

Point of Operation Control (POC) Light Curtains



Features/Benefits

Point of Operation Control light curtains are placed close to the hazard, at the point of operation where personnel may frequently interact with the machine as part of a process. POC light curtains are designed for partial-body detection—finger, hand and arm detection—and are offered in multiple resolutions and protective heights with ranges up to 16 meters. An easy-to-install Category 4 solution, these light curtains are easily connected to other safety systems, but require no separate controller and can therefore be operated as standalone units (i.e. without a safety relay). Since they are located at the machine's point of operation, POC light curtains eliminate the need for gates, allowing frequent and easy access to the hazardous area, and can be used as an ergonomic workstation control that increases safety while enhancing productivity. These light curtains can be mounted vertically or horizontally. However, it is important to note that these light curtains do not detect people or objects once they have passed through the light curtain.

POC light curtains are also suitable for use in washdown applications when used in conjunction with the IP67 light curtain enclosure accessory.

Applications

- Conveyors
- Electronic fences
- Forming operations
- Robot Cells
- Presses
- Workstations
- Washdown applications (use IP 67 tube accessory)

Common Misapplications

- Used on full revolution machinery
- Mounted too close to hazard

Perimeter Access Control (PAC) Light Curtains



Features/Benefits

Perimeter Access Control light curtains are an easy-to-install, Category 4 solution for full-body or access detection. Designed to create a safety perimeter around a machine that does not require frequent interaction between personnel and the hazard during regular operation (i.e. for maintenance and troubleshooting), PAC light curtains provide large object pass-through sensing with detection ranges up to 70 meters. Like their POC counterparts, PAC light curtains are not floor dependent and can be easily interfaced with other safety systems or used as standalone units without a dedicated control unit/safety relay. However, it is important to note that these light curtains do not detect people or objects once they have passed through the light curtain.

Applications

- Conveyor Systems with muting
- Robot cells
- Opto-electronic fence
- Washdown with IP 67 tube

Common Misapplications

- Used as POC device
- Used on machine that does not stop until completing a full revolution
- Horizontal installation

Safety Light Curtains

Overview

GuardShield™

Introduction

The Allen Bradley Guardmaster GuardShield is offered as a Type 2 and a Type 4 POC (Point of Operation Control) safety light curtain as well as a Type 4 PAC (Perimeter Access Control) safety light curtain. The Type 4 POC GuardShield is offered in both 14 mm and 30 mm resolutions while the Type 2 is offered in 30 mm resolution only. The GuardShield PAC is offered with multiple beam configurations with varying beam spacings. All GuardShield family safety light curtains meet the requirements of IEC/EN 61496.

Point of operation safety light curtains are designed to detect the presence of an opaque object of a minimum resolution. These devices are usually positioned in front of the point of operation hazard, however, they may also be used for perimeter guarding applications.

Perimeter access control safety light curtains are typically used as opto-electronic fences or as whole body detection devices to detect personnel or large objects when they pass through the sensing field. These PAC safety light curtains are typically positioned around an area or in front of a process entry or exit area.

The Allen Bradley Guardmaster GuardShield is a two box safety light curtain, consisting of a nonmatched transmitter and receiver pair. Any GuardShield transmitter of the same family (POC, PAC) and same resolution will work with any receiver of the same family and resolution. The synchronization between transmitter and receiver is achieved optically. The first beam adjacent to the receiver LEDs is the synchronization channel. This synchronization beam cannot be blocked in a fixed or floating blanking application.

The GuardShield safety light curtain has two transistor type PNP safety outputs, referred to as OSSDs (Output signal switching devices). These outputs may be connected to a safety relay module or directly to the primary control element of a machine if the EDM connection within the GuardShield receiver is also connected and configured.

