

INDEX

- 1. GENERAL INFORMATION 1**
 - 1.1. General description of the safety light curtain 1
 - 1.2. How to choose the device 3
 - 1.3. Typical applications 6
 - 1.4. Safety information 7
- 2. INSTALLATION MODE 8**
 - 2.1. Precautions to respect for the choice and installation of the device 8
 - 2.2. General information on device positioning 9
 - 2.2.1. *Minimum installation distance* 9
 - 2.2.2. *Minimum distance from reflecting surfaces* 10
 - 2.2.3. *Installation of several adjacent safety light curtains* 12
 - 2.2.4. *Use of deviating mirrors* 13
- 3. MECHANICAL MOUNTING 14**
 - 3.1. Mechanical arm mounting 16
- 4. ELECTRICAL CONNECTIONS 17**
 - 4.1. Notes on connections 18
- 5. ALIGNMENT PROCEDURE 23**
 - 5.1. Correct light curtain alignment procedure 23
 - 5.2. Correct Muting arm alignment procedure 25
- 6. FUNCTIONING MODE 26**
 - 6.1. Dip-switch selectable functions 26
 - 6.2. Standard configuration 26
 - 6.3. Restart mode 27
 - 6.4. Test function 29
 - 6.5. Reset function 30
 - 6.6. Muting function 31
 - 6.7. Installation mode of Muting sensors 34
 - 6.7.1. *SB4S model* 35
 - 6.7.2. *SB4L model* 38
 - 6.7.3. *SB4T model* 39
 - 6.8. Override function 40
 - 6.9. EDM function 43
- 7. DIAGNOSTIC FUNCTIONS 44**
 - 7.1. Visualisation of the functions 44
 - 7.2. Alignment mode 45
 - 7.3. Operating mode 45
 - 7.4. Fault and diagnostic messages 46
- 8. CHECKS AND PERIODICAL MAINTENANCE 48**
 - 8.1. Maintenance 48
 - 8.2. General information and useful data 49
 - 8.3. Warranty 49
- 9. TECHNICAL DATA 50**
- 10. LIST OF AVAILABLE MODELS 51**
- 11. DIMENSIONS 51**
- 12. ACCESSORIES 52**

English

1. GENERAL INFORMATION

1.1. General description of the safety light curtain

The safety light curtains of the SB4-T/L/S series, are optoelectronic multibeam devices that can be used to protect working area that, in presence of machines, robots, and automatic systems in general, can become dangerous for operators that get in touch, even accidentally, with moving parts.

The light curtains of the SB4-T/L/S series are Type 4 intrinsic safety systems used as accident-prevention protection devices and are manufactured in accordance with the international Standards in force for safety, in particular:

CEI EN 61496-1: 2004 Safety of machinery:
electro-sensitive protective
equipment. Part 1: General
requirements and tests.

CEI IEC 61496-2: 1997 Safety of machinery:
electro-sensitive protective
equipment. Particular
requirements for equipment
using active optoelectronic
protective devices.

The device, consisting in one emitting and one receiving units housed inside strong aluminium profiles, generates infrared beams that detect any opaque object positioned within the light curtain detection field.

The emitting and the receiving units are equipped with the command and control functions. The connections are made through a M12 connector located in the lower side of the profile.

The synchronisation between the emitter and the receiver takes place optically, i.e. no electrical connection between the two units is required.

The microprocessors guarantee the check and the management of the beams that are sent and received through the units: the microprocessors – through some LEDs – inform the operator about the general conditions of the light curtain and about eventual faults (see section 7 “Diagnostic functions”).

During installation, two yellow LEDs facilitate the alignment of both units (see section 5 “Alignment procedures”).
As soon as an object, a limb or the operator’s body accidentally interrupts the beams sent by the emitter, the receiver immediately opens the OSSD output and blocks the machine (if correctly connected to the OSSD).

Note: *The following abbreviations, defined by the standards in force, will be used in this manual:*

AOPD	Active opto-electronic protective device
ESPE	Electro-sensible protective equipment
OSSD	Output signal switching device (switching output)
TX	Emitting device
RX	Receiving device
EDM	External device monitoring

Some parts or sections of this manual containing important information for the operator are preceded by a note:



Notes and detailed descriptions about particular characteristics of the safety devices in order to better explain their functioning; special instructions regarding the installation process.



The information provided in the paragraphs following this symbol is very important for safety and may prevent accidents.
Always read this information accurately and carefully follow the advice to the letter.

This manual contains all the information necessary for the selection and operation of the safety devices.
However, specialised knowledge not included in this technical description is required for the planning and implementation of a safety light curtain on a power-driven machine.
As the required knowledge may not be completely included in this manual, we suggest the customer to contact **CARLO GAVAZZI** Sales Technical Service for any necessary information relative to the functioning of the SB4-T/L/S series light curtains and the safety rules that regulate the correct installation (see section 8 “Checks and periodical maintenance”).

1.2. How to choose the device

The SB4-T/L/S series light curtains efficiently satisfy all applications that require the Muting function thanks to pre-assembled, pre-cabled and pre-aligned Muting sensors.

T-shaped models are available with integrated Muting sensors for bidirectional Muting, L-shaped models for unidirectional Muting and linear models without integrated Muting sensors are available.

The integrated Muting solution with “L” configuration facilitates sensor installation and suits applications requiring one-way object passage direction.

The integrated Muting solution with “T” configuration facilitates sensor installation and is ideal for applications requiring a bidirectional object passage movement.

The linear models, presenting a specific connector allowing easy connection of the Muting sensors, is recommended for difficult or particular applications.

Sensor positioning has to be carried out by the operator, respecting the precautions listed in the following chapters.

There are at least three different main characteristics that should be considered when choosing a safety light curtain:



- **The resolution** strictly depending on the part of the body to be protected.

The resolution of the device is the minimum dimension, which an opaque object must have in order to obscure at least one of the beams that constitute the sensitive area.

As shown in Fig.1, the resolution only depends on the geometrical characteristics of the lenses, diameter and distance between centres, and is independent of any environmental and operating conditions of the safety light curtain.

The resolution value is obtained applying the following formula:

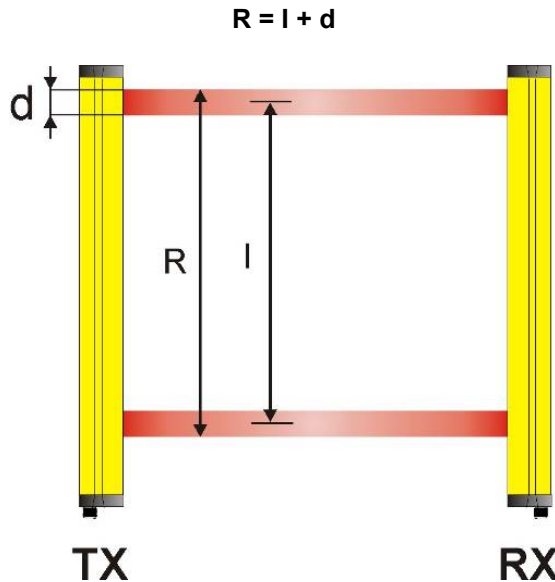


Fig. 1

The following table shows the values of the optic interaxis (I), the resolution (R) and the optic diameter (d), of the safety light curtains.

Model	Optic interaxis mm (I)	N°. optics (n)	Resolution mm (R)	Optics Ø mm (d)	Operating distance m
SB4T-515/515-D3	500	2	515	16	3
SB4T-415/815-D3	400	3	415	16	3
SB4L-515/515-D3	500	2	515	16	3
SB4L-415/815-D3	400	3	415	16	3
SB4S-515/515-D25	500	2	515	16	25
SB4S-415/815-D25	400	3	415	16	25

Note: Safety light curtains for body protection with sensitive area heights and optic interaxis different from the standard versions can be manufactured upon specific request.

• **The height of the protected area**

It is important to distinguish between “Height of the sensitive area” and “Height of the controlled area” (see Fig.2).

- The height of the sensitive area is the distance between the lower and the upper limits respectively of the first and the last lens.
- The height of the controlled area is the effectively protected area; it delimits the area where an opaque object with larger or equal dimensions respect to the resolution of the safety light curtain may certainly cause the interruption of a beam.

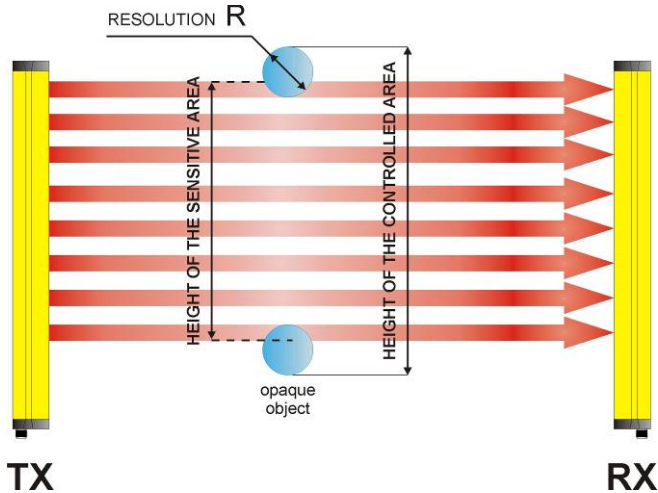


Fig. 2

• **The safety distance**

It is important to carefully calculate the distance between the point where the safety device will be placed and the possible danger associated with the machine to be protected (see section 2 “*Installation mode*” for the calculation of the safety distance).

1.3. Typical applications

The safety light curtains of the SB4-T/L/S series are used in all automation fields where control and protection of the access to dangerous zones is necessary, as well as allowing, by means of the Muting function, material passage inside a dangerous zone during working.

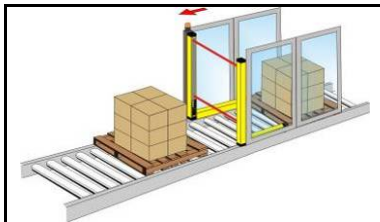
In particular they are used to stop the moving mechanical parts in:

- Palletisers / depalletisers;
- Packaging machines, handling machines, storing machines;
- Automatic and semi-automatic assembly lines;
- Automatic warehouses;
- Robotics.

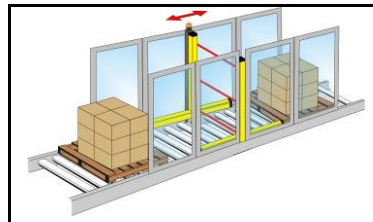


In food industry applications, **CARLO GAVAZZI** Technical Service has to verify the compatibility of the material of the safety light curtain housing with any chemical agents used in the production process.

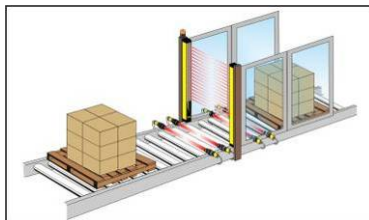
The following pictures show some main applications.



L-shaped version with integrated Muting sensors for unidirectional Muting



T-shaped version with integrated Muting sensors for bidirectional Muting



Linear version with external Muting sensors

1.4. Safety information



The following points must be observed for a correct and safe use of the safety light curtains of the SB4-T/L/S series:

- The stopping system of the machine must be electrically controlled.
- This control system must be able to instantly stop the dangerous movement of the machine during all the phases of the working cycle.
- Mounting and connection of the safety light curtain must only be carried-out by qualified personnel, according to the indications included in the special sections (refer to sections 2; 3; 4; 5; 6).
- The safety light curtain must be securely placed in a particular position so that access to the danger zone is not possible without the interruption of the beams (see section 2 "*Installation mode*").
- The personnel operating in the dangerous area must be well trained and must have adequate knowledge of all the operating procedures of the safety light curtain.
- The TEST/START button must be located outside the protected area because the operator must check the protected area during all the Test, Override and Reset operations.
- The external signalling lamp of the active Muting must be visible from all operating sides.
- Please carefully respect the mounting instructions for the correct functioning of the Muting devices.
- The function of the external device monitoring (EDM) is active only if the specific wire is correctly connected to the device. Please carefully read the instructions for the correct functioning before powering the light curtain.

