam_Status_Data[0]</td><td>INT</td><td>2#1111_1111_1111_1110</td><td>Binary</td></tr><tr><td>▶ _53_Beam_Status_Data[1]</td><td>INT</td><td>2#1111_1011_1111_1111</td><td>Binary</td></tr></table>	Name	Data Type	Value	Style	! _53_Beam_Status_Data	INT[2]		(...) Decimal	▶ _53_Beam_Status_Data[0]	INT	2#1111_1111_1111_1110	Binary	▶ _53_Beam_Status_Data[1]	INT	2#1111_1011_1111_1111	Binary	0: Beam not detected 1: Beam detected
Name	Data Type	Value	Style																
! _53_Beam_Status_Data	INT[2]		(...) Decimal																
▶ _53_Beam_Status_Data[0]	INT	2#1111_1111_1111_1110	Binary																
▶ _53_Beam_Status_Data[1]	INT	2#1111_1011_1111_1111	Binary																
54 (36)	SINT[52]	Array that contains a 2-bit intensity of all beams. Array length = Count of Beams / 4 The max number of beams is 208; which occurs in a 1950 mm (76.77 in.) finger resolution stick. The max size of the array is (208/4=) 52. The size of the array can be adjusted to match the stick.	00: Low 01: Medium Low 10: Medium High 11: High																

Table 19 - Retrievable Attributes (Continued)

Attr ID Dec (Hex)	Data Type	Description of Attribute	Values
56 (38)	INT	Diagnostic code that describes a diagnostic event.	Dec(Hex) 0(0000): No error. 3(0003): OSSD safety output is detected as on when it must be off. 4(0004): EDM signal does not match the invert state of the OSSD output. 5(0005): 24V voltage supply check failure. 6(0006): OSSD1 shorted to OSSD2. 7(0007): OSSD safety output is shorted to ground or open circuit. 8(0008): OSSD safety output cross fault test failed. 17(0011): Invalid DIP switch selection. 18(0012): DIP switch selection not supported. 19(0013): Manufacturing information does not match expected values. 20(0014): Unique safety light curtain ID incorrect. 22(0016): Cascading plug-in firmware mismatch. 23(0017): Cascading plug-in detection failure. 24(0018): Cascading plug-in inserted while system running. 25(0019): Cascading plug-in is missing. 42(002A): Safety light curtain hardware type mismatch in the system. 43(002B): Safety light curtain firmware mismatch. 44(002C): Safety light curtain resolution mismatch. 45(002D): Safety light curtain length mismatch. 46(002E): Safety light curtain mismatch. 4096(1000): Safety light curtain adapter failure. 8192(2000): Serial communication failure. 12288(3000): Invalid IP switch settings. 16384(4000): Adapter firmware not compatible with safety light curtain. 20480(5000): Network collision detected. 24576(6000): Invalid configuration. 28672(7000): Configured safety light curtain identity mismatch. 32768(8000): Adapter firmware corruption. 36864(9000)...65535(FFFF): Unspecified failure.
60 (3C)	DINT	State (inactive or active) of external outputs.	
		Bit	Description
		0	Status 0: Safe state 1: Active
		1	Fault 0: No fault 1: Fault Present
		2	Tripped 0: The safety light curtain interlock has not been activated. 1: Restart required
		3	Muted 0: The safety light curtain is not muted 1: The safety light curtain is muted
		4	Muting dependent override on 0: Normal operation 1: A muting override signal has overridden the safety function temporarily.
74 (4A)	INT	Maximum number of events captured in history. This attribute has a maximum value of 10; only the most recent events are captured. Examples:	0...10
		<ul style="list-style-type: none"> If attribute 34 recorded 5 lockouts since the safety light curtain was initially powered; attribute 74 has a value of 5, and attribute 35 shows five events. If attribute 34 recorded 10 or more lockouts since the safety light curtain was initially powered; attribute 74 has a value of 10, and attribute 35 shows 10 events. 	

Safety Light Curtain Firmware

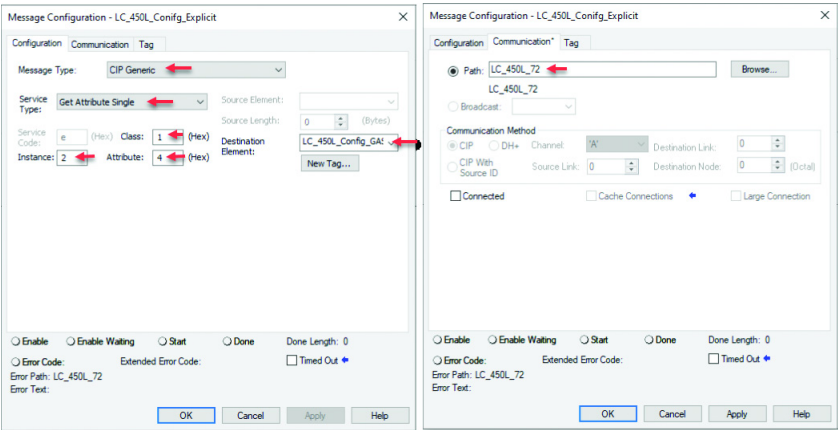
The current version of the safety light curtain firmware can be read with an explicit message.

