



445L Safe 2 and Safe 4 POC Safety Light Curtain Migration

Bulletin Number 445L



Allen-Bradley
by ROCKWELL AUTOMATION



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

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



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



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



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

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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445L Safe 4 POC Safety Light Curtain

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Introduction

A number of older Allen-Bradley® GuardShield™ safety light curtains are discontinued and no longer available for sale. This publication suggests examples for how to convert these existing safety light curtain applications to safety light curtains with the latest technologies.

The products that are described in this publication can be used in various ways. Therefore, you must verify that each application and use of this control equipment meets all performance and safety requirements. Designers must consider applicable laws, regulations, codes, and standards.

The wiring diagrams in this publication are intended as examples. Because many variables and requirements are associated with any installation, Rockwell Automation does not assume responsibility or liability for actual use that is based on these examples.

Who Should Use this Manual

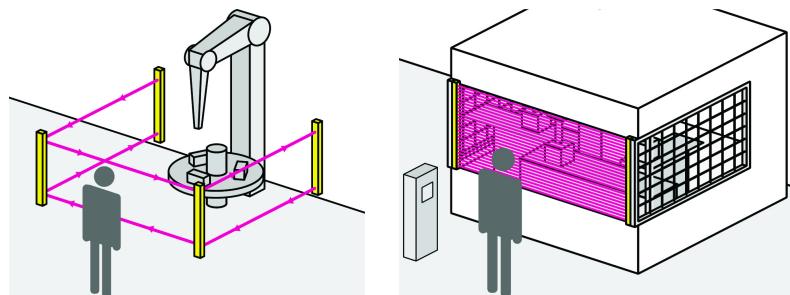
This publication is intended for machine safeguarding system designers who have been adequately trained in the design and use of safeguarding systems and risk assessments.

About This Publication

This publication provides conversion details from the 445L Micro 400 PAC, 445L Safe 2/Safe 4 PAC and 445L Safe 4 POC safety light curtains. POC is an acronym for point of operation control, typically where an operator has direct access to a hazard through the light curtain. POC light curtains have two resolutions:

- 14 mm (0.55 in.) for finger detection
- 30 mm (1.18 in.) for hand protection

PAC is an acronym for perimeter access control. PAC light curtains are used in applications that require full body detection.



For further assistance in replacing those 445L PAC or POC devices, contact Rockwell Automation technical support (rok.auto/support).

Migration Recommendation

We recommend that current users of the 445L Micro 400 PAC, 445L Safe 2/Safe 4 PAC and 445L Safe 4 POC light curtains, or anyone that considers these light curtains for a future project (new or replacement) migrate to the GuardShield 450L family. Alternative models are also available within the GuardShield 440L family.

450L Benefits

The 450L light curtain provides the following benefits:

- Single stick transceiver
- Functionality set by a plug-in module
- Cat 4 PLe and SIL 3 rating
- Full active design (no passive zones at top or bottom of the stick)
- Overall cost of ownership (a)

(a) The 450L light curtain can have a higher list price than some of the discontinued models, but the unique single-stick architecture means that the overall quantity of product that is purchased is less when spare and service inventory is considered. The patented plug-in system also means that you are only purchasing the functionality that is required, while allowing the flexibility of future economical upgrades simply by replacing the plug-ins if requirements change.

Conversion Concerns

Product obsolescence is a part of the industrial business cycle. This publication provides cost-effective recommendations for converting the 445L Micro 400 PAC, 445L Safe 2/Safe 4 PAC and 445L Safe 4 POC light curtains to the state-of-the-art 450L light curtain family, and considers the following major concerns.

Range

Range is the distance between the transmitter and receiver that the light curtains are designed to operate over. For this publication, range is the first consideration.

Protective Height/Resolution

Protective height is the length of the sensing field of the light curtain, from the first beam to the last. The overall length of the 445L Micro 400 and 445L Safe 2/Safe 4 light curtains is longer than the protective field. Therefore, you must verify that the migration is to an equivalent length or perform a risk assessment if a shorter length is selected.

Resolution is the ability of the light curtain to detect certain size objects. For POC light curtains, finger detection is accepted as 14 mm (0.55 in.), and hand detection accepted as 30 mm (1.18 in.). For PAC light curtains, whole-body detection is achieved using 2-, 3-, or 4-beams across the length of the light curtain. The migration suggestions in this publication maintain the resolutions from the 445L light curtain to the 450L or 440L light curtains. Changes to the resolution must be done with a risk assessment and can require the light curtains to be relocated.

Electrical Connections

The 445L light curtains have 5-pin quick disconnect connectors. This publication shows migration to light curtains that have similar electrical connections to minimize wiring changes.

Mounting

The 445L Micro 400 has a much smaller profile than either the 450L or 440L alternatives and the mounting brackets must be changed.

The 445L Safe 2/Safe 4 and 450L light curtains have similar housing features, which allow them to use the same mounting brackets. This reuse simplifies the migration as it minimizes the installation changes.

If you determine that the best migration path is to the 440L light curtain, the mounting brackets must be changed.

Response Time

Response time is the time that is required to perform the safety function. For each conversion, the comparable response time is provided. An increase in the response time can require you to adjust the safety distance.



ATTENTION: A risk assessment must be performed if the migration is to a longer response time (see SAFEBK-RM002 for further information on the safety distance calculation).

Output Load Capability

Output load capability is the ability of the light curtain output safety switching device (OSSD) to switch loads. The 445L Micro 400 PAC (via the MSR4x) has a limit of 400 mA and the 445L Safe 2/Safe 4 PAC and 445L Safe 4 POC have a limit of 300 mA. Both the 450L and 440L light curtains have a higher (500 mA) switching capability, which removes any conversion concerns.

OSSD Pulse Testing

The 445L Micro 400 PAC, 445L Safe 2/Safe 4 PAC, 445L Safe 4 POC, and 450L light curtains use pulse testing on the OSSD safety outputs to detect short circuits to 24V, 0V, and to each other. The 440L light curtain does not use pulse testing; instead, short circuits are checked by creating a short delay between the turn on of the OSSD safety outputs.

This section is provided for informational purposes only. Both methods of detecting short circuits on the OSSD safety signals are adequate for their safety ratings and does not influence the decision to migrate to one light curtain or the other.

Download Firmware, AOP, EDS, and Other Files

The 450L light curtain is the newest light curtain that Rockwell Automation offers. Field upgrade is possible using ControlFLASH™ software.

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

Discontinued Products

Product	Description	Cat. No.
Micro 400 PAC (See 445L Micro 400 PAC Safety Light Curtain on page 11)	GuardShield Safe2 Pair PAC 3 Beam	445L-110492-0002
	GuardShield Safe2 Pair PAC 4 Beam	445L-110492-0004
	GuardShield Safe2 Pair PAC 2 Beam	445L-110492-0006
Safe 2 PAC (See 445L Safe 2/Safe 4 PAC Safety Light Curtain on page 13)	GuardShield Safe2 Pair PAC 3 Beam	445L-103005-0019
	GuardShield Safe2 Pair PAC 4 Beam	445L-P2S4120YD
	GuardShield Safe2 Pair PAC 2 Beam	445L-P2S2500YD
	GuardShield Safe2 Pair PAC 3 Beam	445L-P2S3400YD
Safe 4 PAC (See 445L Safe 2/Safe 4 PAC Safety Light Curtain on page 13)	GuardShield Safe4 Pair PAC 3 Beam	445L-103002-0003
	GuardShield Safe4 Pair PAC 4 Beam	445L-103002-0007
	GuardShield Safe4 Pair PAC 2 Beam	445L-103002-0048
	GuardShield Safe4 Pair PAC 2 Beam	445L-P4S2500YD
	GuardShield Safe4 Pair PAC 3 Beam	445L-P4S3400YD
	GuardShield Safe4 Pair PAC 4 Beam	445L-P4S4120YD
Safe 4 POC (See 445L Safe 4 POC Safety Light Curtain on page 19)	GuardShield Safe4 Pair 30-0120mm	445L-P4X0120YD
	GuardShield Safe4 Pair 30-0240mm	445L-P4X0240YD
	GuardShield Safe4 Pair 30-0360mm	445L-P4X0360YD
	GuardShield Safe4 Pair 30-0480mm	445L-P4X0480YD
	GuardShield Safe4 Pair 30-0600mm	445L-P4X0600YD
	GuardShield Safe4 Pair 30-0720mm	445L-P4X0720YD
	GuardShield Safe4 Pair 30-0840mm	445L-P4X0840YD
	GuardShield Safe4 Pair 30-0960mm	445L-P4X0960YD
	GuardShield Safe4 Pair 30-1080mm	445L-P4X1080YD
	GuardShield Safe4 Pair 30-1200mm	445L-P4X1200YD
	GuardShield Safe4 Pair 30-1320mm	445L-P4X1320YD
	GuardShield Safe4 Pair 30-1440mm	445L-P4X1440YD
	GuardShield Safe4 Pair 30-1560mm	445L-P4X1560YD
	GuardShield Safe4 Pair 30-1680mm	445L-P4X1680YD
	GuardShield Safe4 Pair 30-1800mm	445L-P4X1800YD
	GuardShield Safe4 Pair 30-1920mm	445L-P4X1920YD

