

*PHOTOELECTRIC
SAFETY
LIGHT CURTAIN*

VISION MXL

INSTALLATION USE AND MAINTENANCE

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This symbol stands by a very important warning concerning the safety of persons. Its non-observance can cause a very serious risk for the exposed personnel.

INTRODUCTION

VISION MXL light curtain is a multibeam optical-electronic safety system belonging to the category of Type 2 electro-sensitive devices, and is equipped with a MUTING function to protect people exposed to dangerous machines or equipment, according to norms IEC 61496-1,2 and EN 61496-1.

VISION MXL is composed of Emitter plus Receiver, with added functions such as Muting, feedback control of eventual external contactors, and manual/automatic function management.

A series of warning LEDs located on the Emitter and the Receiver display the information necessary for the correct use of the device and to evaluate eventual functioning anomalies. Thanks to an automatic self-monitoring system, VISION MXL light curtain is able to autonomously detect any dangerous fault in a maximum of 28 seconds. This detection system is permanently active and does not need any external command.

VISION MXL is ideal for protecting:

- automatic palletizing/depalletizing systems
- materials handling and storage systems;
- packing and packaging machines;
- assembly lines;
- industrial automatic warehouses;
- AGV transit openings;
- metal, wood, marble and glass tool machines.



Carefully consider the risk analysis of the application and the legislation of the light curtain application within the Country to establish if the application is compatible with the safety category 2.



If necessary, for any safety-related problems contact the competent safety authorities or industrial associations in the country of use.



For applications in the food industry, please contact REER to ensure that the light curtain contains materials that are compatible with the chemical agents utilized.

The protective function of the optoelectronic devices is not effective in the following case:



If the machine stopping control cannot be actuated electrically and it is not possible to stop all dangerous machine movements immediately and at any time during the operating cycle.



If the machine generates dangerous situations due to material being expelled or falling from overhead.

OPERATION

If the protected area is clear, the two outputs on the Receiver are active and enable the machine to which they are connected to operate normally.

Each time that an object bigger than or equal in size to the resolution of the system intercepts the optical path of one or more beams, the Receiver deactivates the outputs.

This condition enables hazardous machine movements to be stopped (by means of an adequate machine emergency stop circuit).



The resolution is the minimum dimensions that an object must have so that, on crossing the protected area, it will certainly intercept at least one of the optical beams generated by the light curtain (Figure 1).

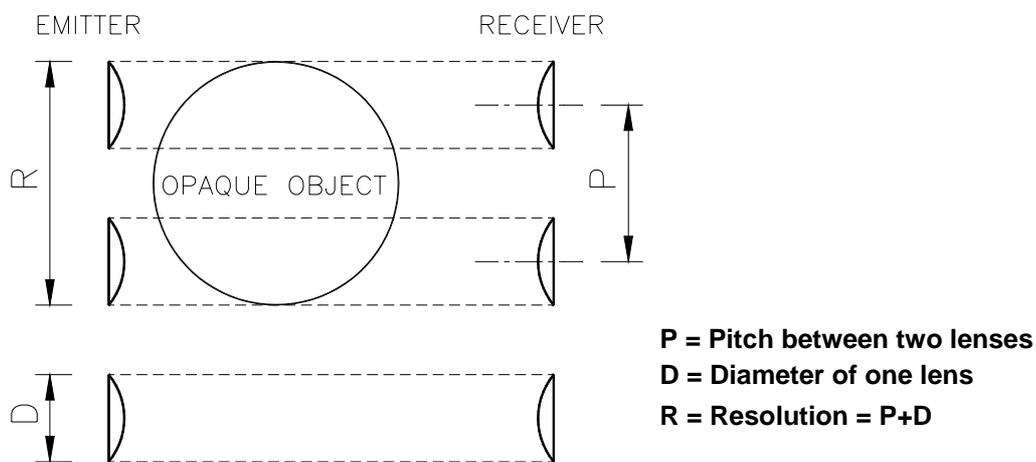


Figure 1

The resolution is constant irrespectively of work conditions, as it only depends on the geometric characteristics of the lenses and the distance between the centres of two adjacent lenses.

The **height of the protected area** is the height that is actually protected by the safety light curtain. If the latter is placed horizontally, this value refers to the depth of the protected area.

The **working range** is the maximum operative distance that can exist between the Emitter and the Receiver.

VISION MXL is available with the following resolutions:

- 30 mm (protected height from 150 mm to 1200 mm)
PROTECTION OF HANDS
- 40 mm (protected height from 300 mm to 1200 mm)
PROTECTION OF HANDS

VISION MXL is available also in the **2, 3, 4 beams** configuration with the following lens pitch:

- 500mm (2 beams), 400mm (3 beams), 300mm (4 beams).
PROTECTION OF BODY

INSTALLATION

Before installing the VISION MXL safety system, make sure that:

-  **The safety system is only used as a stopping device and not as a machine control device.**
-  **The machine control can be actuated electrically.**
-  **All dangerous machine movements can be interrupted immediately. In particular, the machine stopping times must be known and, if necessary, measured.**
-  **The machine does not generate dangerous situations due to materials projecting or falling from overhead; if that is not the case, additional mechanical guards must be installed.**
-  **The minimum dimensions of the object that must be detected are greater than or equal to the resolution of the specific model.**

Knowledge of the shape and dimensions of the dangerous area enables the width and height of the relative access area to be calculated.

-  **Compare these dimensions with the maximum working range and the height of the protected area in relation to the specific model.**

The general instructions set out below must be taken into consideration before placing the safety device in position.

-  **Make sure that the temperature of the environment in which the system is to be installed is compatible with the temperature parameters contained in the technical data sheet.**
-  **Do not install the Emitter and Receiver close to bright or high-intensity flashing light sources.**
-  **Certain environmental conditions may affect the monitoring capacity of the photoelectric devices. In order to assure correct operation of equipment in places that may be subject to fog, rain, smoke or dust, the appropriate correction factors Cf should be applied to the maximum working range values. In these cases:**

$$Pu = Pm \times Cf$$

where Pu and Pm are, respectively, the working and maximum range in meters.

The recommended Cf factors are shown in the table below:

ENVIRONMENTAL CONDITION	CORRECTION FACTOR Cf
Fog	0.25
Steam	0.50
Dust	0.50
Dense fumes	0.25

-  **If the device is installed in places that are subject to sudden changes in temperature, the appropriate precautions must be taken in order to prevent the formation of condensation on the lenses, which could have an adverse effect on monitoring.**

MUTING FUNCTION

The Muting function is a temporary suspension of the safety light curtain's protective function. Carefully check your risk analysis in order to assess whether the Muting function is compatible with your application and what additional measures have to be taken.

The Muting function is capable of generating a **temporary and automatic suspension of the light curtain functioning** in order to guarantee the normal flow of material through the protected passage. The muting function takes place with 2 events:

- Interruption of beams from the two muting sensors, in a maximum time of 4 seconds.
- MUTING ENABLE signal (pin C) at +24DC.

The activation of the Muting function depends not only on the consent obtained by activating the MUTING ENABLE signal, but also on the system's acknowledgement of the object interrupting the guarded passage. In other words, whenever the system acknowledges the material and distinguishes it from an eventual operator (in a potentially dangerous situation), it is enabled to temporarily exclude the curtain, so that the material can cross the passage. The Muting sensors are the detection system which decides whether to activate or not the Muting function. Only a correct sequence of beam interruption of the Muting sensors can consent the disabling of dangerous passage control.

Remember that muting is a temporary automatic suspension of the safety function. This means that a time limit is always mandatory. If a time out limit of 90min is a too short time for a particular machine cycle, the configuration without time monitoring ($t = \infty$) can be selected. In this case alternative solutions or additional measures shall be implemented to detected the condition of a muting function permanently active caused by accumulation of faults or by the muting sensors activated all the time. For example for the application of guarding the openings of a conveyor system (palletizers) by monitoring appropriate signals generated by the transport system to determinate if and when a pallet is in the detection zone.

MUTING TYPES

MXL uses 2 sensors, to be connected to the M16 connector located on the receiver. These sensors can be of different types (proximity, optical, capacity), with PNP or electro-mechanic outputs and with DARK-ON change-over switching, i.e. active output in presence of material.

CONNECTION FOR TWO-WAY MUTING

This connection is useful to protect the passages with pallet output and input.

The meeting point of the two sensors must be located inside the dangerous area, to avoid undesired and dangerous activations of the Muting function.

The activation of the Muting function takes place after sensors S1 and S2 are interrupted at the same time (within max 4 sec). The Muting function will remain activated for as long as both sensors are occupied, and is disabled as soon as the first of the two sensors is free. Maximum Muting duration (timeout) can be selected as 30 seconds, 90 minutes or Infinite.

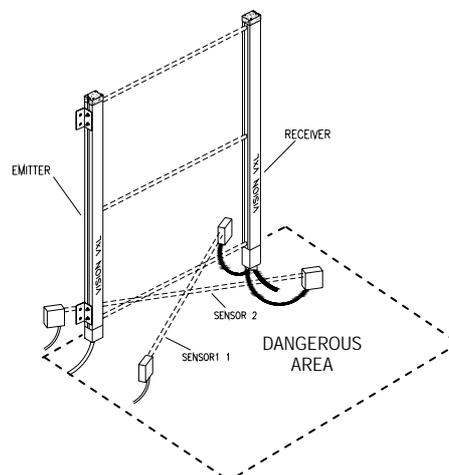


Figure 2 - Two-way openings with pallet entrance/exit.

SERIES "MXL T" - KIT OF MXL LIGHT CURTAIN AND SENSOR ELEMENT "MXLT S1" AND "MXLT SE"
Integrated Muting sensors – for two-way openings with pallet entrance/exit.

In this model, the Muting sensors are the first on one side and the second on the other in relation to the vertical light curtain (Figure 3).

This model is therefore two-way and is useful for protecting pallet entrance/exit openings.

⚠ The point of intersection of the two muting sensors (Figure 3) must be INSIDE the dangerous area in order to avoid accidental actuation of the Muting function.

The Muting function is activated following concurrent interruption (within max. 4 sec) of sensors S1 and S2. The Muting function remains active as long as both sensors remain occupied.

When the first of the two sensors is cleared, the Muting function is disabled. Also for this model, the maximum duration of the Muting condition (timeout) can be set to 30 seconds or 90 minutes.

