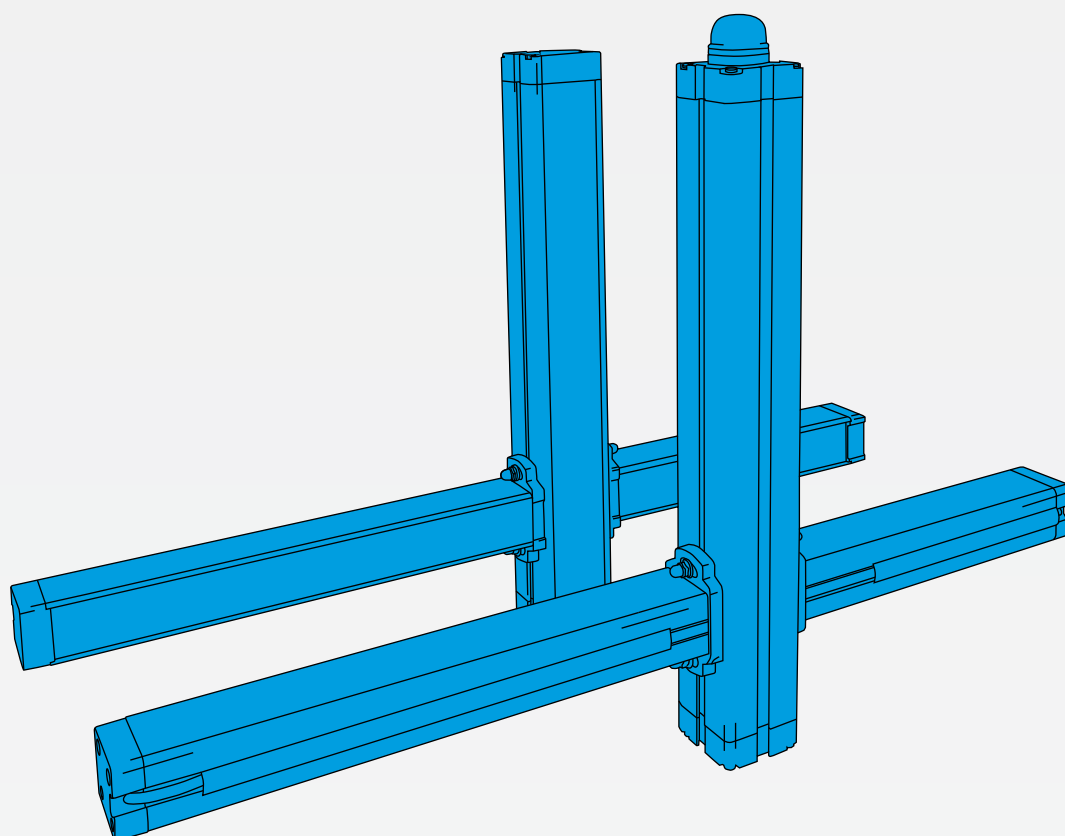


# SL-4M MUTING

**Safety light curtains and grids**  
**Type 4**



600001-0000EN · Rev 1 · 2019/12

USER MANUAL

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## 1 INTRODUCTION

Please read through this manual carefully before putting the SLM4 safety light barrier into operation. Keep this manual and all quick installation guides in an easily accessible location.

### 1.1 PURPOSE OF THESE INSTRUCTIONS

---

These instructions describe the operation of SLM4 safety light barriers with an integrated muting function.

This manual includes:

- A general description of the SLM4 and its technical features;
- The characteristics of the muting function;
- The various types of muting and their application;
- A list of the available SLM4 models;
- The mechanical installation;
- The electrical connections;
- The various operating modes;
- The muting and override modes and how to activate them;
- How to program the safety light barriers using the SLM4 configuration software.

### 1.2 PRODUCT DESCRIPTION

---

The SLM4 safety light barrier is an opto-electronic multi-beam safety system with muting function that belongs to the category of Type 4 electro-sensitive devices (in accordance with EN 61496-1,-2) for protecting people from hazardous machines and systems.

SLM4 ensures that the muting sensors, which are directly connected to the safety light barrier connectors, are optimally integrated into the system.

For models with a hardware configuration (SLM4 and SLM4O), the muting logic and operating parameters are completely determined by the connections of the main connector.

