Quick Start

Original Instructions

Allen-Bradley by ROCKWELL AUTOMATION

Guardmaster®

450L GuardShield Safety Light Curtain

Catalog Numbers 450L-B4FNxYD, 450L-B4HNxYD, 450L-E4FLxYD, 450L-E4HLxYD

This quick start provides a summary of the basic steps that are required to configure and run a system using 450L light curtains in minimal time.

IMPORTANT This guide provides links to resources for more information and is not a replacement for a complete understanding of either publication 450L-IN004 or publication 450L-UM001.

ATTENTION: See publication 450L-UM001 for safety application requirements and functional safety data. You must read and understand the safety requirements before putting a system that contains light curtains into use.

LASER LIGHT CLASS 2 HAZARD: Do not stare into the beam. 450L-E light curtains are equipped with an integrated laser alignment help option.

Product Overview

The 450L GuardShield™ safety light curtain family is designed for use on hazardous machinery for Point of Operation Control (POC). The product family is certified as Type 4 electro-sensitive protective equipment (ESPE) (as defined by EN 61496-1 and IEC 61496-2) and can be used in applications that require up to and including PLe category 4 according to EN ISO 13849-1.

The 450L safety light curtain family consists of two product lines:

- 450L-B (Basic): Suitable for basic ON/OFF applications.
- 450L-E (Enhanced): Provides enhanced features for more sophisticated applications.

Table 1 - Differences Between 450L-B and 450L-E Safety Light Curtain Systems

Description	450L-B	450L-E
Alignment aid	Two zone indicator light-emitting diode (LED)	Integrated laser alignment and two zone indicator LED
Operating range	• Resolution 14 mm (0.56 in.): 0.5...4 m (1.64...13.12 ft) • Resolution 30 mm (1.19 in.): 0.9...7.0 m (2.95...22.97 ft) • Reduced operating range (selected with DIP switch): – Resolution 14 mm (0.56 in.): 0.9...2 m (2.95...6.56 ft) – Resolution 30 mm (1.19 in.): 1.2...3.5 m (3.94...11.48 ft)	• Resolution 14 mm (0.56 in.): 0.5...9 m (1.64...29.53 ft) • Resolution 30 mm (1.19 in.): 0.9...16.2 m (2.95...53.15 ft) • Reduced operating range (selected with DIP switch): – Resolution 14 mm (0.56 in.): 0.9...4.5 m (2.95...14.76 ft) – Resolution 30 mm (1.19 in.): 1.2...8.0 m (3.94...26.25 ft)
Functionality	• Start modes • External device monitoring (EDM) • Operating range • CIP Safety™	• Start modes • EDM • Operating range • Beam coding • Blanking • Muting • Cascading • CIP Safety
Protective field length	150...1950 mm (5.91...76.77 in.) in 150 mm (5.91 in.) increments	

Plug-ins are available to provide for additional functions, like muting. See publication 450L-UM001 for full specifications, details on both products, and available accessories.

IMPORTANT 450L-B transceiver stick cannot be operated with a 450L-E transceiver stick.

Requirements

See firmware revision information in publication 450L-UM001 for information and the PCDC to download firmware. If you use Connected Components Workbench™ software, version 12 or later is required.

Workflow

1. Verify that you have all required parts
2. Configure the light curtain
3. Assemble, position, and mount the light curtain
4. Wire, apply power, and align system
5. Verify correct operation

Step 1: Verify that you have all required parts

A 450L GuardShield safety light curtain is normally shipped as an individual component (single transceiver). A functional system includes four individual boxes. Plug-ins are ordered separately from the transceivers.