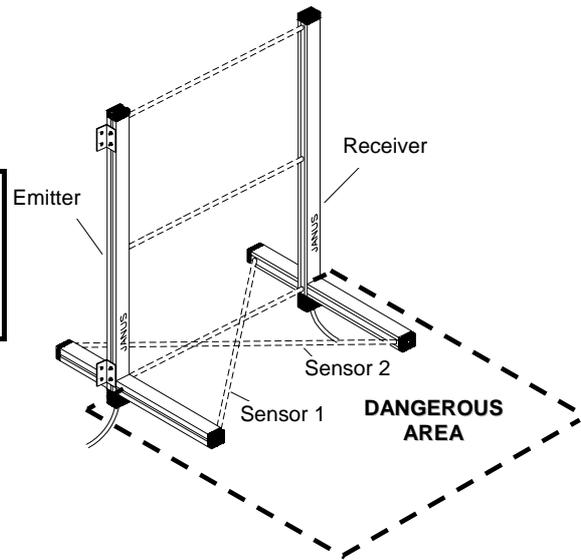


Figure 3

CONNECTION FOR ONE-WAY MUTING

This connection is useful to protect passages with pallet output.

The activation of the Muting function takes place after sensors S1 and S2 are interrupted at the same time (within max 4 sec).

The Muting function will remain activated for as long as both sensors are occupied.

When the first of the 2 sensors is free, the material will still have 4 seconds available to abandon the guarded area limited by the curtain. The Muting condition will be disabled as soon as the guarded area is free. At the end of the 4 seconds, if the curtain is still occupied the OSSD outputs will be disabled, interrupting machine function.

For this model the maximum duration of the Muting condition (timeout) can be selected as 30 seconds, 90 minutes or Infinite.

⚠ In case the selected timeout is Infinite, please refer to the precautions section of page 5.

➔ It is absolutely necessary to complete a Muting sequence (freeing the guarded area) in order to guarantee the correct activation of the next sequence.

⚠ In order to work safely with the MXL equipped with One-way Muting, the muting sensors must absolutely be positioned inside the dangerous area (in dashed lines in Figures 4 and 5).

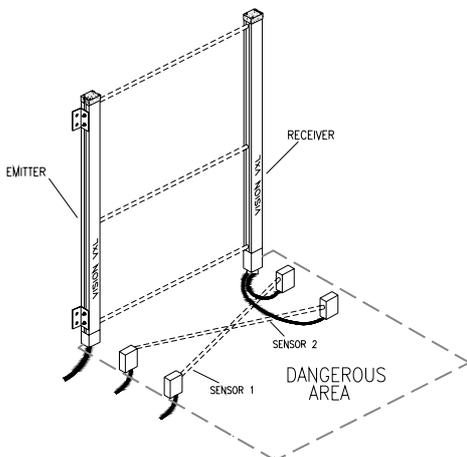


Figure 4 - Crossed sensors (one way muting)

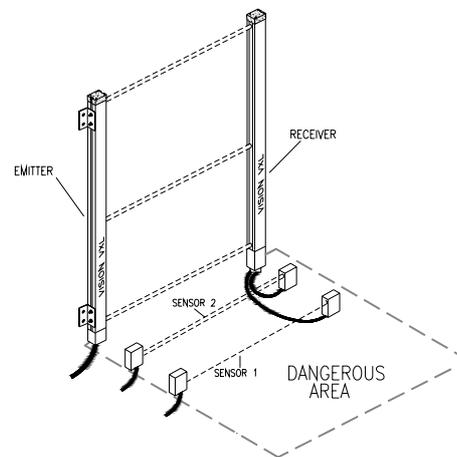


Figure 5 - Parallel sensors (one way muting)

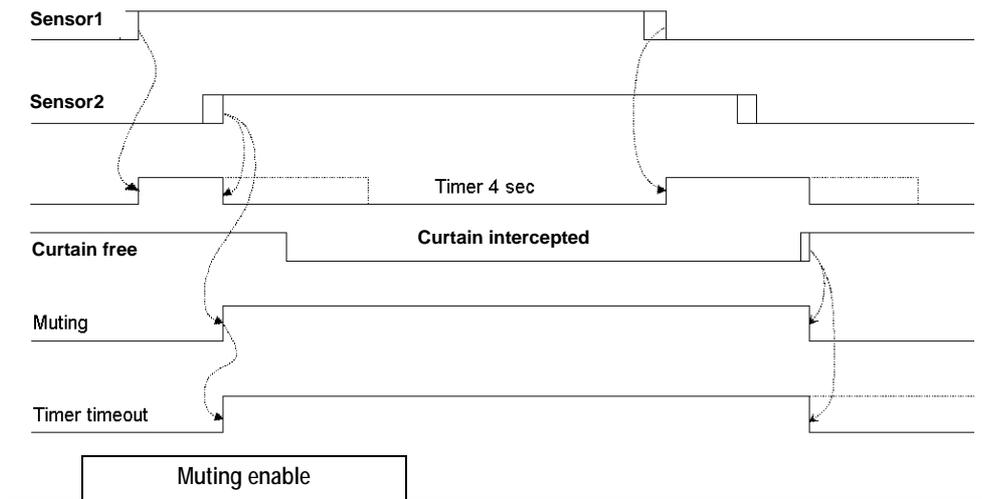


Figure 6 - Muting cycle closed by the light curtain

SERIES "MXL L" - KIT OF MXL LIGHT CURTAIN AND SENSOR ELEMENT "MXLL S"
Integrated Muting sensors – only for one-way openings with pallet exit.

In this model, the sensors 1 and 2 are on the same side of the vertical light curtain and are placed in front of the guarded opening (Figure 7).

This model is one-way and is useful for protecting pallet exit openings.

The Muting function is activated following concurrent interruption (within max. 4 sec) of sensors S1 and S2. The Muting function remains active as long as both sensors remain occupied.

When the first of the 2 sensors is cleared, the material has four seconds to abandon the guarded area delimited by the light curtain. The Muting condition will be disabled as soon as the protected area is cleared.

After 4 seconds, if the light curtain is still occupied, the OSSD outputs are disabled, interrupting functioning of the machine. For this model, the maximum duration of the Muting condition (timeout) can be set to 30 seconds or 90 minutes.

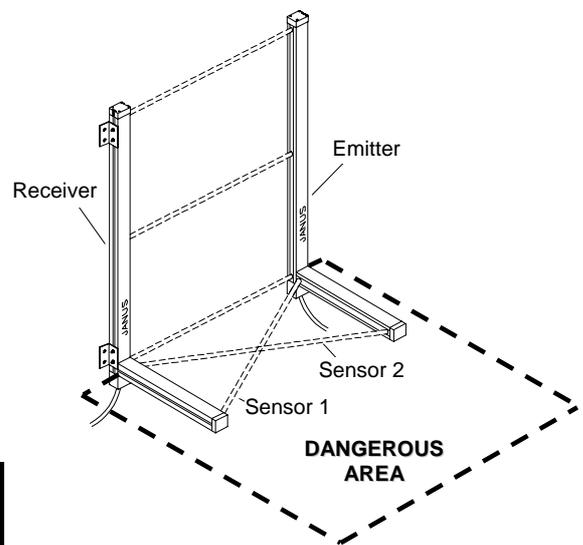


Figure 7

-  **To guarantee the safety operation of the MXL L series, the horizontal muting sensor must be mounted *INSIDE* the dangerous area (dashed on Figure 7).**
-  **When using a MXL L series, the minimum distance between two consecutive pallets must be less than 10cm or more than 32cm.**

POSITIONING OF THE MUTING SENSORS

The Emitter and Receiver of the light curtain must be positioned so as to permit access to the dangerous area from above, from below and from the sides without first of all intercepting at least one of the optical beams.

Indications for correct positioning of the light curtain are provided in the figure below:

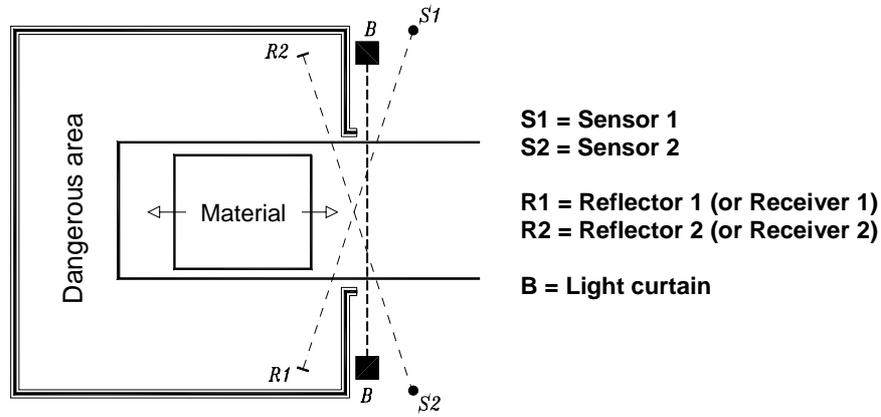


Figure 8

For correct positioning of sensors 1 and 2, i.e. those that manage enabling and disabling of the Muting function, take into account the following:

- the two beams must be crossed and pass diagonally through the zone guarded by the light curtain;
- the point of intersection of the two beams must be **in the dangerous area beyond the light curtain**;
- the angle between the two Muting beams must be calculated according to the size of the pallet and its speed, taking into account that the Muting function is activated only if the interception delay between the two sensors is less than 4 seconds;
- the pallet must interrupt the two beams **before** intercepting the light curtain;
- the two beams must be interrupted continuously by the pallet for the entire period during which the pallet passes between the sensors;
- make sure that the two beams are effectively intercepted by the material on the pallet and not by the empty pallet;
- the zone identified by the points of interception and clearing of the beams of sensors 1 and 2 by pallet **must be limited as far as possible (or suitably protected)** so as to avoid the possibility of accidental passing through the light curtain with Muting active (Figure 9).