For the SLM4O and SLM4PO models with an integrated signal lamp, the status of the safety light barrier is also immediately visible from a distance.

The programmable SLM4PO models have the features of the SLM4O models. Furthermore, they allow for a wide variety of parameters and additional functions to be configured using the SLM4 CONFIGURATOR software.

Main features of SLM4:

- Resolution: 30 mm for the light curtains, as well as 2, 3 and 4 beams for light grids.
- Integration of the most important safety functions, including automatic control of the static outputs, EDM and Start/Restart Interlock.
- Profile dimensions: 55 x 50 mm.
- Height of the protected area: 300 to 2200 mm.
- Degree of protection: IP65 and IP67.
- Operating temperature: -30 to +55 °C (without condensation).
- Muting lamp and integrated signaling of the barrier status (SLM4O/SLM4PO).

## 1 INTRODUCTION

### 1.3 SCOPE OF DELIVERY

- SLM4 transmitter and receiver
- Mounting accessories: Mounting elements with M6 threaded bolts
- Protective caps for unused electrical connectors
- Quick Installation Guide

Mounting materials for installation:

- Light grids with 2 beams and light curtains with protective field height up to 620 mm:  
4 mounting brackets, 4 mounting elements with M6 threaded bolts, nuts, washers
- Light grids with 3 or 4 beams and light curtains with protective field height of 760 mm or more:  
6 mounting brackets, 6 mounting elements with M6 threaded bolts, nuts, washers

This manual is available for download on the product page of the device at [www.di-soric.com](http://www.di-soric.com).

The SLM4 CONFIGURATOR configuration software for the SLM4PO model is available for download on the product page of the device at [www.di-soric.com](http://www.di-soric.com)

### 1.4 GLOSSARY

<b>PROTECTIVE FIELD HEIGHT</b>	Height of the protective field for safety light curtains.
<b>SAFETY DISTANCE</b>	Minimum distance between the protected passageway and the danger zone.
<b>EDM</b>	External Device Monitoring: Switching check of external contactors with positively driven normally close contacts via the feedback input.
<b>MUTING</b>	Temporary safety-related automatic bypassing of the safety function for transporting material into or out of a danger zone.
<b>OVERRIDE</b>	Manual activation of the OSSD outputs for removing material during a muting cycle.
<b>RANGE</b>	Maximum operating distance between transmitter and receiver.
<b>RESOLUTION</b>	Minimum dimensions of the detected object to guarantee that the hazardous machine will come to a stop.
<b>START/RESTART INTERLOCK</b>	Locking function (requires manual resetting) when the machine is started or restarted.
<b>RESPONSE TIME</b>	Time between interruption of the conveying and deactivation of the output.
<b>LX</b>	Muting logic with 2 crossed unidirectional sensors.
<b>L2</b>	Muting logic with 2 parallel unidirectional sensors.
<b>TX</b>	Muting logic with 2 crossed bidirectional sensors.
<b>T4</b>	Muting logic with 4 parallel bidirectional sensors.
<b>SLM4</b>	Model with muting and hardware configuration on the main connector.
<b>SLM4O</b>	Model with integrated muting lamp.
<b>SLM4PO</b>	Model with software configuration and integrated muting lamp.

## 1 INTRODUCTION

### 1.5 DISPOSAL OF THE MATERIAL



Dispose of the product in an environmentally friendly manner and in compliance with the applicable national legal provisions.

#### For countries of the European Union:

#### In accordance with Directive 2012/19/EU on waste electrical and electronic equipment

The device or its packaging has a symbol of a crossed-out trash bin, which indicates that when the product has reached the end of its service life it must be collected separately from other waste. Corresponding separate collection for subsequent forwarding of the decommissioned device for recycling, processing and environmentally friendly disposal assists in preventing potential negative effects on the environment and health while promoting reuse and/or recycling of the materials of which the device is made.

In each individual member state of the European Union, the product must be disposed of in accordance with Directive **2012/19/EU** as it has been implemented in the member state in which the product is being disposed of. For more information, please contact di-soric or your local dealer.

### 1.6 SYMBOLS



#### DANGER!

The hazard symbol in combination with the signal word DANGER! indicates an imminently hazardous situation. Failure to comply will result in **death or severe injury with permanent damage**.



#### WARNING!

The hazard symbol in combination with the signal word WARNING! indicates a potentially hazardous situation. Failure to comply can result in **severe to potentially fatal injury or severe noxious effects with permanent damage**.



