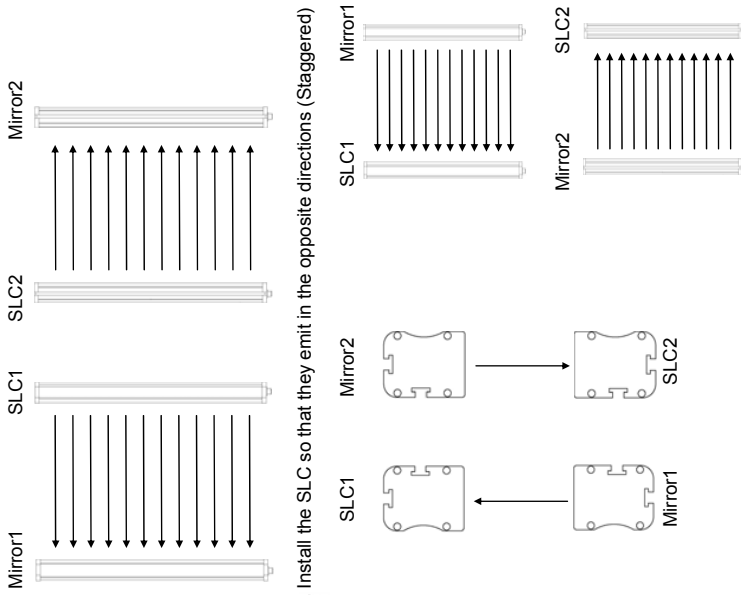


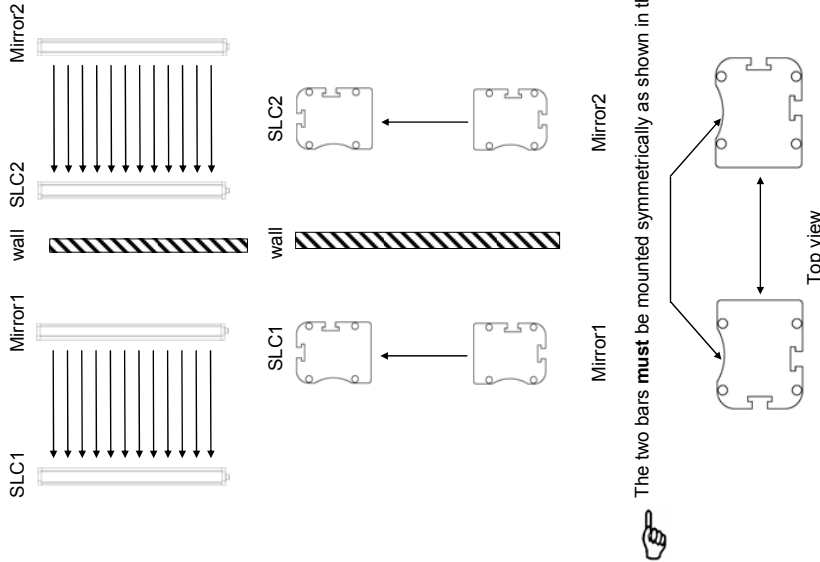
If several SLCs are used, care must be taken that each SLC does not interfere with the ones nearby; please install as follows:



Install the SLC so that they emit in the opposite directions (Staggered)

All these installation will prevent mutual interference between SLC.

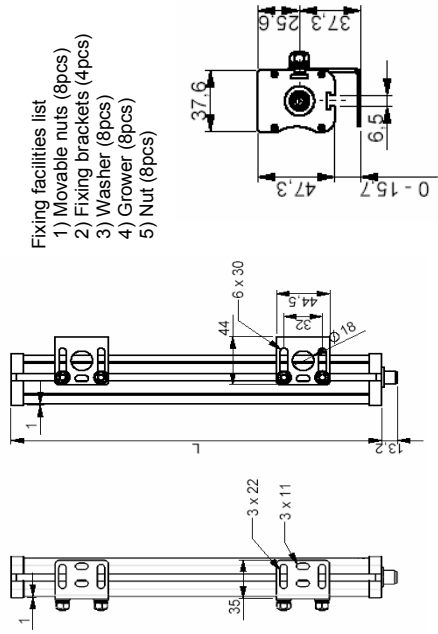
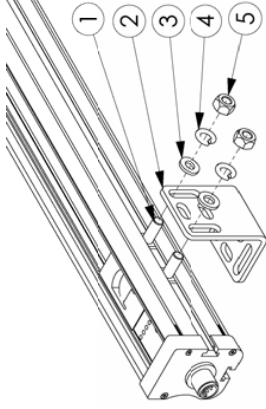
Insert a non-transparent wall if it is not possible to connect the SLC as shown previously.