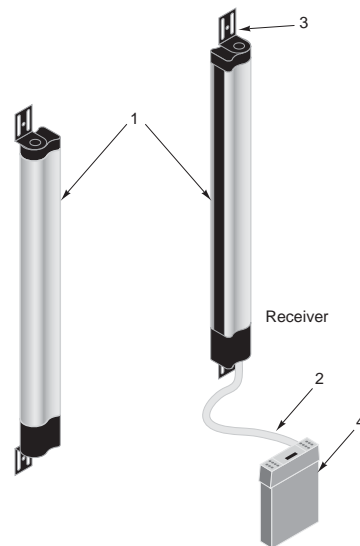
The GuardShield receiver's also have an auxiliary nonsafety output which can be connected to a PLC for status of the OSSDs, to a stack light for signaling or to control an in-feed motor, etc.

The GuardShield's require separate transmitter and receiver cables. The transmitter cable utilizes a 4-pin micro quick-disconnect (M12) connector and is offered in lengths from 2 meters to 30 meters. The receiver cable has an 8-pin micro quick-disconnect (M12) connector and is also offered in lengths from 2 meters to 30 meters.

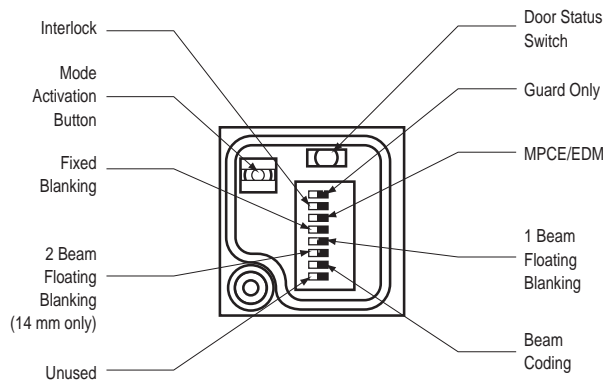
Typical System Configuration

Components required for a "Guard only" system:

1. Optic heads (operate on 24V DC—ordered as a pair (transmitter/receiver)
2. Cable—two required per pair—specify transmitter cable and receiver cable
3. Mounting brackets—included
4. Safety Relay Module—optional (**Note:** A Category 3 system may be possible by connecting the GuardShield OSSDs directly to two safety contactors and connecting and configuring the EDM mode of operation in the GuardShield's receiver.)



The Allen-Bradley Guardmaster GuardShield Type 4 is a two box, light curtain with dip switch selectable operating modes.



Receiver Dip Switch Functions or GuardShield Type 4 POC

The GuardShield has dip-switches located in both the Transmitter and Receiver endcaps. The dip-switches are accessible through a hinged door which is secured to the endcap with a security screw.

The Transmitter dip-switches provide for the configuration and activation of Beam Coding and Machine Test Signal.

The Receiver dip-switches provide for configuration of all of the GuardShield's modes of operation.

SafeShield™

The Allen-Bradley Guardmaster SafeShield family of safety light curtains are software configurable, Type 4 AOPDs per IEC 61496. SafeShield is available in resolutions of 14mm and 30mm and offers many advanced features such as fixed blanking, floating blanking, reduced resolution, beam coding, EDM, as well as a seven-segment status and diagnostic display on both transmitters and receivers.

It is possible to connect up to three segments in a cascaded configuration, with each of these segments having the advanced features individually programmed. Cable lengths between segments can be up to a maximum of three meters.

A communication cable is required to link your laptop to the SafeShield's transmitter and receiver, allowing the programming and configuration of your system. Password protection assures that once a system is configured, it is securely stored in the system's memory and is accessible only to authorized personnel.

This versatile safety light curtain system provides maximum flexibility in solving simple to complex machine guarding applications.



Typical System Configurations

The Allen-Bradley Guardmaster SafeShield safety light curtain system is a two box design. This means the safety light curtain does not need a separate controller to operate. Therefore, the safety outputs of the light curtain (OSSDs) can be connected directly to any safety relay that will accept two PNP inputs.