#### NOTE!

The warning symbol in combination with the signal word NOTE! indicates important information about correct usage of the technology and proper function of machinery. Failure to observe this can result in **potentially hazardous situations with property damage**.



This symbol highlights **useful tips and recommendations**. It refers to information that is helpful for efficient and trouble-free operation.



Safety light barrier with resolution of 30 mm for detection of a hand



Safety light barrier with 2/3/4 beams for detecting a body for perimeter access control

## 2 SAFETY AND PROTECTIVE MEASURES

### 2 SAFETY AND PROTECTIVE MEASURES

Comply with the relevant standards and provisions and these instructions to ensure proper use. di-soric disclaims any liability for failure to observe notes or standards.



**DANGER!** Observe the following points to ensure safe use of the SLM4 safety light barrier.

#### 2.1 SAFETY NOTES



**DANGER!** The tasks described in these instructions may be performed by skilled personnel only. These personnel must have the necessary prerequisites to be able to work on the electronic devices being installed. The purpose of this is to avoid a potential hazardous situation. di-soric disclaims any liability for malfunctions of devices that have been installed by unqualified personnel. Improper use, that is, use deviating from the specifications of these instructions is a potential hazard for the installer and the personnel operating the machine. If you have questions regarding safety, contact your country's authorities in charge of safety issues or your responsible industrial association. For use in the food industry, please contact the manufacturer to verify compatibility of the barrier materials and the chemical substances being used.



**DANGER!** The protective function of the opto-electronic protective devices will be effective only in the following cases:

- The control system of the machine must be electrically controllable.
- Hazardous movement of the machine can be interrupted immediately and at any time during the machine cycle.
- The hazardous area can be accessed only through the protective field.
- No hazardous situations are posed by material falling from a height.
- No operating personnel is endangered by ejection of material or the machine's components.
- Additional measures are required if the following conditions are present:  
Effects of abnormal radiation (radiation from weld spatter, use of wireless control units on cranes)

## 2 SAFETY AND PROTECTIVE MEASURES

---

### 2.2 SAFETY PRECAUTIONS BEFORE INSTALLATION

---

Before the SLM4 safety system is installed, all conditions specified in the following section must be checked.



**DANGER!** The degree of protection (Type 4, SIL3, SILCL3, PLe) of the SLM4 system must be compatible with the hazard level of the system to be monitored.

The safety system may only be used as a device to stop the machine, not to control it.

It must be possible to monitor the machine control system electronically.

It must be possible to stop any dangerous action of the machine immediately. In particular, the time required to stop the machine must be known; it may be possible to determine this through measuring.

There must not be any hazardous situations at the machine from material being ejected or falling from a height; if necessary, additional mechanical protective measures must be taken.

The minimum dimensions of the object to be detected must be at least as large as the resolution of the selected model.

Knowing the shape and dimensions of the danger zone enables estimation of the width and height of the access area;



Compare these dimensions to the maximum range and the height of the protective field of the model used.

Before the safety device is positioned, the following general notes absolutely must be observed:



**WARNING!** Make sure that the temperature of the environment where the system will be installed is compatible with the operating parameters specified on the product label and in the technical data.

## 2 SAFETY AND PROTECTIVE MEASURES

### 2.3 RANGE FOR PARTICULAR AMBIENT CONDITIONS



**WARNING!** Do not position the transmitter or receiver near intense light sources or flashing lights. Particular ambient conditions can affect the ability of safety light barriers to detect. In environments where fog, rain, smoke or dust can appear, it is advisable to use suitable Fc correction factors on the values for the maximum usable range to ensure that the device will always operate properly.

In these cases:

If the device is exposed to continuous temperature fluctuations, then suitable measures absolutely must be taken to prevent condensation from forming on the lenses, since that can impair the device's ability to detect.

$$P_u = P_m \times F_c$$

AMBIENT CONDITIONS	F <sub>c</sub> CORRECTION FACTOR
Fog	0.25
Steam	0.50
Dust	0.50
Thick smoke	0.25

P<sub>u</sub>: Usable range in meters  
P<sub>m</sub>: Maximum range in meters  
F<sub>c</sub>: Correction factor from table

### 2.4 LIST OF RELEVANT SAFETY STANDARDS

SLM4 complies with the following European directives:

- 2006/42/EC "Machinery Directive"
- 2014/30/EU "Directive relating to electromagnetic compatibility"

And corresponds to the following standards:

Safety level	Type 4	EN 61496-1:2013 EN 61496-2:2013
	SIL 3	IEC 61508-1:(ed.2) IEC 61508-2:(ed.2) IEC 61508-3:(ed.2) IEC 61508-4:(ed.2)
	SILCL 3	IEC 62061:2005/A2:2015
	PL e - Cat. 4	EN ISO 13849-1:2015

## 2 SAFETY AND PROTECTIVE MEASURES

### 2.5 DECLARATION OF CONFORMITY

**SOLUTIONS.  
CLEVER.  
PRACTICAL.**



di-soric GmbH & Co. KG · Steinbeisstraße 6 · DE-73660 Urbach

#### EU - KONFORMITÄTSERKLÄRUNG

EU declaration of conformity  
Déclaration UE de conformité

Wir bestätigen für folgende Produkte / We confirm for the following products / Nous confirmons pour les produits suivants:

**Sicherheitslichtgitter**  
Safety light grid  
Barrage immatériel de sécurité

Typ / Type / Type:

**SLM4xx...**

die Übereinstimmung mit den europäischen Richtlinien / the conformity to the European directives / la conformité aux directives européennes:

- **Maschinenrichtlinie 2006/42/EG**  
Machinery Directive 2006/42/EC  
Directive Machines 2006/42/CE
- **EMV-Richtlinie 2014/30/EU**  
EMC-Directive 2014/30/EU  
Directive CEM 2014/30/UE
- **Niederspannungsrichtlinie 2014/35/EU**  
Low Voltage Directive 2014/35/EU  
Directive Basse tension 2014/35/UE
- **RoHS-Richtlinie 2011/65/EU**  
RoHS-Directive 2011/65/EU  
Directive RoHS 2011/65/UE

den Anforderungen der Sicherheitsmerkmale / to the requirements of safety attributes / aux exigences des critères de sécurité

- **Typ 4** gemäß / according to / conforme à **EN 61496-1:2013; EN 61496-2:2013**
- **SIL 3** gemäß / according to / conforme à **(EN 61508 -1, -2, -3, -4) – ed.2**
- **SILCL 3** gemäß / according to / conforme à **EN 62061:2005/A2:2015**
- **PL e** gemäß / according to / conforme à **EN ISO 13849-1:2015**

und den Anforderungen der harmonisierten Normen / and the requirements of the harmonized standards / et aux exigences des normes harmonisées:

- **EN 50178: 1997**
- **EN 55022: 2010**
- **EN 61000-6-2: 2005**

Benannte Stelle für das EG-Baumusterprüfverfahren / Notified body for the EC-type examination / L'organisme notifié pour un examen CE de type:

**TÜV SÜD Product Service GmbH – Zertifizierstelle – Ridlerstrasse 65 – 80339 – München – Germany – N.B. number: 0123 – Certificate No. Z10 69165 010 Rev. 00**

Lüdenscheid, 08.10.2019

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### 3 PRODUCT DESCRIPTION

## 3 PRODUCT DESCRIPTION

SLM4 is supplied as a set (transmitter/receiver) and can be supplemented with external muting sensors that are connected directly to the connectors of the safety light barrier.

- Each safety light barrier can be configured as LX, L2, TX and T4 through wiring to the main connector (see the various muting types in the section “MZ-T4PR DX”, page 15). This configuration can be changed.
- SLM4 can be operated with the muting arms (integrated muting sensors, pre-adjusted and configured), with M5 muting sensors (available as accessories) or with any other muting sensor.
- The SLM4 models include the muting function, but do not have the integrated signal lamp.
- The programmable **SLM4PO** models include additional configuration options, which are suitable for complex applications.
- For the **SLM4O** and **SLM4PO** models with an integrated signal lamp, the status of the safety light barrier is also immediately visible from a distance.

### COMBINATION WITH MUTING ARMS (OPTIONAL ACCESSORY)

#### COMMENT

“Fig. 3-a” shows a receiver of an SLM4PO model. This model is equipped with the integrated signal lamp. The configuration connector enables a USB connection to a computer where the configuration software is installed.