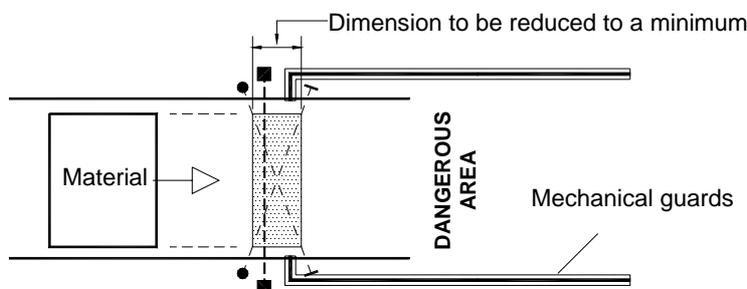
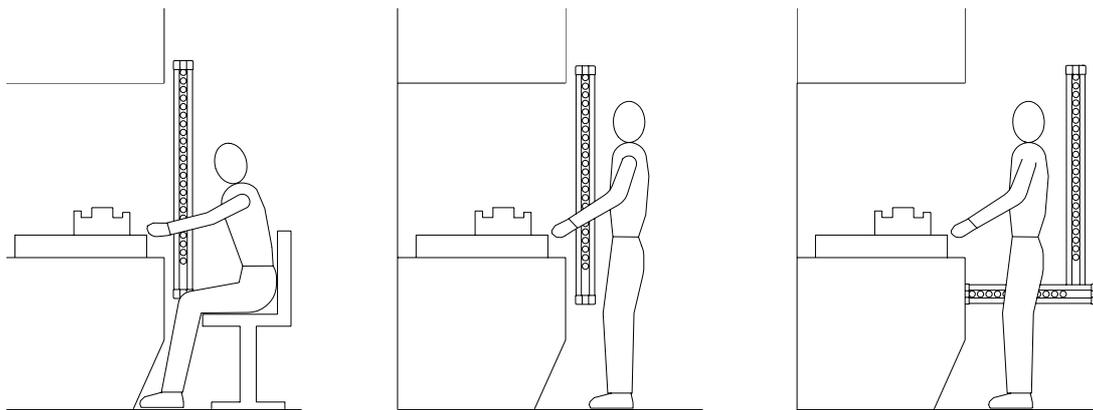
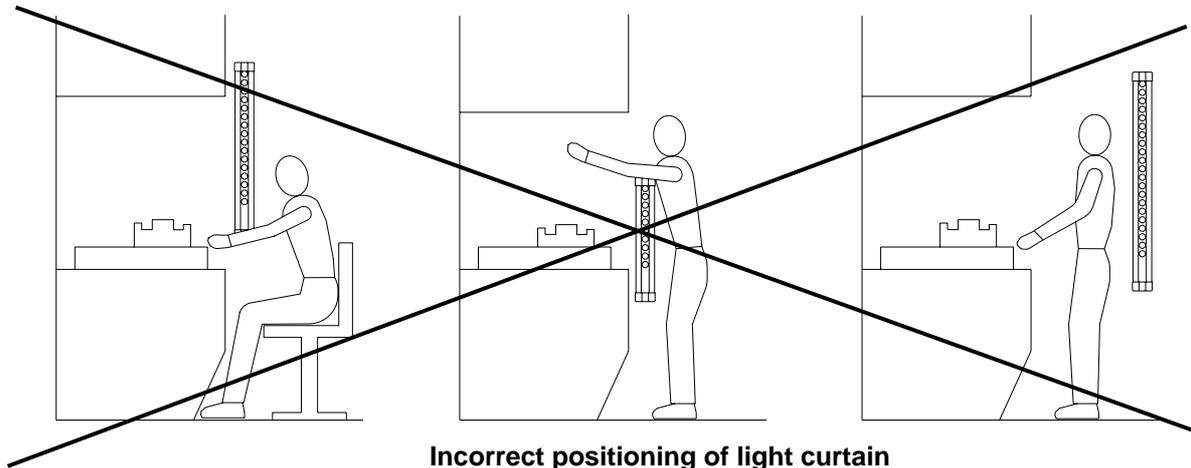


Figure 9

POSITIONING

The position of the *MXLE* Emitter and the *MXLR* Receiver must prevent access to the danger zone from above, below and from the sides, unless at least one of the optical beams has been intercepted. Some useful information regarding the correct position of the light curtain is shown in the figure below.



Correct positioning of light curtain

Figure 10

SAFETY DISTANCE CALCULATION

The light curtain must be installed at a distance that is greater than or equal to the **minimum safety distance S**, so that a dangerous point can only be reached after all hazardous machine movements have stopped (Figure 11).

According to European standard EN999, the minimum safety distance **S** must be calculated using the following formula:

$$S = K (t_1 + t_2) + C$$

where:

S	<i>minimum safety distance</i>	mm
K	<i>approach speed of object to the dangerous area</i>	mm/sec
t₁	<i>response time of the safety light curtain in seconds</i>	sec
t₂	<i>machine response time, in seconds, meaning the time required for the machine to interrupt the dangerous movement following transmission of the stop signal</i>	sec
c	<i>additional distance</i>	mm

 **The non-observance of the correct safety distance reduces or cancels the protective action of the light curtain.**

 **If the position of the light curtain does not prevent the operator from having access to the dangerous area without being detected, additional mechanical guards must be installed to complete the system.**

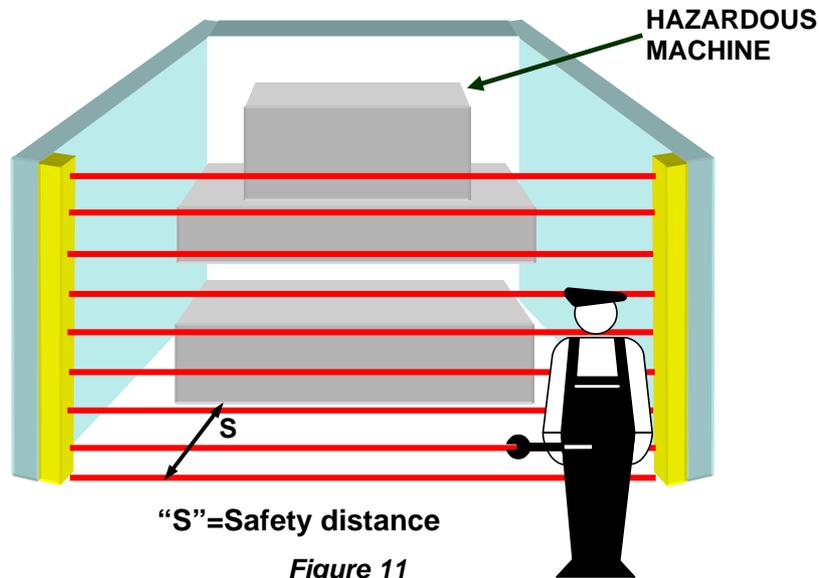


Figure 11

VERTICAL POSITION OF THE LIGHT CURTAIN

30 mm and 40 mm resolution models.



These models are suitable for the protection of hands.

The minimum safety distance **S** is calculated according to the following formula:

$$S = 2000(t_1 + t_2) + 8(D-14)$$

D=resolution (mm)

This formula is valid for distances **S** between 100 and 500 mm. If this formula results in **S** being greater than 500 mm, the distance can be reduced to a minimum of 500 mm by means of the following formula:

$$S = 1600(t_1 + t_2) + 8(D-14)$$

If, due to the specific configuration of the machine, the dangerous area can be accessed from above, the highest beam of the light curtain must be at a height **H** of at least 1800 mm from the base **G** of the machine.

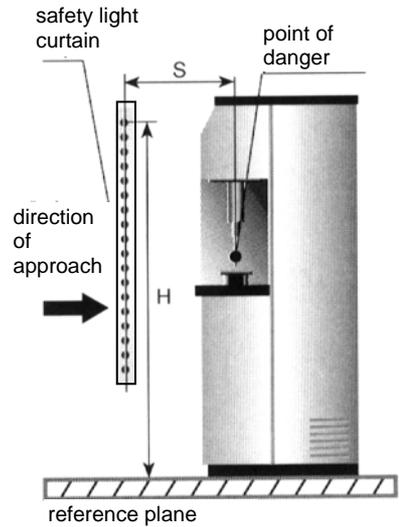


Figure 12

2, 3, 4 beams Models.



These models are suitable for the protection of the entire body and must not be used to protect arms or legs.

The minimum safety distance **S** is calculated according to the following formula:

$$S = 1600 (t_1 + t_2) + 850$$

→ The recommended height **H** from the base (G) must be the following:

MODEL	BEAMS	Reccomended Height H (mm)
MXL 2B	2	400 – 900
MXL 3B	3	300 – 700 – 1100
MXL 4B	4	300 – 600 – 900 - 1200

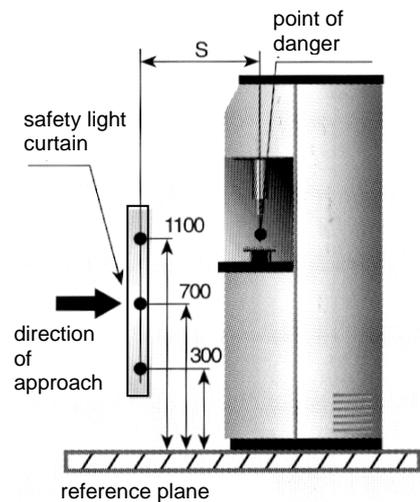


Figure 13

MULTIPLE SYSTEMS

When more than one VISION MXL system is used, precautions must be taken to avoid optical interference between them: install units so that the beam emitted by the Emitter of one system can only be received by the relative Receiver.

Figure 14 illustrates some examples of correct positioning when two photoelectric systems are installed. Incorrect positioning could generate interference, and may result in malfunctioning.

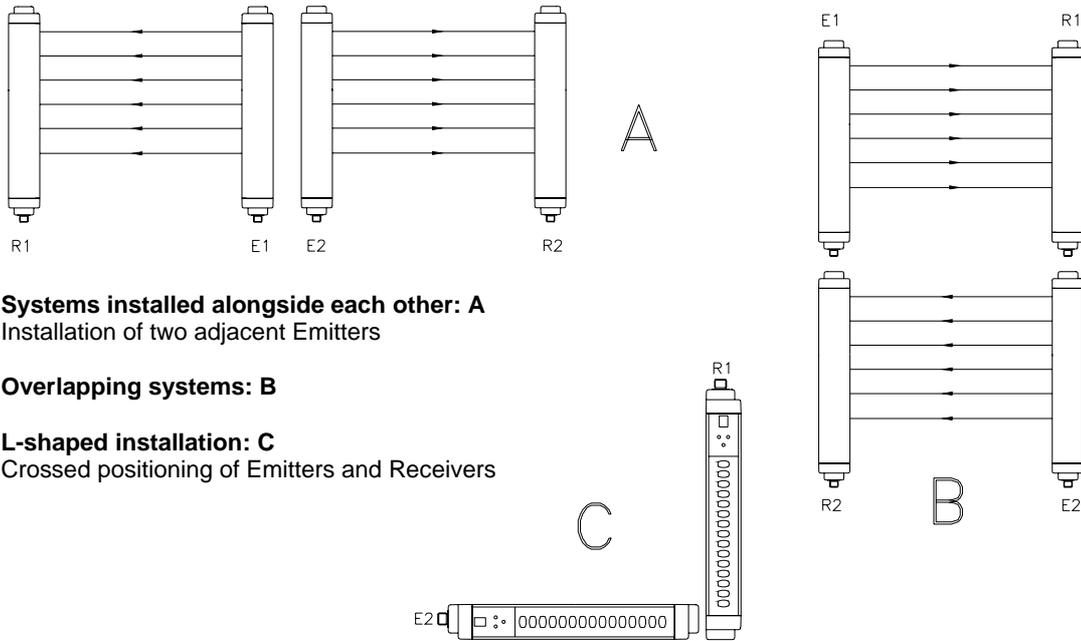


Figure 14

DISTANCE BETWEEN REFLECTING SURFACES

The presence of reflecting surfaces in proximity of the photoelectric light curtain may generate spurious reflections that prevent monitoring. With reference to Figure 15, object **A** is not detected because surface **S** reflects the beam and closes the optical path between the Emitter and Receiver. A minimum distance **d** must therefore be maintained between any reflecting surfaces and the protected area. The minimum distance **d** must be calculated according to the distance **l** between the Emitter and the Receiver, considering that the angle of projection and reception is 5°.