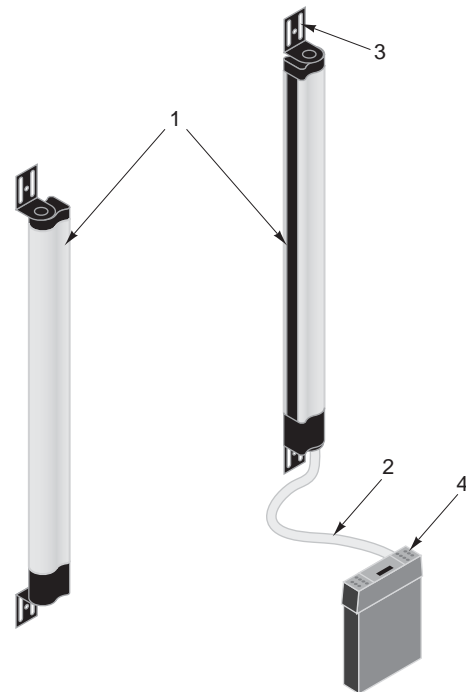
The following are some common configurations of light curtain systems. The numbers on the drawing indicate the ordering steps to follow to ensure that a complete system is specified.

Components required for a "Guard only" system:

1. Optic heads (operate on 24V DC)—ordered as a pair (transmitter/receiver)
2. Cables—two required per pair—specify length (SafeShield uses a standard 12 conductor cable with M23 quick disconnect for both XMTR receiver)
3. Mounting brackets—various styles available

Optional components (customer or Allen-Bradley Guardmaster supplied):

4. Safety Relays



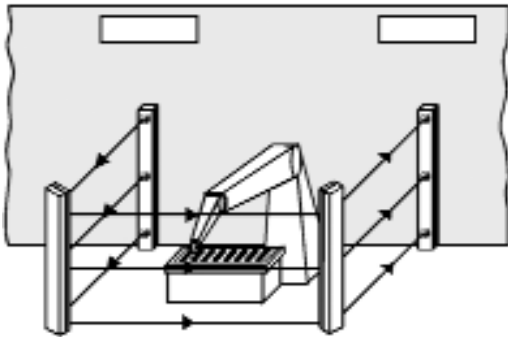
Safety Light Curtains

Overview

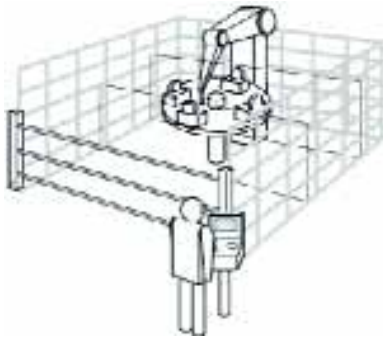
Perimeter Access Control

Allen-Bradley Guardmaster PAC safety light curtains consist of two families, the GuardShield PAC family and the original PAC family. The GuardShield PAC family is offered with multiple beams with various beam spacings for short range applications (16 meters or less). The original PAC family is offered with multiple beams (1, 2, 3, 4) with various beam spacings for long range (70 meters) and short range (18 meters) applications. This family of PAC safety light curtains allows the integration of a muting module to the receiver for 2- and 3-beam models.

Perimeter Access (PAC) safety light curtains are opto-electronic through-beam devices typically used to detect personnel around hazardous equipment or machinery. PAC safety light curtains are usually used as an opto-electronic fence and when used with corner mirrors, can provide two- or three-sided detection around the perimeter of hazardous machinery.



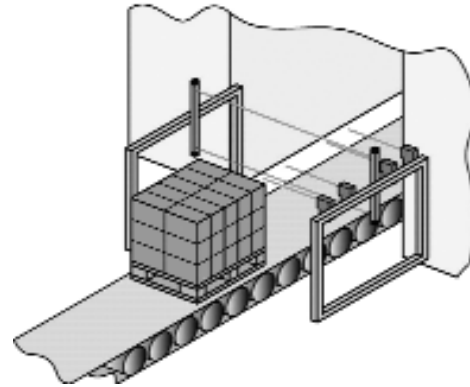
PAC safety light curtains are generally of resolutions that provide detection of limbs and bodies of personnel, i.e. 50 mm, 70 mm, 90 mm and up. It is also common for PAC safety light curtains to be offered with a limited number of infrared beams spaced at consistent distances from one another such as 3 beams with 400 mm spacing between beams, or 2 beams with 500 mm beam spacing.



