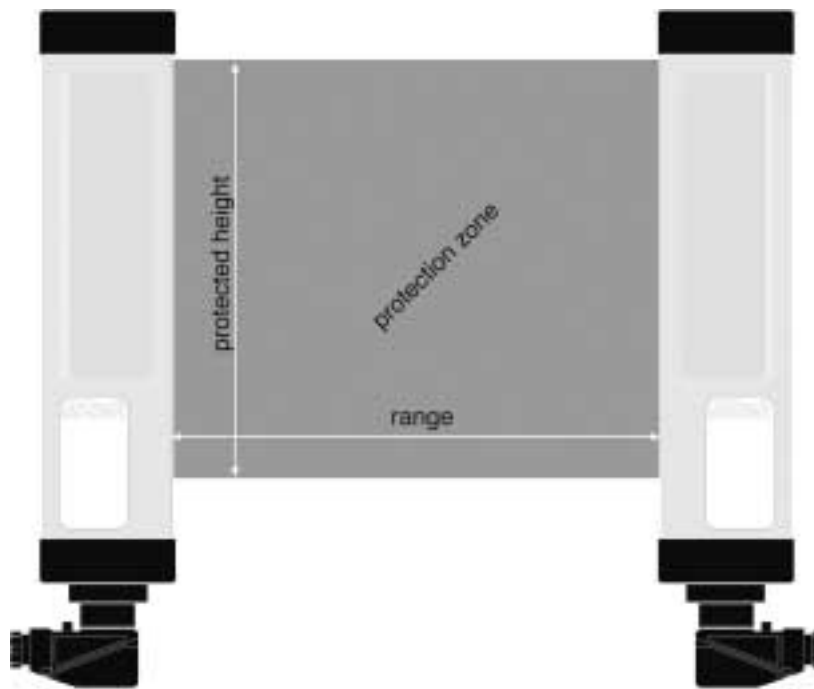


I. Selection & Application Characteristics

1 What is meant by “protected height”?

“Protected height” is the length of the light curtain’s active sensing area... that is the distance from center of the first beam to the center of the last beam in the light curtain’s transmitter/receiver array.



2 What is meant by “range” of a light curtain?

“Range” is the maximum effective distance that may exist between the light curtain’s emitter (transmitter) and its receiver. The effective range is generally reduced by use of reflecting mirrors and environmental contaminants (such as fog, smoke, steam, dust, moisture, etc.)

3

What is meant by “response time” of a light curtain?

The “response time” of the light curtain is the time it takes for the light curtain to transmit the output (alarm) signal to the safety interface or machine control element after the protection field has been interrupted. The overall response time of the light curtain safety system includes the response time of the light curtain, the response time of any interposed interface (such as a safety controller or safety PLC), and the response time of the machine primary control elements (e.g. motor contactor or control relay). Response time is one of the important factors that must be considered when calculating the proper minimum safety distance.

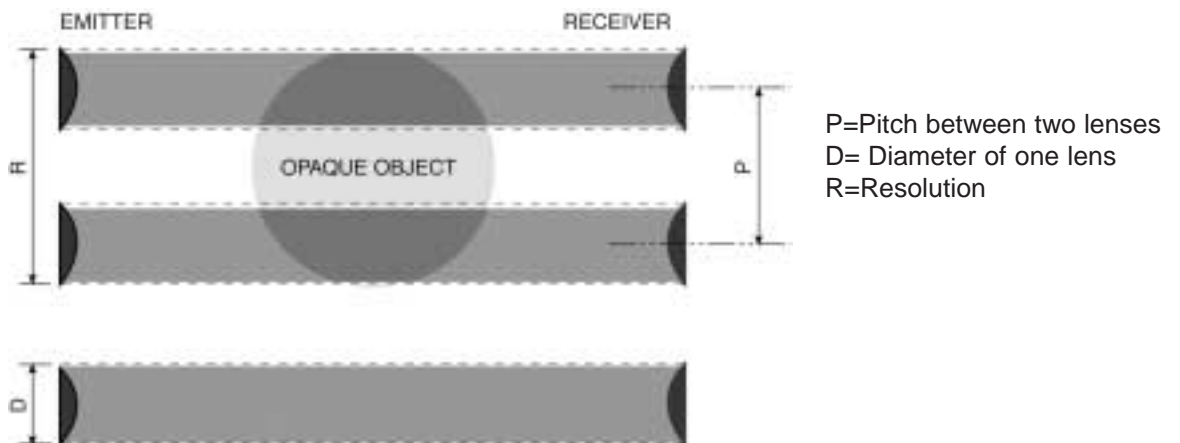
4

What is meant by “minimum object sensitivity” and does it mean the same as “optical pitch” or “beam spacing”?

“Minimum object sensitivity” refers to the smallest object (diameter) that the light curtain can detect. It is commonly stated as the “resolution” of the light curtain and is also referred to as “detection capability”.

“Optical” or “beam spacing” refers to the distance from the center line of one beam to the center line of the next beam.

It is important to understand that it is possible for an object to be in such a position that it does not block the path of a single beam even though it is the same diameter of the optical pitch. Therefore the resolution of a light curtain is equal to the optical pitch plus one lens diameter.



5 What light curtain resolutions are commonly used?

The most common light curtain resolutions are:

- 14mm (0.55 inches) for finger protection
- 30mm (1.25 inches) for hand protection
- 50mm (2.00 inches) to 90mm (3.5 inches) for body protection.



Finger Detection



Hand Detection



Whole Body Protection

6 What do “angle of divergence” and “angle of acceptance” mean and what are the application considerations that they imply?