Configure two controller tags:

- A message tag
- A SINT[2] tag

[Figure 58](#) shows the setup of the message.

Figure 58 - Firmware Explicit Message Configuration



Item	Description
Message Type	Must be CIP Generic
Service Type	Must be Get Attribute Single
Class	Must be 1
Instance	Must be 2
Attribute	Must be 4
Destination Element	User-defined SINT[2]
Path	Browse for the path to the safety light curtain.

[Figure 59](#) shows an example logic for using explicit messaging. An HMI input enables the messaging. When the messaging is complete, the DN (done) bit is highlighted.

Figure 59 - Example Logic for Explicit Messaging

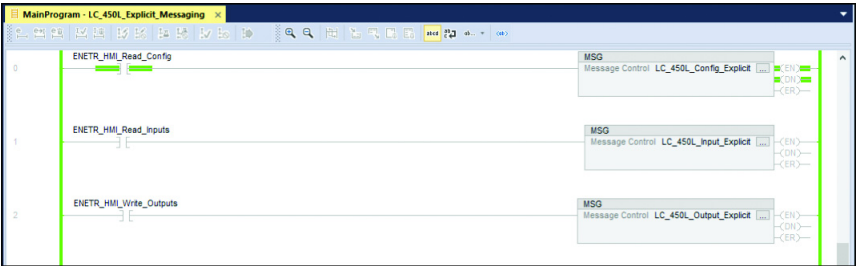


Figure 60 shows the results of the message.

- LC_45oL_Config_GAS[0]: The major revision.
- LC_45oL_Config_GAS[1]: The minor revision.

The firmware revision is 5.002.

Figure 60 - Safety Light Curtain Firmware Revision

Name	Value	Style	Data Type	Class
LC_45oL_Config_Explicit	(...)		MESSAGE	Standard
LC_45oL_Config_GAS	(...)	Decimal	SINT[2]	Standard
LC_45oL_Config_GAS[0]	5	Decimal	SINT	Standard
LC_45oL_Config_GAS[1]	2	Decimal	SINT	Standard

Notes:

ControlFLASH Firmware Update

This chapter shows the steps that are required to update the firmware of the EtherNet/IP™ module with the ControlFLASH™ application.

Overview

To update the firmware, the 450L-ENETR network interface must have the following connections:

- Power
- Transmitter
- Receiver
- At least one network connection to the updating host computer.

The 450L safety light curtain must be updated to at least firmware 5.002 to operate with the 450L-ENETR network interface. [Table 20](#) shows the firmware update availability. Safety light curtain sticks with 1K key encryption certificates must be replaced with sticks with 4K key encryption certificates to operate with the 450L-ENETR network interface.

Table 20 - Firmware Update Availability

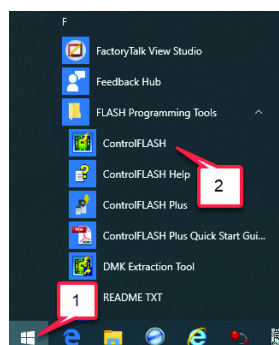
Current LC FW	Key Certificate	Action to Upgrade
2.001 or 2.002	1K	Cannot be updated to 5.002. Sticks must be replaced with 4K key security certificate.
4.001 and 4.002	1K	
3.001, 3.002, 5.001	4K	Can be updated to 5.002.

Procedure

Follow these steps to update the 450L-ENETR network interface and 450L-E/450L-B safety light curtain firmware. When using a 450L-APC-IO-8 cascading plug-in module, verify that it is installed before you update the firmware.

1. Click the Start Menu.
2. Scroll down to find Flash Programming Tools, expand, and click ControlFLASH.

IMPORTANT ControlFLASH 15.03.00 or later is required.



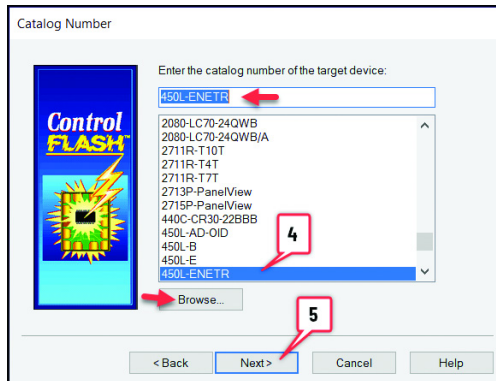
3. Click Next.