Table 2 - Part List for a Complete System

Item	Required Quantity	Part	Description
1	2	450L GuardShield transceiver stick	Each box contains the following items (shown in Figure 1): • One stick • Mounting kit (top and bottom) • Test rod • Instruction manual
2	1	Transmitter plug-in	150 mm (5.9 in.) pigtail with M12 QD connector (male)
3	1	Receiver plug-in	

Figure 1 - Contents of the 450L Transceiver Stick Box

Transceiver Stick | Standard Mounting Kit | Test Rod | Installation Instructions

Step 2: Configure the light curtain

IMPORTANT Only authorized personnel must perform system configuration, by any method.

The plug-in that is inserted determines the functionality and operating parameters of 450L. Configuration can be made either directly at the DIP switches or with software:

- Connected Components Workbench software (450L-E only and requires 450L-AD-OID optical interface device).
- Studio 5000 Logix Designer® application if you use the CIP Safety model.

Rockwell Automation

The transmitter and cascading plug-ins do not have DIP switches, this functionality is only on receiver and universal plug-ins.

If you are configuring the light curtain with Connected Components Workbench software, set DIP switch 1 to ON. Otherwise, use the settings that are defined in the following tables.

Table 3 - DIP Switches by Plug-in Type

Type/ Catalog Number	Receiver Plug-in				Universal Plug-in
	ON/OFF 450L-APR-ON-5	EDM 450L-APR-EDM-8	Blanking 450L-APR-BL-5	Muting 450L-APR-MU-8	450L-APU-UN-8
DIP Switches	1...4	1...8	1...8	1...12	1...12

Table 4 - DIP Switch Functionality (1)

Switch (2)	Switch Function	Default	Description
1	Software configuration	OFF	OFF: Disabled ON: Enabled
2	Low range activation	OFF	OFF: Disabled ON: Enabled
3	Beam coding (450L-E only)	OFF	OFF: Disabled ON: Enabled
4	–	OFF	–
5	Combination activation of the following start modes: • Automatic start • Manual (re) start • Manual cold start • Manual start with off function	OFF	• DIP 5: OFF DIP 6 OFF: Automatic start (Default) • DIP 5: ON DIP 6 OFF: Manual (re) start
6		OFF	• DIP 5: OFF DIP 6 ON: Manual cold start • DIP 5: ON DIP 6 ON: Manual start with off function
7	External Device Monitor	OFF	OFF: Disabled ON: Enabled
8	Muting or Blanking	OFF	–
9		OFF	For details, see publication 450L-UM001
10		OFF	
11		OFF	
12	–	OFF	–

(1) For functionality of 450L-APR-BL-5 DIP switches 5...8, see publication 450L-UM001.
(2) For DIP Switches by Plug-in Type, see Table 3.

Figure 2 - DIP Switches

IMPORTANT DIP switches must be switched to OFF if the switch function is not defined. Otherwise, an error condition occurs.

After you check the DIP switch settings and configure as required, insert the plug-ins into the sticks.

For more information on these functions, proper configuration, configuration via software, and configuration confirmation see System Configuration in publication 450L-UM001.

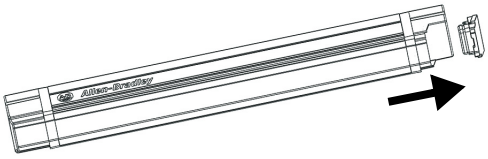
Step 3: Assemble, position, and mount the light curtain

After setting the plug-in DIP switches, you can assemble, position, and mount your light curtain.

IMPORTANT Plug-ins and enclosures are mechanically keyed to help prevent the wrong plug-in from being used. If any resistance is felt when inserting the plug-in, stop and verify that it is assembled at the correct end.

To Do:

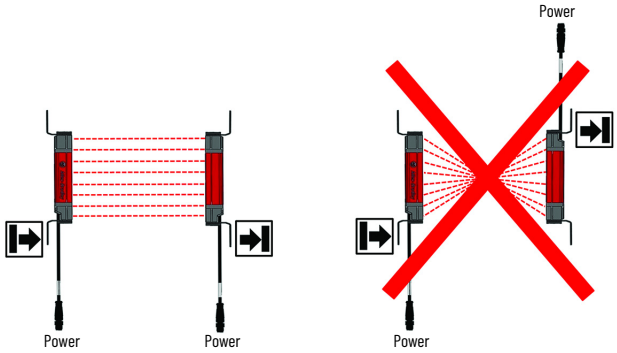
1. Remove the red slot cover.