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 Table 3	9
Updated Table 10	14
Updated Table 12	14

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation. You can view or download publications at rok.auto/literature.

Resource	Description
GuardShield Safe 4 and Safe 4 PAC Safety Light Curtains User Manual, publication 445L-UM001	Provides detailed information to install, wire, configure, troubleshoot, and use the GuardShield 445L Safe 4 POC safety light curtains.
GuardShield Safe 2 and Safe 2 PAC Safety Light Curtains User Manual, publication 445L-UM002	Provides detailed information to install, wire, configure, troubleshoot, and use GuardShield 445L Safe 2 POC safety light curtains.
GuardShield Micro 400 Safety Light Curtains Installation Instructions, publication 445L-IN005	Provides detailed information to install, wire, configure, troubleshoot, and use 445L Micro 400 PAC safety light curtains.
GuardShield 450L POC and 450L PAC Safety Light Curtain User Manual, publication 450L-UM001	Provides detailed information to install, wire, configure, troubleshoot, and use GuardShield 450L safety light curtains.
GuardShield PAC Type 4 (Premier Access Control) Safety Light Curtain User Manual, publication 440L-UM001	Provides detailed information to install, wire, configure, troubleshoot, and use GuardShield 440L Type 4 PAC safety light curtains.
GuardShield Type 4 and Remote Teach User Manual, publication 440L-UM003	Provides detailed information to install, wire, configure, troubleshoot, and use GuardShield 440L Type 4 POC safety light curtains.
GuardShield Type 2 Safety Light Curtain Installation Instructions, publication 440L-IN011	Provides detailed information to install, wire, configure, troubleshoot, and use GuardShield 440L Type 2 POC safety light curtains.
MSR42 Control Module User Manual, publication 440R-UM008	Provides detailed information to install, wire, configure, troubleshoot, and use the MSR42 control module.
System Design for the Control of Electrical Noise Reference Manual, publication GMC-RM001	Provides a thorough review of the installation and grounding of noisy components and what can be done to minimize their potential for system noise injection.
Industrial Automation Wiring and Grounding Guidelines, publication I770-4.1	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.

445L Micro 400 PAC Safety Light Curtain

Range

The first criteria to determine the best migration path is the range of the 445L Micro 400 safety light curtain. The 445L Micro 400 safety light curtain product line all have the same range of 0...5 m (0...16.4 ft).

[Table 1](#) compares the range of the 445L Micro 400 safety light curtain to the 450L PAC and the 440L Type 4 PAC safety light curtains. The preferred solution is to migrate to the 450L PAC safety light curtain; the alternative is to migrate to the 440L Type 4 PAC safety light curtain.

Table 1 - Range Comparison

Resolution	Range [m (ft)]		
	445L Micro 400	450L PAC	440L Type 4 PAC ⁽¹⁾
2-beam, 500 mm (19.7 in.)			
3-beam, 400 mm (15.7 in.)	0...5 (0...16.4)	0.9...16.2 (2.95...53.15)	0...16.0 (0...52.5)
4-beam, 300 mm (11.8 in.)			

(1) 440L Type 4 PAC safety light curtains only have 2- and 3-beam options.

Protective Height

Protective height is the portion of the light curtain that is designed for sensing. For PAC safety light curtains, this portion is whole body detection and achieved with 2-, 3-, or 4-beams across the length of the unit.

- The 445L Micro 400 PAC safety light curtain has protective heights from 550...950 mm (21.7...37.4 in.).
- The 450L PAC safety light curtain has protective heights from 600...1050 mm (23.6...41.3 in.).
- The 440L Type 4 PAC safety light curtain has protective heights from 520...820 mm (20.5...32.3 in.).

[Table 2](#) shows the recommended conversions that are based on number of beams and protective.

[Table 3](#) shows the conversion to the alternative 440L Type 4 PAC safety light curtain.

Table 2 - 445L Micro 400 to 450L PAC Conversion Table

Resolution	From 445L Micro 400 PAC		To 450L PAC	
	Protective Height [mm (in.)]	Cat. No.	Protective Height [mm (in.)]	Cat. No.
2-beam, 500 mm (19.7 in.)	550 (21.65)	445L-110492-0002	600 (23.6)	450L-E4A2L0600YD
3-beam, 400 mm (15.7 in.)	850 (33.46)	445L-110492-0004	900 (35.4)	450L-E4A3L0900YD
4-beam, 300 mm (11.8 in.)	950 (37.4)	445L-110492-0006	1050 (41.3)	450L-E4A4L1050YD

Table 3 - 445L Micro 400 to 440L Type 4 PAC Conversion Table

Resolution	From 445L Micro 400 PAC		To 440L Type 4 PAC ⁽¹⁾	
	Protective Height [mm (in.)]	Cat. No.	Protective Height [mm (in.)]	Cat. No.
2-beam, 500 mm (19.7 in.)	550 (21.65)	445L-110492-0002	520 (20.4)	440L-P4A2500YD
3-beam, 400 mm (15.7 in.)	850 (33.46)	445L-110492-0004	820 (31.8)	440L-P4A3400YD
4-beam, 300 mm (11.8 in.)	950 (37.4)	445L-110492-0006	—	—

(1) 440L Type 4 PAC safety light curtains only have 2- and 3-beam options

Connections

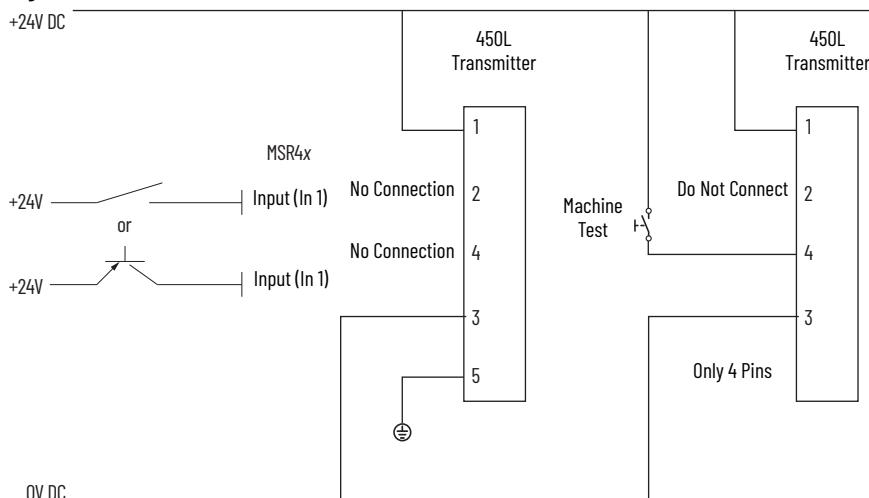
445L Micro 400 safety light curtains must connect to the dedicated MSR41 or MSR42 controller using 8-pin M12 to RJ45 patchcords. The wiring is not compatible with either 450L PAC or 440L Type 4 PAC safety light curtains.