The two bars must be mounted symmetrically as shown in the picture:

3 MECHANICAL ASSEMBLY

Use the appropriate brackets provided to complete the mechanical assembly.
The securing brackets nuts ① slide in the container's grooves so the brackets ② can be placed at an equal distance from each other.



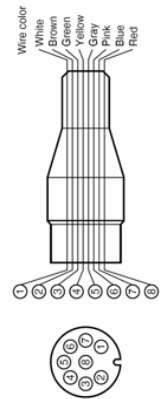
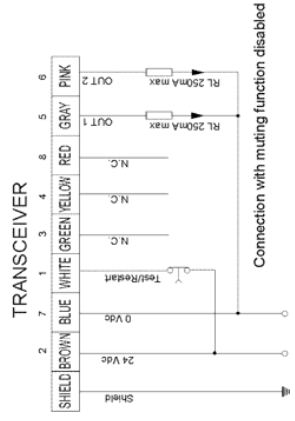
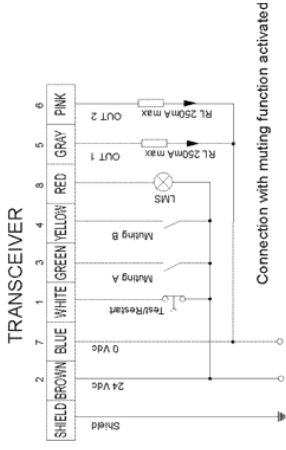
Fixing facilities list

- 1) Movable nuts (8pcs)
- 2) Fixing brackets (4pcs)
- 3) Washer (8pcs)
- 4) Grower (8pcs)
- 5) Nut (8pcs)









4 CONNECTIONS

4.1 REFERENCES FOR CABLES:

The test connection must always be executed with a N.C. button or connected to an automatic device, such as a PLC.



4.2 NOTES ON CONNECTIONS

-  The transformer needed to power the system must comply with standard EN 60742 (dual isolation), or with equivalent isolation, e.g. VDE 0551, protective separation is required.
-  The control unit must be protected with an external fuse, whose rated breaking current must be 1A.
-  The TEST/RESTART button must be located so that the operator can see the protected area when restarting, testing or overriding.
-  The external illuminated indicator for *muting override* enabled must be located so that it can be seen from all sides of operation.
-  Read the section on the *muting* function and its use before locating the sensors for the activation of this function.
-  Check that the load does not absorb current in excess of 250mA for each OSSD; in this case a protection device will intervene to limit the maximum current. If loads with currents in excess of 250mA for each OSSD or alternating current are to be controlled, please connect an external safety relay module.
-  Muting input A and Muting input B can be provided by mechanical switch, photoelectric sensors, proximities switch, with closed contact in the presence of the object to be detected.
-  The test connection must always be executed with a N.C. button or connected to an automatic device, such as a PLC.

5 ALIGNMENT PROCEDURE

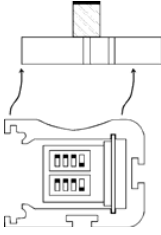
After completing correct mechanical assembly and connections, as described in the previous sections, the SLC should be aligned as follows:

- Disconnect the SLC's power supply.
- Open the *test/restart* contact.
- Restore the SLC's power supply.
- Adjust the direction of the SLC by moving the transceiver or the mirror. The 2 yellow LEDs located on the transceiver will both be lit when the SLC is aligned correctly. In addition also the green guard LED will switch on and the red break LED will switch off
- After aligning the SLC, secure the bolts firmly.
- Disconnect the power supply.
- Restore the SLC's power supply (with the *test* contact closed); it will enter operating mode.
- Complete all the tests described in section 9 (final checks) and those required for routine maintenance (section 10).