2 INSTALLATION MODE

2.1. Precautions to respect for the choice and installation of the device



- Make sure that the protection level assured by the (Type 4) is compatible with the real danger level of the machine to be controlled, according to EN 954-1.

- The outputs (OSSD) of the ESPE must be used as machine stopping devices and not as command devices.

The machine must have its own START command.

- The dimension of the smallest object to be detected must be larger than the resolution level of the ESPE.
- The ESPE must be installed respecting the technical characteristics indicated in section 9.
- Do not place the device, in particular the receiving unit, near intense light sources.
- Strong electromagnetic interferences can compromise the correct functioning of the device. **CARLO GAVAZZI** suggests contacting its own Technical Service when this problem occurs.

The operating distance of the device can be reduced by 50% in the presence of smog, fog or airborne dust.

- A sudden change in environment temperature, with very low minimum peaks, can generate a small condensation layer on the lenses and so jeopardise functioning.
- The Muting function is signalled by a specific Muting signalling lamp. Ensure that the signalling device has sufficient lighting and visibly positioned near the dangerous zone.
- Ensure to correctly use Muting sensors as described in the instructions supplied hereinafter.

Avoid incongruent connections that cannot be controlled and thus excluding undesired potentially dangerous activations.

2.2. General information on device positioning

2.2.1. Minimum installation distance

The safety device must be placed at a specific safety distance (Fig.3). This distance must ensure that the danger zone cannot be reached before the dangerous motion of the machine has been stopped by the ESPE.

The safety distance depends on 4 factors, according to the EN-999, 775 and 294 Standards:

- 1 Response time of the ESPE (the time between the effective beam interruption and the opening of the OSSD contacts).
- 2 Machine stopping time (the time between the effective opening of the contacts of the ESPE and the real stop of the dangerous movement of the machine).
- 3 ESPE resolution.
- 4 Approaching speed of the object to be detected.

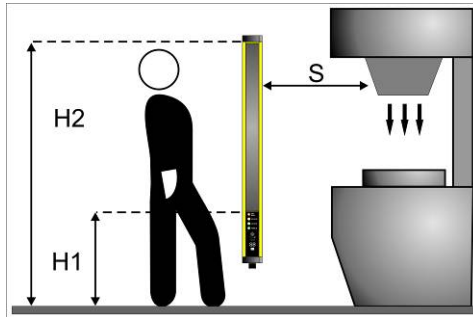


Fig. 3

The following formula is used for the calculation of the safety distance:

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

where:

- S** = Minimum safety distance in mm.
- K** = Speed of the object, limb or body approaching the dangerous area in mm/sec.
- t₁** = Response time of the ESPE in seconds (see section 9 "Technical data")
- t₂** = Machine stopping time in seconds.
- d** = Resolution of the system.
- C** = 850 mm for device with resolution > 40mm.

Note: The value of K is:
2000 mm/s if the calculated value of S is \leq 500 mm
1600 mm/s if the calculated value of S is $>$ 500 mm

When devices with >40 mm resolution are used, the height of the top beam has to be ≥ 900 mm (H2) while the height of the bottom beam has to be ≤ 300 mm (H1).

2.2.2. Minimum distance from reflecting surfaces

Reflecting surfaces placed near the light beams of the SB4-T/L/S device (over, under or laterally) can cause passive reflections. These reflections can compromise the recognition of an object inside the controlled area (see Fig.4). However, if the **RX** receiver detects a secondary beam (reflected by the side-reflecting surface) the object might not be detected, even if the object interrupts the main beam.

English

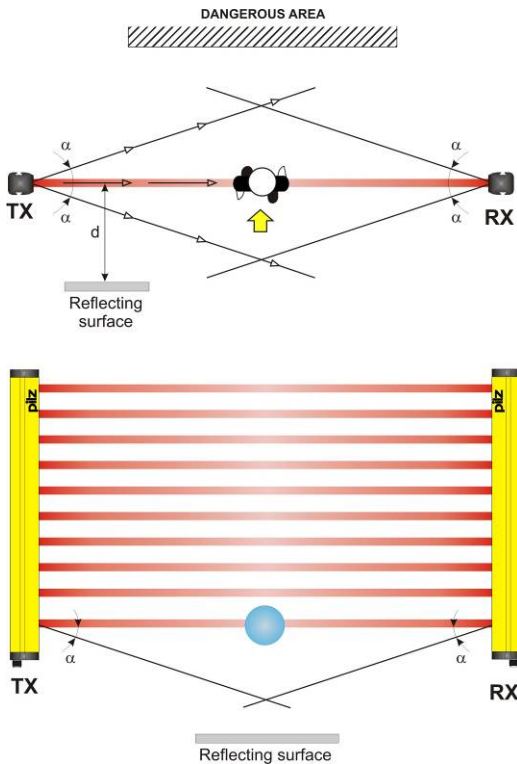


Fig. 4

It is thus important to position the safety light curtain according to the minimum distance from reflecting surfaces. The minimum distance depends on:

- Operating distance between emitter (TX) and receiver (RX);
- Maximum aperture angle of the light beam emitted by the safety light curtain, depending on the type of the device; in particular:
 - 5° for ESPE type 4 ($\pm 2.5^\circ$ as to the optic axis)

The graphic in Fig.5 shows the data of the minimum distance.

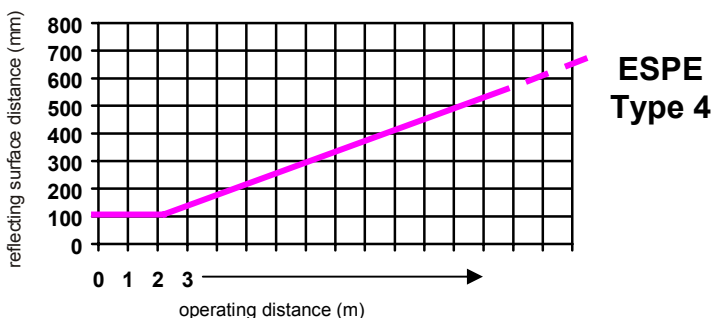


Fig. 5

Particularly:

$d \geq 100$ mm for operating distance $0.5 \div 3$ m.

$d \geq 100$ mm + $40 \times$ [operating distance (m) - 3] for operating distance ≥ 3 m.

2.2.3. *Installation of several adjacent safety light curtains*

When several safety devices must be installed in adjacent areas, interferences between the emitter of one device and the receiver of the other must be avoided.

Fig.6 provides an example of possible interferences between different devices and two pertinent solutions.

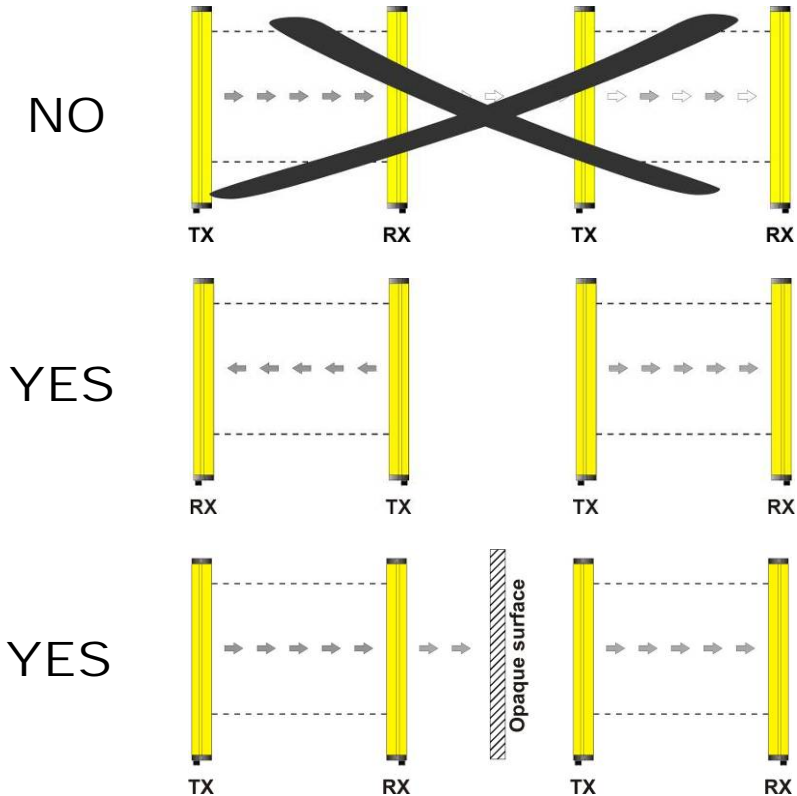


Fig. 6

English

2.2.4. Use of deviating mirrors

The control of any dangerous area, with several but adjacent access sides, is possible using the linear version without integrated Muting sensors and well-positioned deviating mirrors (see section 12 “Accessories”).

Fig.7 shows a possible solution to control three different access sides, using two mirrors placed at a 45° angle respect to the beams.

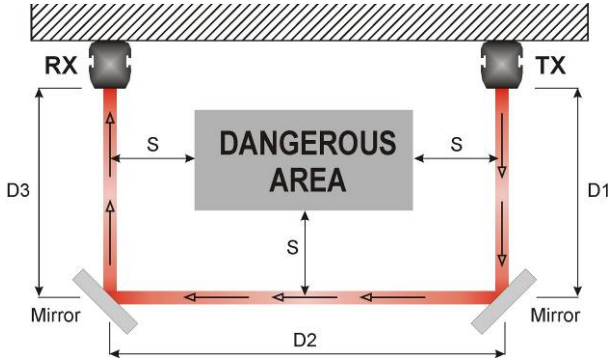


Fig. 7

The operator must respect the following precautions when using the deviating mirrors:

- The alignment of the emitter and the receiver can be a very critical operation when deviating mirrors are used. Even a very small angular displacement of the mirror is enough to loose alignment. A laser pointer (available as an accessory) can be used to avoid this problem.
- The minimum safety distance (S) must be respected for each single section of the beams.
- The effective operating range decreases by about 15% by using only one deviating mirror, the percentage further decreases by using 2 or more mirrors (for more details make refer to the technical specifications of the mirrors used).
- Do not use more than three mirrors for each device.
- The presence of dust or dirt on the reflecting surface of the mirror causes a drastic reduction in the range.

3. MECHANICAL MOUNTING

The emitting (TX) and receiving (RX) bars must be installed with the relevant sensitive surfaces facing each other. The connectors must be positioned on the same side and the distance must be included within the operating range of the model used (see *section 9 "Technical data"*).

Once positioned the two units, the two bars should be aligned and parallel as much as possible.

The next step, if necessary, is the fine alignment, as shown in section 5 "*Alignment procedures*".

To mount the device, use the threaded pins supplied, inserting them into the slots on the two bars (Fig.8 and Fig.9).