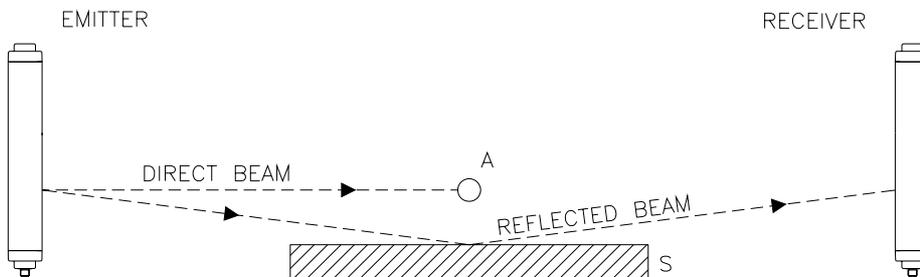


Figure 15

Figure 16 illustrates the values for the minimum distance **d** that must be maintained when the distance **l** between the Emitter and Receiver is changed.

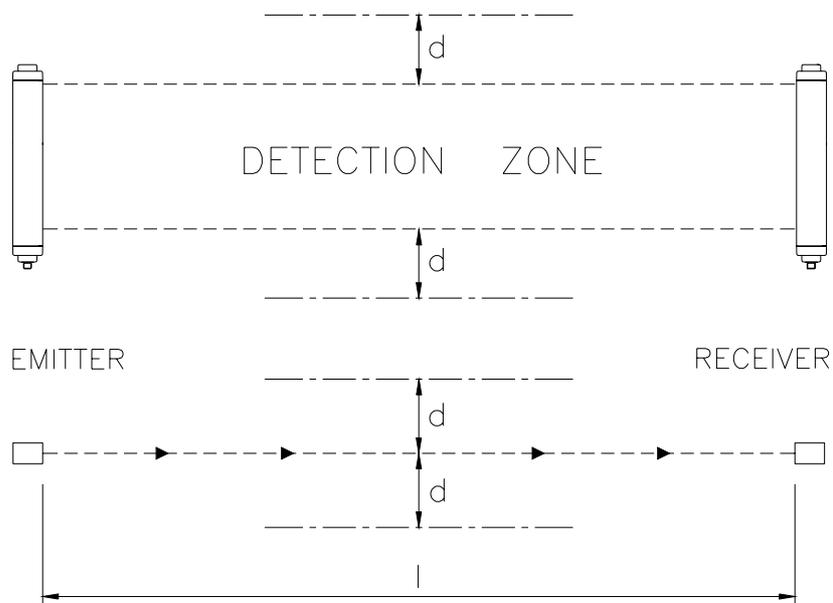
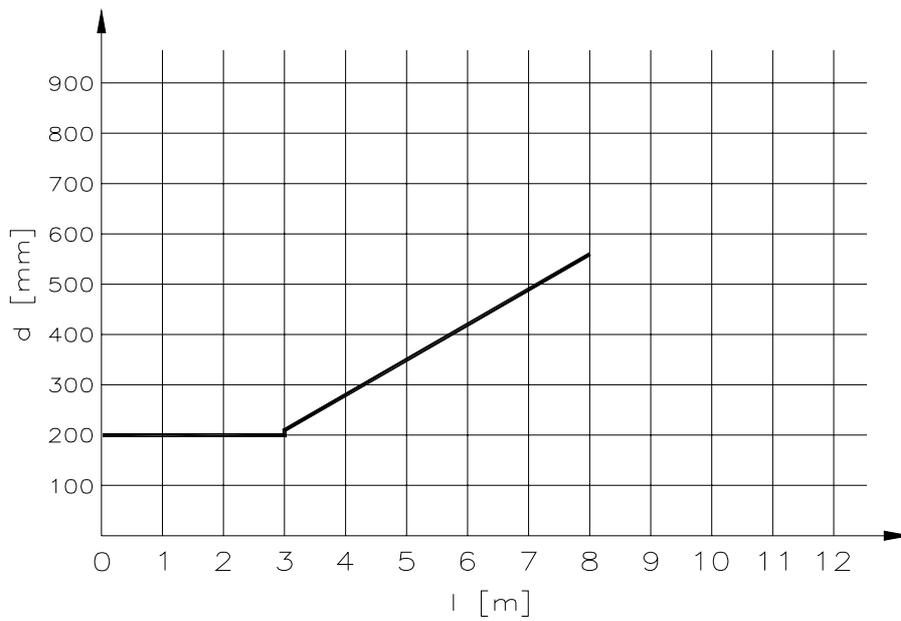


Figure 16

After installing the system, check whether any reflecting surfaces intercept the beams, first in the centre and then in the vicinity of the Emitter and Receiver. During these operations, the red LED on the Receiver should never, for any reason switch off.

MECHANICAL ASSEMBLY AND OPTICAL ALIGNMENT

The Emitter and the Receiver must be assembled opposite each other (at a distance specified in the technical data sheet). Use the **fastening brackets and inserts** supplied with the system to place the Emitter and the Receiver so that these are aligned and parallel to each other and with the connectors facing the same way.

Depending on the dimensions and the shape of the support on which they are to be installed, the Emitter and Receiver must be assembled with the fastening inserts at the back, or else by fitting these in the side groove (Figure 17).

Perfect alignment of the Emitter and Receiver is essential in order to assure correct light curtain operation. The indicator LEDs on the Emitter and Receiver facilitate this operation.



To perform an easier alignment the use of SFB circular brackets is necessary. These are available on request (ordering code 1330974).

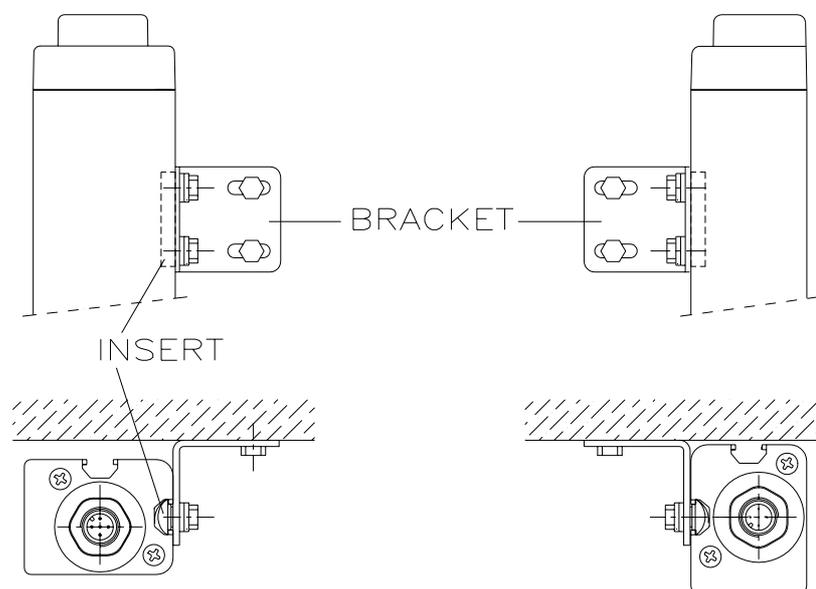


Figure 17

- Position the optical axis of the first and last beam of the Emitter on the same axis as that of the corresponding beams on the Receiver.
- Move the Emitter in order to find the area within which the green LED on the Receiver stays on, then position the first beam of the Emitter (the one close to the indicator LEDs) in the centre of this area.
- Using this beam as a pivot, effect small sideways movements of the opposite end to move to the protected area clear condition. The green LED on the Receiver will indicate this condition.
- Lock the Emitter and Receiver in place.



In case the Emitter and the Receiver are assembled in areas subject to strong vibration, in order to prevent damages to the equipment **it is necessary to use anti-vibration devices** (code SAV-3 120088, code SAV-4 120089).

ELECTRICAL CONNECTIONS

WARNINGS

Before making the electrical connections, make sure that the supply voltage complies with that specified in the technical data sheet.

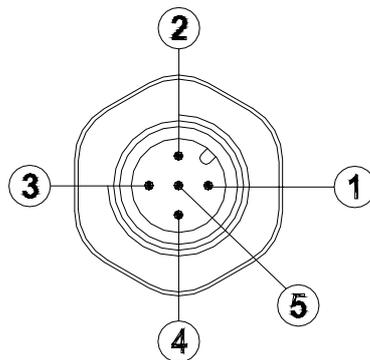
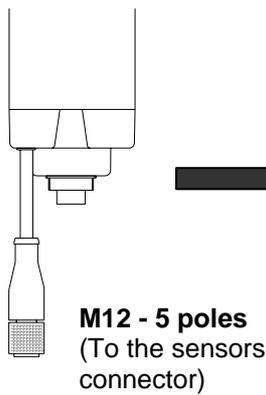
-  **Emitter and Receiver units must be supplied with 24Vdc±20% power supply that guarantee safe isolation from main voltage.**
-  **The external power supply must comply with the standard EN 60204-1 (Chapter 6.4).**

The electrical connections must be made according to the diagrams in this manual. In particular, do not connect other devices to the connectors of the Emitter and Receiver.

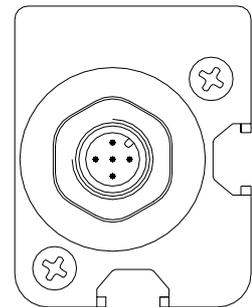
For reliability of operation, when a diode jumper supply unit is used, its output capacity must be at least 2000µF for each absorbed A.