6 OPERATING PROCEDURES

6.1 SETTING THE INTERNAL DIP-SWITCHES

- Disconnect the SLC's power supply and remove the connector side of the transceiver, so that you can reach the two banks four-way dip-switches located there.
- Use a suitably sized screwdriver to set the dip-switches as per the required configuration according to the following tables.



6.1.1 SELECTION OF RESET MODE

| | |
|------------------------|-----------------------------|
| Single switch number 4 | Reset |
| OFF | Manual |
| ON | Automatic (Initial setting) |



ATTENTION

In every transceiver unit there are two separate dip-switch banks. The two banks must be set in the same way to get a valid configuration.

| | |
|------------------------|-----------------|
| Single switch number 3 | No function |
| OFF | DEFAULT SETTING |
| ON | NOT ALLOWED |

Dip switches number 1 and 2, act on the partial muting configuration. See "Partial muting configuration" chapter 7.3 on page after next.

7 MUTING AND OVERRIDE FUNCTIONS

7.1 GENERAL INFORMATION

The *muting* and *override* functions enable the SLC to be bypassed for operational requirements. As required by current standards, the SLC is provided with inputs for the activation of these functions. It should however be remembered that these functions basically override the system and they should therefore be used with due care.

7.2 MUTING FUNCTION

As mentioned in the introduction, the *muting* function can be enabled with any SLC by simply connecting the LMS muting indicator when the SLC is switched off.

The presence of this indicator is recognised when the SLC is switched on. If its presence is detected, the SLC will enable the *muting* function and if it is not present the SLC will ignore any request for *muting*. **It is important to note that if the *muting* indicator is connected when the SLC is already connected to the power supply, it will not be recognised and the *muting* function will not be enabled.** Once enabled, if the LMS muting indicator develops a fault or is removed without first disconnecting the SLC's power supply, it will signal an error with the *muting* light, as described in section 10.

To disable the *muting* function, the power supply must be turned on without the LMS muting indicator connected.

In brief: this function, present on all SLC s, is enabled and disabled by means of the following simple procedure:

- Disconnect the SLC's power supply.
- Connect the appropriate **LMS muting indicator** and the muting sensors (see section 6)
- Restore the SLC's power supply.

Bypass the muting function as follows.

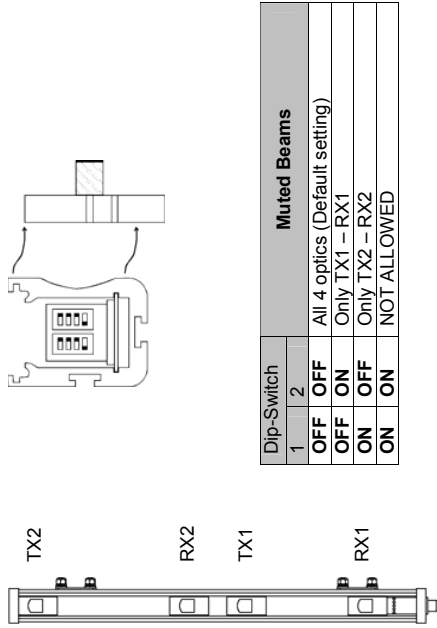
- Disconnect the SLC's power supply.
- Disconnect the **LMS muting indicator** and the muting sensors (see section 6)
- Restore the SLC's power supply.

7.3 PARTIAL MUTING CONFIGURATION.

This feature is available only on the SBx-K3C and SBx-K4C models. It gives the users the opportunity to mute only half of the light curtain. The other half remains active.

The configuration of this function is done by setting the internal dip switches **1 & 2**.

For correct configuration and identification of dip switch and bypassed optics refer to the following drawing and table.