4. Type in the catalog number or click Browse to locate the 450L-ENETR network interface.

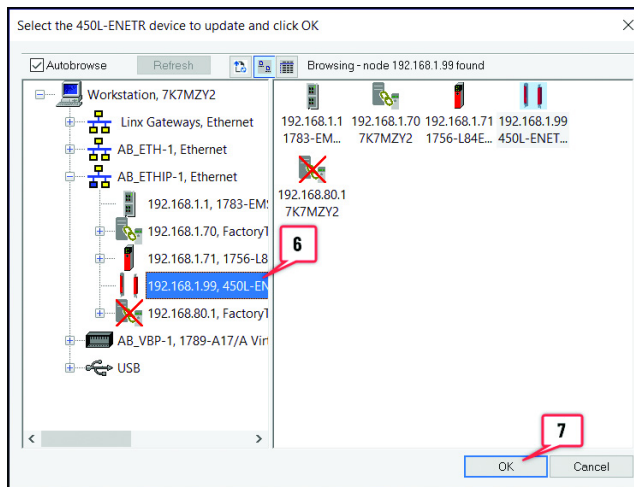
You can follow this procedure to update other devices, like the 450L-E and 450L-B safety light curtains.

5. Click Next.

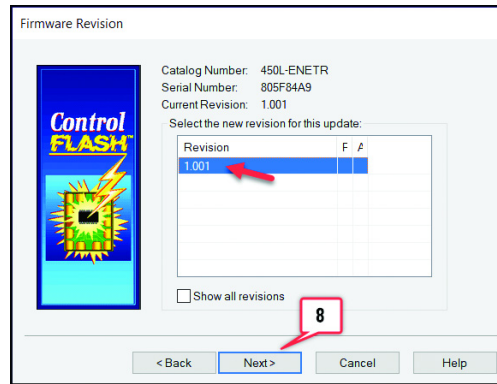


6. Locate the safety light curtain in the RSLink® window.

7. Click OK.

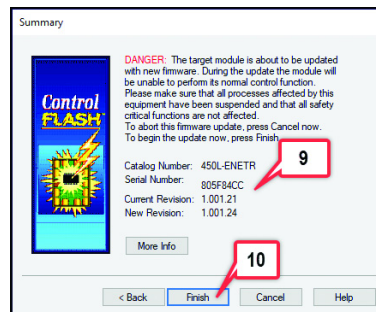


8. Select the firmware revision and click Next.



9. Verify the change in the revision level.

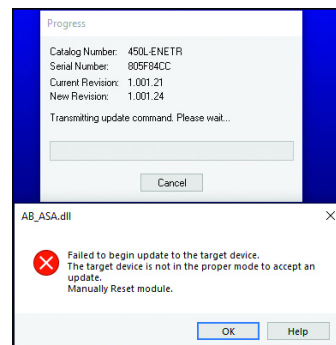
10. Click Finish.



11. Click Yes to begin updating the device.

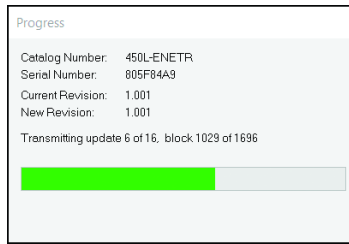


If you get a message to reset the module manually, you must remove the connection from the controller. Click OK and see [Remove Controller Connections on page 93](#).



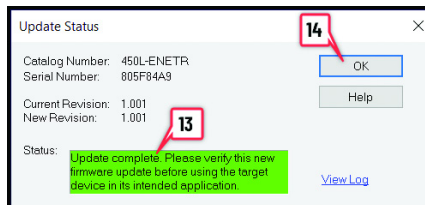
Once the controller connections are removed, restart the update.

12. The ControlFLASH application provides progress updates.



13. Verify that the update is complete.

14. Click OK.



You can now update another device or close out the ControlFLASH application.

Troubleshooting

This chapter provides guidelines to troubleshoot your 450L-ENETR network interface.

Power Fault

Conditions

No active status indicators.

Action

Confirm that the 450L-ENETR network interface connects to +24V DC and the 450L safety light curtain receiver stick.

Communication Fault

Conditions

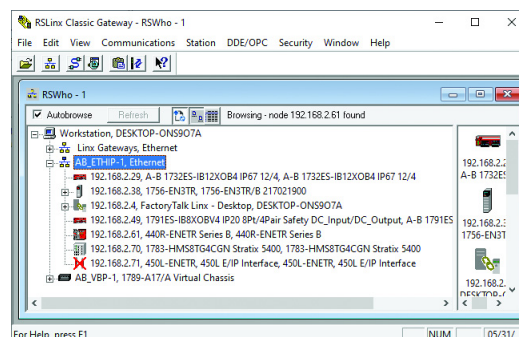
Upon power-up, you find the following:

- MOD is flashing red and green
- Net is flashing green
- Link is steady green and flashing yellow

Action

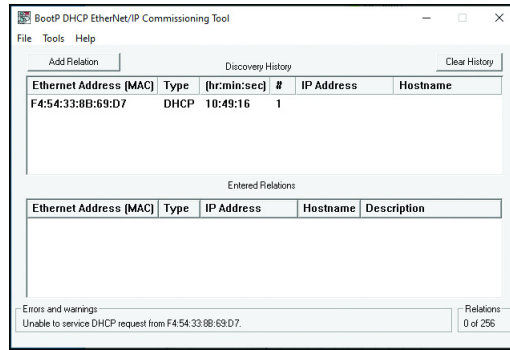
1. Check RSLinx®

RSLinx shows your 450L-ENETR network interface in the device list with an X over its icon. RSLinx remembers that the 450L-ENETR network interface was assigned the IP address before the most recent power-up.