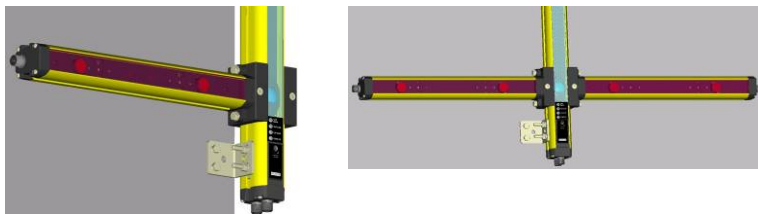
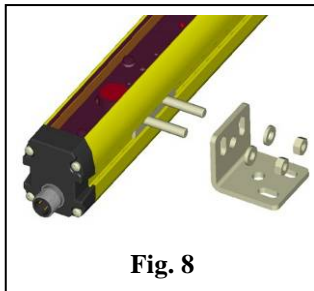


Fig.9

In presence of strong vibrations fixing brackets for the Muting arms mounting are compulsory (Fig.10).

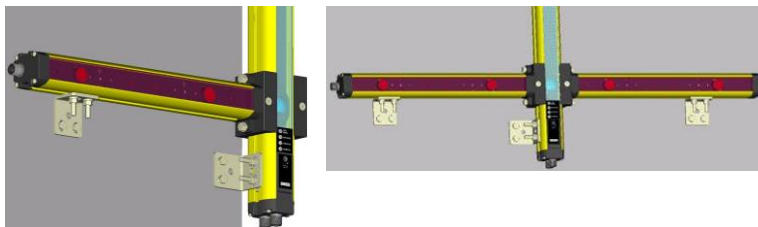


Fig.10

Fixing brackets can be used where no large mechanical compensation is required during the alignment operation.

The rotating supports for the correction of the bar inclination are available on request (see section 12 “Accessories”).

In case of applications with particularly strong vibrations, anti-vibration shock absorbers, together with threaded pins, rigid brackets and/or rotating supports, are recommended to reduce the impact of the vibrations,

The recommended mounting positions according to the safety light curtain length are shown in the following drawings and table:



MODEL	L (mm)	A (mm)	B (mm)
SB4T-515/515-D3	642	342	150
SB4T-415/815-D3	942	542	200
SB4L-515/515-D3	642	342	150
SB4L-415/815-D3	942	542	200
SB4S-515/515-D25	642	342	150
SB4S-415/815-D25	942	542	200

3.1. Mechanical arm mounting

To mount the Muting arms on both the “L” and “T” version, use the fixing bracket shown in Fig. 11a.

This accessory guarantees the perfect alignment of the arms and the perpendicularity respect to the main unit.

Position the bracket on the main unit, after having mounted the arm or arms, as shown in Fig. 11b.

Verify the correct functioning position and block the group using the two plates and the screws and tightening them with a CH.2.5 allen key (Fig.11c).

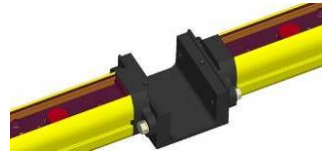


Fig.11a



Fig.11b



The following aspects have to be considered during the mechanical arm mounting for the “L” and “T” light curtain models:

- Mount the arm with the active Muting sensors on the receiving unit and the arms with the reflectors on the emitting unit.
- In the “L” version mount the arms in order to intercept the object before entering in the light curtain sensitive area.
- The two arms have to be mounted in order to be the most parallel and aligned possible. The sensors have default alignment, but the rotation around the main arm can be further adjusted by regulating the specific fixing bracket.
- In critical applications due to the presence of strong vibrations, the arms have to be fixed using the specific fixing brackets (Fig.11).
- The use of arms for the Muting function limits the maximum operating distance to 3 meters.
- The Muting arms can be adjusted vertically according to the application and to the connecting cable lengths (typical range is 14 cm).

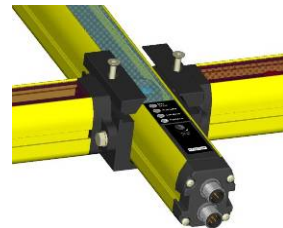


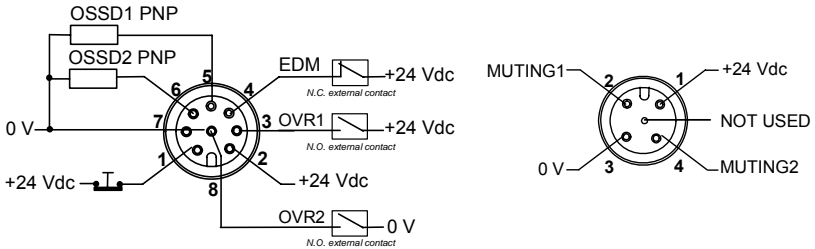
Fig.11c

4. ELECTRICAL CONNECTIONS

All electrical connections to the emitting and receiving units are made through a male M12 connector, located on the lower part of the safety light curtain.

A M12 8-pole connector is used for the receiver, a M12 5-pole connector for the Muting sensors and a M12 4-pole connector for the emitter.

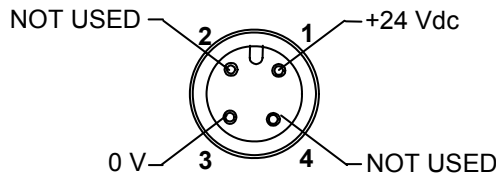
RECEIVER (RX):



- 1 = white = TEST/START
- 2 = brown = +24 Vdc
- 3 = green = OVERRIDE 1
- 4 = when = EDM
- 5 = grey = OSSD1
- 6 = pink = OSSD2
- 7 = blue = 0 V
- 8 = red = OVERRIDE 2

- 1 = brown = +24 Vdc
- 2 = white = MUTING1
- 3 = blue = 0 V
- 4 = black = MUTING2
- 5 = grey = NOT USED

EMITTER (TX):



- 1 = brown = +24 Vdc
- 2 = white = NOT USED
- 3 = blue = 0 V
- 4 = black = NOT USED

4.1. Notes on connections

For the correct functioning of the safety light curtains of the SB4-T/L/S series, the following precautions regarding the electrical connections have to be respected.



- Use only shielded cables for the connection of the two units.
- The light curtain has been developed to offer an adequate immunity level against disturbances in the most critical working conditions.
- It is possible to connect to ground the device housing using the mechanical part supplied for ground connection (refer to configuration illustrated in Fig.12).

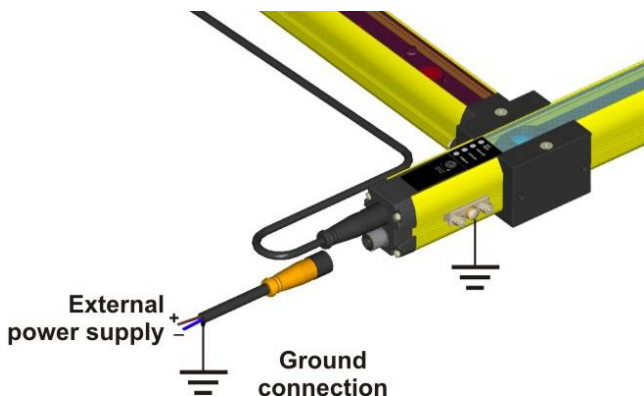



Fig. 12

- Do not place connection cables in contact or near high-voltage cables (e.g. motor power supplies, inverters, etc.);
- Do not connect in the same multi-pole cable the OSSD wires of different light curtains;
- The TEST/START wire must be connected through a N.C. button to the supply voltage of the ESPE. A daily manual test is necessary to verify the correct functioning of the safety light curtain. Push the specific button to activate the test.

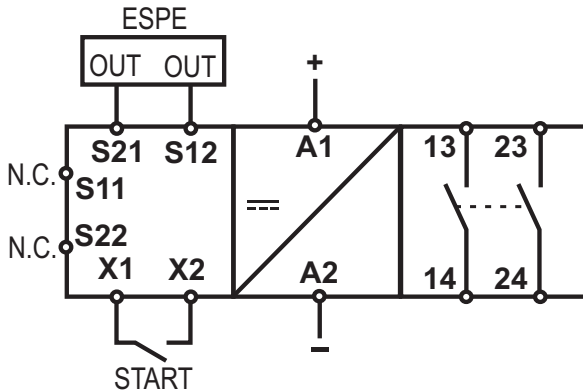


- The TEST/START button must be located in such a way that the operator can check the protected area during any Test, Override and Reset operation. (see section 6 “*Functioning mode*”).
- The EDM wire has to be connected to a 24 Vdc normally closed contact, before powering. The monitoring function, if selected, is not activated if at powering the wire is not correctly connected; in this case the light curtain enters in a failure condition.
- The Muting function is activated only if the wires are connected to the sensors, as thus is enable di Mutino lamp integrated on Rx side.
- The device is already equipped with internal overvoltage and overcurrent suppression devices. The use of other external components is allowed but not recommended.
Read the “Functioning mode” section 6 relative to the Muting function, its use and the positioning of the activating sensors.

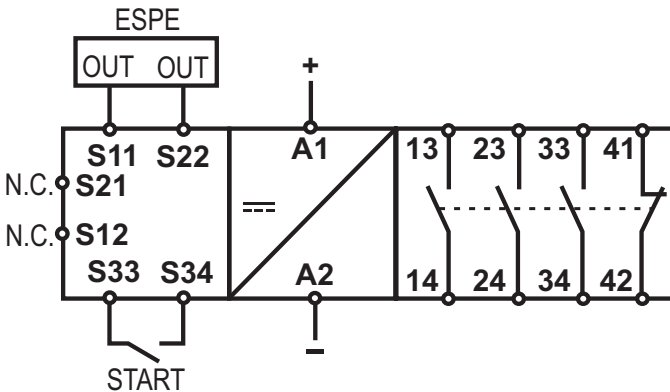
 To use the SB*2 series together with the light curtain safety modules NLG02 and NLG13, connect the PNP outputs of the ESPE to the terminals S21 and S12 (NLG02) or S11 and S22 (NLG13). The module, 24 VDC supplied, can be activated at the start and after every intervention of the safety function, in manual mode through the reset button (to be connected in series to the N.C. external contactors), or in automatic mode (by short-circuiting X1-X2 for NLG02 or S33-S34 for NLG13).

For more connecting details between the safety light curtain SB*2 series and the NLG02 and NLG13 modules, please refer to the relevant instruction manuals.

NLG02



NLG13



English

The ground connection of the two units depends on the electrical protection class to be guaranteed (see section 9 “Technical Data” for more information).

This connection can be carried-out using the mechanical part supplied for ground connection (see Fig. 13).

Insert the support plate (M4x0.7 mm threaded holes) in one of the two slots visible laterally on the profile.

The two pins (M4x14) have to be screwed on the external support hole, leaving the central hole free.

We suggest to screw the pins using a couple included between 2.2 and 2.5 Nm.

The Couple guarantees that the pin head passes through the paint allowing the contact with the metal housing.

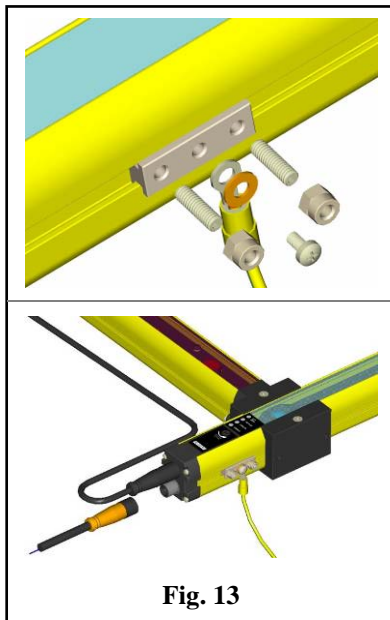


Fig. 13

Block the pins using the two M4 self-fixing nuts.