EMITTER CONNECTIONS

MXL L / MXL T



MXL I



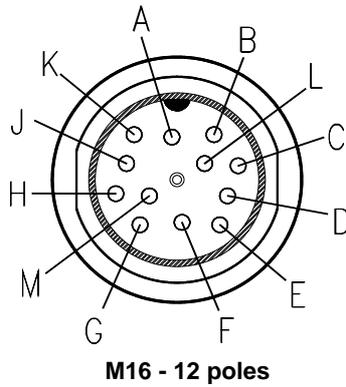
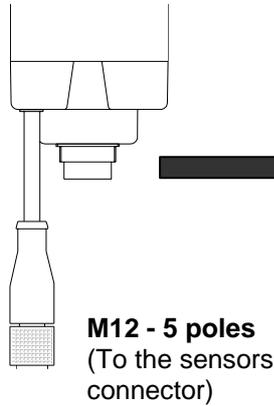
5 poles M12 connector

PIN	COLOR	NAME	TYPE	DESCRIPTION	FUNCTIONING
1	BROWN	24VDC	INPUT	+24VDC power supply	-
3	BLUE	0VDC		0VDC power supply	-
5	GREY	FE		Ground connection	-
2	WHITE	TEST	-	TEST request	- Operation without TEST (+24VDC) - TEST request (Transition +24VDC -> 0VDC or open circuit)
4	BLACK	N.C.	-	N.C.	-

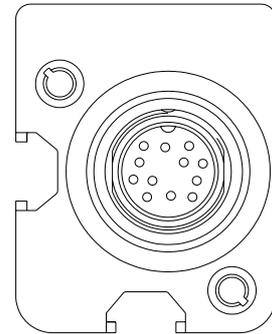
Table 1 - Emitter connections

RECEIVER CONNECTIONS

MXL L / MXL T



MXL I



12 poles M16 connector

PIN	COLOR	NAME	TYPE	DESCRIPTION	FUNCTIONING	
D	GREY	SUPPLY_A	-	Supply A	SUPPLY_A : 0Vdc SUPPLY_B : 24Vdc	MANUAL (see Table 4)
B	GREEN	SUPPLY_B	-	Supply B	SUPPLY_A : 24Vdc SUPPLY_B : 0Vdc	AUTOMATIC (see Table 3)
H	PURPLE	FE	-	Ground connection	-	
A	GREY-PINK	OSSD1	OUTPUT	Static safety outputs	PNP active high	
K	YELLOW	OSSD2	OUTPUT			
L	BROWN	SENSOR1	INPUT	Muting sensors	< 5VDC (with <3mA) : sensor free 11÷30 VDC (with 6÷30mA): sensor occupied	
M	BLUE	SENSOR2	INPUT			
J	RED-BLUE	FBK_K1K2/ RESTART	INPUT	External contactors feedback + RESTART input	< 5VDC (I <3mA) : OFF 11÷30 VDC (I = 6÷30mA): ON	
F	RED	OVERRIDE	INPUT	Override request		
C	WHITE	MUTING ENABLE	INPUT	Muting enabling request		
E	PINK	TIMEOUT	INPUT	Timeout Selection		
G	BLACK	MUT_LAMP	OUTPUT	Muting lamp output	PNP active high	

Table 2 - Receiver connections

5 poles M12 connector

This connector must be wired to the 5 poles M12 male connector connected to the muting arms.

WARNINGS REGARDING THE CONNECTION CABLES

- For connections over 50m long, use cables with a cross-section area of 1 mm².
- The power supply to the light curtain should be kept separate from that to other electric power equipment (electric motors, inverters, frequency converters) or other sources of disturbance.
- Connect the Emitter and the Receiver to the ground outlet.
- The connection cables must follow a different route to that of the other power cables.

Example of connection in MANUAL mode of operation with feedback of K1K2 external contactors, pulse OVERRIDE and MUTING timeout = 30 s

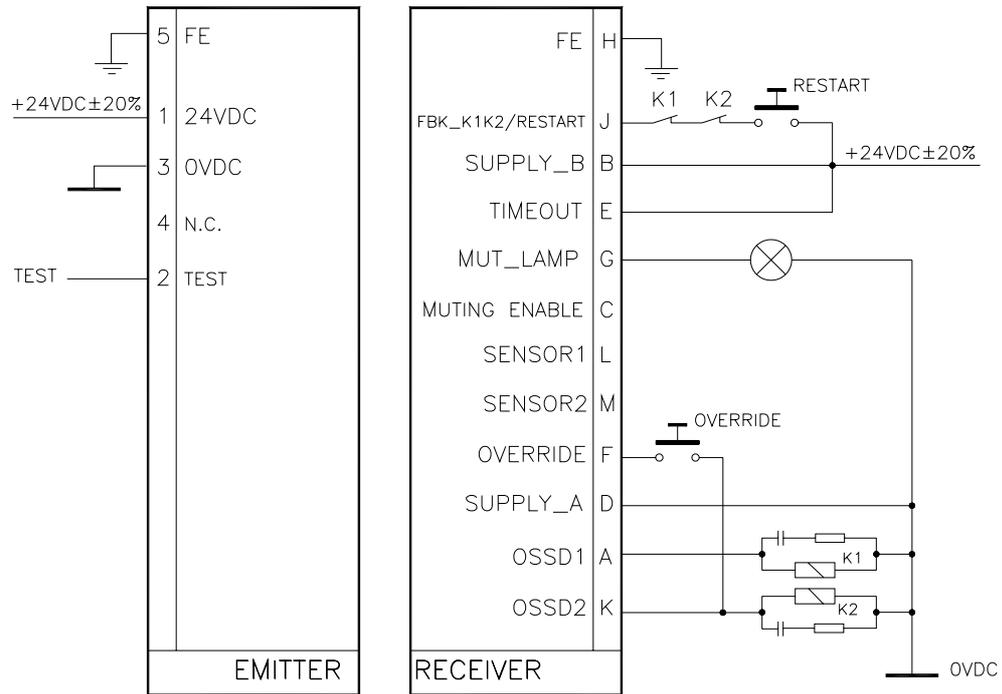


Figure 18

Example of connection in AUTOMATIC mode of operation with feedback of K1K2 external contactors, OVERRIDE with continuous action and MUTING timeout = 90 min

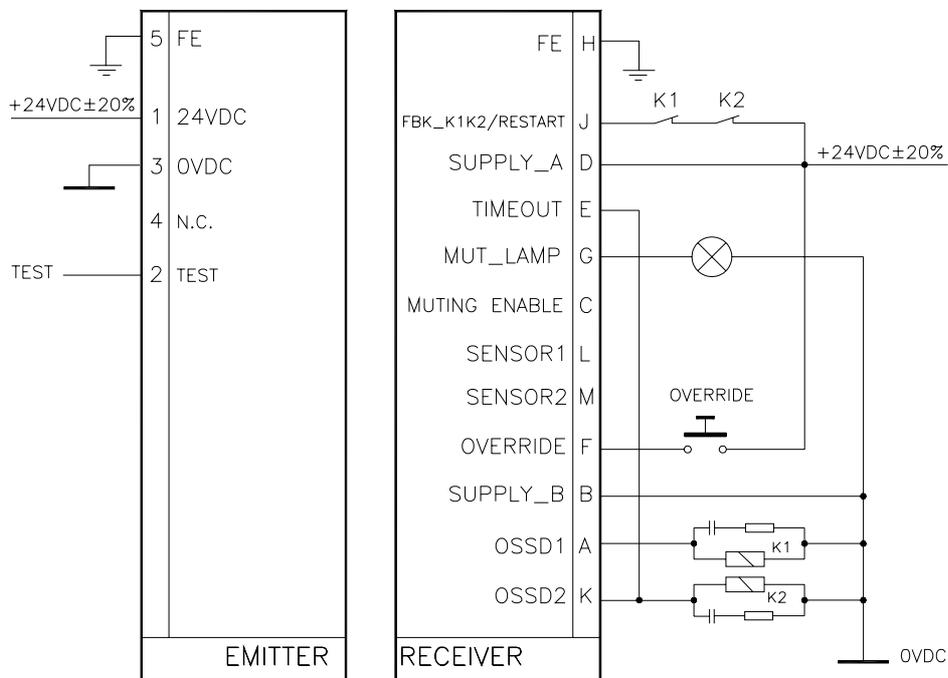


Figure 19

➔ If the TEST function is not required by the application, connect pin 2 of the emitter to +24Vdc.

CONFIGURATION AND MODE OF OPERATIONS

The mode of operation of VISION MXL curtain is set thanks to connections to be carried out on connector 12 poles M16 of the Receiver (Table 3 and Table 4).

AUTOMATIC MODE

⚠ *The VISION MXL light curtain does not dispose of a start/restart interlock circuit in automatic mode. In most applications this safety function is necessary. Please consider the risk-analysis of your application about this matter.*

In AUTOMATIC operation mode, the two static outputs OSSD1 and OSSD2 follow the status of the guarded opening.

- with the area guarded clear, the outputs will supply +24VDC
- with the area occupied they will supply 0VDC.

OPERATION MODE	CONNECTIONS
AUTOMATIC without K1-K2 feedback control	
AUTOMATIC with K1-K2 feedback control	

Table 3 - Automatic mode

MANUAL MODE

⚠ *Use of manual mode (start/restart interlock activated) is compulsory if the safety device controls an opening to protect a danger area and a person, after passing through the opening, may remain in the danger area without being detected (use as 'trip device' according to IEC 61496). Failure to comply with this rule may result in very serious hazards for the persons exposed.*

In this operating mode the safety outputs OSSD1 and OSSD2 are activated (+24VDC) only if the protected area is free and after the reception of the RESTART signal, using a push button (ref. Table 4).

The series of control contacts of external relays and RESTART button guarantees that the curtain is rearmed only if K1K2 external relays are not excited (control contacts closed).

After an interception of the protected area, the safety outputs will be de-activated. To re-activate them it will be necessary to repeat the sequence described above. The RESTART command is active with a voltage of +24VDC. The minimum duration of the RESTART command is **100ms**.

OPERATION MODE	CONNECTIONS
MANUAL without K1-K2 feedback control	
MANUAL with K1-K2 feedback control	

Table 4 - Manual Mode

SELECTING THE MAXIMUM DURATION OF MUTING AND OVERRIDE TYPE

MXL receiver inputs allow to configure the maximum duration of Muting condition (timeout) and the Override type to be adopted.

At start up it is necessary to correctly connect the various inputs in order to achieve correct operation, as indicated below.