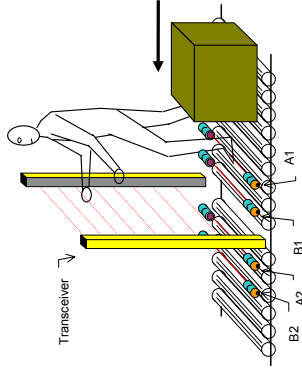


CONNECTOR SIDE.

7.4 CRITERIA FOR INSTALLATION

Take adequate care when installing the muting sensors to prevent undesired requests for *muting*:

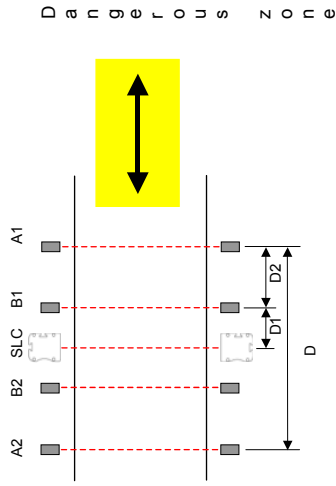
1. Wiring must be done correctly.
2. The *muting* sensors must recognise the whole length of the material (i.e. pallets, vehicles...).
3. The sensors must be arranged so that the material is also recognised if it has to be lifted for processing.
4. The effect of various transportation speeds in the field of *muting* on the overall duration of muting must be taken into account, if any.
5. All the safety photocells and *muting* sensors must be arranged so that the previous material clears the last *muting* sensor before the new material reaches the first sensors



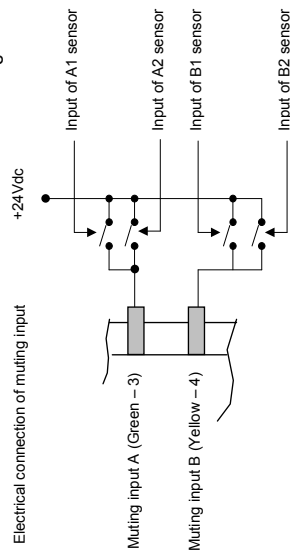
Example of conveyor protection installation, which must allow a box to pass through but not a person. The **transceiver (SLC)** is connected to the control panel, and **A1, A2, B1** and **B2** are sensors used to enable *muting*. The contacts for these sensors are controlled on the transceiver unit. Sensors **A1, A2, B1** and **B2** can be optical, mechanical or proximity sensors etc., with closed contact in the presence of the object to be detected.

The following drawings show several examples of configurations with the use of the *muting* function:

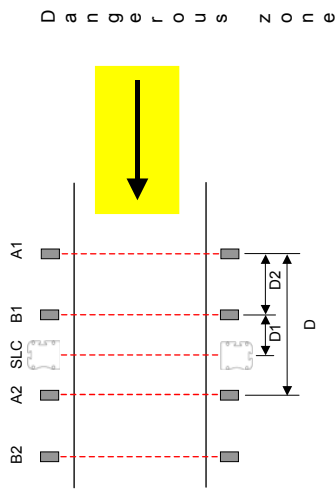
Application with four sensors – 'Bi directional muting'



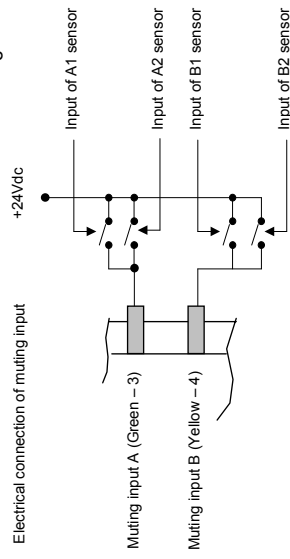
D a n g e r o u s z o n e




Application with four sensors and single direction for material exit:

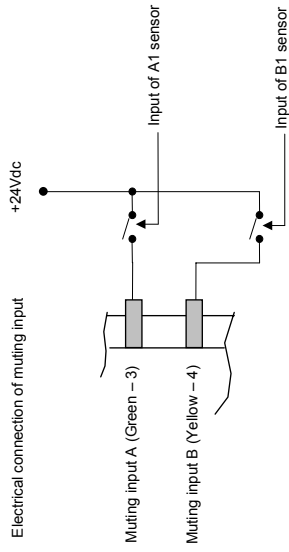
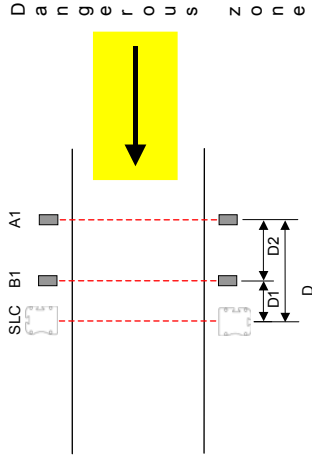


D a n g e r o u s z o n e



Application with two sensors and single direction for material exit:

 This muting activation sequence is only available for SLCs with postfix “-MTL” at the ordering code.



Where:

D: minimum dimension of package that can cross the SLC.

D1: distance between muting actuator B and SLC.

It MUST be as short as possible.

Minimum distance allowable depends on the speed of conveyour, the response time of SLC and response time of muting actuator.

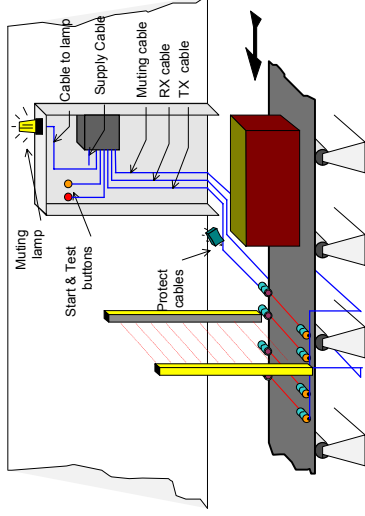
D2: Distance between muting actuator A and muting actuator B.

It must be > 250mm

It also depends on the conveyour speed:

$$d_{max} [cm] = v[m/s] * 3[s] * 100 > 25$$

It is necessary that this distance does not allow both sensors to be activated and thus *muting* if a person goes through by accident.

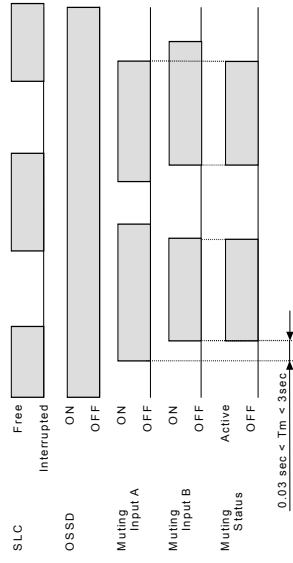


- The TEST/RESTART button must be located so that the operator can see the protected area when restarting, testing or overriding.
- The external illuminated indicator for *muting override* enabled must be located so that it can be seen from all sides of operation.
- If the *muting* sensors are installed very close to the SLC, care must be taken that the receivers of the sensors are mounted on the mirror side of the SLC in order to avoid interference.
- The system is protected against the possibility of faults due to damage to the wires; however we recommend laying the cables for all connections in order to avoid damage to the connection cables.

7.5 TIMING CONSTRAINTS (muting function)

- The *muting* request must take place with the correct timing sequence: the Muting A input must be enabled first and then the Muting B input. The request for the latter must be made within a maximum of 3 seconds and not before 30 ms (T_M) after enabling Muting A input. Otherwise the *muting* function will not be enabled. An incorrect sequence on the *muting* inputs will not start the muting process.
- Muting* status can be maintained for an unlimited period of time as long as the muting signals are valid.

Timing chart

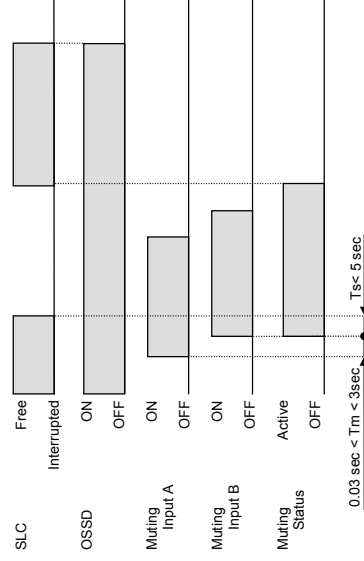


A muting request cannot be made if the SLC outputs are open, that is to say when the beams have been interrupted.