Transmitter Test Function

The transmitter test function allows you to turn off the transmitter at any time. This function is often used to verify that the light curtain is operating properly. If the application requires the use of the test function, then you must consider migrating to the 440L Type 4 PAC safety light curtain. [Figure 1](#) compares the schematic of the transmitter test functions.

- 445L Micro 400: +24V via a contact that is connected to IN1 of the MSR4x Control Module. See publication [440R-UM008](#) more information.
- 450L PAC: No test function.
- 440L Type 4 PAC: Pin 4 is left open when the test function is not needed and connected to 24V to turn off the transmitter. Pin 2 must remain unconnected.

Figure 1 - Transmitter Test Schematics

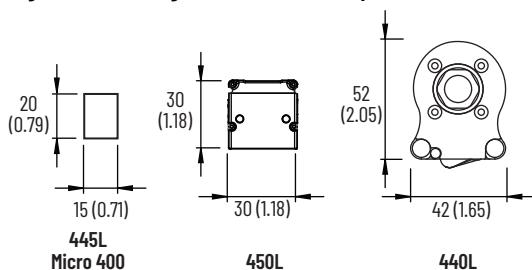


Housing Size

[Figure 2](#) shows the comparison of the housing cross sections of the light curtains that are referenced in this publication. The 445L Micro 400 PAC safety light curtains profile is smaller than either the 450L or 440L safety light curtains. Migration to the 450L or 440L safety light curtain requires changes in the mounting brackets.

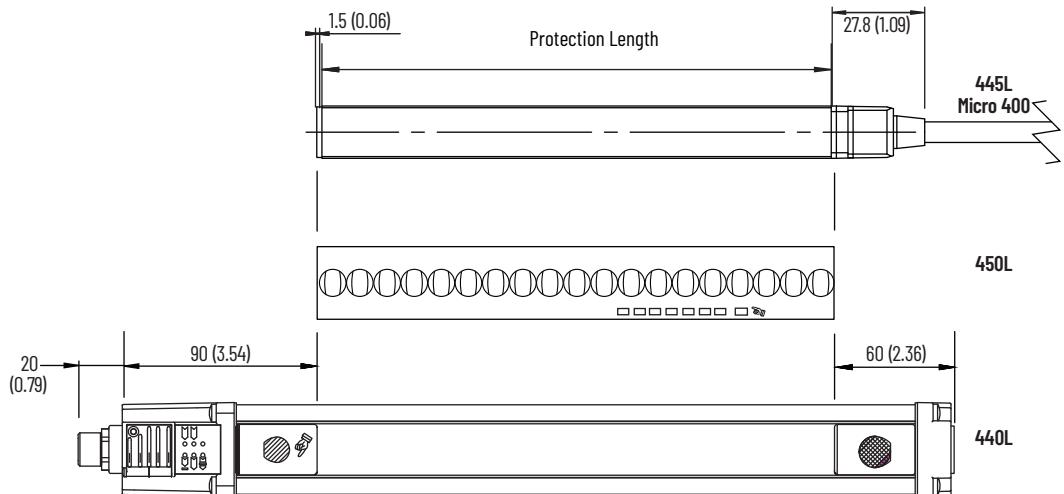
Housing Cross Section

Figure 2 - Housing Cross Section Comparison [mm (in.)]



Housing Overall Length

[Figure 3 on page 11](#) shows a comparison of the protective length to the overall housing length. The housing length of both the 445L Micro 400 PAC and 440L PAC safety light curtains are longer than the protective length. The 450L safety light curtain has the additional benefit where the housing length is the same as the protective length.

Figure 3 - Protection Length Compared to Housing Length [mm (in.)]

Mounting Brackets

Due to the small profile of the 445L Micro 400 safety light curtain, the 450L PAC or 440L Type 4 PAC safety light curtains cannot reuse its mounting brackets and they must be replaced.

[Table 4](#) shows the types of mounting brackets for the 445L Micro 400, 450L, and 440L safety light curtains.

Table 4 - Mounting Bracket Types

Bracket Type	445L Micro 400	450L	440L
Standard	 Cat. No. 445L-AF6143 Adjustable 180° bracket kit (two kits supplied with each pair).	 Cat. No. 450L-AM-TBM Adjustable top/bottom mounting brackets that are shipped with all 450L safety light curtains.	 Cat. No. 440L-AF6101 End-cap mounting brackets that are shipped with all 440L safety light curtains.
Swivel	The standard bracket kit is 180° adjustable.	 Cat. No. 450L-AM-SM Optional for 450L safety light curtains.	The standard end-cap mounting brackets provide swivel adjustments.
Shock mount	—	 Cat. No. 445L-AF6142 Optional for 450L safety light curtains.	 Cat. No. 440L-AF6108 Cat. No. 440L-AF6120 Other kits available. Optional for 440L safety light curtains.

Laser Alignment

The 445L Micro 400 safety light curtain has integrated light-emitting diodes (LEDs) to indicate alignment status, but does not feature laser alignment.

The 450L PAC safety light curtain has integral laser alignment; it creates a linear series of spots that appear along the length of the opposite transceiver.

The 440L Type 4 PAC safety light curtain also has integrated laser alignment (top and bottom).

Response Time

Response time is dependent on the height of the protective field of the light curtain. [Table 5 on page 12](#) and [Table 6 on page 12](#) compare the response times of the 445L Micro 400 safety light curtain to the 450L PAC and 440L Type 4 PAC safety light curtains.

The 445L Micro 400 PAC safety light curtain has faster response times. In this case, the safety distance must be recalculated, which can require the relocation of the light curtain further away from the hazard.

Table 5 - 450L PAC Response Time Comparison

Resolution	From 445L Micro 400		To 450L PAC	
	Protective Height [mm (in.)]	Response Time [ms]	Protective Height [mm (in.)]	Response Time [ms]
2-beam, 500 mm (19.7 in.)	550 (21.65)	11.8	600 (23.6)	<20
3-beam, 400 mm (15.7 in.)	850 (33.46)	12.4	900 (35.4)	<20
4-beam, 300 mm (11.8 in.)	950 (37.4)	12.9	1050 (41.3)	<20

Table 6 - 440L Response Time (With No Beam Coding)

Resolution	From 445L Micro 400		To 440L PAC	
	Protective Height [mm (in.)]	Response Time [ms]	Protective Height [mm (in.)]	Response Time [ms]
2-beam, 500 mm (19.7 in.)	550 (21.65)	11.8	520 (20.4)	20
3-beam, 400 mm (15.7 in.)	850 (33.46)	12.4	820 (31.8)	20
4-beam, 300 mm (11.8 in.)	950 (37.4)	12.9	—	—

Output Load Capability

The 450L and 440L safety light curtains have higher output load capability than the 445L Micro 400 safety light curtain via the MSR41/MSR42 controller. The output load capability of the light curtains is shown in [Table 7](#). All three safety light curtain systems have output short-circuit protection.

Table 7 - Output Load Capability

Load Type	445L Micro 400	450L PAC	440L Type 4 PAC
DC	400 mA (via MSR4x)	500 mA	500 mA

445L Safe 2/Safe 4 PAC Safety Light Curtain

Range

The first criteria to determine the best migration path is the range of the 445L Safe 4 safety light curtain. The 445L Safe 4 safety light curtain has three ranges:

- 0...9 m (0...29.5 ft) with 14 mm (0.55 in.) resolution
- 0...18 m (0...59.1 ft) with 30 mm (1.18 in.) resolution
- 5...30 m (16.4...98.4 ft) with 30 mm (1.18 in.) resolution

[Table 8](#) compares the range of the 445L Safe 2 safety light curtain to the 450L PAC and the 440L Type 4 safety light curtains. The preferred solution is to migrate to the 450L PAC safety light curtain. The alternative is to migrate to the 440L safety light curtain.