2. Run BOOTP/DHCP.

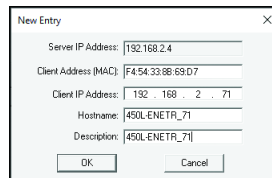
The following image shows the safety light curtain block with no IP address. The likely cause is the block is assigned an IP address, but DHCP is not disabled.



3. Reassign the IP address and disable DHCP.

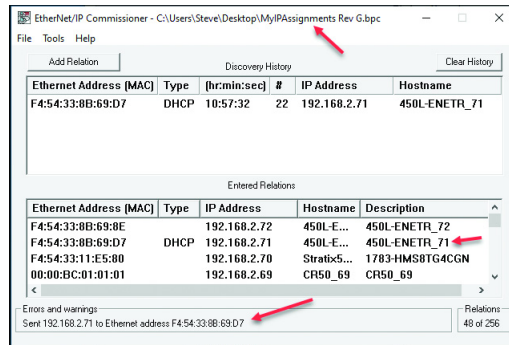
- Method 1:

Double-click the discovered address and make a new entry.



- Method 2:

If you keep a file of your IP addresses, open that file and wait several seconds. The BOOTP/DHCP server sends the IP address to the Ethernet address (MAC address) automatically.

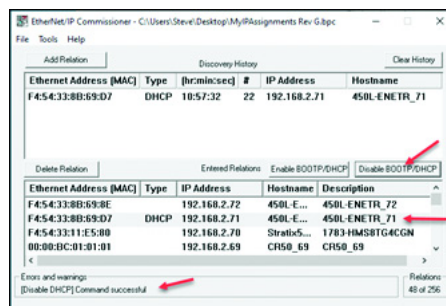


4. Disable DHCP.

Click the device in the Entered Relations table.

Click the Disable BOOTP/DHCP button.

Verify that you get the successful disable message.

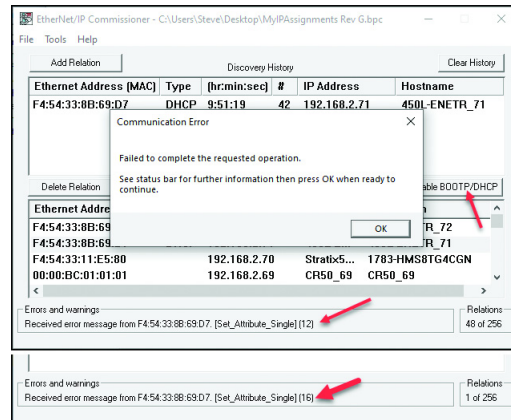


Cannot Disable DHCP

Conditions

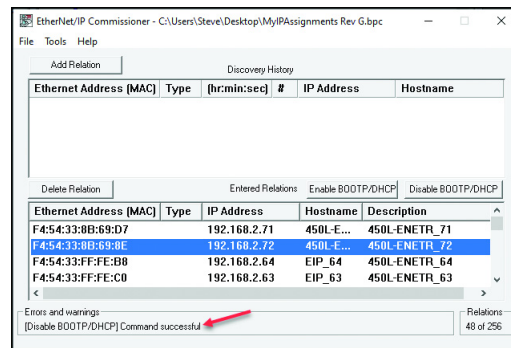
In an attempt to disable DHCP, a communication error similar to [Figure 61](#) is received. This error can be either Set_Attribute_Single [12] or [16].

Figure 61 - [Set_Attribute_Single][12] Error



Resolution

1. Remove the module from the controller connection (see [Remove Controller Connections on page 93](#)).
2. Reset the plug-in module to the factory default (see [Reset to Factory Default and Protection Mode on page 25](#)).
3. Reassign the IP address (see [BOOTP/DHCP on page 26](#))
4. Disable DHCP.
5. You must see a success message (Disable BOOTP/DHCP Command successful.)



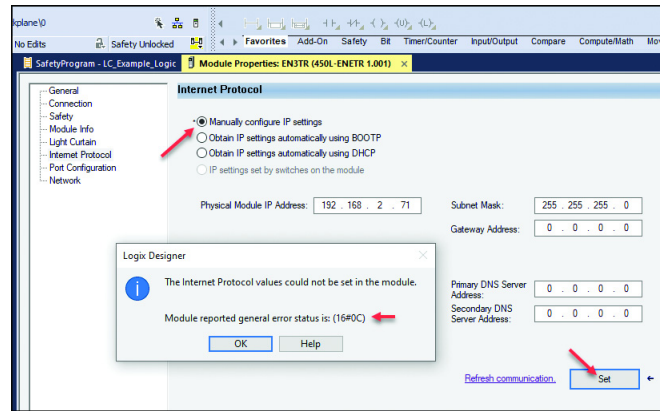
6. Connect the 450L-ENETR network interface directly to the computer that is running the BOOTP/DHCP server (with no other EtherNet/IP™ connections). Cycle power to the 450L-ENETR network interface, allow the BOOTP/DHCP server to assign the IP address, and then attempt to disable DHCP.
7. If the error persists, reinstall the firmware in the 450L-ENETR network interface (see [ControlFLASH Firmware Update on page 75](#)).