The nuts have to be tightened using a hexagonal CH.7 wrench.

The nuts avoid the unscrewing of the pins in presence of strong vibrations.

Insert the M4 ring and screw it on the central support hole.



- The OSSD1 and OSSD2 safety contacts cannot be connected in series or in parallel, but can be used separately (Fig.14). If one of these configurations is erroneously used, the device enters into the output failure condition (see cap.7 “Diagnostic functions”).



- Connect both OSSD to the activating device.
- The avoided connection of an OSSD to the activating device jeopardises the system safety degree that the light curtain has to control.

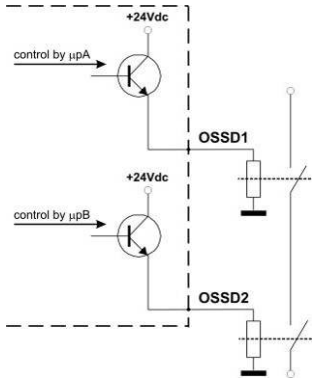


Fig. 14

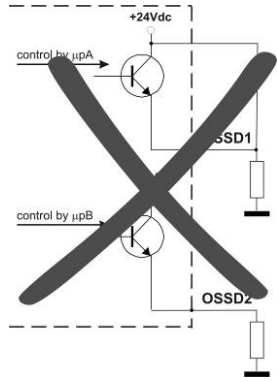


Fig. 15

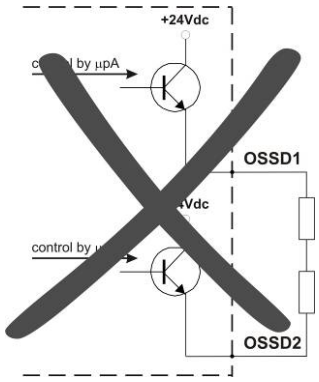


Fig. 16

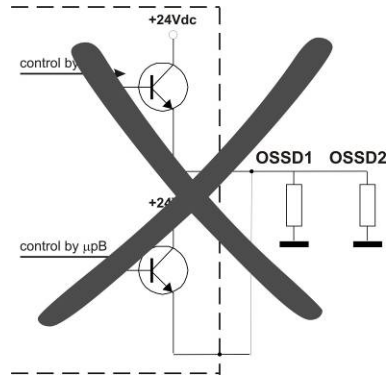


Fig. 17

English

5. ALIGNMENT PROCEDURE

The alignment between the emitting and the receiving units is necessary to obtain the correct functioning of the light curtain.

The alignment is perfect if the optic axes of the first and the last emitting unit's beams coincide with the optic axes of the corresponding elements of the receiving unit. Two yellow LED indicators (HIGH ALIGN, LOW ALIGN) facilitate the alignment procedure.

5.1. Correct light curtain alignment procedure

When the mechanical installation and the electrical connections have been effected – as explained in the previous paragraphs – it is possible to carry-out the alignment of the safety light curtain, according to the following procedure:

- Disconnect the power supply.
- Press the TEST/START button and keep it pressed (open the contact).
- Re-connect the power supply.
- Release the TEST/START button.
- Check the green LED on the bottom of the TX unit (POWER ON) and the yellow LED (SAFE); if they are ON, the unit is running correctly.
- Verify that one of the following conditions is present on the RX unit:
 1. The green LED on the bottom is ON (POWER ON) and the light of the SAFE/BREAK LED on the top is red (BREAK): non-alignment condition.
 2. The green LED on the bottom is ON (POWER ON) and the light of the SAFE/BREAK LED on the top is green (SAFE): alignment condition (in this case also the two intermediate yellow LED HIGH ALIGN, LOW ALIGN, are ON).
- Continue with the following steps to change from condition 1 to condition 2:
 - A** Keep the receiving unit in a steady position and set the transmission unit until the yellow LED on the bottom (LOW ALIGN) is ON. This condition shows the effective alignment of the first lower beam.

- B** Rotate the transmission unit until the upper yellow LED (HIGH ALIGN) is ON: in this condition the upper LED must change from BREAK to SAFE (from red to green).

Note: Ensure that the green light of the SAFE LED is ON and steady.

- C** Delimit the area in which the SAFE LED is steady through some micro adjustments - for the first and then for the second unit - then place both units in the centre of this area.
- Fix the two units firmly using pins and brackets.
 - Disconnect the power supply.
 - Re-connect the power supply.
 - Verify that the green LED is ON on the RX unit (condition where the beams are free, SAFE) and verify that the same LED turns red if even one single beam is obscured (condition where an object has been detected, BREAK).

5.2. Correct Muting arm alignment procedure

Once effected the safety light curtain alignment and the mechanical arm mounting and the relative connection, ensure the correct alignment of the arm sensors regulating the fixing bracket.

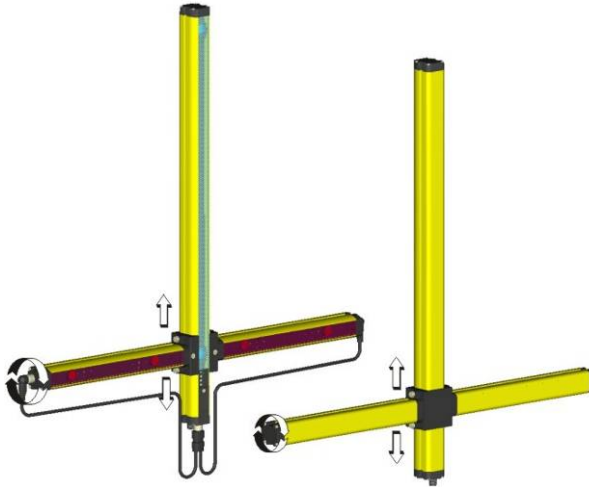


Fig.18

The arm position can be modified vertically and horizontally respect to the main axis.



Carefully avoid precarious alignment, controlling the status of the signalling LED, positioned on the active arms.

Optimal alignment is reached when all signalling LEDs are OFF.

6. FUNCTIONING MODE

6.1. Dip-switch selectable functions

A slot situated in the front side of the RX unit (Fig. 19), that can be easily opened using a screwdriver, facilitates the access to the internal dip-switches for the configuration of the following functions:

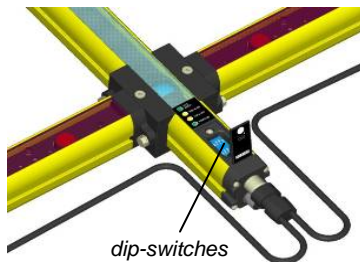




Fig. 19

dip-sw	Function	ON	OFF
1	Muting time-out	10 min.	∞
2	Muting	T config. (4 beams)	L config. (2 beams)
3	EDM	Deactivated	Activated
4	Reset	Automatic	Manual

 **Muting time-out “ ∞ ” does not comply with the requirements of IEC 61496-1. Therefore all possible risks must be considered and related precautions undertaken before selecting the “ ∞ ” option.**

 The device does not accept configuration changes during normal functioning. A change is accepted only beginning from the successive powering of the device. Particular attention has to be taken during the configuration dip-switch management and use.

Note: For the SB4-T/L/S devices the top and bottom dip-switches must be configured in the same manner.

6.2. Standard configuration

The device is supplied with the following standard configuration:

- Muting time-out = 10 min
- Muting in the T configuration (4 beams)
- EDM deactivated
- Automatic Reset

Note: The Muting function can be activated only if the Muting1 and Muting2 inputs and the Muting lamp are correctly operating. The EDM function can be activated only if the specific input is correctly connected to the appropriate device. For further details of these functions see sections 6.3 and 6.4.

Note: When “L” configuration model is used, is strictly necessary to set dip-switch 2 in OFF position.

6.3. Restart mode

An opaque object detected by the beams causes the switching of the OSSD outputs (i.e. the opening of the safety contacts - BREAK condition).

The restart of the ESPE (i.e. the closing of the OSSD safety contacts - SAFE condition) can be carried-out in two different ways:

- **Automatic Restart:** when an opaque object is detected, the ESPE enters in the BREAK condition. Then, after the opaque object has been removed from the controlled area, the ESPE begins its normal functioning again.
- **Manual Restart:** after the ESPE has detected an opaque object in the controlled area, the light curtain begins its normal functioning again only by pressing the Restart button (TEST button) and after the object has been removed from the controlled area.

Temporal diagram (Manual Restart)

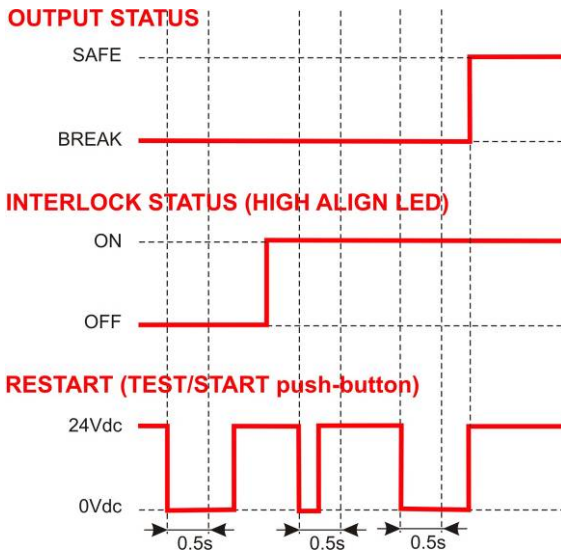


Fig.20 below shows the two functioning modes.

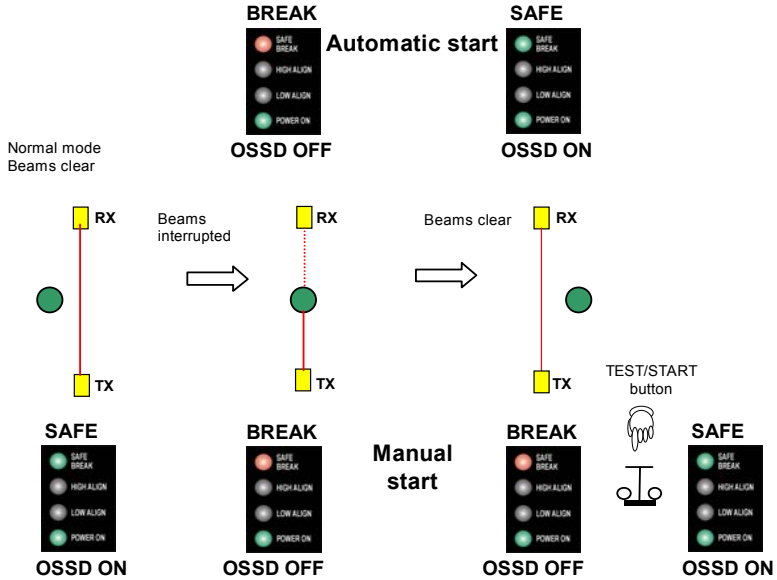
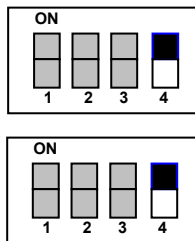


Fig.20

The selection of the manual/automatic Restart mode is made through the dip-switches placed under the slot of the receiving unit.

In particular, the position 4 of both switches must be ON to activate the automatic Restart mode; OFF for the manual Restart mode.