For applications where the 30 mm (1.18 in.) 445L Safe 4 safety light curtain is used at the range from 18...30 m (59.1...98.4 ft), two sets of safety light curtains must be used to cover the distance.

Table 8 – Range Comparison Safe 2 PAC

Resolution	Range [m (ft)]		
	445L Safe 2	450L PAC	440L Type 4 PAC (1)
3-beam, 400 mm (15.7 in.)	0...18 (0...59)	0.9...16.2 (2.95...53.15)	0.3...16.0 (0.98...52.5)
2-beam, 500 mm (19.7 in.)			
3-beam, 400 mm (15.7 in.)	5...30 (16.4...98.4)	Need two light curtains for ranges between 16...30 m (52.5...98.4 ft).	
4-beam, 300 mm (11.8 in.)			

(1) 440L safety light curtains only have 2- and 3-beam options.

Table 9 – Range Comparison Safe 4 PAC

Resolution	Range [m (ft)]		
	445L Safe 4	450L PAC	440L Type 4 PAC (1)
2-beam, 500 mm (19.7 in.)			
3-beam, 400 mm (15.7 in.)	0...18 (0...59)	0.9...16.2 (2.95...53.15)	0.3...16.0 (0.98...52.5)
4-beam, 300 mm (11.8 in.)			
2-beam, 500 mm (19.7 in.)			
3-beam, 400 mm (15.7 in.)	5...30 (16.4...98.4)	Need two light curtains for ranges between 16...30 m (52.5...98.4 ft).	
4-beam, 300 mm (11.8 in.)			

(1) 440L safety light curtains only have 2- and 3-beam options.

Protective Height

PAC safety light curtains use multiple separate beams for whole-body detection. The heights above the reference plane for the beams are advised in ISO 13855 for models with 2-, 3-, and 4-beams. Therefore, number of beams rather than protective height is the consideration for PAC safety light curtains.

Protective height, which is the portion of the light curtain that is used for detection, from the first to the last beam, is provided here for information only. 445L Safe 2 and Safe 4 safety light curtains have protective heights from 600...960 mm (23.6...37.8 in.). The 450L PAC safety light curtain has protective heights from 600...1050 mm (23.6...41.3 in.). The 440L Type 4 PAC safety light curtain has protective heights from 520...820 mm (20.5...32.3 in.).

[Table 10 on page 14](#) shows the recommended conversions from a Safe 2 safety light curtain that are based on number of beams and protective height.

[Table 11](#) shows the conversion from a Safe 2 safety light curtain to the alternative 440L Type 4 PAC safety light curtain.

[Table 12](#) shows the recommended conversions from a Safe 4 safety light curtain that are based on number of beams and protective height.

[Table 13 on page 15](#) shows the conversion from a Safe 4 safety light curtain to the alternative 440L Type 4 PAC safety light curtain.

Table 10 - 445L Safe 2 PAC to 450L PAC Conversion Table

Resolution	From 445L Safe 2		To 450L PAC	
	Protective Height [mm (in.)]	Cat. No.	Protective Height [mm (in.)]	Cat. No.
2-beam, 500 mm (19.7 in.)	600 (23.6)	445L-P2S2500YD	600 (23.6)	450L-E4A2L0600YD
3-beam, 400 mm (15.7 in.)	840 (33.0)	445L-103005-0019	900 (35.4)	450L-E4A3L0900YD
3-beam, 400 mm (15.7 in.)	840 (33.0)	445L-P2S3400YD	900 (35.4)	450L-E4A3L0900YD
4-beam, 300 mm (11.8 in.)	960 (37.8)	445L-P2S4120YD	1050 (41.3)	450L-E4A4L1050YD

Table 11 - 445L Safe 2 PAC to 440L Conversion Table

Resolution	From 445L Safe 2		To 440L Type 4 PAC ⁽¹⁾	
	Protective Height [mm (in.)]	Cat. No.	Protective Height [mm (in.)]	Cat. No.
2-beam, 500 mm (19.7 in.)	600 (23.6)	445L-P2S2500YD	520 (20.5)	440L-P4AL2500YD ⁽²⁾
3-beam, 400 mm (15.7 in.)	840 (33.0)	445L-103005-0019	820 (32.3)	440L-P4AL3400YD ⁽³⁾
3-beam, 400 mm (15.7 in.)	840 (33.0)	445L-P2S3400YD	820 (32.3)	440L-P4AL3400YD ⁽³⁾
4-beam, 300 mm (11.8 in.)	960 (37.8)	445L-P2S4120YD	—	—

(1) 440L safety light curtains only have 2- and 3-beam options.

(2) Alternatives:

- 440L-P4A2500YD, but does not have integrated laser alignment
- 440L-P4AL2500YA, has ArmorBlock® Guard I/O™ connectivity

(3) Alternatives:

- 440L-440L-P4A3400YD, but does not have integrated laser alignment
- 440L-P4AL3400YA, has ArmorBlock Guard I/O connectivity

Table 12 - 445L Safe 4 PAC to 450L PAC Conversion Table

Resolution	From 445L Safe 4		To 450L PAC	
	Protective Height [mm (in.)]	Cat. No.	Protective Height [mm (in.)]	Cat. No.
2-beam, 500 mm (19.7 in.)	600 (23.6)	445L-103002-0048	600 (23.6)	450L-E4A2L0600YD
3-beam, 400 mm (15.7 in.)	840 (33.0)	445L-103002-0003	900 (35.4)	450L-E4A3L0900YD
4-beam, 300 mm (11.8 in.)	960 (37.8)	445L-103002-0007	1050 (41.3)	450L-E4A4L1050YD
2-beam, 500 mm (19.7 in.)	600 (23.6)	445L-P4S2500YD	600 (23.6)	450L-E4A2L0600YD
3-beam, 400 mm (15.7 in.)	840 (33.0)	445L-P4S3400YD	900 (35.4)	450L-E4A3L0900YD
4-beam, 300 mm (11.8 in.)	960 (37.8)	445L-P4S4120YD	1050 (41.3)	450L-E4A4L1050YD

Table 13 - 445L Safe 4 PAC to 440L Conversion Table

Resolution	From 445L Safe 4		To 440L Type 4 PAC ⁽¹⁾	
	Protective Height [mm (in.)]	Cat. No.	Protective Height [mm (in.)]	Cat. No.
2-beam, 500 mm (19.7 in.)	600 (23.6)	445L-103002-0048	520 (20.5)	440L-P4AL2500YD ⁽²⁾
3-beam, 400 mm (15.7 in.)	840 (33.0)	445L-103002-0003	820 (32.3)	440L-P4AL3400YD ⁽³⁾
4-beam, 300 mm (11.8 in.)	960 (37.8)	445L-103002-0007	—	—
2-beam, 500 mm (19.7 in.)	600 (23.6)	445L-P4S2500YD	520 (20.5)	440L-P4AL2500YD ⁽²⁾
3-beam, 400 mm (15.7 in.)	840 (33.0)	445L-P4S3400YD	820 (32.3)	440L-P4AL3400YD ⁽³⁾
4-beam, 300 mm (11.8 in.)	960 (37.8)	445L-P4S4120YD	—	—

⁽¹⁾ 440L safety light curtains only have 2- and 3-beam options.⁽²⁾ Alternatives:

- 440L-P4A2500YD, but does not have integrated laser alignment
- 440L-P4AL2500YA, has ArmorBlock Guard I/O connectivity

⁽³⁾ Alternatives:

- 440L-P4A3400YD, but does not have integrated laser alignment
- 440L-P4AL3400YA, has ArmorBlock Guard I/O connectivity

Connections

All safety light curtains in this publication are available with 5-pin quick disconnect connectors, which minimizes changes to the wiring.