Cannot Manually Assign IP Address in Module Properties

Conditions

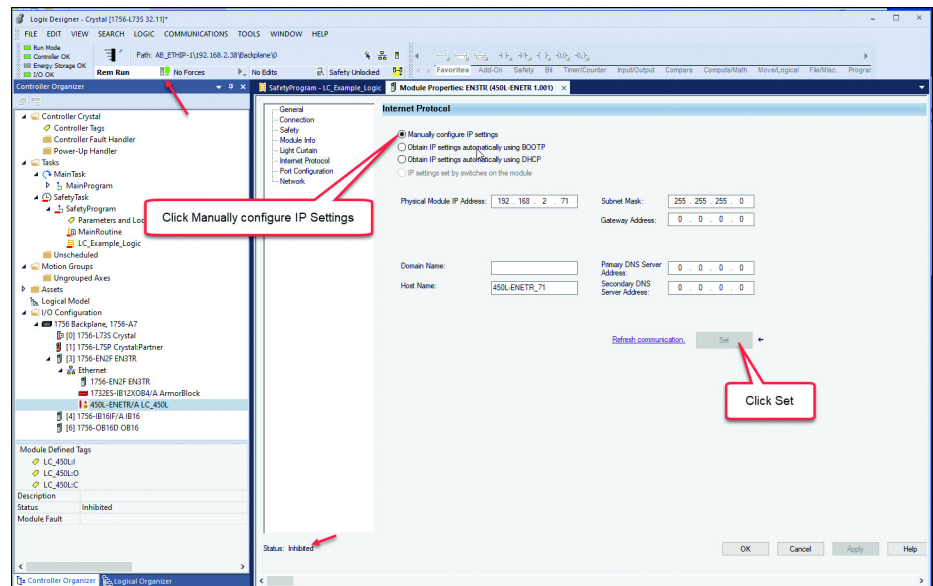
In the module properties, you want to configure the IP settings manually. When you click Set, you get an error code 16#0c. See [Figure 62](#).

Figure 62 - Module Error Code 16x0C



Resolution

1. Remove the module from the controller connection (see [Remove Controller Connections on page 93](#)).
2. Click Manually configure IP settings and click Set.



Laser Alignment Not Working

When the safety light curtain aligns properly, the laser on the receiver stick cannot turn on with the use of the optical switch. Since the safety light curtain is aligned, the laser is no longer needed. If the receiver does not align properly, the laser can turn on and off with the use of the optical switch.

The laser on the transmitter stick can always turn on and off with the use of the optical switch.

If you want to double-check the alignment with the laser and you cannot turn on the laser, slightly misalign either the transmitter or receiver. Then touch the optical switch to turn on the laser. Then realign the two sticks. After alignment is completed, the laser turns off automatically after the Laser Operation Time expires (see [Environment on page 45](#)).

IP Address Defaults to 192.168.1.99 and Locks Out

The IP address defaults to 192.168.1.99 regardless of the switch settings. Check the safety light curtain firmware. If it is 2.002, then the sticks have 1K security key and you must replace them with sticks with 4K security key and firmware 5.002.

IP Address Switches Not Read Correctly

The 450L-ENETR network interface is fully compatible with safety light curtain firmware v5.002. Earlier safety light curtain firmware must be upgraded to v5.002. To update the firmware, follow these steps:

1. To perform a factory reset, set the IP address switches to 888 and cycle power.
2. Set the IP address switches to 999; do not set the switches to 001...254.
3. Use BootP/DHCP tool to assign an IP address.
4. Use ControlFLASH™ to upgrade the safety light curtain firmware (see [ControlFLASH Firmware Update on page 75](#)).

Configuration Operation Not Allowed (16#080F)

The configuration of the safety light curtain is not the same as specified in the module profile. Verify that the module definition agrees with the actual safety light curtain: Length, resolution, and cascading.

If the 450L-APC-IO-8 plug-in used, a firmware incompatibility also generates this message.