7.6 Timing constraints (for SLCs with postfix “-MTL” at the ordering code)

- The *muting* request must take place with the correct timing sequence: the Muting A input must be enabled first and then the Muting B input. The request for the latter must be made within a maximum of 3 seconds and not before 30 ms after the enabling of the Muting A input. Otherwise the *muting* function will not be enabled. An incorrect sequence on the *muting* inputs will not start the muting process.
- There are 5 seconds maximum from the activation of muting to the package entrance in the protected area by interrupting the SLC. If this time is exceeded, muting function will stop immediately.
- As long as a package interrupts the protected area (at least one beam), the muting function is maintained
- Muting* status can be maintained for an unlimited period of time as long as the muting signals are valid.

Timing chart



7.7 OVERRIDE

This function makes it possible to override or bypass the system. It is used to start up the machine after the material has interrupted one or more of the SLC beams and to free the protected area from any material that is present in front of the SLC. If a *pallet* has stopped in front of the protected area, it will not be possible to restart the conveyor belt because the SLC detects one or more beams have been interrupted and therefore will not close the outputs; therefore the protected area cannot be cleared. However, it can be cleared if the *override* function is enabled.

This function can be used for all SLCs with the LMS muting indicator connected, as described in section 3.

7.7.1 ENABLING THE OVERRIDE FUNCTION

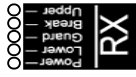
- Switch the appliance off.
- Switch it on again and press the *test/restart* button within 5 seconds, keeping it pressed for at least 5 seconds.
- The *override* function is now enabled. The LMS muting indicator flashes to signal the exclusion of the SLC.
- The maximum duration of the *override* function is 120 seconds, after which the SLC is reset, even if the button is kept pressed. Naturally, if the button is released before this, the *override* function will terminate immediately.

8 LED DIAGNOSTICS

8.1 LED's Description

The operator is able to recognise the operating status of the SLC by means of five LED located on the transceiver. The status of the LED indicates the following: (looking at the front of the transceiver from right to left)

Basic understanding of LED indicators

| Disposition of indicator | Name of indicator | Colour | LED signal Pattern |
|---|-------------------|--------|--------------------|
|  | Power | Green | ● ON |
| | Lower | Yellow | ○ OFF |
| | Guard | Green | ● ON |
| | Break | Red | ● ON |
| | Upper | Yellow | ● ON |

8.1.1 Normal Operation indication

| LED signal Pattern | Description |
|--------------------|---|
| ● ○ ○ ○ ○ | OSSD ON |
| ● ○ ○ ● ○ | OSSD OFF, object in the field |
| ● ○ ○ ● ● | Interlock, waiting for test button pressure |
| ● ● ● ○ ○ | Correctly aligned in aligning procedure |
| ● ● ● ○ ○ | Dust indication, probable lost of signal due to dust on the front cover |
| ● ● ● ○ ○ | A short circuit on OSSD is present |

8.1.2 Faulty conditions indication


| LED signal Pattern | Description |
|--------------------|--|
| ●○○○○ | Power supply is too low |
| ●●○○● | Micro controller fault |
| ●●○○●● | Fault on output system |
| ●●●○○● | Muting lamp connection fault or muting lamp burned |
| ●●●○○○ | Optical defect |

9 ROUTINE CONTROLS AND MAINTENANCE

 These checks are recommended and should be carried out on a regular basis by qualified personnel:

- 1) Check that the SLC remains blocked by inserting an object that intercepts the beams along the entire length of the protected area.
- 2) Check via the opening of the TEST/RESTART contact, that the safety outputs open (red LED lit and controller machinery stopped).
- 3) Check that it is not possible to access the danger areas of the machinery from any area that is not protected and that the minimum distance between the dangerous areas and the SLC is no less than that calculated as per formulas 4.1 and 4.2.)
- 4) Check that it is not possible for a person to get between the SLC and the dangerous parts of the machinery.
- 5) Check that there is no external damage to the SLC and/or to the external electrical connections.