Transmitter Connection

The 450L PAC safety light curtain uses plug-in modules to determine functionality. To convert from a 445L Safe 2/Safe 4 safety light curtain to the 450L PAC safety light curtain, the following two plug-in modules are required:

- Transmitter: Catalog number 450L-APT-PW-5
- Receiver: Catalog number 450L-APR-ON-5

[Table 14](#) describes the functionality of each pin in the connector. The 440L safety light curtain has only a 4-pin transmitter; there is no need for a connection to protective earth (PE). Also, remove the connection to Pin 2 if you convert to the 440L safety light curtain.

Table 14 - Transmitter Pinout Descriptions

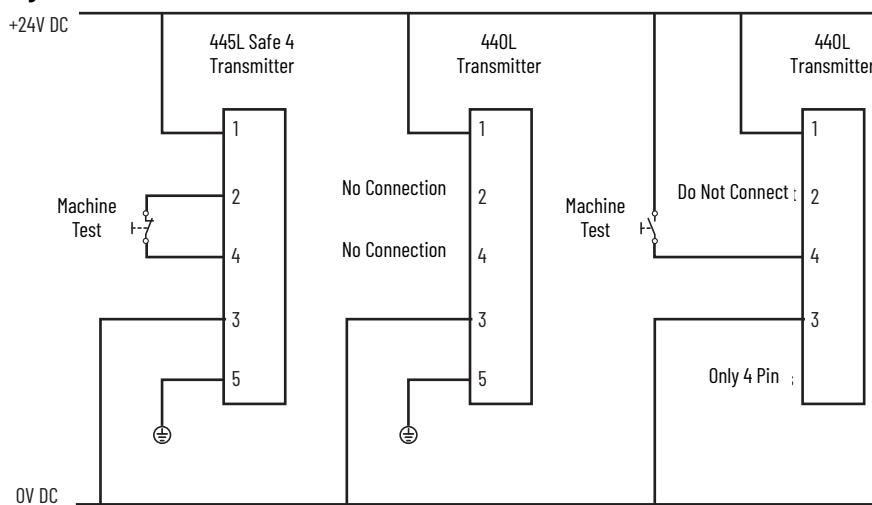
View	Pin	445L	450L PAC	440L
	1	+24V	+24V	+24V
	2	Test 2	No connection	Do not connect
	3	0V	0V	0V
	4	Test 1	No connection	Test
	5	Ground (PE)	Ground (PE)	—

Transmitter Test Function

The transmitter test function allows you to turn off the transmitter at any time. This function is often used to verify that the light curtain is operating properly. If the application requires the use of the test function, then you must consider migrating to the 440L safety light curtain.

[Figure 4 on page 16](#) compares the schematic of the transmitter test functions.

- 445L Safe 2/Safe 4: Short Pin 2 to Pin 4 when test function is not needed.
- 450L PAC: No test function.
- 440L Type 4 PAC: Pin 4 is left open when the test function is not needed and connected to 24V to turn off the transmitter. Pin 2 must remain unconnected.

Figure 4 - Transmitter Test Schematics

Receiver Connection

The receiver QD connections are interchangeable.

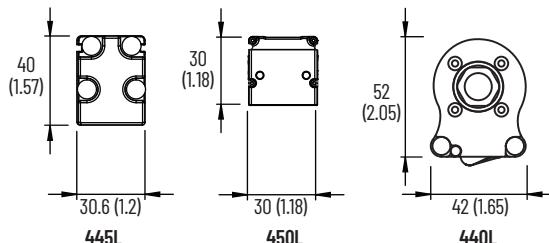
Table 15 - Receiver Pinout

View	Pin	445L	450L	440L
	1	+24V	+24V	+24V
	2	OSSD 2	OSSD 2	OSSD 2
	3	OV	OV	OV
	4	OSSD 1	OSSD 1	OSSD 1
	5	Ground (PE)	Ground (PE)	No connection (only 4 pins)

Housing Size

[Figure 5](#) shows the comparison of the housing cross sections of the light curtains that are referenced in this publication. The 445L and 450L safety light curtains have similar housings, so the mounting brackets for the 445L safety light curtain can also be used with the 450L safety light curtain. Migration to the 440L safety light curtain requires changes in the mounting brackets.

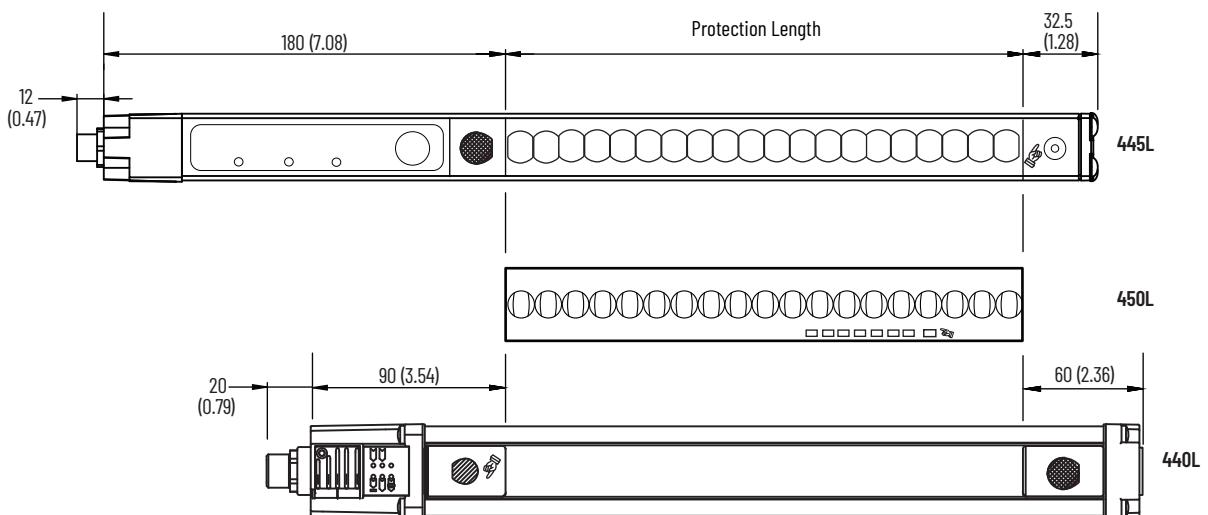
Housing Cross Section

Figure 5 - Housing Cross Section Comparison [mm (in.)]

Housing Overall Length

[Figure 6 on page 17](#) shows a comparison of the protective length to the overall housing length. The housing length of both the 445L and 440L safety light curtains are longer than the protective length. The 450L safety light curtain has the additional benefit where the housing length is the same as the protective length.

Figure 6 - Protection Length Compared to Housing Length [mm (in.)]



Mounting Brackets

The mounting brackets for the 445L safety curtain are usable with 450L safety light curtains. The mounting brackets for 440L safety light curtains are different and require further consideration. [Table 16](#) shows the types of mounting brackets for the 445L, 450L, and 440L safety light curtains.

Table 16 - Mounting Bracket Types

Bracket Type	445L and 450L	440L
Standard	 Shipped with 445L safety light curtains after April 2017. Optional mount for 450L safety light curtains. Cat. No. 450L-AM-SM	 End-cap mounting brackets that are shipped with all 440L safety light curtains. Cat. No. 440L-AF6101
Old standard	 Shipped with 445L safety light curtains before May 2017. Optional for 450L safety light curtains. Cat. No. 445L-AF6140	No equivalent for 440L safety light curtains.
Vertical	 Optional for 445L and 450L safety light curtains. Cat. No. 445L-AF6144	No equivalent for 440L safety light curtains.
Swivel	 Optional for 445L and 450L safety light curtains. Both the standard Cat. No. 450L-AM-TBM (top/bottom) mounting brackets that are supplied with all 450L safety light curtains and the optional Cat. No. 450L-AM-SM (side) mounting brackets allow the light curtains to swivel. Cat. No. 445L-AF6141	The standard end-cap mounting brackets provide swivel adjustments.
Shock mount	 Optional for 445L and 450L safety light curtains. Cat. No. 445L-AF6142 ⁽¹⁾	 Cat. No. 440L-AF6108 Other kits available. Optional for 440L safety light curtains. Cat. No. 440L-AF6120

(1) When using the Cat. No. 445L-AF6142, an extra Cat. No. 450L-AM-SM (side) mounting brackets can be used for longer 450L light curtains in high-shock 450L applications.