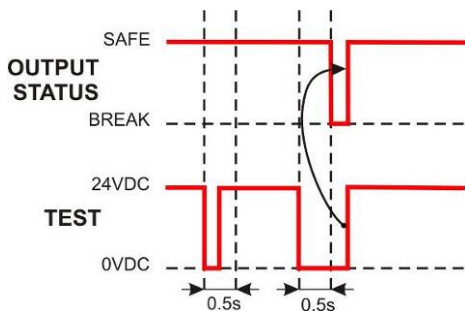
Note: The dip-switches not used for this function are in grey. The lever position of the specific dip-switch is in black (ON) in the automatic Restart mode.

English

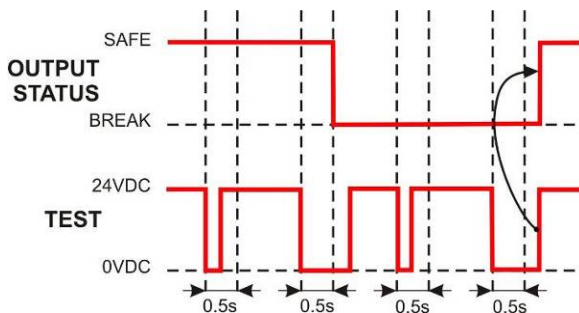
6.4. Test function

The TEST function can be activated by simply pressing the external push-button for at least 0.5 seconds as shown in the following timing diagram. In the previous versions, no timing requirements were specified.

AUTOMATIC VERSION



MANUAL VERSION



6.5. Reset function

The light curtain has a Reset function that is activated in presence of an internal failure.

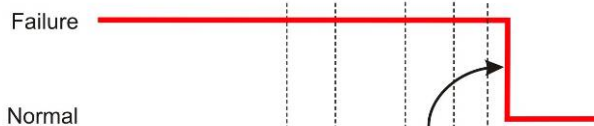
The operator has to press the TEST/START button resetting the break condition and thus return to normal functioning.

The button has to be kept pressed for at least 5 seconds in one of the following conditions:

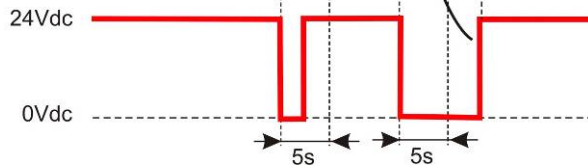
- *output failure;*
- *optic failure;*
- *failure of the Muting signalling device;*
- *failure of EDM test function.*

Temporal diagram of the Reset function

Safety light curtain status



TEST/START push-button

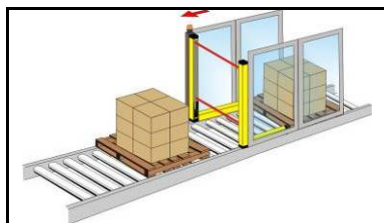


6.6. Muting function

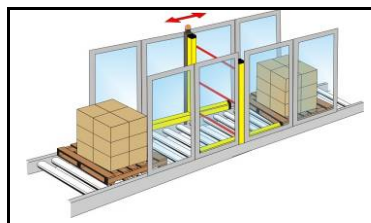
The Muting sensors must be able to recognise the passing material (pallets, vehicles, ...) according to the material's length and speed.

In case of different transport speeds in the Muting area, it is necessary to consider their effect on the total Muting duration.

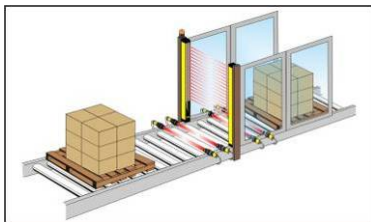
- The Muting function, excludes the light curtain during functioning, maintaining active the OSSD outputs, according to particular operating requirements (Fig.21).



L-shaped version with integrated Muting sensors for unidirectional Muting



T-shaped version with integrated Muting sensors for bidirectional Muting



Linear version with external Muting sensors

Fig. 21

- The safety light curtain is equipped with two inputs (Muting1 and Muting2) for the activation of this function, according to the Standards in force.
- This function is particularly suitable when an object, but not a person, has to pass through the dangerous area, under certain conditions.
- It is important to remember that the Muting function represents a forced system condition and therefore has to be used with the necessary precautions.



- Two Muting sensors activate the Muting1 and Muting 2 inputs. These two sensors should be correctly connected and positioned in order to avoid undesired Muting or potentially dangerous conditions for the operator.
- State of Muting is signalled by Muting Lamp integrated on the top of receiver side.
- During the installation take care to place the Muting Lamp in as visible as possible position.
- If the Muting lamp is broken, the ESPE is blocked. If the Muting lamp is not connected, the Muting or Override request causes the opening of the safety contacts and the device is blocked and the Muting lamp failure is signalled (see 7.4 “Fault and diagnostic messages”).
- Fig. 22 shows an example of Muting functioning:



English

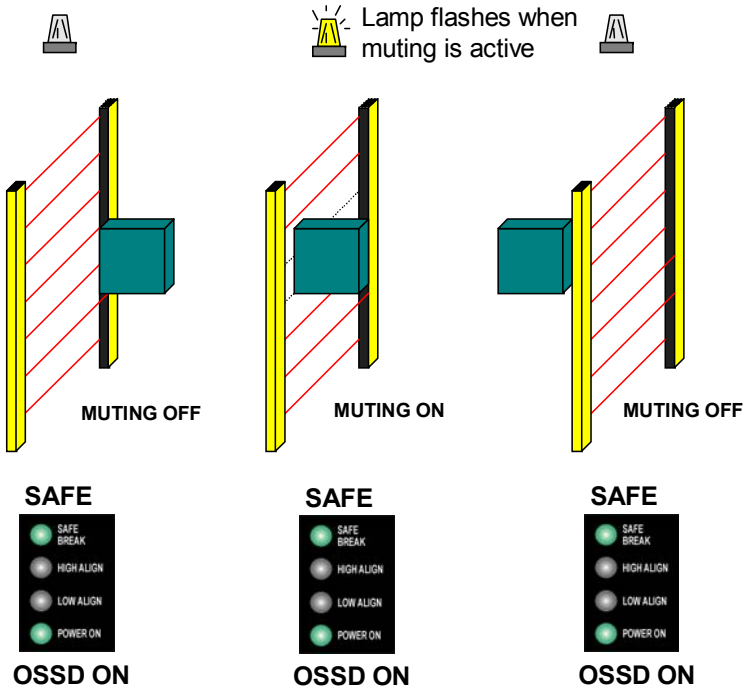
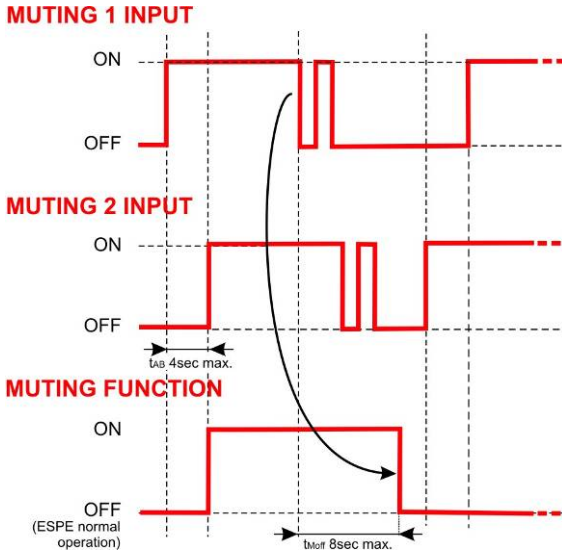
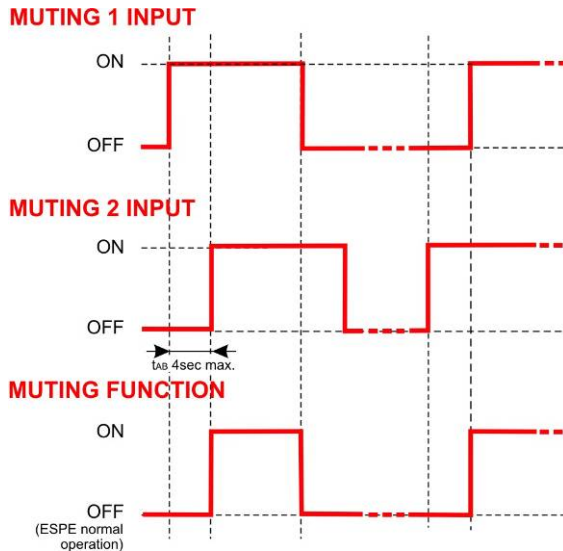


Fig. 22

Temporal diagram of the Muting function for two-sensor configuration ("L-shaped" or crossed-beam versions)



Temporal diagram of the Muting function for four-sensor configuration ("T-shaped" version)



6.7. Installation mode of Muting sensors

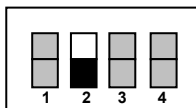
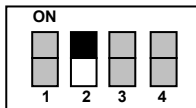


The safety light curtains of the SB4-T/L/S series have a dip-switch dedicated to the Muting configuration selection.

The requested configuration is obtained using the dip-switches n° 2 present on the receiving unit.

With Dip 2 in the ON position, the “T” configuration (4 sensors) is selected.

With Dip 2 in the OFF position, the “L” configuration (2 sensor) is selected.



Select carefully the configuration, as a wrong configuration can cause the incorrect functioning of the Muting function and a reduction of the safety level.

- The Muting sensors must be positioned in such a way that the activation of the Muting function is not possible with the accidental passing of a person.



- The Muting request can be performed in 2 manners:
 - activating the two Muting inputs contemporarily;
 - activating the Muting1 first and then the Muting2, or viceversa.

If the activations occur in sequence, the second activation should occur within 4 sec. after the first; otherwise the Muting will not be activated.

Any Muting request can not be made if the ESPE is in the BREAK condition (red LED is ON and the beams are interrupted).

6.7.1. SB4S model

Fig.23 provides an installation example of a linear light curtain mounted on a conveyor, with the relative external Muting sensors. The A1, A2, B1, B2 Muting activation sensors temporarily inhibit the ESPE if a package passes between the sensors. The outputs of these sensors are connected to the Muting1 and Muting2 inputs of the receiving unit of the ESPE. The contacts of these sensors are controlled by the receiving unit.

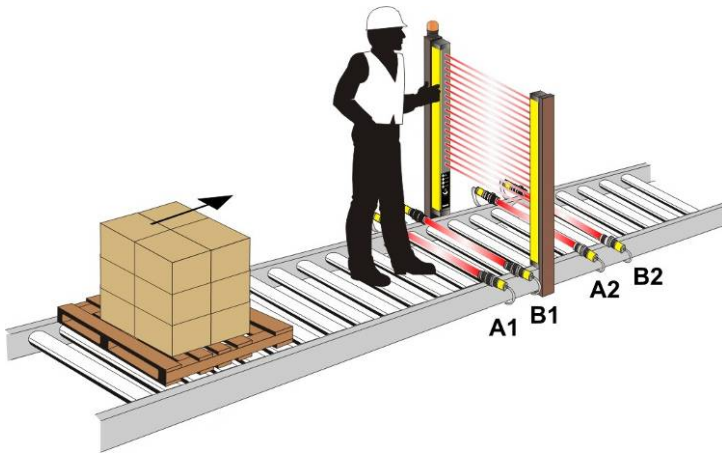


Fig. 23

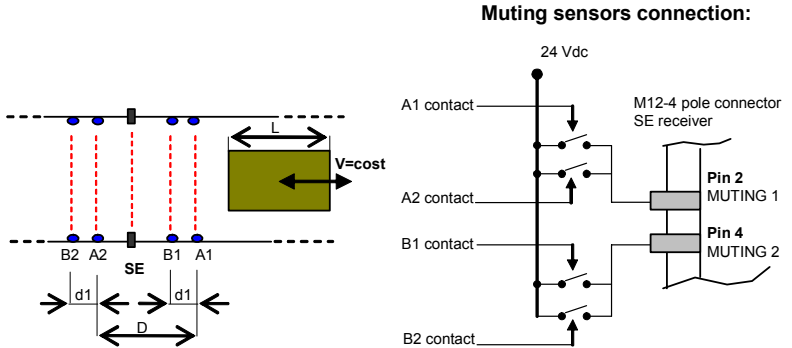
Optoelectronic, mechanical, proximity sensors etc, can be used as Muting sensors, with closed contact in the presence of the object to be detected.