 **Repeat checks 1 and 2 daily.**

 **Repeat checks 1 to 5 every 6 month maximum.**

The interval between the above actions can be shorter depends on the individual application and the environmental conditions where the SLC is used.

10 FINAL CHECKS AFTER INSTALLATION

- Check that the area protected by the SLC is free of obstacles.
- Check that the safety outputs open correctly by interrupting the protection beams (BREAK LED lit, machinery under control stops).

11 GENERAL INFORMATION AND USEFUL DATA

Everyone MUST be aware of issues regarding safety. Safety devices are only useful if they are installed correctly according to the recommendations set down by regulations.

If you are not sure that you are able to install safety devices correctly, you should contact our service department or have them installed by a professional.

This appliance is covered by a total warranty for 12 months from the date of its delivery.

Faults that were clearly caused by damage due to incorrect use, accidental circumstances or catastrophic events are not covered by the guarantee.

In case of faults, please send the SLC to:

TECHNO-GR
via Torino, 13/15
10046 Poirino (TO) - ITALY
Tel. +39 011 9452041
FAX. +39 011 9452090
E-Mail info_technogr@eu.omron.com

A description of the fault found and the period of use must always accompany the appliance.

12 TECHNICAL SPECIFICATIONS

| ITEM | SPECIFICATION |
|--------------------------------------|---|
| Rated operating distance | 0,5m ... 6,0m K1C-500 model 0,5m ... 12m K1C-500-LD model 0,5m ... 5,0m K3C and K4C model |
| Emitted light source | Infrared LED (880 nm) |
| Ambient light immunity | According to IEC61496-2 |
| beam pitch (center) | SBx-K1C-500 → 500mm SBx-K1C-500-LD → 500mm SBx-K3C-800 → 400mm SBx-K4C-900 → 300mm |
| number of beams | SBx-K1C-500 → 2 SBx-K1C-500-LD → 2 SBx-K3C-800 → 3 SBx-K4C-900 → 4 |
| protective height | SBx-K1C-500 → 516 SBx-K1C-500-LD → 516 SBx-K3C-800 → 816 SBx-K4C-900 → 916 |
| resolution | SBx-K1C-500 → 516 SBx-K1C-500-LD → 516 SBx-K3C-800 → 416 SBx-K4C-900 → 316 |
| EAA | According to IEC 61496-2 |
| Indicators | 2 green LEDs 2 yellow LEDs 1 red LED |
| Dimensions (width x depth) Length | Profile: 35*45mm +2mm for connector part SBx-K1C-500: 595 mm SBx-K1C-500-LD: 595 mm SBx-K3C-800: 941 mm SBx-K4C-900: 1041 mm |