Laser Alignment

The 445L Safe 2/Safe 4 PAC safety light curtain has an integrated laser alignment system. This system aligns with two points; one at the top of the light curtain and one at the bottom of the light curtain.

The 440L Type 4 PAC safety light curtain has an integrated laser alignment system like the 445L Safe 2/Safe 4 PAC safety light curtain (top and bottom).

The 450L PAC safety light curtain has an integrated laser alignment system. This system creates a linear series of spots that appear along the length of the opposite transceiver.

Response Time

Response time is dependent on the height of the protective field of the light curtain. [Table 17](#) and [Table 18](#) compare the response times of the 445L Safe 2/Safe 4 PAC safety light curtain to the 450L PAC and 440L Type 4 PAC safety light curtains, respectively.

The 445L Safe 2/Safe 4 PAC safety light curtain has faster response times than both the 450L PAC and 440L Type 4 PAC safety light curtains. In this case, the safety distance must be recalculated, which can require the relocation of the light curtain further away from the hazard.

Table 17 - 450L PAC Standard Response Times Comparison

Resolution	From 445L Safe 2/Safe 4 PAC		To 450L PAC	
	Protective Height [mm (in.)]	Response Time [ms]	Protective Height [mm (in.)]	Response Time [ms]
2-beam, 500 mm (19.7 in.)	600 (23.6)	10.5	600 (23.6)	<20
3-beam, 400 mm (15.7 in.)	840 (33.0)	13.2	900 (35.4)	<20
4-beam, 500 mm (19.7 in.)	960 (37.8)	15.8	1050 (41.3)	<20

Table 18 - 440L Type 4 PAC Standard Response Times

Resolution	From 445L Safe 2/Safe 4 PAC		To 440L Type 4 PAC ⁽¹⁾	
	Protective Height [mm (in.)]	Response Time [ms]	Protective Height [mm (in.)]	Response Time [ms]
2-beam, 500 mm (19.7 in.)	600 (23.6)	10.5	520 (20.5)	20
3-beam, 400 mm (15.7 in.)	840 (33.0)	13.2	820 (32.3)	20
4-beam, 500 mm (19.7 in.)	960 (37.8)	15.8	—	—

(1) 440L safety light curtains only have 2- and 3-beam options.

Output Load Capability

The 450L and 440L safety light curtains have higher output load capability than the 445L Safe 4 safety light curtain. The output load capability of the light curtains is shown in [Table 19](#). All three safety light curtain systems have output short-circuit protection.

Table 19 - Output Load Capability

Load Type	445L Safe 4	450L	440L
DC	300 mA	500 mA	500 mA

445L Safe 4 POC Safety Light Curtain

Range

The only 445L Safe 4 POC safety light curtains still available for purchase today have an extended operating range, which is in excess of the alternative 450L and 440L POC safety light curtains. Range is still considered as the first criteria to determine the best migration path. However, it is recommended that the operating range for the application is considered rather than the maximum specification of the model to be replaced. The 445L Safe 4 POC safety light curtain is only available in 30 mm (1.18 in.) resolution.

[Table 20](#) compares the range of the 445L Safe 4 safety light curtain to the 450L-B, 450L-E, and the 440L Type 4 POC safety light curtains. The 450L-E safety light curtain is the preferred migration solution as it features an integrated laser alignment system and has the best operating range in the 450L safety light curtain family. The 450L-B safety light curtain is also a suitable migration solution. Alternatively, you can migrate to the 440L Type 4 POC safety light curtain.

Table 20 - Range Comparison

Resolution	Range [m (ft)]			
	445L Safe 4	450L-B	450L-E	440L Type 4
30 mm (1.18 in.)	5...30 (16.4...98.4)	0.9...7.0 (2.95...22.97)	0.9...16.2 m (2.95...53.15)	0.3...18.0 (0.98...59.0)

Protective Height

Protective height is the portion of the safety light curtain that is designed to detect the presence of an object, typically a hand.

The 445L Safe 4 POC safety light curtain has protective heights from 120...1920 mm (4.7...75.6 in.), in increments of 120 mm (4.7 in.). The overall length of the 445L Safe 4 POC safety light curtain is approximately 213...217 mm (8.4...8.5 in.) longer than the protective height, depending on model, to accommodate the integrated laser alignment system and controls. The 450L safety light curtain has protective heights from 150...1950 mm (5.9...76.8 in.) in increments of 150 mm (5.9 in.) with no dead zone - the integrated laser alignment system and controls are incorporated within the protective height. The 440L Type 4 POC safety light curtain has protective heights from 160...1760 mm (6.3...69.3 in.) in increments of 160 mm (6.3 in.). The overall length of the 440L Type 4 POC safety light curtain (between mounting points) is approximately 116 mm (4.6 in.) longer than the protective height to accommodate the integrated laser alignment system and controls.

[Table 21 on page 20](#), [Table 22 on page 20](#), and [Table 23 on page 21](#) show the recommended conversions from the 445L Safe 4 POC safety light curtain to either the 450L-B, 450L-E, or 440L Type 4 POC safety light curtains.

Table 21 - 445L Safe 4 POC to 450L-B Conversion Table

Resolution	From 445L Safe 4		To 450L-B ⁽¹⁾	
	Protective Height [mm (in.)]	Cat. No.	Protective Height [mm (in.)]	Cat. No.
30 mm (1.18 in.)	120 (4.7)	445L-P4X0120YD	150 (5.9)	450L-B4HN0150YD
	240 (9.4)	445L-P4X0240YD	300 (11.8)	450L-B4HN0300YD
	360 (14.2)	445L-P4X0360YD	450 (17.7)	450L-B4HN0450YD
	480 (18.9)	445L-P4X0480YD	600 (23.6)	450L-B4HN0600YD
	600 (23.6)	445L-P4X0600YD	600 (23.6)	450L-B4HN0600YD
	720 (28.3)	445L-P4X0720YD	750 (29.5)	450L-B4HN0750YD
	840 (33.1)	445L-P4X0840YD	900 (35.4)	450L-B4HN0900YD
	960 (37.8)	445L-P4X0960YD	1050 (41.3)	450L-B4HN1050YD
	1080 (42.5)	445L-P4X1080YD	1200 (47.2)	450L-B4HN1200YD
	1200 (47.2)	445L-P4X1200YD	1200 (47.2)	450L-B4HN1200YD
	1320 (52.0)	445L-P4X1320YD	1350 (53.1)	450L-B4HN1350YD
	1440 (56.7)	445L-P4X1440YD	1500 (59.1)	450L-B4HN1500YD
	1560 (61.4)	445L-P4X1560YD	1650 (65.0)	450L-B4HN1650YD
	1680 (66.1)	445L-P4X1680YD	1800 (70.9)	450L-B4HN1800YD
	1800 (70.9)	445L-P4X1800YD	1800 (70.9)	450L-B4HN1800YD
	1920 (75.6)	445L-P4X1920YD	1950 (76.8)	450L-B4HN1950YD

(1) The 450L-B safety light curtain does not have an integrated laser alignment system.