The following are some configuration examples when using the Muting function:

- **Application with 4 optoelectronic sensors: parallel-beam configuration**

The solution is suitable for applications requiring bidirectional movements of objects.

For correct functioning, position the dip-switches 2 in the ON position.



Symbol	Unit	Formula	Min	Typ	Max	Description
D	cm		L			Interaxis between sensors connected to the same Muting input
d ₁	cm	= V * t _{AB} * 100	0.1			Interaxis between sensor A and sensor B
t _{AB}	sec	Compulsory condition	0		4	Activation time of the second sensor after first sensor activation (A→B) (B→A)
D _{OA}	cm		d ₁ + D			Distance to respect between adjacent objects to obtain the correct Muting functioning
L	cm		D			Object dimension to activate the Muting function passing between the sensors
V	cm/sec	= d ₁ / t _{AB}			250 (suggested)	Object speed to activate the Muting function passing between the sensors

English

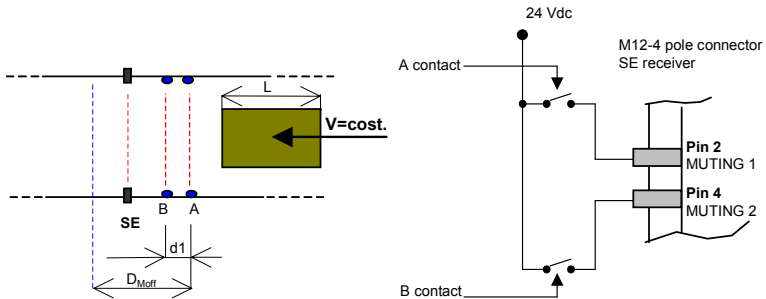
- Application with 2 optoelectronic sensors: parallel-beam configuration

The solution is suitable for applications requiring unidirectional movements of objects.

For correct functioning, position the dip-switch 2 in the OFF position.

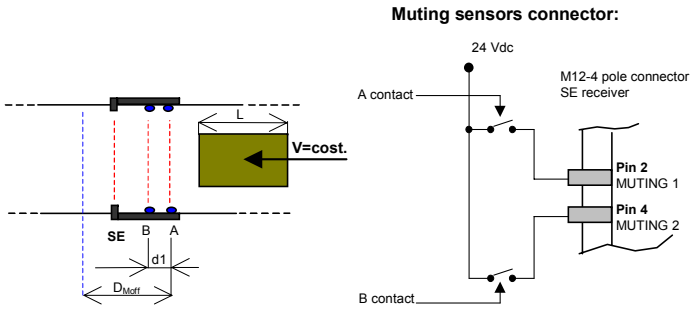
The reset of normal Muting functioning is obtained at a D_{Moff} distance from sensor A.

Muting sensors connection:



Symbol	Unit	Formula	Min	Typ	Max	Description
D ₁	cm	$= V * t_{AB} * 100$	0.1			Interaxis between sensor A and sensor B
D _{Moff}	cm	Compulsory condition		33		Distance from sensor A at which the Muting function is deactivated and the light curtain returns to normal functioning
t _{AB}	sec	Compulsory condition	0		4	Activation time of the second sensor after first sensor activation (A→B)
t _{Moff}	sec	$= D_{Moff} / V$	0.132 <i>(at max. suggested speed)</i>		8	Time period, referred to sensor A, after which the Muting function is deactivated and the light curtain returns to normal functioning
D _{oA}	cm	$= D_{Moff}$	33			Distance to respect between adjacent objects to obtain the correct Muting functioning
L	cm		d ₁			Object dimension to activate the Muting function passing between the sensors
V	cm/sec	$= d_1 / t_{AB}$	4.125		250 <i>(suggested)</i>	Object speed to activate the Muting function passing between the sensors

6.7.2. SB4L model



The L-configured solution with integrated Muting facilitates sensor installation and suits applications with unidirectional object passage.

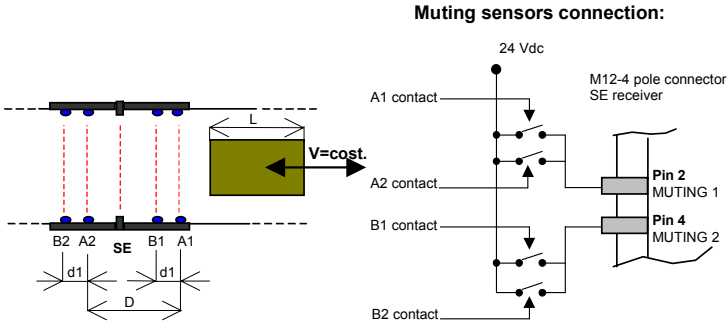
For correct functioning, position the dip-switch 2 in the OFF position.

The reset of normal Muting functioning is obtained at a D_{Moff} distance from sensor A.

Symbol	Unit	Formula	Min	Typ	Max	Description
d_1	cm	Compulsory condition		16.5		Interaxis between sensor A and sensor B
D_{Moff}	cm	Compulsory condition		33		Distance from sensor A at which the Muting function is deactivated and the light curtain returns to normal functioning
t_{AB}	sec	Compulsory condition	0		4	Activation time of the second sensor after first sensor activation (A→B)
t_{moff}	sec	$= D_{Moff} / V$	0.132 <i>(at max. suggested speed)</i>		8	Time period, referred to sensor A after which the Muting function is deactivated and the light curtain returns to normal functioning
D_{oA}	cm	$= D_{Moff}$	33			Distance to respect between adjacent objects to obtain the correct Muting functioning
L	cm		d_1			Object dimension to activate the Muting function passing between the sensors
V	cm/sec	$= d_1 / t_{AB}$	4.125		250 <i>(suggested)</i>	Object speed to activate the Muting function passing between the sensors

English

6.7.3. SB4T model



The T-configured solution with integrated Muting facilitates sensor installation and suits applications with bidirectional object passage.

For correct functioning, position the dip-switch 2 in the ON position.

The reset of normal Muting functioning is obtained at the deactivation of the A2 sensor (or B1 according to the object passage direction).

Symbol	Unit	Formula	Min	Typ	Max	Description
D	cm	Compulsory condition		34.5		Interaxis between sensors connected to the same Muting input
d ₁	cm	Compulsory condition		16.5		Interaxis between sensor A and sensor B
t _{AB}	sec	Compulsory condition	0		4	Activation time of the second sensor after first sensor activation (A1→B1) (B2→A2)
t _{Moff}	sec	= D _{Moff} / V 0.132 <i>(at max. suggested speed)</i>			8	Time period, referred to sensor A2(B1), after which the Muting function is deactivated and the light curtain returns to normal functioning
D _{oA}	cm		d ₁ + D = 51			Distance to respect between adjacent objects to obtain the correct Muting functioning
L	cm	= D	34.5			Object dimension to activate the Muting function passing between the sensors
V	cm/sec	= d ₁ / t _{AB}	4.125		250 <i>(suggested)</i>	Object speed to activate the Muting function passing between the sensors

6.8. Override function

This function allows to force a Muting condition when machine reset is necessary, even if one or more beams are interrupted by passing material.

The purpose is to clear the protected area of any material accumulated consequently to a failure in the working cycle.

For example, if a pallet stops in front of the protected area, the conveyor may not restart as the ESPE (that has one or more interrupted beams) opens the OSSD outputs and will not permit the controlled area clearance.

The activation of the Override function makes permits this operation.

- *Activation of the Override function*

- From a lockout condition it is not possible to actuate the override function.

When the requirements for the activation are met, a signalling is provided onto the LED display in order to inform users that an override is possible and required.



← fixed RED

← blinking when override is possible to require override

Two input lines are provided for the override function, OVR1 and OVR2, that must be connected to +24 Vdc and to 0 Vdc respectively by means of two normal open contacts.

Standard requires the use of spring return hold-to-run devices or secure momentary action pushbuttons, located so that it will not possible to enter the hazardous zone whilst maintaining the action on devices.

Override function can be actuated closing both contacts: whatever contact can be activated first.

The maximum out-of-sync interval time allowed is 400 ms, while the minimum one is 0 ms, as shown in the timing diagram.

While override is actuated, the integrated lamp will be blinking. Override function will automatically terminate when one of the following condition will be given:

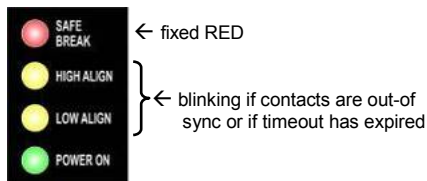
- all the muting sensors are de-actuated (*);
- the pre-determined time limit has expired;
- the requirements for actuation are not met any more (at least one override input line is deactivated).

(*) This is true for light curtains configured as T Muting. For light curtains configured as L Muting, override will terminate when muting sensors are de-actuated AND the light curtain's beams are free.

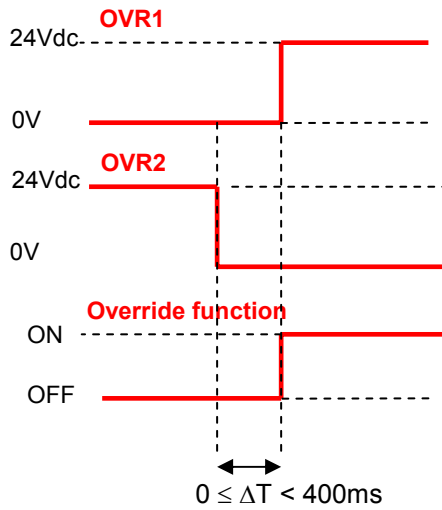
- Keep the button pressed until the clearance of the protected area has been completed.
- The maximum length of the Override function is 120 sec. After that time, the ESPE returns to normal functioning, even if the OVERRIDE button is pressed. Obviously, if the button is released within the 120 seconds, the Override function stops immediately.
- When override is de-actuated, the light curtain will return into the normal operation.

All possible fault conditions at runtime are shown below.

Fault	Cause	Action
Contacts out-of-sync: when trying to actuate the override function, the activation timer expires .	A shortcut to VDC or GND may be present on one of the override input lines or a contact may be defective.	Override is not actuated: the fault is signalled onto the LED display. This is not a lockout condition: the override can be run after fixing the fault.



Temporal diagram of the Override function



English

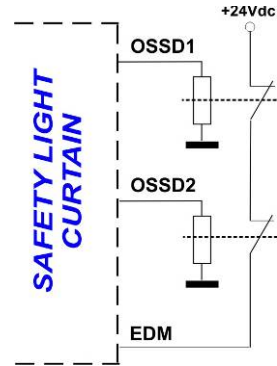
6.9. EDM function

The External devices monitoring (EDM) function controls external devices by verifying the OSSD status.