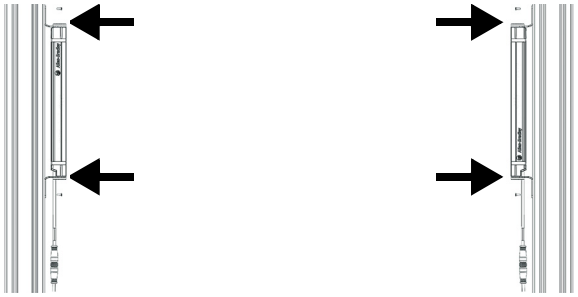
2. Check that the DIP switches on the connection plug-in are set properly.

After setting the DIP switches, you can install the light curtain. Consider the following when mounting the light curtain:

- Mount both sticks so that the distance of the protective field is at or greater than the calculated safety distance away from the hazardous point (see Determine the Safety Distance in publication 450L-UM001).
- Mount both sticks away from any reflective surfaces.
- The sticks must be parallel to each other and be positioned at the same height.
- Verify that both connection plug-ins are at the same ends of the stick during installation.
- Confirm that the operating range is between the maximum and minimum distances show in Table 1 on page 1.



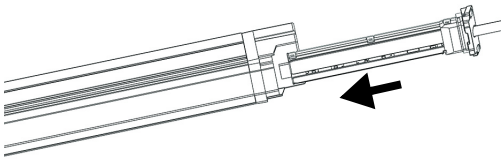
- The optical lens system of transmitter and receiver stick must be in exact opposition to each other.



- Take suitable measures to reduce vibration (see publication 450L-UM001 for a full range of mounting accessories).
- The safety light curtain must be mounted such that the hazardous point cannot be reached from below, above, or behind the safety light curtain and that the light curtain cannot be repositioned.

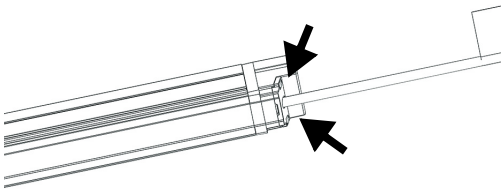
IMPORTANT See Installation and Wiring in publication 450L-UM001 for examples of correct and incorrect mounting locations and configurations.

3. Insert the plug-in.

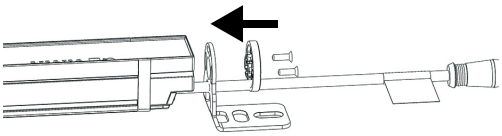


If a 450L-E safety light curtain is used and operated with a cascading plug-in, see publication 450L-UM001.

4. To maintain the IP65 rating, tighten the plug-in screws to (0.38 N•m [3.36 lb•in], max).



5. Install mounting kit with the standard mounting brackets supplied.
6. Leave brackets slightly loose to allow for alignment adjustments.



Step 4: Wire, apply power, and align system

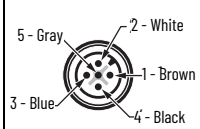
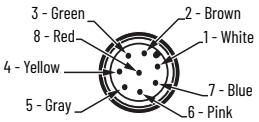
After your light curtains are mounted, you can wire and power them up to complete the system alignment.

IMPORTANT See Typical Wiring Diagrams in publication 450L-UM001 for examples of how to wire your safety light curtain.