SELECTED TIMEOUT	OVERRIDE TYPE	CONNECTION
30sec	Continuous action command	
	Pulse command	

SELECTED TIMEOUT	OVERRIDE TYPE	CONNECTION
90min	Continuous action command	
	Pulse command	
Infinite	Continuous action command	
	Pulse command	

Table 5 - Selection of Timeout and Override

⚠ *In case the selected timeout is Infinite, please refer to the precautions section in the "MUTING FUNCTIONS" paragraph.*

MUTING OVERRIDE FUNCTION

The OVERRIDE function must be used when the machine stops due to incorrect Muting activation sequences with the material obstructing the guarded opening.

In this situation, the OSSD outputs are not active as the light curtain and/or at least one Muting sensor is occupied. In this condition the OVERRIDE request led blinks.



This function activates the OSSD outputs making it possible to remove the material that is obstructing the opening concerned; moreover the Muting lamp lights on.



This operation must be executed under the control of an operator able to control its safety execution.

The operator will use the Override mode previously selected (ref. Table 5).

1. Override with continuous action command
2. Override with pulse command

Override with continuous action command.

To activate this function the OVERRIDE button must be kept pressed for the entire duration of the successive operations.

This function activates the OSSD outputs making it possible to remove the material that is obstructing the opening concerned; moreover the Muting lamp lights on.

The maximum override duration is 15 minutes; it can be stopped for two different causes.

- **When the button is released or after 15 minutes the override will be terminated**, de-activating the OSSD outputs, turning off the muting lamp and showing normal condition on the display. A new override condition can be started, releasing and rearming the selector.
- **Once the opening has been cleared and the sensors are free again**, override ends and GUARD condition (light curtain in normal operation) is activated without necessity of further commands.

Override with pulse command.

To activate this function the OVERRIDE button must be kept pressed for a maximum duration of 500 ms.

The maximum override duration is 15 minutes; it can be stopped for two different causes.

- **When the 15 minutes has been elapsed, override ends**, de-activating the OSSD outputs, turning off the muting lamp and showing normal condition on the display. A new override condition can be started with a new activation of the switch.
- **Once the opening has been cleared and the sensors are free again**, override ends and GUARD condition (light curtain in normal operation) is activated without necessity of further commands.

OPERATION AND TECHNICAL DATA

SIGNALS

The LEDs showed on Emitter and Receiver units labels are visualized depending on the system operation phase. The tables below shows the different signals (ref. Figure 20).

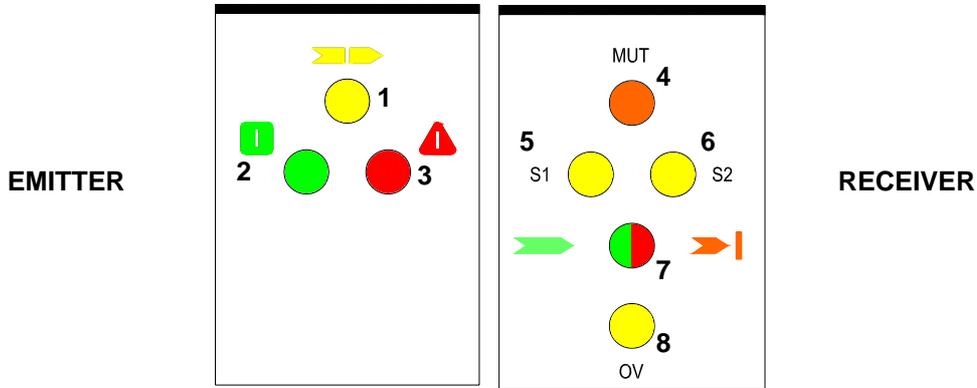


Figure 20

EMITTER SIGNALS

Normal operation

MEANING	RED (3)	GREEN (2)	(TEST) YELLOW (1)
System start up. Initial TEST	ON	OFF	ON
Normal operation	OFF	ON	OFF
TEST condition	OFF	ON	ON

RECEIVER SIGNALS

Normal operation

MEANING	SEMAPHORE (7)	OVERRIDE (8)	SENSOR1 (5)	SENSOR2 (6)	MUTING (4)
	RED/ GREEN/YELLOW	YELLOW	YELLOW	YELLOW	ORANGE
System start up. Initial TEST	RED	ON	ON	ON	ON
First 5 sec: Manual with Muting Timeout = 30 s	OFF	ON	ON	ON	OFF
First 5 sec: Manual with Muting Timeout = 90 min	OFF	ON	ON	OFF	OFF
First 5 sec: Manual with Muting Timeout = ∞	OFF	ON	OFF	ON	OFF
First 5 sec: Automatic with Muting Timeout = 30s	OFF	OFF	ON	ON	OFF
First 5 sec: Automatic with Muting Timeout = 90min	OFF	OFF	ON	OFF	OFF
First 5 sec: Automatic with Muting Timeout = ∞	OFF	OFF	OFF	ON	OFF
BREAK (A) condition	RED	OFF	sens1 status	sens2 status	OFF
CLEAR (B) condition	YELLOW	OFF	OFF	OFF	OFF
MUTING condition	GREEN	OFF	sens1 status	sens2 status	OFF
GUARD (C) condition	GREEN	OFF			OFF
OVERRIDE (D) condition	GREEN	ON			ON
Request of OVERRIDE with BREAK	RED	Blinking			OFF
Request of OVERRIDE with CLEAR	OFF		OFF		

(A) Curtain occupied – outputs disabled; (B) Curtain free – outputs disabled – Waiting for restart
 (C) Curtain free – outputs enabled; (D) Curtain occupied – outputs enabled

Configuration errors

MEANING	SEMAPHORE (7)	OVERRIDE (8)	SENSOR1 (5)	SENSOR2 (6)	MUTING (4)
	RED/ GREEN/YELLOW	YELLOW	YELLOW	YELLOW	ORANGE
OSSD output incorrectly connected to 24VDC	RED QUICK BLINKING	OFF	QUICK BLINKING	QUICK BLINKING	OFF
Muting timeout incorrectly selected		OFF	QUICK BLINKING	OFF	FAST BLINKING
Incorrect connection of pin FBK_K1K2/RESTART		OFF	OFF	QUICK BLINKING	OFF
Incorrect connection of pin OVERRIDE		OFF	QUICK BLINKING	OFF	OFF



On the emitter of the 2, 3, 4 beams models, near each beam, a red led which permits an easy detection of the beam is present.

TEST FUNCTION

In case the operator wishes to verify the equipment connected downstream to the curtain, without physically intervening inside the guarded area, there is a TEST command available.

It allows switching of OSSD from ON to OFF for as long as the command is active.

The test function simulates an occupation of the guarded area, which makes it possible to control the functioning of the entire system by an external supervisor (e.g. PLC, control module, external contactors etc).

Minimum duration of the TEST command must be 40 ms.

VISION MXL is equipped with an automatic, permanently active anomaly detection system, to verify the curtain's correct operation.

REER advises to perform a TEST, as described above, **prior to each work cycle**, so as to make sure the devices located downstream to the curtain are operating properly.

MUTING LAMP

Whenever risk assessment so requires, the MXL curtain allows the connection of an external warning lamp of active Muting (pin G in the receiver), with the following characteristics:

- Active Muting: pin G = +24VDC.
- Maximum supplied power : 5W max.



Check the function of this lamp by periodically verifying its lighting during Muting or Override phase.

MUTING ENABLE COMMAND

The muting enable command **enables** the muting function (when brought to +24Vdc), and must be generated by the control system of the machine at least 100 ms before the intervention of muting sensors; **it has no effect on the disabling of the function itself**. When it is not used, connect pin C at +24Vdc.

OUTPUT STATUS

The VISION MXL features two static PNP outputs on the Receiver, the status of which depends on the condition of the protected area.

The maximum load allowed is 500mA at 24VDC, which corresponds to a resistive load of 48Ω. Maxim load capacity corresponds to 2,2μF. The meaning of the status of outputs is defined in the table below. Any short circuit between outputs or between outputs and 24VDC or 0VDC power supplies is detected by the light curtain.

NAME OF SIGNAL	CONDITION	MEANING
OSSD1	24VDC	Situation of free curtain or Muting function active or Override active
OSSD2		
OSSD1	0VDC	Curtain occupied or fault detected
OSSD2		

Table 6

⚡ *In the protected area clear condition, the Receiver supplies a voltage of 24 VDC on both outputs. The required load must therefore be connected between the output terminals and the 0VDC (Figure 21).*

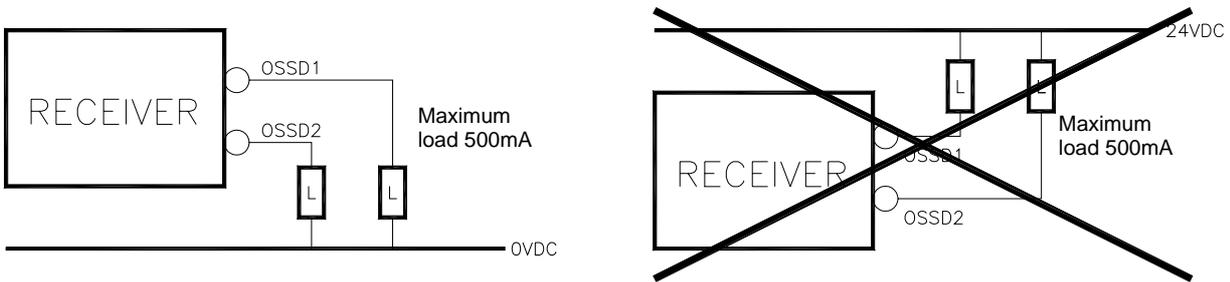


Figure 21

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS	
Safety category	2
Resolutions / N. of beams	30 - 40 mm / 2 - 3 - 4 beam
Protected height	mm 160 – 1210
Working range	m refer to the tables below
Connections	M16 - 12 poles for RX - M12 - 5 poles for TX
Power supply	24 Vdc \pm 20%
Safety outputs	2 PNP – 500mA @ 24VDC
EDM function	Present on RX – selectable
Restart Auto/Manual	Present on RX – selectable
Muting Function	Integrated, with 2-signal logic, 4 seconds simultaneity control, timeout selectable as 30 s, 90 min or ∞
Muting Enable	Selectable MUTING ENABLE input (Muting enabled with 24Vdc)
Muting signal input (MXL I)	2 dark on – for contact relay NA or static output PNP 24Vdc
Lamp output/ muting LED	24Vdc - 5W max. (lamp presence not obligatory)
Override Function	Selectable with continuous manual action or impulse commands
Response time	ms 4 \div 37 (see following tables)
Internal test execution time	s max 28
Test input	Present on TX
Signals and troubleshooting	LED signals
Max. conn. length	m 100
Operating temperature	$^{\circ}$ C 0 \div +55
Storage temperature	$^{\circ}$ C -20 \div +70
Protection rating	IP 65
Dimensions of section	mm 35 x 45
Max. consumption	W 2 (Emitter) 2 (Receiver)