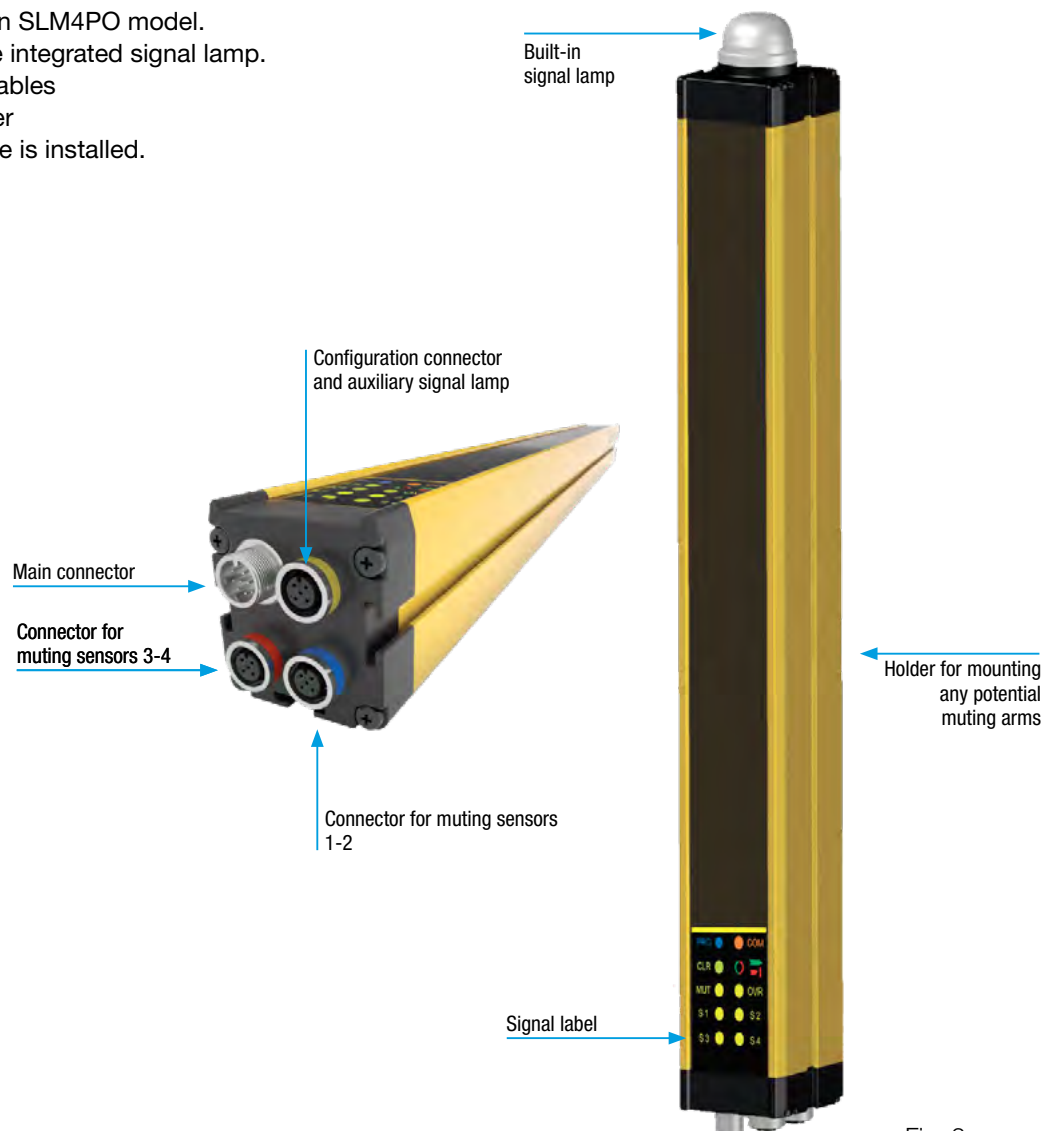
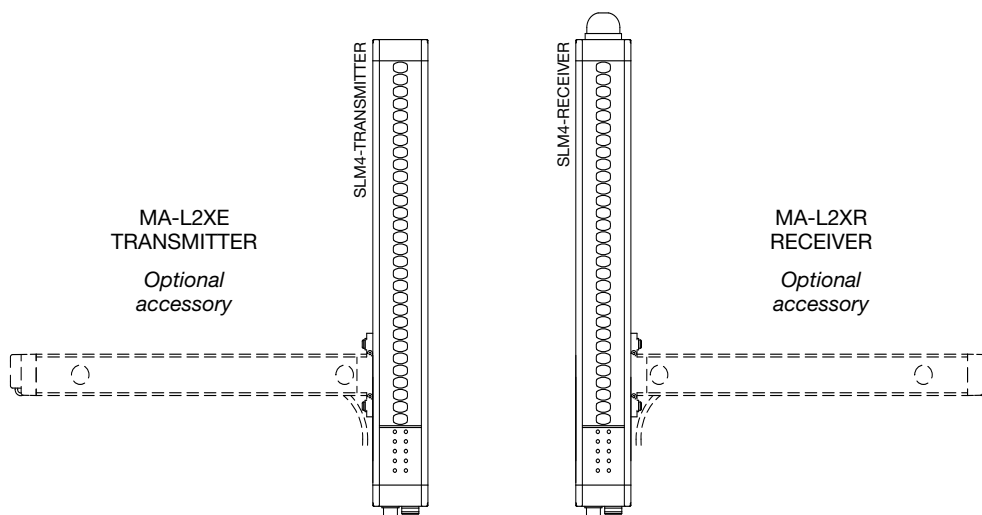