To Do:

1. Complete the electrical wiring of both sticks (see Table 5).

Table 5 - Pin Assignment Connection Plug-in (1)

Plug Type						
Stick Behavior	**Tx**	**Rx**	**Tx**	**Rx**	**Tx**	**Rx**
Plug-in Cat. No.	**450L-APT-PW-5**	**450L-APR-ON-5 450L-APR-BL-5**	**450L-APT-PW-8**	**450L-APR-ED-8 (2) 450L-APR-MU-8 (3)**	**450L-APU-UN-8**	
Pin 1	+24V DC	+24V DC	Do not connect	Auxiliary output (OSSD emulation) (2)	Do not connect	Auxiliary output (OSSD emulation)
2	Do not connect	OSSD1	+24V DC	+24V DC	+24V DC	+24V DC
3	0V (Ground)	0V (GND)	Earth PE	Earth PE	Earth PE	Earth PE
4	Do not connect	OSSD2	Do not connect	EDM (Input) (2)	(4)	EDM input (3)
5	Earth PE	Earth PE	Do not connect	OSSD1	Do not connect	OSSD1
6	–	–	Auxiliary output (Lockout)	OSSD2	Auxiliary output (Lockout)	OSSD2
7			0V (GND)	0V (GND)	0V (GND)	0V (GND)
8			Do not connect	Start (2)	(4)	Start (2)

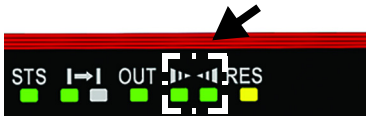
(1) For cascading plug-in (Cat. No. 450L-APC-10-8, see publication 450L-UM001).
(2) If set with DIP switches.
(3) For muting applications, see publication 450L-UM001).
(4) Pin 4 connected to pin 8 (short circuited).

IMPORTANT
- For 450L-APU-UN-8 to be used as a transmitter stick, a link must be made between pins 4 and 8 at the panel. Otherwise, operation is as a receiver stick by default.
- When 450L-APU-UN-8 is set to be a transmitter, the DIP switch settings are ignored.
- To mitigate electrical interference, verify that the Earth PE connection of each plug-in is wired to an appropriate Earth point.

2. Turn on power to the GuardShield safety light curtain system.
3. Check the STS status indicators on both sticks.

ATTENTION: Confirmation of a new system configuration is not required for new systems straight out of the box. However, if the STS status indicator at the receiver stick displays a configuration change (blinking red/green), confirmation is required to proceed. After each reconfiguration of a safety light curtain, test the system for proper configuration and operation before placing the guarded machine in operation. See Confirmation of a New System Configuration in publication 450L-UM001.

4. Once the STS status indicator on both sticks is steady green, proceed with system alignment.
   a. Rotate the transmitter and receiver sticks while watching the two Regional Intensity status indicators on the sticks.
   b. Find the point where the two indicators for the intensity state illuminate to a steady green condition.



The 450L-E sticks have an ILAS system (see 450L-E Integrated Laser Alignment System (ILAS)).
The 450L-B sticks have no integrated laser alignment system, however an optional external alignment aid with a mounting clamp (Cat. No. 450L-ALAT-C) is available.

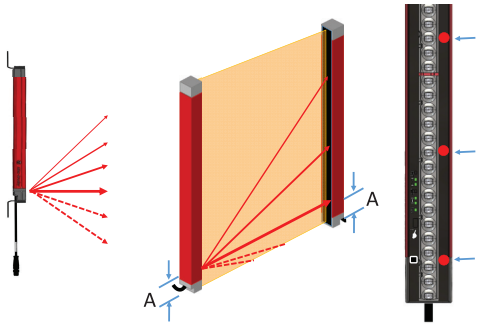
5. To refine the alignment, determine the maximum left and right adjustment angles and position each unit at the midpoint, verifying that both Regional Intensity status indicators are still steady green. To secure the aligned sticks in position, tighten the mounting brackets to a maximum of 0.7 N•m [6.19 lb•in] with a torque driver.
6. Cycle power to confirm that the system powers up, goes to the ON state (STS status indicator steady green), and the intensity status indicators indicate steady green.