Notes:

Specifications

General

Attribute	Value
Communication power supply voltage	24.0V DC±15%, NEC Class 2, PELV
Operating current	340 mA (EtherNet/IP™ block only) See publication 450L-UM001 for current requirements for the safety light curtain sticks.
Communication rate	EtherNet/IP 10/100 Mbps
Internet Protocol	IP4 Addressing
CIP sync	CIP™ sync/IEEE 1588 end-to-end transparent clock supported
CIP safety standards	IEC 61784-3-2: Functional safety fieldbuses - Additional specifications for CPF 2 regarding the following standards: <ul style="list-style-type: none"> • IEC 61158-1: Overview and guidance for the IEC 61158 and IEC 61784 series • IEC 61158-3-2: Datalink layer service definition - Type 2 elements • IEC 61158-4-2: Datalink layer protocol specification - Type 2 elements • IEC 61158-5-2: Application layer service definition - Type 2 elements • IEC 61158-6-2: Application layer protocol specification - Type 2 elements

Environmental

Attribute	Value
Temperature, operating	-10...+55 °C (14...131 °F)
Temperature, storage	-25...+75 °C (-13...+167 °F)
Relative humidity	Up to 95%, noncondensing
Vibration	10...55 Hz, 0.35 mm (0.01 in.)
Shock	10 g, 16 ms
Enclosure type rating	<ul style="list-style-type: none"> • IP20 with no QD connections • IP65 with connectors and sealed caps that are installed properly
Emissions	CISPR 11, Group 1, Class A
ESD immunity	IEC 61000-4-2 and 61496-1 section 4.3.2 <ul style="list-style-type: none"> • Normal Operation: 6 kV contact discharge, 8 kV air discharge • No Dangerous Fail: 8 kV contact discharge, 15 kV air discharge
Radiated RF immunity	IEC 61000-4-3: <ul style="list-style-type: none"> • 10.0V/m (80 MHz...1 GHz) • 3.0V/m (1.4...2GHz) • 3.0V/m (2.0...2.7GHz)
EFT immunity	IEC 61000-4-4, section 5, IEC61000-6-7, and 61496-1 section 4.3.2 <ul style="list-style-type: none"> • Normal operation: ±1kV • No dangerous failure: ±2kV and Severity Level 3
Surge transient immunity	IEC 61000-4-5, section 5, 61000-6-7, and 61496-1 section 4.3.2 <ul style="list-style-type: none"> • Normal operation at ±1 kV (Line to GND) • No dangerous failure at ±2 kV and severity level 3
Conducted RF immunity	IEC 61000-4-6, section 5, 61000-6-7, and 61496-1 section 4.3.2.6 <ul style="list-style-type: none"> Normal operation: <ul style="list-style-type: none"> • 3V for cable between module and safety light curtain. • 10V for other cables if longer than 10 m (32.8 ft) No dangerous failure: <ul style="list-style-type: none"> • 10V for cable between module and safety light curtain • 30V for other cables if longer than 10 m (32.8 ft)

Notes:

Regulatory Approvals

Agency Certifications

- UL Listed Industrial Control Equipment certified for US and Canada. See UL File E322657.
- CE Marked for all applicable EU directives
- UKCA Marked for all applicable regulations
- C-Tick Marked for all applicable acts
- RCM: Australian Radiocommunications Act compliant with AS/NZS CISPR 11: Industrial Emissions
- EtherNet/IP™: ODVA conformance tested to EtherNet/IP specifications
- KC: Korean Registration of Broadcasting and Communications Equipment, compliant with: Article 58-2 of Radio Waves Act, Clause 3

Declaration of Conformity

CE Conformity

Rockwell Automation declares that the products that are shown in this document conform with the 2014/30/EU Electromagnetic Compatibility Directive (EMC) and 2006/42/EC Machinery Directive (MD) and the following standards.

- IEC/EN 61508 - Functional safety of electrical/electronic/programmable electronic safety-related systems
- IEC/EN 62061 - Safety of machinery - Functional safety of safety-related electrical, electronic, and programmable electronic control systems
- EN ISO 13849-1 - Safety of machinery -- Safety-related parts of control systems -- Part 1: General principles for design
- EN 61000-6-4 - Generic Standards - Emission Standard for Industrial Environments
- EN 61000-6-2 - Generic Standards - Immunity of Industrial Environments

This product is intended for use in an industrial environment.

For a comprehensive CE certificate visit: rok.auto/certifications.

UKCA Conformity

Rockwell Automation declares that the products that are shown in this document are in compliance with 2016 No. 1091 Electromagnetic Compatibility Regulations and 2008 No. 1597 Supply of Machinery (Safety) Regulations and the following standards.

- IEC/EN 61508 - Functional safety of electrical/electronic/programmable electronic safety-related systems

- IEC/EN 62061 - Safety of machinery - Functional safety of safety-related electrical, electronic, and programmable electronic control systems
- EN ISO 13849-1 - Safety of machinery -- Safety-related parts of control systems -- Part 1: General principles for design
- EN 61000-6-4 - Generic Standards - Emission Standard for Industrial Environments
- EN 61000-6-2 - Generic Standards - Immunity of Industrial Environments

This product is intended for use in an industrial environment.

For a comprehensive UKCA certificate visit: rok.auto/certifications.

SIL Rating

The 450L-ENETR network interface meets the requirements of SIL CL 3 in accordance with IEC/EN 61508.

Attribute	Rating
SIL CL (IEC/EN 62061) SIL (IEC/EN 61508)	3
PFDavg ⁽¹⁾	1.61E-04
PFHD [/h] ⁽²⁾	2.00E-09
Mode of operation	High Demand mode
Safety-related subsystems	Type B (use of programmable / complex components)
Hardware Fault Tolerance, HFT	1
Safe Failure Fraction, SFF [%]	95%

(1) Average probability of a dangerous failure on demand (61508, not in 62061).