Table 22 - 445L Safe 4 POC to 450L-E Conversion Table

Resolution	From 445L Safe 4		To 450L-E	
	Protective Height [mm (in.)]	Cat. No.	Protective Height [mm (in.)]	Cat. No.
30 mm (1.18 in.)	120 (4.7)	445L-P4X0120YD	150 (5.9)	450L-E4HL0150YD
	240 (9.4)	445L-P4X0240YD	300 (11.8)	450L-E4HL0300YD
	360 (14.2)	445L-P4X0360YD	450 (17.7)	450L-E4HL0450YD
	480 (18.9)	445L-P4X0480YD	600 (23.6)	450L-E4HL0600YD
	600 (23.6)	445L-P4X0600YD	600 (23.6)	450L-E4HL0600YD
	720 (28.3)	445L-P4X0720YD	750 (29.5)	450L-E4HL0750YD
	840 (33.1)	445L-P4X0840YD	900 (35.4)	450L-E4HL0900YD
	960 (37.8)	445L-P4X0960YD	1050 (41.3)	450L-E4HL1050YD
	1080 (42.5)	445L-P4X1080YD	1200 (47.2)	450L-E4HL1200YD
	1200 (47.2)	445L-P4X1200YD	1200 (47.2)	450L-E4HL1200YD
	1320 (52.0)	445L-P4X1320YD	1350 (53.1)	450L-E4HL1350YD
	1440 (56.7)	445L-P4X1440YD	1500 (59.1)	450L-E4HL1500YD
	1560 (61.4)	445L-P4X1560YD	1650 (65.0)	450L-E4HL1650YD
	1680 (66.1)	445L-P4X1680YD	1800 (70.9)	450L-E4HL1800YD
	1800 (70.9)	445L-P4X1800YD	1800 (70.9)	450L-E4HL1800YD
	1920 (75.6)	445L-P4X1920YD	1950 (76.8)	450L-E4HL1950YD

Table 23 - 445L Safe 4 POC to 440L Type 4 POC Conversion Table

Resolution	From 445L Safe 4		To 440L Type 4	
	Protective Height [mm (in.)]	Cat. No.	Protective Height [mm (in.)]	Cat. No.
30 mm (1.18 in.)	120 (4.7)	445L-P4X0120YD	160 (6.3)	440L-P4KA0160YD
	240 (9.4)	445L-P4X0240YD	320 (12.5)	440L-P4KA0320YD
	360 (14.2)	445L-P4X0360YD	480 (18.8)	440L-P4KA0480YD
	480 (18.9)	445L-P4X0480YD	480 (18.8)	440L-P4KA0480YD
	600 (23.6)	445L-P4X0600YD	640 (25.1)	440L-P4KA0640YD
	720 (28.3)	445L-P4X0720YD	800 (31.4)	440L-P4KA0800YD
	840 (33.1)	445L-P4X0840YD	960 (37.8)	440L-P4KA0960YD
	960 (37.8)	445L-P4X0960YD	960 (37.8)	440L-P4KA0960YD
	1080 (42.5)	445L-P4X1080YD	1120 (44.0)	440L-P4KA1120YD
	1200 (47.2)	445L-P4X1200YD	1280 (50.3)	440L-P4KA1280YD
	1320 (52.0)	445L-P4X1320YD	1440 (56.6)	440L-P4KA1440YD
	1440 (56.7)	445L-P4X1440YD	1440 (56.6)	440L-P4KA1440YD
	1560 (61.4)	445L-P4X1560YD	1600 (65.0)	440L-P4KA1600YD
	1680 (66.1)	445L-P4X1680YD	1760 (69.2)	440L-P4KA1760YD
	1800 (70.9)	445L-P4X1800YD	—	—
	1920 (75.6)	445L-P4X1920YD	—	—

Connections

All safety light curtains in this publication are available with 5-pin quick disconnect connectors, which minimizes changes to the wiring.

Transmitter Connection

The 450L safety curtain uses plug-in modules to determine functionality. To convert from 445L to 450L safety light curtains (both B and E), the following two plug-in modules are required:

- Transmitter: Catalog number 450L-APT-PW-5
- Receiver: Catalog number 450L-APR-ON-5

[Table 24](#) describes the functionality of each pin in the connector. The 440L safety light curtain has only a 4-pin transmitter; there is no need for a connection to protective earth (PE). Also, remove the connection to Pin 2 if you convert to the 440L safety light curtain.

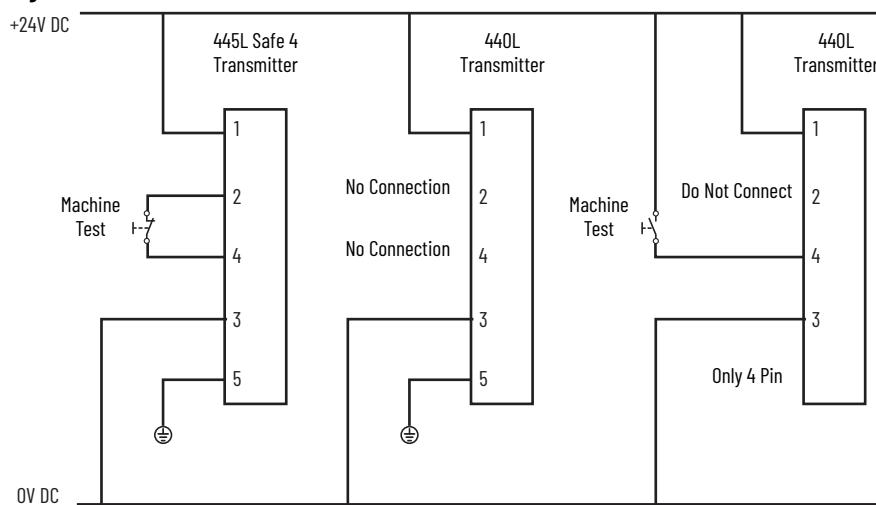
Table 24 - Transmitter Pinout

View	Pin	445L	450L-B and 450L-E	440L
	1	+24V	+24V	+24V
	2	Test 2	No connection	Do not connect
	3	OV	OV	OV
	4	Test 1	No connection	Test
	5	Ground (PE)	Ground (PE)	No pin

Transmitter Test Function

The transmitter test function allows you to turn off the transmitter at any time. This function is often used to verify that the safety light curtain is operating properly. If the application requires the use of the test function, then you must consider migrating to the 440L safety light curtain. [Figure 7 on page 22](#) compares the schematic of the transmitter test functions.

- Safe 4: Short Pin 2 to Pin 4 when test function is not needed.
- 450L: No test function.
- 440L: Pin 4 is left open when the test function is not needed and connected to 24V to turn off the transmitter. Pin 2 must remain unconnected.

Figure 7 - Transmitter Test Schematics

Receiver Connection

The receiver QD connections are interchangeable.

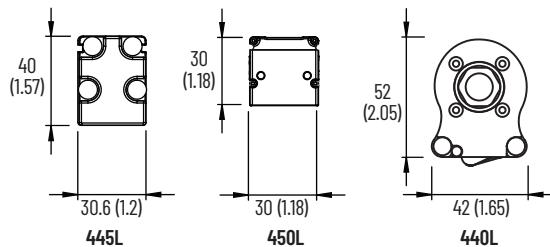
Table 25 - Receiver Pinout Descriptions

View	Pin	445L	450L-B and 450L-E	440L
	1	+24V	+24V	+24V
	2	OSSD 2	OSSD 2	OSSD 2
	3	OV	OV	OV
	4	OSSD 1	OSSD 1	OSSD 1
	5	Ground (PE)	Ground (PE)	No connection (only 4 pins)

Housing Size

[Figure 8](#) shows the comparison of the housing cross sections of the safety light curtains that are referenced in this publication. The 445L and 450L safety light curtains have similar housing sizes, so the mounting brackets for the 445L safety light curtain can also be used with the 450L safety light curtain. Migration to the 440L safety light curtain requires changes in the mounting brackets.