450L-E Integrated Laser Alignment System (ILAS)

The 450L-E ILAS system can be switched on/off by placing a finger on the optical switch, which is the square next to the hand symbol on the front window (see Figure 4 on page 4). When the laser is activated, several red laser beams are transmitted from a source close to the optical push button (see Figure 3).

The brightest beam is transmitted perpendicular to the front window, which is also parallel to the infrared light of the stick. The brightest beam must be positioned at the opposite stick at the same level as indicated with distance A (Figure 3). An inverted laser warning symbol has been provided as a convenient target. The other slanted laser beams must also be targeted between the optics center and the housing of the opposite stick on the front window. The quantity of slanted beams on the opposite stick depends on the installation distance. To find optimum alignment for a 450L-E safety light curtain system, the laser of each stick must be aligned to the opposite stick.

Figure 3 - Principal Function of the Integrated Laser Alignment System



LASER LIGHT CLASS 2 HAZARD: Do not stare into the beam. Each 450L-E safety light curtain has a built-in laser alignment system. LASER CLASS 2 (IEC 60825-1). Conforms to 21 CFR 1040.10.

In a cascading system, each integrated laser system works independently and can be switched on or off individually.

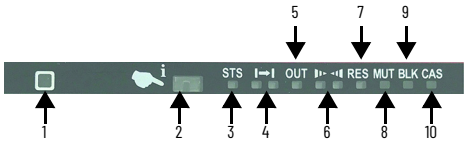
For more information on ILAS system use, see publication 450L-UM001.

Step 5: Verify correct operation

450L-B and 450L-E safety light curtain transceiver sticks share a common user interface (Figure 4). The 450L-E safety light curtain has an additional built-in laser for alignment and additional indicators for its advanced features.

ATTENTION: After each reconfiguration of a safety light curtain, test the system for proper configuration and operation before placing the guarded machine in operation.

Figure 4 - Status Indicator Location



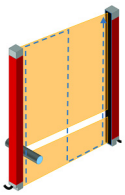
Item	Description
1	Laser (1)
2	Optical switch and communication interface (2)
3	Status
4	Tx/Rx
5	OSSD

Item	Description
6	Regional intensity
7	Restart
8	Muting (1)
9	Blanking (1)
10	Cascading (1)

(1) 450L-E safety light curtains only.
(2) Via Connected Components Workbench software.

To Do:

1. Verify that while the test rod is anywhere within the protective field, the OSSD safety outputs remain in the OFF-state (OUT is steady red).
2. Move the test rod as shown with a maximum speed of 0.3 ms (11.8 in./s).

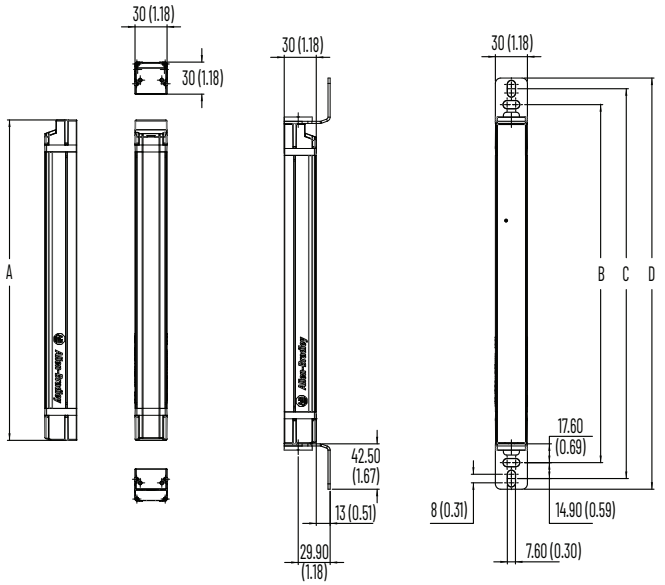


3. Verify that the intensity indicator indicates a continuous protective field interruption (minimum one intensity indicator is OFF) while the test rod is within the protective field.