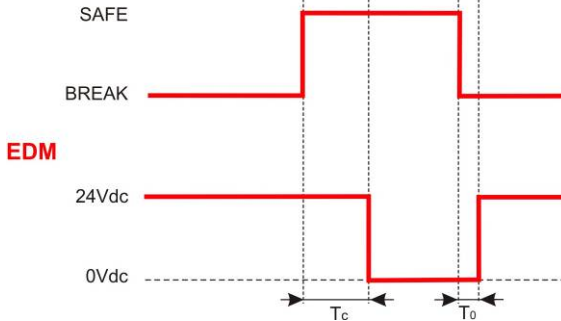
To correctly use this function:

- select it using the specific dip-switch
- connect EDM input to the 24Vdc N.C. contact of the device to control.

The function controls the N.C. contact switching according to the changes of the OSSD status.



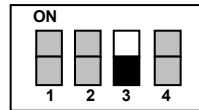
OSSD STATUS



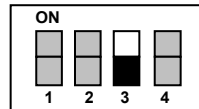
$T_c \geq 350\text{msec}$ time after the OSSD OFF-ON passage when EDM is carried-out
 $T_0 \geq 100\text{msec}$ time after the OSSD ON-OFF passage when EDM is carried-out

The use of non-conform devices may cause failures.

The periodical testing of the function is recommended.



The correct dip-switch positioning (dip 3 OFF) for the function activation is shown here aside.



7. DIAGNOSTIC FUNCTIONS

7.1. Visualisation of the functions

The operator can verify the operating condition of the light curtains through four LEDs positioned on the receiving unit and two LEDs on the emitting unit (Fig.24).

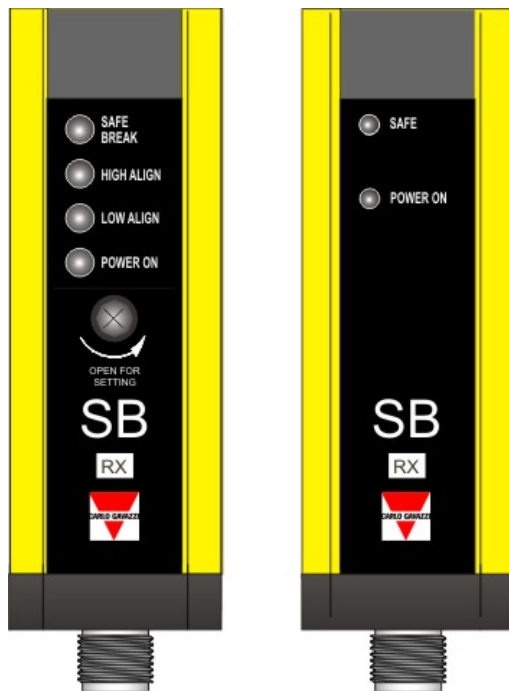


Fig. 24

The meaning of the LEDs positioned on the receiving unit (RX) depends on the light curtain operating mode.

7.2. Alignment mode

In this condition the outputs are OFF.

- **SAFE/BREAK LED:**

SAFE GREEN LED when **ON**, indicates that no objects have been detected by the device.

BREAK RED LED when **ON**, indicates that the receiving and the emitting units are not aligned, or that an object has been detected.

- **ALIGN HIGH LED: (yellow)** when **ON**, indicates the correct alignment of the last TX optic with the corresponding RX optic (top side of the device).
- **ALIGN LOW LED: (yellow)** when **ON**, indicates the correct alignment of the first TX optic with the corresponding RX optic (lower side of the device).
- **POWER ON LED: (green)** when **ON**, indicates that the unit is correctly powered.

7.3 Operating mode

- **SAFE/BREAK LED:**

SAFE GREEN LED when **ON**, indicates that no objects have been detected by the device.

BREAK RED LED when **ON**, indicates that one object has been detected; in this condition the outputs are OFF.

- **ALIGN HIGH LED: (yellow)** when continuously **ON**, indicates that it is necessary to press the TEST/START button to reset the device consequently to an object interception. This occurs only when the device runs under the manual Reset mode.
- **ALIGN LOW LED: (yellow)** when blinking, indicates the presence of an output short-circuit. This signalling is only a warning; the device continues to operate.








The LEDs located on the emitter (TX) have the following meanings:

- **SAFE LED (yellow):** when **ON**, indicates that the unit is emitting correctly.
- **POWER ON LED (green):** when **ON**, indicates that the unit is correctly powered.









7.4. Fault and diagnostic messages

The operator is able to check the main causes of the system stop and failure, using the same LEDs used for the visualisation of the functions.







RECEIVING UNIT:

Failure	Cause	Check and repair
 <p>Red <i>blinking</i> Yellow <i>blinking</i> Yellow <i>blinking</i> Green ON</p>	Output failure	<ul style="list-style-type: none"> - Check the output connections. - Check if the load characteristics are in accordance with the Technical data (<i>see section 9</i>)
 <p>Red <i>blinking</i> OFF Yellow <i>blinking</i> Green ON</p>	Failure of external switching device (EDM test function)	<ul style="list-style-type: none"> - Control the EDM connections - Check the compatibility of external switching device with EDM test time - Switch OFF and switch ON the devices; if failure persists replace external switching device
 <p>OFF Yellow <i>blinking</i> Yellow <i>blinking</i> Green ON</p>	Microprocessor failure	<ul style="list-style-type: none"> - Check the correct positioning of the configuration dip-switches. - Switch OFF and switch ON the device; if the failure continues contact CARLO GAVAZZI
 <p>Red ON Yellow <i>blinking</i> OFF Green ON</p>	It's possible to require Override	<ul style="list-style-type: none"> - The signalling is NOT a failure. - Activate override to remove material from the protected zone.
 <p>Red ON Yellow <i>blinking</i> Yellow <i>blinking</i> Green ON</p>	Override connection failure.	<ul style="list-style-type: none"> - Check connections of the override input lines.
 <p>OFF OFF Yellow <i>blinking</i> Green ON</p>	Optic failure	<ul style="list-style-type: none"> - Check unit alignment. - Switch OFF and switch ON the device; if the failure continues contact CARLO GAVAZZI
 <p>Green <i>blinking</i> Yellow <i>blinking</i> Yellow <i>blinking</i> Green ON</p>	Failure of the integrated Muting signalling lamp	<ul style="list-style-type: none"> - Switch OFF and switch ON the device; if the failure continues contact CARLO GAVAZZI.

English

Failure	Cause	Check and repair
 OFF  OFF  OFF  OFF	Power supply failure	<ul style="list-style-type: none"> - Check power supply. - If the failure continues contact CARLO GAVAZZI
 OFF  OFF  OFF  Green ON	The power supply voltage is outside the allowed range. Main microprocessor failure	<ul style="list-style-type: none"> - Check power supply. - Switch OFF and switch ON the device; if the failure continues contact CARLO GAVAZZI

EMITTING UNIT:

Failure	Cause	Check and repair
 Yellow blinking  Green ON	Emitter side generic failure	<ul style="list-style-type: none"> - Check the power supply; if the failure continues contact CARLO GAVAZZI and replace both units
 OFF  OFF	Power supply failure	<ul style="list-style-type: none"> - Check the power supply; if the failure continues contact CARLO GAVAZZI.
 OFF  Green ON	The power supply voltage is outside the allowed range Main microprocessor failure	<ul style="list-style-type: none"> - Check the power supply; if the failure continues contact CARLO GAVAZZI.

8. CHECKS AND PERIODICAL MAINTENANCE

The following is a list of recommended check and maintenance operations that should be periodically carried-out by qualified personnel.

Check that:

- The ESPE stays locked during beam interruption along the entire protected area, using the suitable "Test Piece".
- Pressing the TEST/START button, the OSSD outputs should open (the red BREAK LED is ON and the controlled machine stops).
- The response time at the machine STOP (including response time of the ESPE and of the machine) is within the limits defined by the calculation of the safety distance (see section 2 "*Installation Mode*").
- The safety distance between the dangerous areas and the ESPE are in accordance with the instructions included in section 2 "*Installation Mode*".
- Access to the dangerous area of the machine from any unprotected area is not possible .
- The ESPE and the external electrical connections are not damaged.

The frequency of checks depends on the particular application and on the operating conditions of the safety light curtain.

8.1. Maintenance

The SB4-T/L/S safety devices do not require any particular maintenance, with the exception of the cleaning of the protection front surfaces of the optics.

When cleaning, use a cotton cloth dampened with water.



Do not under any circumstances use:

- alcohol or solvents
- wool or synthetic cloths

8.2. General information and useful data



The safety devices fulfil their safety function only if they are correctly installed, in accordance with the Standards in force. If you are not certain to have the expertise necessary to install the device in the correct way, **CARLO GAVAZZI** Technical Service is at your disposal to carry-out the installation.

Auto-regenerating type fuses are used. Consequently, in presence of a short-circuit, these fuses protect the device.

After the intervention of the fuses, it is necessary to disconnect the power supply and wait for 20 seconds so that the fuses can automatically restart normal functioning.

A power failure caused by interferences may cause the temporary opening of the outputs, but the safe functioning of the light curtain will not be compromised.

8.3. Warranty

All appliances are under a 24 months warranty from the manufacturing date.

CARLO GAVAZZI will not be liable for any damages to persons and things caused by the non-observance of the correct installation modes and device use.

The warranty will not cover damages caused by incorrect installation, incorrect use and accidental causes such as bumps or falls.



In presence of a non-functioning device, always return the emitting and receiving units for repair or replacement.

In presence of failures send the both units to **CARLO GAVAZZI Controls - Sensors Division**

Technical Service

Tel.: +39 051 4178811

Fax.: +39 051 4178800

email: cust.service@gavazziacbu.it

9. TECHNICAL DATA

Power supply = Vdd:	24 Vdc \pm 20% (SELV/PELV)
Internal capacitance:	23 nF (Tx) /120 nF (Rx)
Emitter consumption (TX) S model:	30 mA max / 0.9W
Receiver consumption (RX) S model:	75 mA max (without load) / 2.2W
Muting sensor arm consumption:	35 mA max / 1W (with sensors off)
Outputs:	2 PNP outputs (2 NPN on request) short-circuit protection max: 1.4A at 55°C min: 1.1A at -10°C
Output current:	0.5 A max / each output
Output voltage - ON min:	Vdd -1 V
Output voltage - OFF max:	0.2 V
Leakage current:	< 1mA
Capacitive load (pure):	65 nF max at 25°C
Resistive load (pure):	56 Ω min. at 24 Vdc
Response time:	14 ms
Emission type:	Infrared (880 nm)
Resolution:	415 mm (2 optics) 515 mm (3 optics)
Operating distance:	0.5...3 m (SB4-T/L) 0.5...25 m (SB4-S)
Safety category:	Type 4
Auxiliary functions:	Muting / Override Restart/EDM/Reset
Time-out period:	Muting: 10 minutes / ∞ Override: 2 minutes
Operating temperature:	- 10...+ 55 °C
Storage temperature:	- 25...+ 70 °C
Temperature class:	T6 (Tx/Rx/Arm)
Humidity:	15...95 % (no condensation)
Electrical protection:	Class 1 (**refer to note)
Mechanical protection:	IP 65 (EN 60529)
Ambient light rejection:	IEC-61496-2
Vibrations:	0.35 mm width, 10 ... 55 Hz frequency, 20 sweep for each axis, 1octave/min (EN 60068-2-6)
Shock resistance:	16 ms (10 G) 1.000 shock for each axis (EN 60068-2-29)
Reference Standards:	IEC 61496-1; IEC 61496-2
Housing material:	Painted aluminium (yellow RAL 1003)
Cap material:	PC MAKROLON
Lens material:	PMMA
Connections:	M12-4 pole connector (TX) M12-8 pole conn. + M12-5 pole conn.(RX)
Cable length:	50 m. max (* refer to note) (with 50nF capacitive load and Vdc=24V)
Muting signalling device:	LED lamp on board
Weight:	1.2 Kg max./m of total height