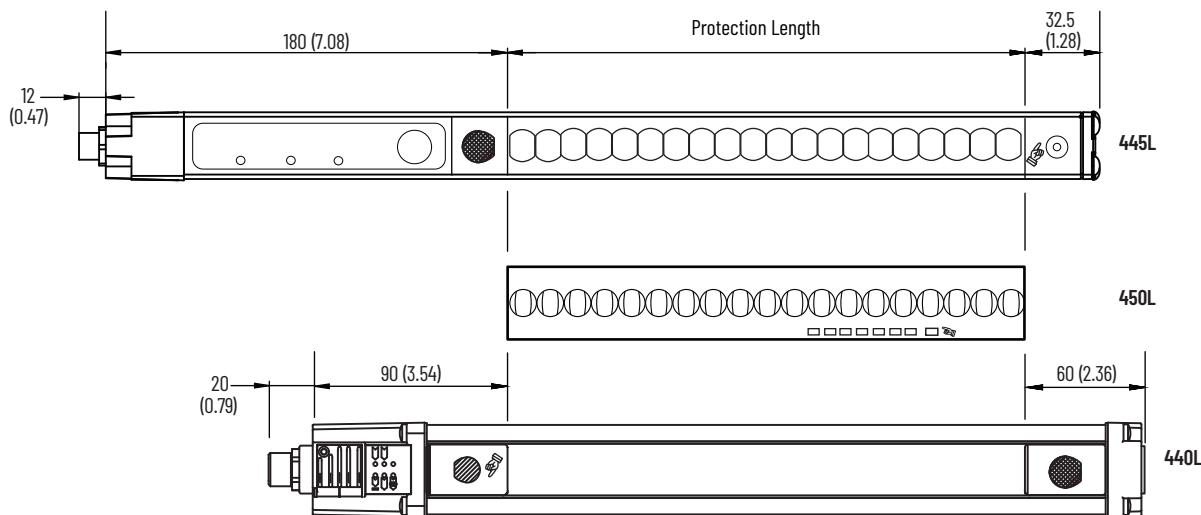
Housing Cross Section

Figure 8 - Housing Cross Section Comparison [mm (in.)]

Housing Overall Length

[Figure 9 on page 23](#) shows a comparison of the protective length to the overall housing length. The housing length of both the 445L and 440L safety light curtains are longer than the protective length. The 450L safety light curtain has the additional benefit where the housing length is the same as the protective length.

Figure 9 - Protection Length Compared to Housing Length [mm (in.)]



Mounting Brackets

The mounting brackets for the 445L safety light curtain can be used by the 450L safety light curtains. The mounting brackets for the 440L safety light curtains are different and require further considerations. [Table 26](#) shows the types of mounting brackets for the 445L, 450L, and 440L safety light curtains.

Table 26 - Mounting Bracket Types

Bracket Type	445L and 450L	440L
Standard	 Shipped with 445L safety light curtains after April 2017. Shipped with all 450L safety light curtains. Cat. No. 450L-AM-SM	 End-cap mounting brackets that are shipped with all 440L safety light curtains. Cat. No. 440L-AF6101
Old standard	 Shipped with 445L safety light curtains before May 2017. Optional for 450L safety light curtains. Cat. No. 445L-AF6140	No equivalent for 440L safety light curtains.
Vertical	 Optional for 445L and 450L safety light curtains. Cat. No. 445L-AF6144	No equivalent for 440L safety light curtains.
Swivel	 Optional for 445L and 450L safety light curtains. Both the standard Cat. No. 450L-AM-TBM (top/bottom) mounting brackets that are supplied with all 450L safety light curtains and the optional Cat. No. 450L-AM-SM (side) mounting brackets allow the safety light curtains to swivel. Cat. No. 445L-AF6141	The standard end-cap mounting brackets provide swivel adjustments.
Shock mount	 Optional for 445L and 450L safety light curtains. Cat. No. 445L-AF6142 ⁽¹⁾	 Cat. No. 440L-AF6108 Other kits available. Optional for 440L safety light curtains. Cat. No. 440L-AF6120

(1) When using the Cat. No. 445L-AF6142, an extra Cat. No. 450L-AM-SM (side) mounting brackets can be used for longer 450L safety light curtains in high shock 450L applications.

Laser Alignment

The 445L Safe 4 POC safety light curtain has an integrated laser alignment system. The 445L Safe 4 POC safety light curtain aligns with two points; one at the top of the safety light curtain and one at the bottom of the safety light curtain.

The suggested 440L Type 4 POC safety light curtains in this guide also have integrated laser alignment like the 445L Safe 4 POC safety light curtain (top and bottom).

The 450L-E safety light curtain has an integrated laser alignment system. This system creates a linear series of spots that appear along the length of the opposite transceiver.

The 450L-B safety light curtain does not have integrated laser alignment. An external alignment laser, which can be snapped on the 450L-B stick, is optionally available: Use the 440L-ALAT laser with the 450L-ALAT-C snap-on bracket, as shown in [Figure 10](#).

Figure 10 - Laser Alignment Bracket and Laser



Response Time

Response time is dependent on the height of the protective field of the safety light curtain. [Table 27](#) and [Table 28 on page 25](#) compare the response times of the 445L Safe 4 safety light curtain to the 450L and 440L safety light curtains.

The 445L Safe 4 safety light curtain has faster response times for the smallest protectives. In this case, the safety distance must be recalculated, which can require the relocation of the safety light curtain further away from the hazard.

Table 27 - 450L Standard Response Time Comparison

Resolution	From 445L Safe 4		To 450L		
	Protective Height [mm (in.)]	Response Time [ms]	Protective Height [mm (in.)]	450L-B Response Time [ms]	450L-E Response Time [ms]
30 mm (1.18 in.)	120 (4.7)	7.9	150 (5.9)	14	8
	240 (9.4)	10.5	300 (11.8)	14	9
	360 (14.2)	13.2	450 (17.7)	14	9
	480 (19.9)	15.8	600 (23.6)	14	10
	600 (23.6)	18.5	600 (23.6)	14	10
	720 (28.3)	21.1	750 (29.5)	14	11
	840 (33.1)	23.8	900 (35.4)	14	11
	960 (37.8)	26.3	1050 (41.3)	14	12
	1080 (42.5)	29.1	1200 (47.2)	14	12
	1200 (47.2)	31.6	1200 (47.2)	14	12
	1320 (52.0)	34.3	1350 (53.1)	14	13
	1440 (56.7)	37.0	1500 (59.1)	14	13
	1560 (61.4)	39.6	1650 (65.0)	14	13
	1680 (66.1)	42.3	1800 (70.9)	14	13
	1800 (70.9)	44.9	1800 (70.9)	14	13
	1920 (75.6)	47.6	1950 (76.8)	15	13

Table 28 - 440L Response Time (With No Beam Coding)

Resolution	From 445L Safe 4		To 440L Type4	
	Protective Height [mm (in.)]	Response Time [ms]	Protective Height [mm (in.)]	Response Time [ms]
30 mm (1.18 in.)	120 (4.7)	7.9	160 (6.3)	20
	240 (9.4)	10.5	320 (12.5)	20
	360 (14.2)	13.1	480 (18.8)	20
	480 (19.9)	15.8	480 (18.8)	20
	600 (23.6)	18.5	640 (25.1)	20
	720 (28.3)	21.1	800 (31.4)	20
	840 (33.1)	23.7	960 (37.7)	20
	960 (37.8)	26.3	1120 (44.0)	20
	1080 (42.5)	29.9	1120 (44.0)	20
	1200 (47.2)	31.6	1280 (50.3)	20
	1320 (52.0)	34.3	1440 (56.6)	20
	1440 (56.7)	36.9	1440 (56.6)	20
	1560 (61.4)	39.6	1600 (65.0)	20
	1680 (66.1)	42.2	1760 (69.2)	20
	1800 (70.9)	44.9	—	—
	1920 (75.6)	47.6	—	—

Output Load Capability

The 450L and 440L safety light curtains have higher output load capability than the 445L Safe 4 safety light curtain. The output load capability of the safety light curtains is shown in [Table 29](#). All three safety light curtain systems have output short-circuit protection.

Table 29 - Output Load Capability

Load Type	445L Safe 4 POC	450L	440L
DC	300 mA	500 mA	500 mA

Notes:

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, Knowledgebase, and product notification updates.	rok.auto/support
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Technical Documentation Center	Quickly access and download technical specifications, installation instructions, and user manuals.	rok.auto/techdocs
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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Waste Electrical and Electronic Equipment (WEEE)



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

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