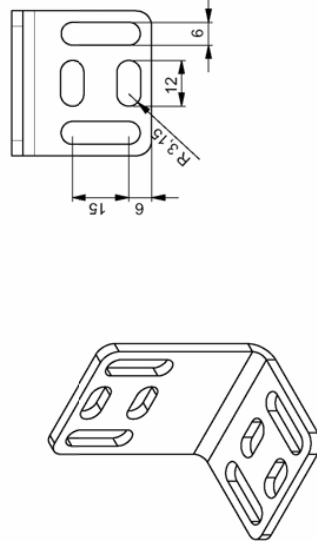
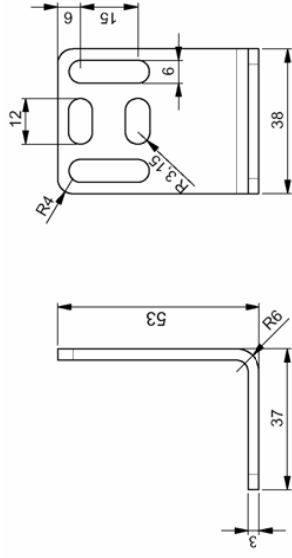
| ITEM | SPECIFICATION |
|---|--|
| Materials: Housing Front panel Sealing gasket Connector parts | Powder-coated aluminum, Polycarbonate EPDM (synthesis rubber) Metal: Galvanized brass Plastic: PVC |
| Housing color | Yellow, RAL 1023 |
| Connection | M12 connector, 8-pole |
| Operation temperature range | - 10 °C ... + 55 °C |
| Storage temperature range | - 25 °C ... + 70 °C |
| Relative humidity | 15 % ... 95 % RH (no condensing) |
| Enclosure rating (EN 60529) | IP 65 |
| Pollution degree | II |
| Installation category | II process control equipment |
| Altitude | Up to 2000m |
| External controls | Test/Restart Muting and override |
| Resistance to Vibration (to IEC 68-2-6) Shock (to IEC 68-2-27) | 10 – 70 Hz ± 1.5mm amplitude, X, Y, Z directions 30G, 16ms, X, Y, Z direction |
| Rated operating voltage | + 24 Vdc ±20% |
| Operating voltage range | +19.2 ... 28.8Vdc |
| Current consumption | < 420mA (muting lamp included) |
| Power-on delay | < 800ms |
| Outputs | PNP |
| Output circuit protection | PNP short circuit protected |

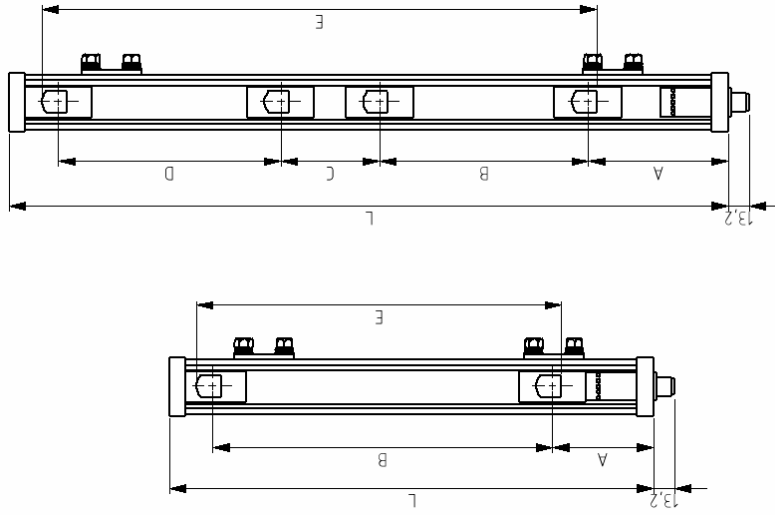
| ITEM | SPECIFICATION |
|--|---|
| Output current | 250 mA each OSSD |
| Max. Capacitive load | 200nF (pure capacitive load) |
| Output voltage drop | < 2.0 V (excl. voltage drop due to cable extension) |
| Residual current | < 100 μ A |
| Circuit protection | Reverse polarity, Overload Short-circuit (pulsed) |
| Input circuit | Logical Zero level 0 – 8V Logical One level 14 – 24Vdc |
| Input pulse duration | Min. 2 cycle time |
| Response time | \leq 16ms |
| Reset time (T _{OFF} \rightarrow T _{ON}) (interlock) | \leq 300ms |
| Insulation resistance | 800 M Ω @ 500Vdc |
| Dielectric voltage strength | 350Vac, 50/60 Hz (1 min) |
| Configuration | Manual reset / Automatic reset (default) |
| Operating modes | Muting / Override (by wiring setting) |

13 DIMENSIONS

All dimensions are shown in millimetres

Mounting bracket





| MODEL | A | B | C | D | E | L |
|----------------|-----|-----|-----|-----|-----|------|
| SBx-K1C-500 | 66 | 500 | | | 516 | 595 |
| SBx-K1C-500-LD | 66 | 500 | | | 516 | 595 |
| SBx-K3C-800 | 110 | 400 | 60 | 340 | 816 | 941 |
| SBx-K4C-900 | 110 | 300 | 300 | 300 | 916 | 1041 |

14 NOTE