Fig. 3-a

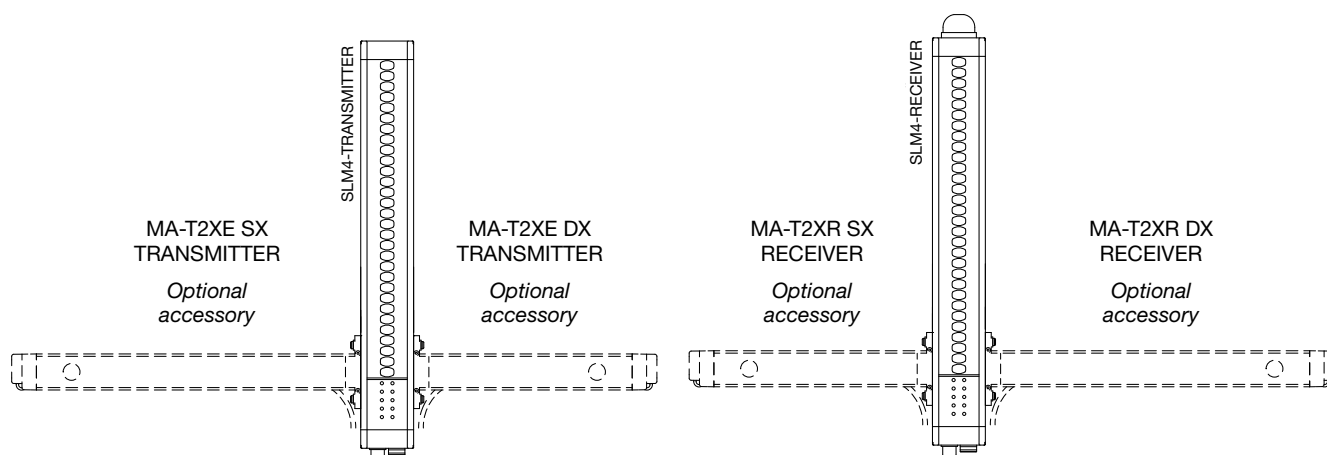


### 3 PRODUCT DESCRIPTION

#### MA-L2X - L ARMS WITH 2 CROSSED TX/RX BEAMS, 1 BEAM PER MUTING SENSOR

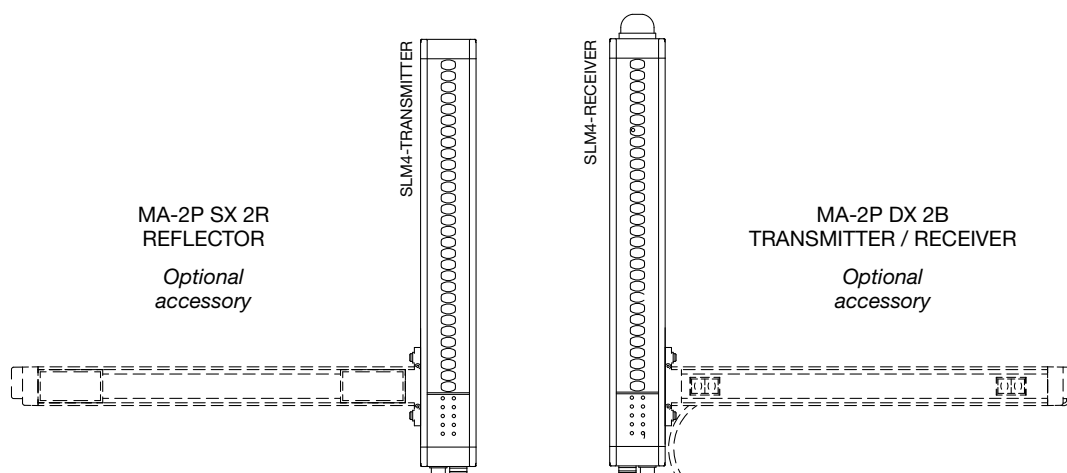


#### MA-T2X - T ARMS WITH 2 CROSSED TX/RX BEAMS, 1 BEAM PER MUTING SENSOR

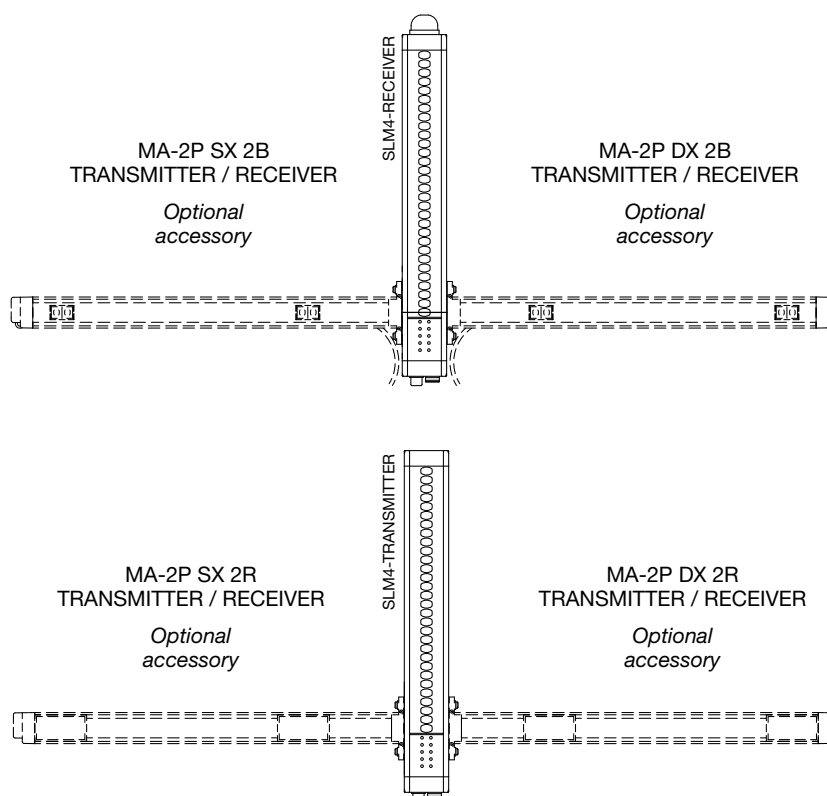


### 3 PRODUCT DESCRIPTION

#### MA-L2P - L ARMS WITH 2 PARALLEL BEAMS AND REFLECTOR, 1 BEAM PER MUTING SENSOR

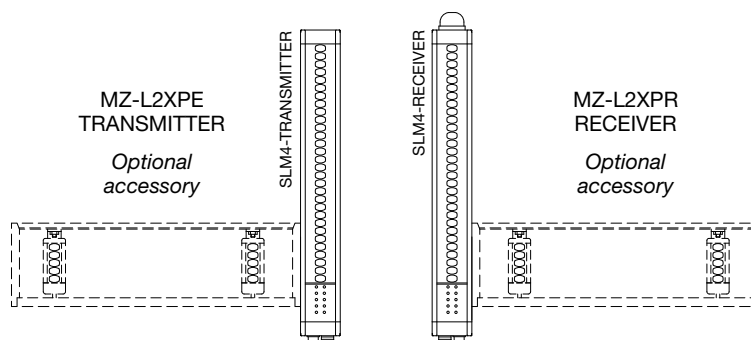