30 mm Resolution Models	153	303	453	603	753	903	1053	1203
Number of beams	8	16	24	32	40	48	56	64
Response time	ms	7	11,5	16	20	24	28,5	33
Overall light curtain ht.	mm	261	411	561	711	861	1011	1161
Working range	m	0,3 ÷ 8						

40 mm Resolution Models	304	454	604	754	904	1054	1204
Number of beams	10	15	20	25	30	35	40
Response time	ms	8	11	13,5	16	19	22
Overall light curtain ht.	mm	411	561	711	861	1011	1161
Working range	m	0,3 ÷ 8					

2-3-4 beams Models	MXL 2B	MXL 3B	MXL 4B
Number of beams	2	3	4
Distance between beams	mm	500	400
Response time	ms	4	4,5
Overall light curtain ht.	mm	711	1011
Working range	m	0,3 ÷ 8	

MXL L SERIES		
PRE-ASSEMBLED KIT OF MXL LIGHT CURTAIN AND SENSOR ELEMENT "MXLL S"		
	MXL L 2B	MXL L 3B
Number of beams	2	3
Distance between beams	mm	500
Response time	ms	4
Working range	m	1 ÷ 2,5
Muting system	One-way with max. concurrent actuation time 4 sec	
Muting sensors	2 opto-electronic - integrated – pre-aligned– prewired	
Muting sensor detection plane	adjustable height and slope	

MXL T SERIES		
PRE-ASSEMBLED KIT OF MXL LIGHT CURTAIN AND SENSOR ELEMENTS "MXLT SI" AND "MXLT SE"		
	MXL T 2B	MXL T 3B
Number of beams	2	3
Distance between beams	mm	500
Response time	ms	4
Working range	m	1 ÷ 2,5 2 ÷ 3,5 (MXL T H)
Muting system	Two-way with 2 sensors	
Muting sensors	2 opto-electronic - integrated – pre-aligned– prewired	
Muting sensor detection plane	adjustable height and slope	

DIMENSIONS (mm)

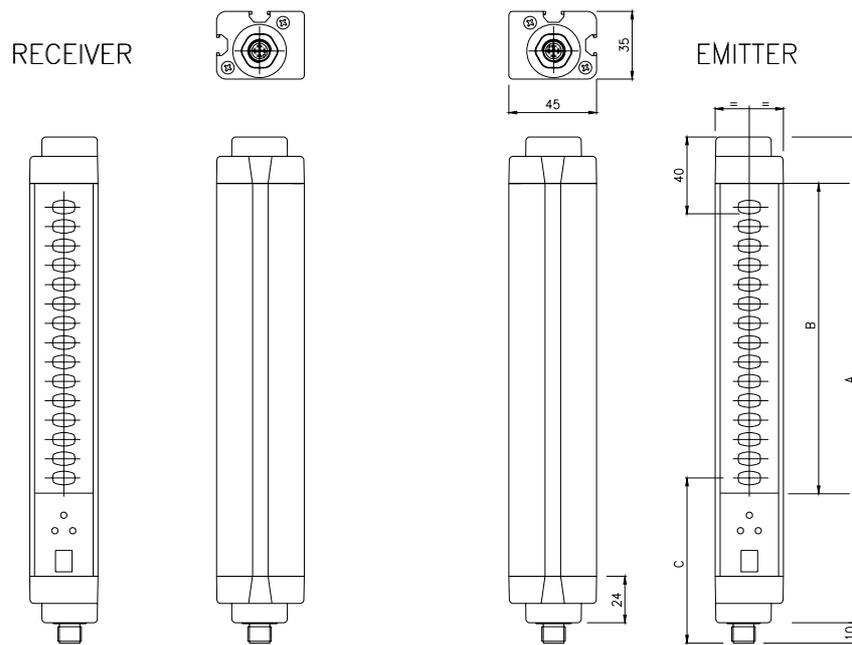


Figure 22 - Emitter and Receiver

Model	150	300	450	600	750	900	1050	1200
A	251	401	551	701	851	1001	1151	1301
B (PROTECTED AREA)	160	310	460	610	760	910	1060	1210
C	85							
Fastening	2 LS Brackets with 2 mounting inserts						3 LS Brackets with 3 mounting inserts	

Model	MXL 2B - MXL L2B - MXL T2B	MXL 3B - MXL L3B - MXL T3B	MXL 4B
A	701	1001	1101
Distance between beams	500	400	300
C	135		

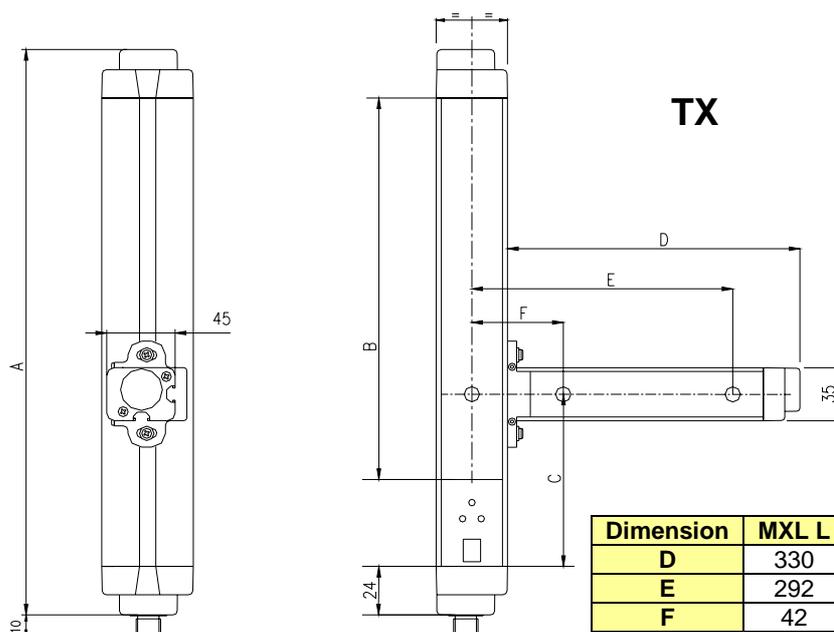


Figure 23

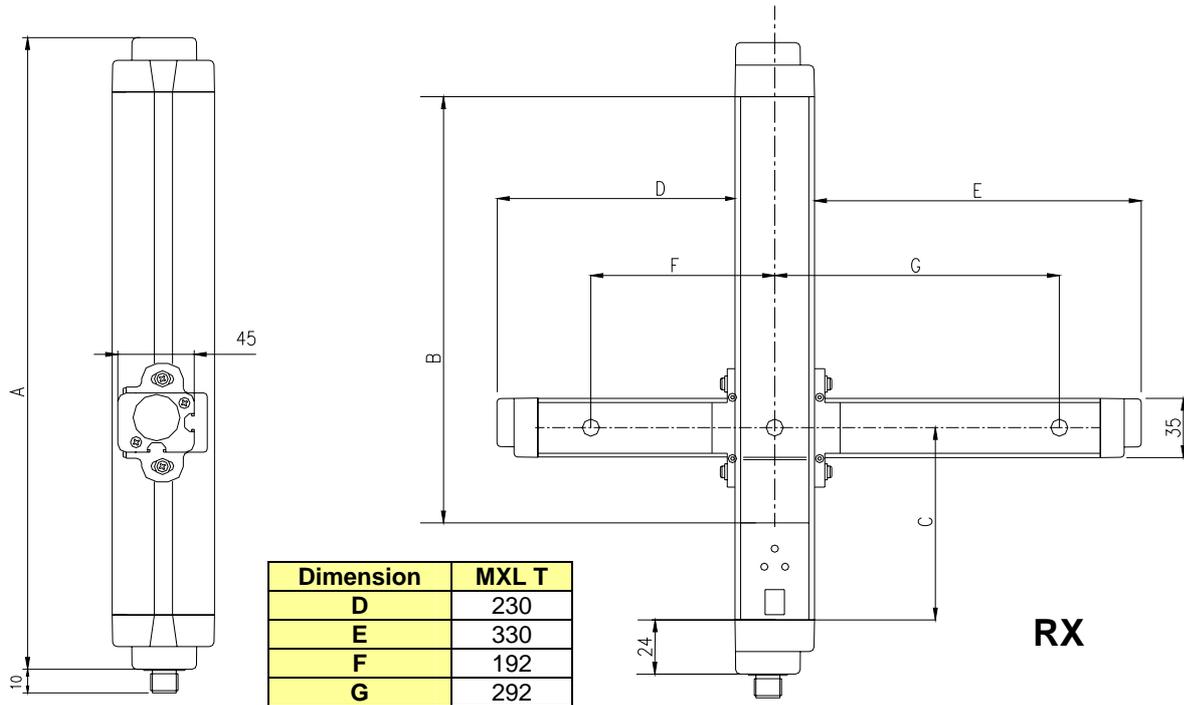


Figure 24

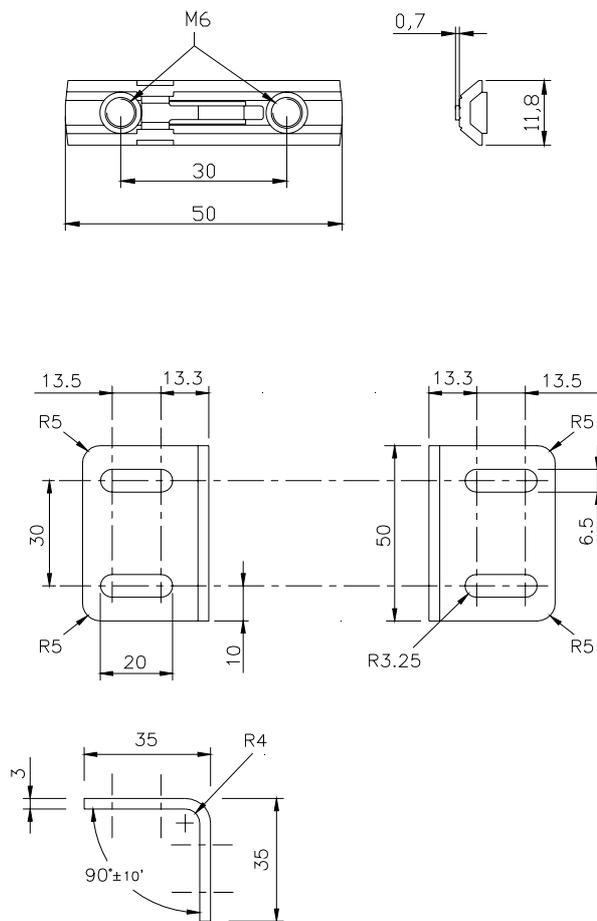


Figure 25 - Fastening LS type brackets and inserts (included)

CHECKOUTS AND MAINTENANCE

VERIFICATION OF LIGHT CURTAIN EFFICIENCY

Before each work shift or just after switching on, check the correct operation of the photoelectric light curtain.