PAC safety light curtains are also used in conveyORIZED processes and very often are used in conjunction with a muting module. Muting is the temporary automatic suspension of the protective function of the PAC safety light curtain.

Muting modules can be integrated into the light curtain's receiver or external to the light curtains.

This muting function allows material to move through the safety light curtain's sensing field without stopping the machine, however, if a person attempts to pass through the safety light curtain, they will be detected and the machine will stop. The differentiation between material and personnel is determined by the use of muting sensors. These muting sensors create a particular switching sequence together with the safety light curtain as the material passes through the process.



ConveyORIZED muting

Muting sensors are typically used in pairs and depending upon the sensor configuration and muting module, allow either uni-directional or bi-directional travel of material through the safety light curtain.

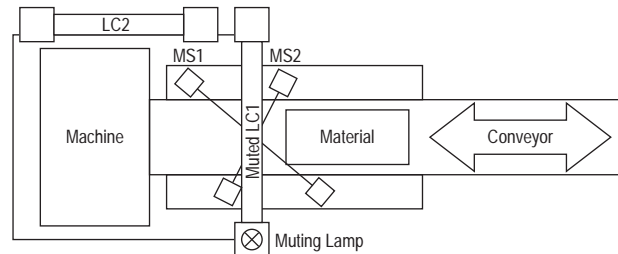


Figure 1: Two sensor bi-directional muting

Two sensor muting allows material to move through the safety light curtain in either direction.

Notice that the two muting sensors are arranged in a skewed X pattern. The optical paths of the two sensors intersect in the safety light curtain's sensing field. This reduces the possibility that a person can manipulate the two sensors and activate the muting function.

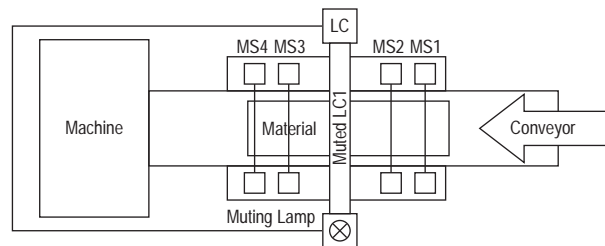


Figure 2: Four sensor, uni-directional muting

Four sensor muting for this particular muting module allows a single direction of travel. A particular sequence is also required in this configuration; muting sensor 1 must be interrupted first followed by muting sensor 2 and then the safety light curtain, then muting sensor 3 and finally muting sensor 4. It is necessary with this particular muting module to have the light curtain's sensing field interrupted within 3 seconds of muting sensor two being interrupted. Also, the material must block muting sensor 3 and muting sensor 4 before clearing muting sensors 1 and 2 or the muting function is overridden and the safety light curtain would become active causing a nuisance shutdown of the machine if the material is within the light curtain sensing field.

An interruption of the safety light curtain sensing field would cause the machine or the hazardous motion to be turned off. The muting cycle is completed when the material clears muting sensor 4.

The muting sensors must be spaced appropriately from the safety light curtain and each other in order that the sensors cannot be interrupted by personnel, causing the activation of the muting function.

A requirement of muting in machine applications is for indication that the muting function is activated. This is typically accomplished by the use of a muting lamp. The various muting modules offered by Rockwell Automation have inputs for the connection of a muting lamp.