Approximate Dimensions

450L-B and 450L-E safety light curtain transceiver sticks have the same dimensions. The only difference is that the 450L-E safety light curtain sticks have an additional slot, which allows the insertion of a cascading plug-in and the connection plug-in.

Figure 5 - 450L Safety Light Curtain Stick Dimensions [mm (in.)]



Cat. No.	A	B	C	D
	Protective Height	Mounting Value	Mounting Value	Total Length
450L-B4xN0150YD	150 (5.91)	185.5 (7.3)	215 (8.46)	235 (9.25)
450L-E4xL0150YD				
450L-B4xN0300YD	300 (11.81)	335.5 (13.21)	365 (14.37)	385 (15.16)
450L-E4xL0300YD				
450L-B4xN0450YD	450 (17.72)	485.5 (19.11)	515 (20.28)	535 (21.06)
450L-E4xL0450YD				
450L-B4xN0600YD	600 (23.62)	635.5 (25.02)	665 (26.18)	685 (26.97)
450L-E4xL0600YD				
450L-B4xN0750YD	750 (29.53)	785.5 (30.93)	815 (32.09)	835 (32.87)
450L-E4xL0750YD				
450L-B4xN0900YD	900 (35.43)	935.5 (36.83)	965 (37.99)	985 (38.78)
450L-E4xL0900YD				
450L-B4xN1050YD	1050 (41.34)	1085.5 (42.74)	1115 (43.9)	1135 (44.68)
450L-E4xL1050YD				
450L-B4xN1200YD	1200 (47.24)	1235.5 (48.64)	1265 (49.8)	1285 (50.59)
450L-E4xL1200YD				
450L-B4xN1350YD	1350 (53.15)	1385.5 (54.55)	1415 (55.71)	1435 (56.5)
450L-E4xL1350YD				
450L-B4xN1500YD	1500 (59.06)	1535.5 (60.45)	1565 (61.61)	1585 (62.4)
450L-E4xL1500YD				
450L-B4xN1650YD	1650 (64.96)	1685.5 (66.36)	1715 (67.52)	1735 (68.31)
450L-E4xL1650YD				
450L-B4xN1800YD	1800 (70.87)	1835.5 (72.26)	1865 (73.43)	1885 (74.21)
450L-E4xL1800YD				
450L-B4xN1950YD	1950 (76.77)	1985.5 (78.17)	2015 (79.33)	2035 (80.12)
450L-E4xL1950YD				

Additional Resources

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

Resource	Description
GuardShield Safety Light Curtain Installation Instructions, publication 450L-IN004	Provides information that is required to install a GuardShield light curtain.
GuardShield Safety Light Curtain User Manual, publication 450L-UM001	Provides product-specific guidelines for installing the 450L-B and 450L-E safety light curtain system.
GuardShield 450L EtherNet/IP™ Module CIP Safety Connection User Manual, publication 450L-UM002	Provides information to install, wire, configure, and troubleshoot a 450L-ENETR network interface.
"How To..." videos, GuardShield 450L Product Page	Provides introductory and "How To" videos to help familiarize yourself with the 450L safety light curtain.
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.

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

Documentation Feedback

Your comments help us serve your documentation needs better. If you have any suggestions on how to improve our content, complete the form at rok.auto/docfeedback.

Waste Electrical and Electronic Equipment (WEEE)

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

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

Rockwell Otomasyon Ticaret A.Ş. Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400 EEE Yönetmeliğine Uygundur

Connect with us.

rockwellautomation.com — expanding **human possibility**®

AMERICAS: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
EUROPE/MIDDLE EAST/AFRICA: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
ASIA PACIFIC: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication 450L-QS001A-EN-P - September 2021