Proceed as follows, intercepting the beams using the appropriate test object (available as accessory, free of charge).

The correct test object must be used for testing, depending on the light curtain resolution. See page 26 for the correct ordering code.

Refer to Figure 26:

- Introduce the test object into the protected area and move it slowly, starting from the top and moving down (or vice versa), first in the centre and then in the vicinity of both the Emitter and the Receiver.
- **2, 3, 4 beams models:**
Intercept each beam with an opaque object, first in the center of the detection zone and then close to the emitter and the receiver.
- Make sure that during each stage of the test object's movements the red LED on the Receiver is always on.

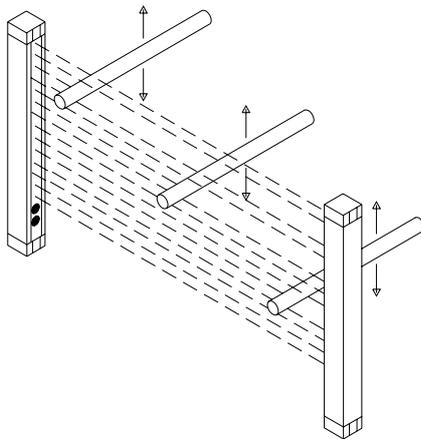


Figure 26

The VISION MXL light curtain does not require any specific maintenance operations; however, periodic cleaning of the front protective surfaces of the Emitter and Receiver optics is recommended.

Wipe using a clean, damp cloth; in particularly dusty environments, after cleaning the front surface, the use of an anti-static spray is recommended.

Never use abrasive or corrosive products, solvents or alcohol, which could damage parts. Do not use woollen cloths, that could electrify the front surface.

Grooving or fine scratching of the front plastic surfaces can increase the amplitude of the emission angle of the light curtain, jeopardising detection efficiency in the presence of lateral reflecting surfaces.

This issue can also cause interference by muting sensors and jeopardise reliability of the system, also in absence of lateral reflecting surfaces.

It is therefore fundamental to pay particular attention during the cleaning phases of the curtain front window, especially in environments where abrasive dusts are present. (E.g. cement factories, etc).

TROUBLESHOOTING

The indications provided by the LEDs present on the Emitter and Receiver units make it possible to trace the cause of a system malfunction.

As indicated in the “**SIGNALS**” chapter of this manual, in the case of a fault, the system is blocked and the type of fault can be identified by the LEDs present on the Emitter and Receiver units. (See the figure and tables below).

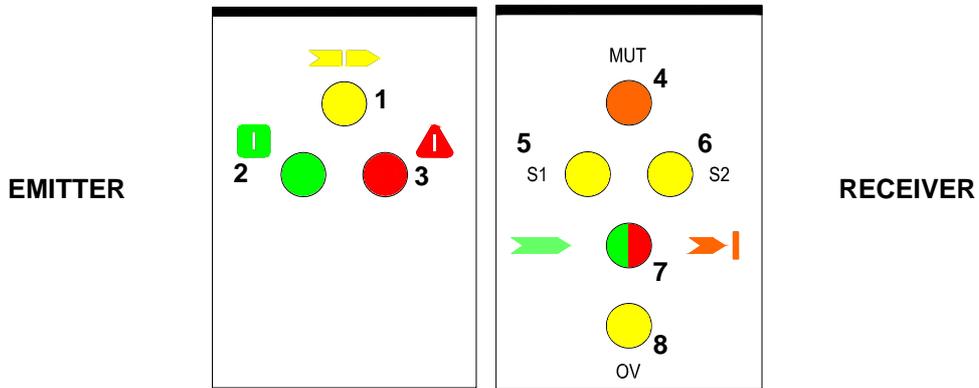


Figure 27

EMITTER - Troubleshooting

MEANING	RED (2)	GREEN (3)	YELLOW (1)	SOLUTION
Internal error	ON	OFF	Blinking	Send the equipment for repair to the REER laboratories.

RECEIVER - Troubleshooting

MEANING	SEMAPHORE (7)	OVERRIDE (8)	SENSOR1 (5)	SENSOR2 (6)	MUTING (4)	SOLUTION
	RED/ GREEN/YELLOW	YELLOW	YELLOW	YELLOW	ORANGE	
Internal fault	Quick blinking	Quick blinking	OFF	OFF	OFF	Send the equipment to ReeR laboratories for repair
A dangerous condition of interfering Emitter has been detected. The Receiver is capable of receiving the beams emitted by two different Emitters at the same time.		Quick blinking	OFF	OFF	Quick blinking	Carefully locate the disturbing Emitter and intervene in one of the two following manners: <ul style="list-style-type: none"> – Change the position of Emitter and Receiver – Move the interfering Emitter to prevent it from lighting the Receiver – Use opaque protections to shield the beams coming from the interfering Emitter

MEANING	SEMAPHORE (7)	OVERRIDE (8)	SENSOR1 (5)	SENSOR2 (6)	MUTING (4)	SOLUTION
	RED/ GREEN/YELLOW	YELLOW	YELLOW	YELLOW	ORANGE	
Fault at OSSD static outputs	Quick blinking	OFF	Quick blinking	Quick blinking	OFF	Carefully verify the connection of pins A and K (OSSD) on the connector. If necessary, re-dimension the load by reducing the requested current to a maximum of 500 mA (2,2µF)
Overload of OSSD static outputs						
Short-circuit of OSSD static outputs						
Overload of Muting light		OFF	OFF	OFF	Quick blinking	Verify the presence and the efficiency of the MUTING light.

RECEIVER - Configuration error

MEANING	SEMAPHORE (7)	OVERRIDE (8)	SENSOR1 (5)	SENSOR2 (6)	MUTING (4)	SOLUTION
	Red/ Green/Yellow	YELLOW	YELLOW	YELLOW	ORANGE	
OSSD output incorrectly connected at 24VDC	RED Quick blinking	OFF	Quick blinking	Quick blinking	OFF	Verify connections
Muting timeout incorrectly selected		OFF	Quick blinking	OFF	Quick blinking	
Incorrect connection of pin FBK_K1K2/RESTART		OFF	OFF	Quick blinking	OFF	
Incorrect connection of pin OVERRIDE		OFF	Quick blinking	OFF	OFF	

In any case, when faced with a system stoppage, switch the system off and then on again, to exclude any occasional electromagnetic disturbances.

Should the problem persist, contact REER's service department. In case of continued malfunctioning:

- make sure that the Emitter and the Receiver are correctly aligned and that the front surfaces are perfectly clean.
- verify the integrity of electrical connections and check that these have been made correctly;
- check that the supply voltage levels comply with those specified in the technical data sheet;

The light curtain power supply should be kept separate from that of the other electric power equipment (electric motors, inverters, frequency converters) or other sources of disturbance.



If it is not possible to clearly identify the malfunction and to remedy it, stop the machine and contact Reer's Assistance Service.

If correct system operation cannot be restored after carrying out the above procedures, send the equipment to REER's laboratories, complete with all parts, stating clearly:

- the product code number (the **P/N** field is shown on the product label)
- serial number (the **S/N** field is shown on the product label)
- date of purchase;
- period of operation;
- type of application;
- fault.

SPARE PARTS

MODEL	ARTICLE	CODE
AD SR0	AD SR0 Safety Relay	1330902
AD SR0A	AD SR0A Safety Relay	1330903
MXJB1	Muting junction Box	1360934
MXJB3	Muting junction Box	1360935
CD5	Straight 5-pin M12 female connector, 5 m cable	1330950
CD95	90° 5-pin M12 female connector, 5 m cable	1330951
CD15	Straight 5-pin M12 female connector, 15 m cable	1330952
CD915	90° 5-pin M12 female connector, 15 m cable	1330953
CDM9	Straight 5-pin M12 female connector PG9	1330954
CDM99	90° 5-pin M12 female connector PG9	1330955
C12D3	Straight 12-pin M16 female connector, 3 m cable	1330991
C12D5	Straight 12-pin M16 female connector, 5 m cable	1330992
C12D10	Straight 12-pin M16 female connector, 10 m cable	1330993
TR30	30mm diameter test rod	1330962
TR40	40mm diameter test rod	1330963
FB 4	Set of 4 fastening brackets	1330970
FB 6	Set of 6 fastening brackets	1330971
FI 4	Set of 4 fastening inserts	1330972
FI 6	Set of 6 fastening inserts	1330973
SFB	Set of 4 swivel fastening brackets	1330974
SAV-3	Set of 2 anti-vibration supports	1200088
SAV-4	Set of 3 anti-vibration supports	1200089

GUARANTEE

All new VISION MXL systems are guaranteed by REER for a period of 12 (twelve) months under normal working conditions, against defects due to faulty materials and workmanship. During the aforesaid period, REER promises to replace faulty parts free of charge. This guarantee covers both material and labour.

REER reserves the right to decide whether to repair equipment or replace it with equipment of the same type or having the same characteristics.

The validity of this guarantee is subject to the following conditions:

- The user must notify REER of the fault within twelve months following the date of delivery of the product.
- The equipment and all parts thereof must be in the condition in which they were supplied by REER.
- The defect or malfunction must not arise directly or indirectly from:
 - Improper use
 - Non-observance of the instructions for use;
 - Negligence, inexperience, improper maintenance;
 - Repairs, modifications and adjustments carried out by personnel not authorised by REER, tampering, etc.;
 - Accidents or collisions (also during transportation or due to acts of God);
 - Other reasons for which REER cannot be held responsible.

Repairs will be carried out at REER's laboratories, to which the material must be consigned or forwarded: transport costs and any damage or loss of material during transportation will be charged to the Customer.

All replaced products and parts are property of REER.

REER does not recognise any other form of guarantee or rights other than those expressly stated above; no requests for compensation for damages incurred for costs, suspension of activities or any other events or circumstances related in any way to malfunctioning of the product or any parts thereof will be taken into consideration.

In order to ensure the correct operation of the photoelectric light curtain, careful and full compliance with all the rules, instructions and warnings stated in this manual is essential.

REER s.p.a. declines all responsibility for events arising from non-compliance with all or part of the aforesaid instructions.

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