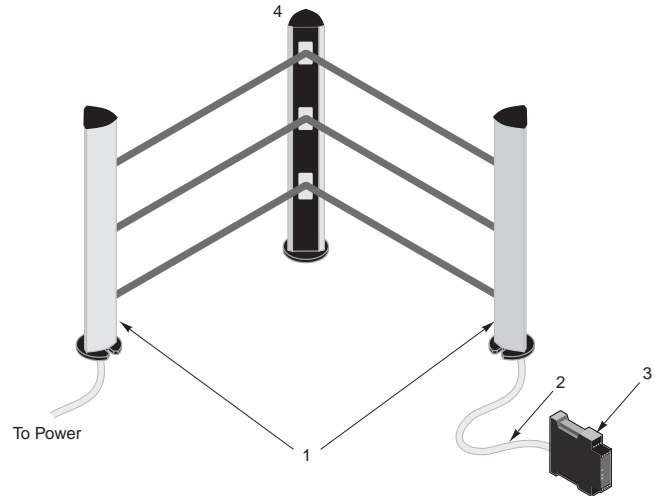


Figure 3

GuardShield Perimeter Access Control (PAC)

The Allen-Bradley Guardmaster GuardShield Perimeter Access Control (PAC) safety light curtain system is a two box design. This means the safety light curtain does not need a separate controller to operate in a guard only mode with manual reset. Therefore, the safety outputs of the light curtain (OSSDs) can be connected directly to any safety relay that will accept PNP inputs.

The following are some common configurations of light curtain systems. The numbers on the drawing indicate the ordering steps to follow to ensure that a complete system is specified.

Components required for a multiple-beam Perimeter Access Control system (PAC), see Figure 3:

1. Optic heads (operate on 24V DC)—ordered as a pair (transmitter/receiver) mounting brackets included
2. Cables—separate 4-pin transmitter and 8-pin receiver
3. Safety relay
4. Mirror columns (for multiple side protection)

Safety Light Curtains

Overview

Components Required for Perimeter Access Control (PAC) with Muting, see Figure 4:

1. Optic heads (operate on 24V DC) with muting module—ordered as a pair (transmitter/receiver)
2. 440R-P23071—MSR22LM muting module
3. Power supply
4. Cables for light curtains
5. Muting indication
6. Sensors for muting
7. Sensor accessories
8. Sensor cordsets

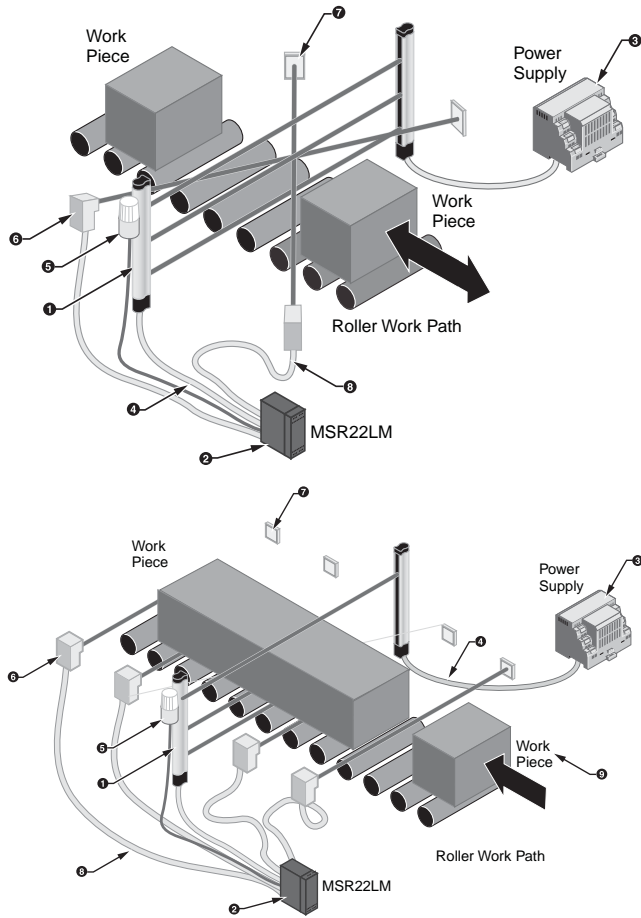


Figure 4: PAC with Muting—Two and four sensor muting shown using external muting module, MSR22LM

Perimeter Access Control Overview

Typical System Configurations

The Allen-Bradley Guardmaster Perimeter Access Control (PAC) safety light curtain system is a two box design. This means the safety light curtain does not need a separate controller to operate in a guard only mode with manual reset. Therefore, the safety outputs of the light curtain (OSSDs) can be connected directly to any safety relay that will accept PNP inputs.