* = if a longer cable has to be used, please verify that the same specifications are respected

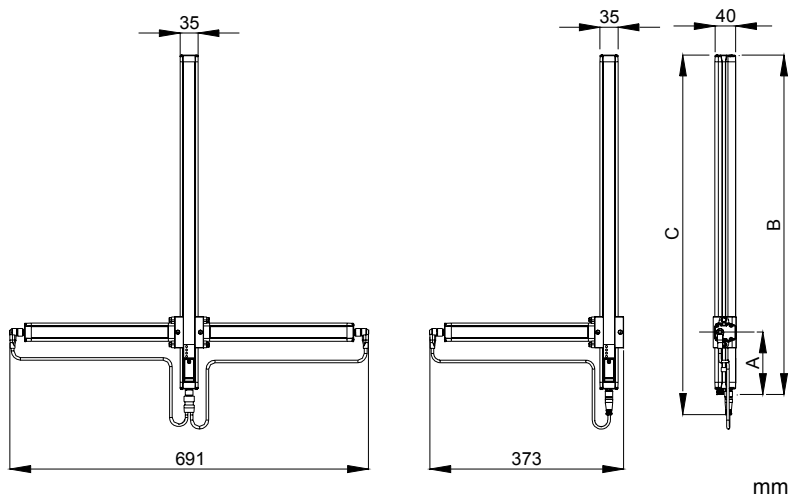
** Electrical protection	Class 1	Class 3
Protective grounding	Compulsory	Not accepted
Symbol for connection protective grounding	Compulsory	Not accepted
Protection by means of extra-low voltage with protective separation (SELV and PELV)	Recommended	Compulsory

10. LIST OF AVAILABLE MODELS

Model	Length of the sensitive area	Interaxis	N°. Beams	Resolution (mm)	Response time (ms)	Operating distance (m)
SB4T-515/515-D3	515	500	2	515	14	0.5...3 m
SB4T-415/815-D3	815	400	3	415	14	0.5...3 m
SB4L-515/515-D3	515	500	2	515	14	0.5...3 m
SB4L-415/815-D3	815	400	3	415	14	0.5...3 m
SB4S-515/515-D25	515	500	2	515	14	0.5...25 m
SB4S-415/815-D25	815	400	3	415	14	0.5...25 m

11. DIMENSIONS

All the dimensions given are in mm.

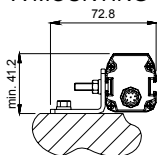


MODEL	A (mm)	B (mm)	C (mm)
SB4T-515/515-D3	120...260	653	690
SB4T-415/815-D3	120...260	953	990
SB4L-515/515-D3	120...260	653	690
SB4L-415/815-D3	120...260	953	990
SB4S-515/515-D25	-	653	690
SB4S-415/815-D25	-	953	990

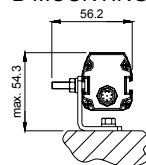
12. ACCESSORIES

Fixing brackets

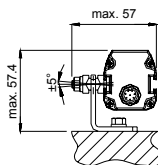
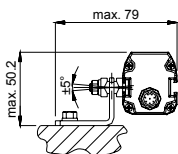
A MOUNTING



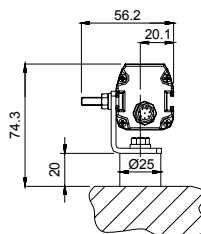
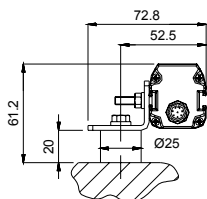
B MOUNTING



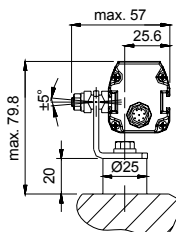
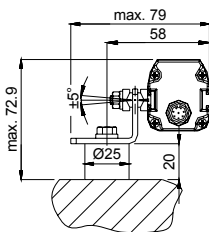
Angled fixing bracket



Angled fixing bracket + Orientable support



Angled fixing bracket + Antivibration support



Angled fixing bracket + Orientable support + Antivibration support

MODEL

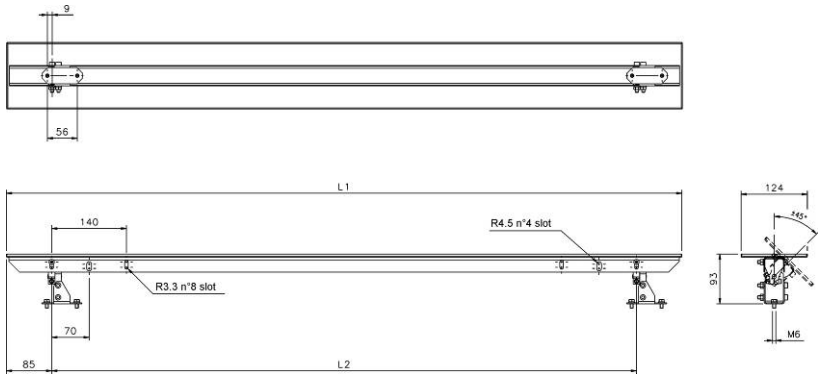
DESCRIPTION

MBR-ST	Fixing brackets for angle mounting (4 pcs kit)
SAV-4	Antivibration support (4 pcs kit)
SAV-6	Antivibration support (6 pcs kit)
SOR-4	Orientable support (4 pcs kit)
SOR-6	Orientable support (6 pcs kit)

English

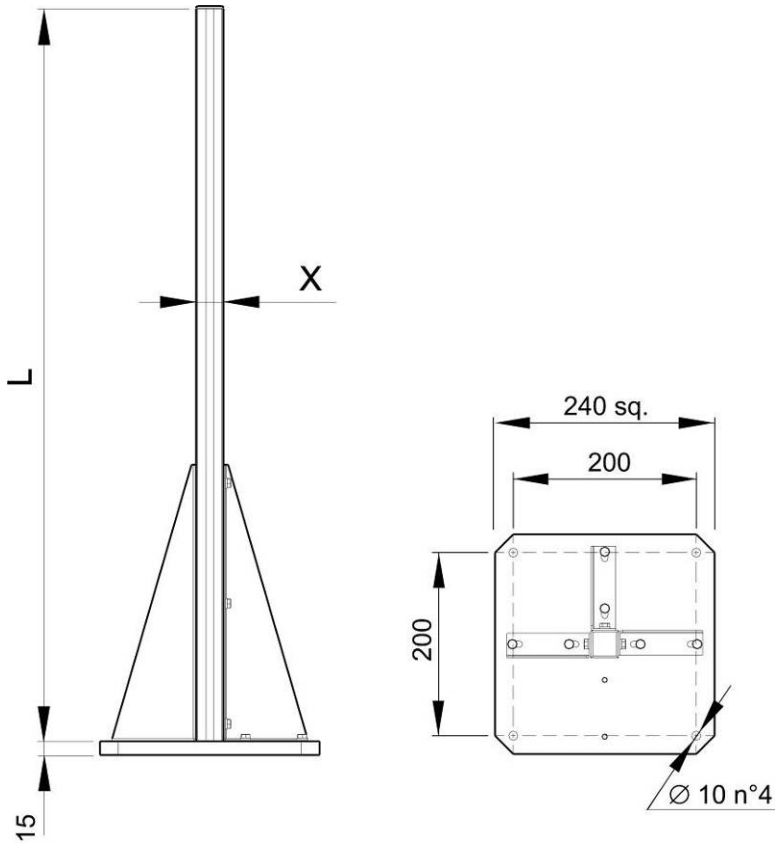
Deviating mirrors

MODEL	DESCRIPTION	L ₁ (mm)	L ₂ (mm)
SRN-500	Deviating mirror H= 550 mm	554	384
SRN-600	Deviating mirror H= 700 mm	704	534
SRN-800	Deviating mirror H= 900 mm	904	734
SRN-900	Deviating mirror H= 1000 mm	1004	834



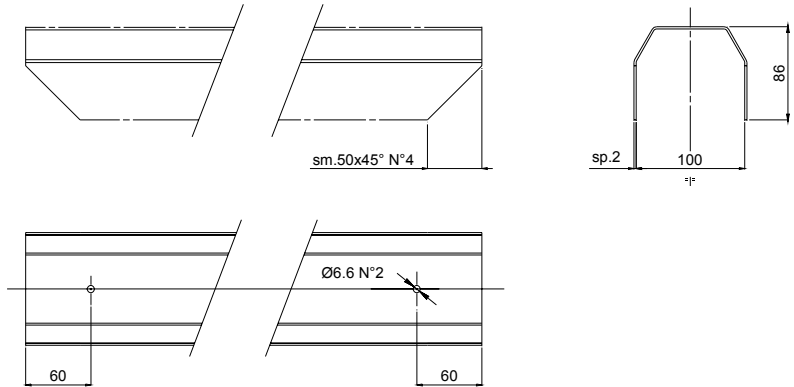
Columns and floor stands

MODEL	DESCRIPTION	L (mm)	X (mm)
SPT-800	Column and floor stand H= 800 mm	800	30x30
SPT-1000	Column and floor stand H= 1000 mm	1000	30x30
SPT-1200	Column and floor stand H= 1200 mm	1200	30x30
SPT-1500	Column and floor stand H= 1500 mm	1500	45x45
SPT-1800	Column and floor stand H= 1800 mm	1800	45x45



English

Protective stands



MODEL	DESCRIPTION	L (mm)
CPZ-150	Protective stand H= 273 mm	273
CPZ-300	Protective stand H= 420 mm	420
CPZ-450	Protective stand H= 567 mm	567
CPZ-600	Protective stand H= 714 mm	714
CPZ-750	Protective stand H= 861 mm	861
CPZ-800	Protective stand H= 969 mm	969
CPZ-900	Protective stand H= 1069 mm	1069
CPZ-1050	Protective stand H= 1155 mm	1155
CPZ-1200	Protective stand H= 1302 mm	1369
CPZ-1350	Protective stand H= 1449 mm	1449
CPZ-1500	Protective stand H= 1596 mm	1596
CPZ-1650	Protective stand H= 1743 mm	1743

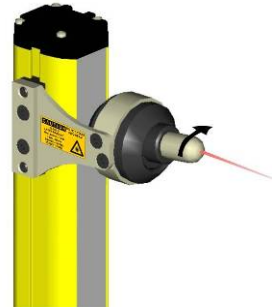
Connection cables

MODEL	DESCRIPTION
CFB-1A4/3MT	Axial shielded 4-pin 3 m cable
CFB-1A4/5MT	Axial shielded 4-pin 5 m cable
CFB-1A4/10MT	Axial shielded 4-pin 10 m cable
CFB-1A8/3MT	Axial shielded 8-pin 3 m cable
CFB-1A8/5MT	Axial shielded 8-pin 5 m cable
CFB-1A8/10MT	Axial shielded 8-pin 10 m cable

Laser pointer

The laser pointer of the LASP series represents a valid alignment and installation support for the SB safety light curtain series.

The pointer can be moved along the light curtain profile to verify the complete device alignment (top and bottom).



MODEL	DESCRIPTION
LASP	Laser pointer

Connection box

The **CON-BOX** connection box facilitates the connection and use of the SB4-T/L/S safety light curtains.

Two force-guided contact relays and extractable clamps to ease cabling are available inside the connection box.

MODEL	DESCRIPTION
CON-BOX	Muting connection box