(2) Average frequency of a dangerous failure per hour

Performance Level/Category

The Performance Level of the safety function is dependent on the structure of all devices that comprise the safety function.

The 450L-ENETR network interface can be used in safety systems that meet up to Category 4 and Performance Level PL_e in accordance with ISO 13849-1.

Attribute	Rating
Category	4
Performance Level	PL _e
MTTFd [years]	196.1
Diagnostic Coverage, DCavg	90.7%
Days, dop [days/year]	365
Hours [hours/day]	24
T [years]	20

Safety Statements for the Use of CIP Safety Devices

Safety Statements

When using CIP Safety™ devices, follow these guidelines:

- Safety system designers must have sufficient technical knowledge of and experience with IEC 61508 to apply the 450L-ENETR network interface properly.
- The replacement of safety devices requires that the replacement device is configured properly, and the operation of the replacement device must be verified.
- If you choose to configure safety connections with a safety configuration ID (SCID)=0, you are responsible to confirm that the originators and targets have the correct configurations.
- You must assign SNN numbers for each safety network or safety subnet that are unique system wide.
- When a safety device is configured directly from a workstation, compare the transferred SCID and configuration data with the SCID and configuration data that is originally viewed in the workstation.
- All downloads are validated through user tests.
- The signature is only considered verified (and configuration locked) after user tests.
- Configuring an originator with connection data and/or target configuration data must be downloaded to the target so it can be tested and verified. Only then can you confirm SCIDs from the target.
- You must test the operation of a device completely before you set the lock attribute.
- You must clear any pre-existing configuration from any safety device before you install it onto a safety network.
- You must commission all safety devices with MAC ID (and communication rate if necessary) before you install it onto a safety network.
- Safety function implementers must carefully consider the implications of mixing different SIL level devices on the network.
- You must test safety connection configurations after they are applied in an originator to confirm that the target connection is operating as intended.



ATTENTION:

- Status indicators are not reliable indicators and cannot guarantee accurate information. Only use status indicators for general diagnostics during commissioning or troubleshooting. Do not attempt to use status indicators as operational indicators.
- Originators with an automatic SNN setting feature must only use that feature when the safety system is not relied upon.
- If a Type 1 Safety Open configures a device, verify that all originator-configured safety devices have their ownership assignments as part of the final verification process.
- You must visually verify that all configuration data is downloaded correctly.

Notes:

Uninstall the Logix Designer Application Module Profile

This appendix describes the steps to remove the Module Profile from the Studio 5000 Logix Designer® application.

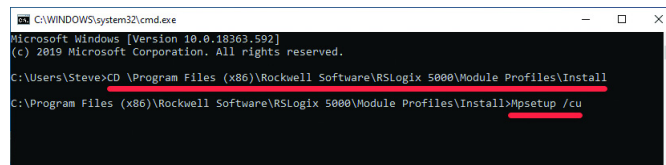
Procedure

1. Go to a DOS command prompt.
2. Change the directory to the typical location of the module profiles. Copy and paste this DOS command to the DOS prompt.

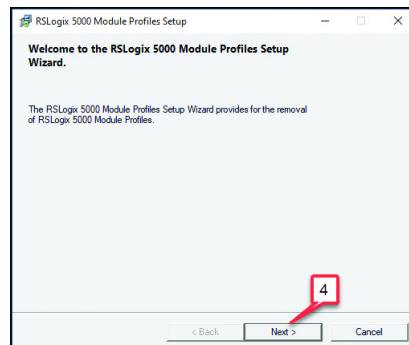
```
CD \Program Files (x86)\Rockwell Software\RSLogix 5000\Module Profiles\Install
```

3. Type the following command at the DOS prompt:

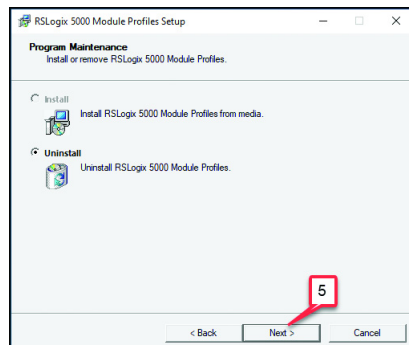
```
MPSetup /cu
```



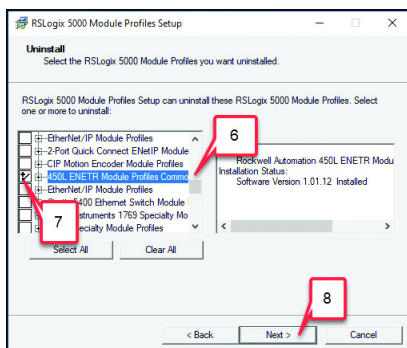
4. At the wizard, click Next.