This PAC family allows the integration of the muting module to the PAC receiver.

The following are some common configurations of light curtain systems. The numbers on the drawing indicate the ordering steps to follow to ensure that a complete system is specified.

Components required for a multiple-beam Perimeter Access Control system (PAC), see Figure 5:

1. Optic heads (operate on 24V DC)—ordered as a pair (transmitter/receiver)
2. Cables—7-pin cable for transmitter and 8-pin cable for receiver
3. Safety relay
4. Power supply—120V AC to 24V DC
5. Mounting brackets—minimum of 4 per optic head pair
6. Mirror columns (for multiple side protection)

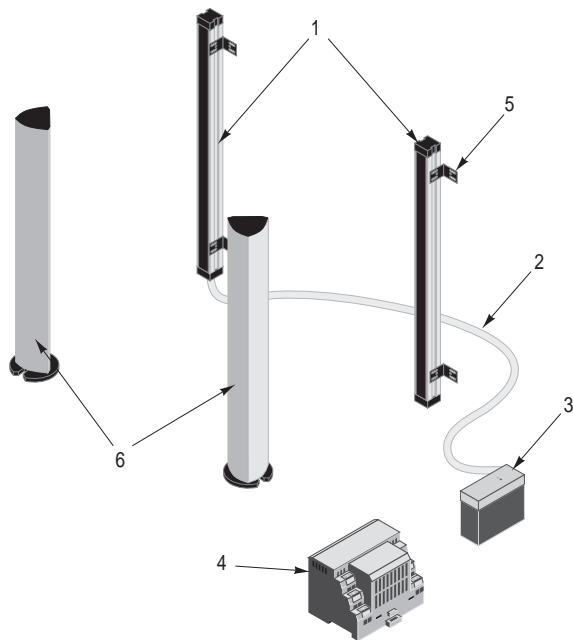


Figure 5

Components required for a single-beam Perimeter Access Control system (PAC), see Figure 6:

1. Optic head—transmitter and receiver are contained in same optic head (operates on 24V DC)
2. Cables—one required—specify length (8-pin quick disconnect cable)
3. Safety relay
4. Power supply—120V AC to 24V DC (if required)
5. Mounting brackets
6. Passive mirror column

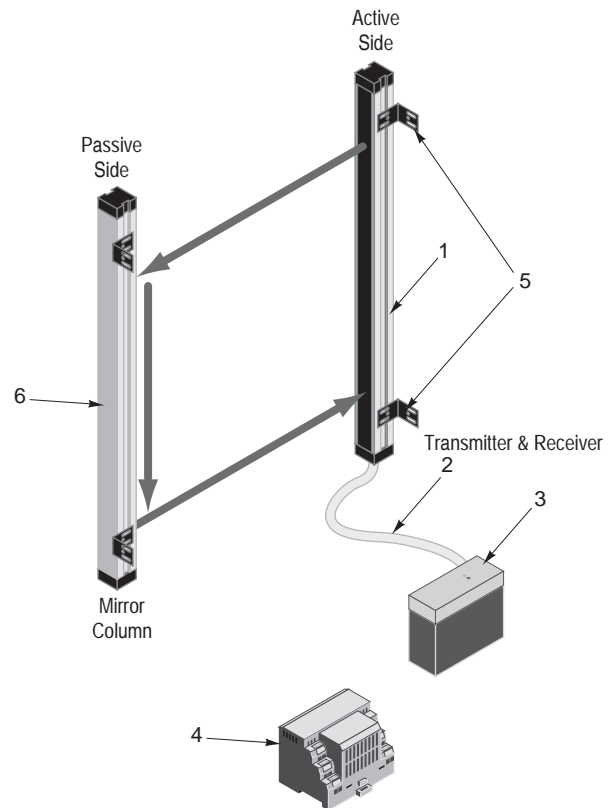


Figure 6: Single Beam PAC