“Angle of divergence” is the cone angle of the emitted light from the transmitter. “Angle of acceptance” is the cone angle within which the receiver will detect this emitted light. The wider the angles, the easier it is to align the light curtain. However, one must recognize that a wider angle of acceptance can result in possible interference from another photoelectric device emitting light energy within the receiver’s angle of acceptance. Contemporary light curtain standards (IEC 61496) require a maximum angle of divergence of ± 2.5 degrees for Safety Category 4 units. (SCHMERSAL Series SLC/SLG light curtains feature a coded signal, and hence are not affected by interference from other photoelectric devices).

7

What are “two box” and “three box” light curtain systems?

A “three box” light curtain system consists of an emitter, a receiver and a separate safety controller (safety relay module). A “two box” system consists of an emitter and a receiver with the safety controller functions integral to the emitter-receiver pair. A two box light curtain system generally results in lower wiring and installation cost.

8

What is an “OSSD”?

“OSSD” is the abbreviation for “Output Signal Switching Device” (also known as the light curtain’s safety outputs). For example the SCHMERSAL Series SLC 410 light curtains have two OSSD’s (two, 500mA PNP safety outputs).

9

What is “fixed blanking” and “floating blanking”?

“Fixed Blanking” is when a fixed set of adjacent light beams are rendered permanently inactive for the purpose of allowing product or part of the process to enter the sensing area without deactivating the light curtain safety outputs. An example would be the “blanking” of a small segment of the light curtain to allow finished parts to eject from a machining operation through this specific “opening” in the protected field.

“Floating blanking” is when a set number (one or more) of adjacent beams is allowed to ignore the presence of an object within their portion of the protection field. However, unlike fixed blanking (where the specific set of inactive beams are fixed), “floating blanking” allows the set number of adjacent beams to “float” within protected field ... thus allowing the object to be ignored to move within the protected field without deactivating the light curtain safety outputs.

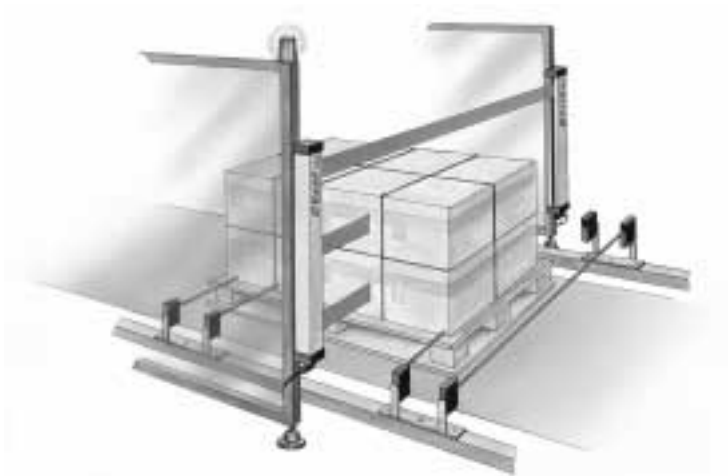
As long as no more than the selected number of adjacent beams is interrupted, the system remains operational and does not stop the machine. If one or more additional beams are interrupted, the light curtain system will provide a signal to initiate machine stoppage. An example would be similar to the ejected parts example above, but where the parts eject through a “moving opening” ... that is, at different points through the protected field.

10 What is “muting”?

“Muting” is the provisional and automatic overriding of the light curtain safety output function during normal, uninterrupted machine cycle operation. This is an important function in applications in which the light curtain or light grid must be interrupted by some part of the machine or the materials being processed without stopping the operation or process.

An example is a palletizing system within which the palletized product must be allowed to pass through the opening protected by the light curtain, while the entry of a person must stop the machine.

Muting is typically accomplished using additional sensing devices (such as safety limit switches or photoelectric sensors that can be checked for functionality) in conjunction with a light curtain and a muting controller (such as SCHMERSAL’s model SCM 3R) to detect the presence of the material/machine element and override the light curtain’s safety function.



- materials authorized to go through the barrier
- people non-authorized to go through the barrier



11 What is “PSDI”?

“PSDI” (Presence Sensing Device Initiation) refers to the use of the sensing device (e.g. light curtain) to activate the machine/manufacturing process once it has been determined that a human is no longer in the hazard area.

12 I want to set up my light curtain so it operates in PSDI mode. What are some of the requirements?

Use of a light curtain in the “PSDI” mode requires that it have a maximum object sensitivity of not less than 31.75 mm (1.25 inch) and be located at the correct “safety distance” from the point of the hazard. “Blanking” of the sensing field is not permitted when operating in this mode.

13 What application characteristics suggest that a light curtain may be a more suitable means of protection than some other alternative safety device? (such as a safety pressure mat, interlocked movable guards, or a laser scanner)?

Some of the application characteristics that may suggest use of a light curtain are:

- The hard guards require frequent (and costly) cleaning ... such as in a food processing application.
- The operator is required to gain frequent access to the hazardous area ... such that hard guards or movable guards are inconvenient and/or compromise efficient process operations.
- Products of different sizes/shapes are required to pass through the guarded area without interrupting production.
- A single light curtain might be less costly and may be used without compromising the safety of personnel.
- Fork lifts or other vehicles must frequently enter the hazardous area.

What questions might I ask to better evaluate if a light curtain is suitable solution for my application?

Typical application “screening” questions might include:

- Will the presence of dirt, dust, moisture, oil mist, or other environmental contaminants adversely affect a light curtain’s performance?
- Can the light curtains be installed such that their alignment and performance are maintained?
- Can the light curtains be installed to respect the required safety distance for the application?
- Will ambient light conditions (such as welding arcs, AGV or forklift strobe lights) adversely affect the light curtain’s performance?