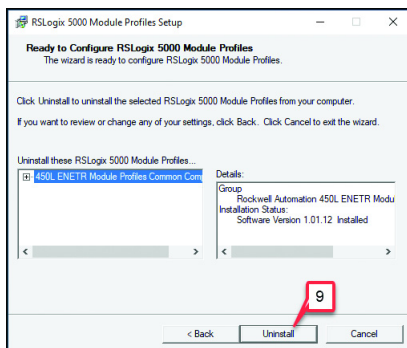
5. Click Next to uninstall.



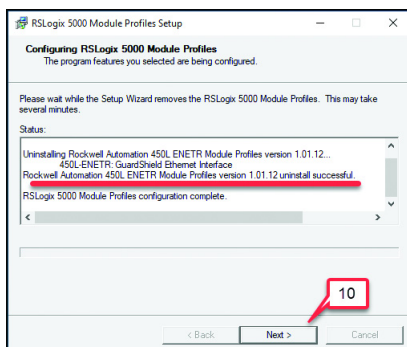
6. Use the vertical scroll bar to locate the 450L module.
7. Check the 450L box to select.
8. Click Next.



9. Click Uninstall.



10. Uninstall is successful. Click Next. Click Finish in the final window.



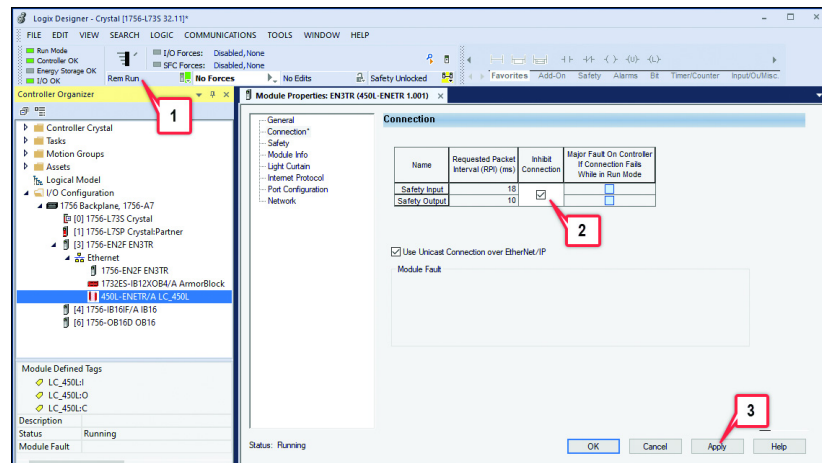
Remove Controller Connections

Before you update the firmware and sometimes when attempting to disable DHCP communications, the 450L-ENETR network interface must not have any connections to the controller.

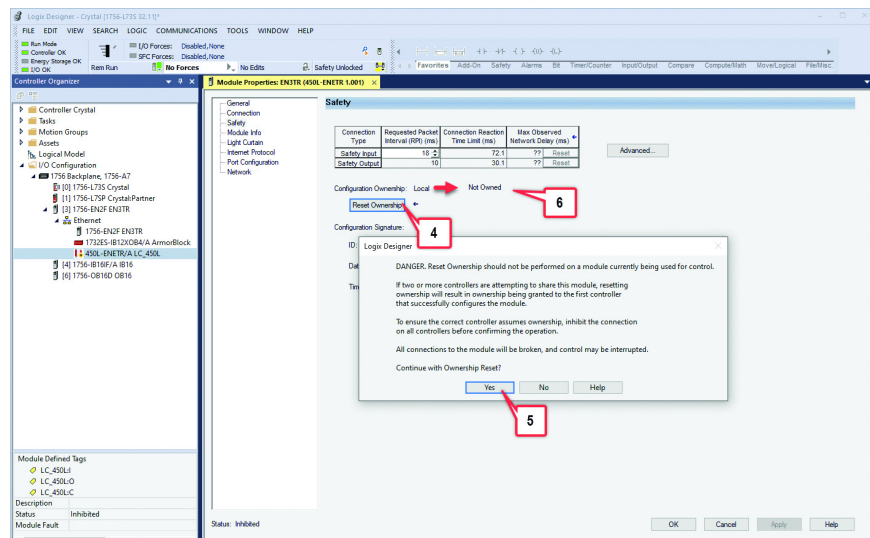
Procedure

Start the Studio 5000 Logix Designer® application and open the 450L-ENETR network interface properties. Go to the Connection folder.

1. Go online with the controller.
2. Check the Inhibit Connection box.
3. Click Apply.



4. Go to the Safety folder and click Reset Ownership.
5. Click Yes to continue.
6. Upon completion, the ownership changes from Local to Not Owned.



To reconnect the module to the controller, repeat the steps with the Inhibit Connection box cleared.

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Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, and product notification updates.	rok.auto/support
Knowledgebase	Access Knowledgebase articles.	rok.auto/knowledgebase
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	rok.auto/pcdc

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At the end of life, this equipment should be collected separately from any unsorted municipal waste.

Rockwell Automation maintains current product environmental information on its website at rok.auto/pec.





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