#### MA-T4P - T ARMS WITH 4 PARALLEL BEAMS AND REFLECTOR, 1 BEAM PER MUTING SENSOR

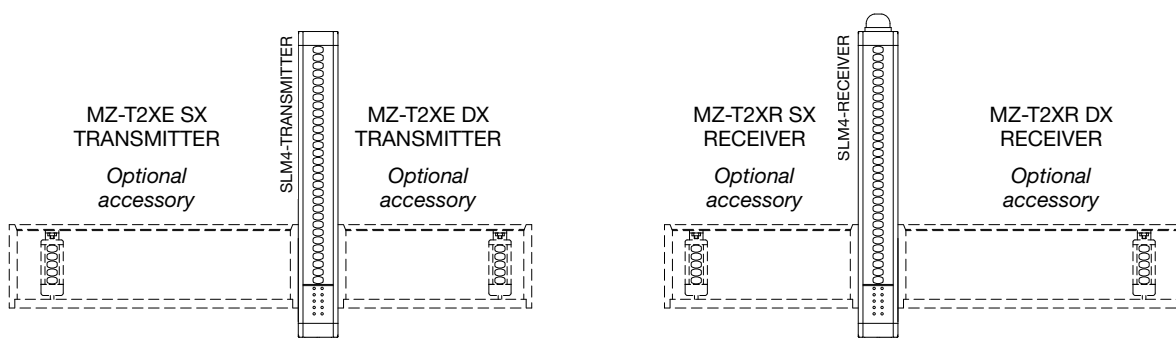


### 3 PRODUCT DESCRIPTION

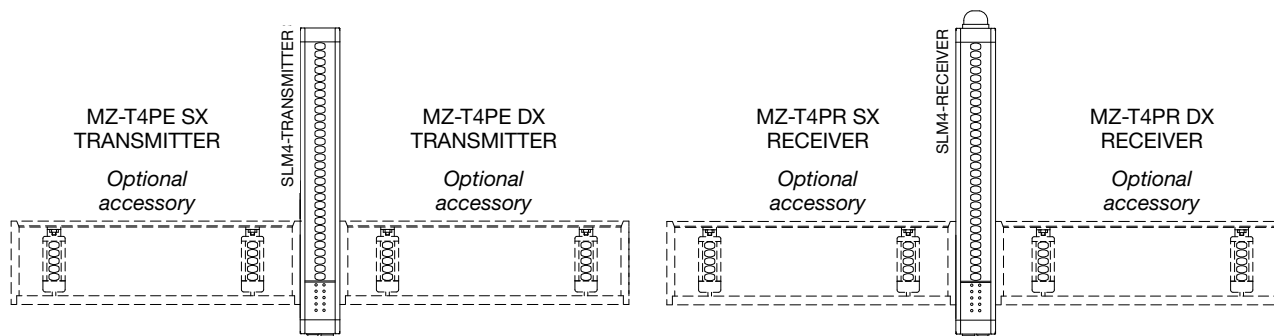
#### MZ-L2XP - L ARMS WITH 2 CROSSED /PARALLEL ADJUSTABLE M5 MUTING SENSORS, 5 BEAMS PER MUTING SENSOR



#### MZ-T2X - T ARMS WITH 2 CROSSED ADJUSTABLE M5 MUTING SENSORS, 5 BEAMS PER MUTING SENSOR



#### MZ-T4P - T ARMS WITH 4 PARALLEL ADJUSTABLE M5 MUTING SENSORS, 5 BEAMS PER MUTING SENSOR



## 4 THE MUTING FUNCTION

### 4 THE MUTING FUNCTION

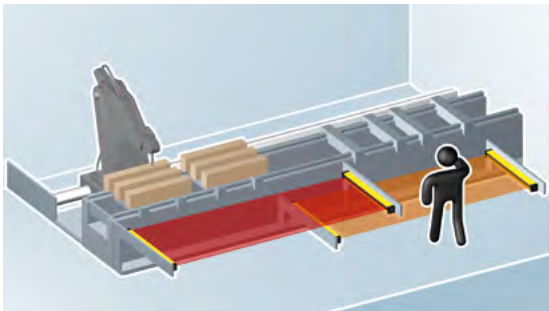
The muting function temporarily interrupts the safety function.



**WARNING!** Carefully check your risk analysis to make sure the muting function is compatible with your application and to determine which additional measures have to be taken.

There are essentially two types of use:

1. Persons are allowed access to the danger zone during the non-hazardous phase of the machine cycle.

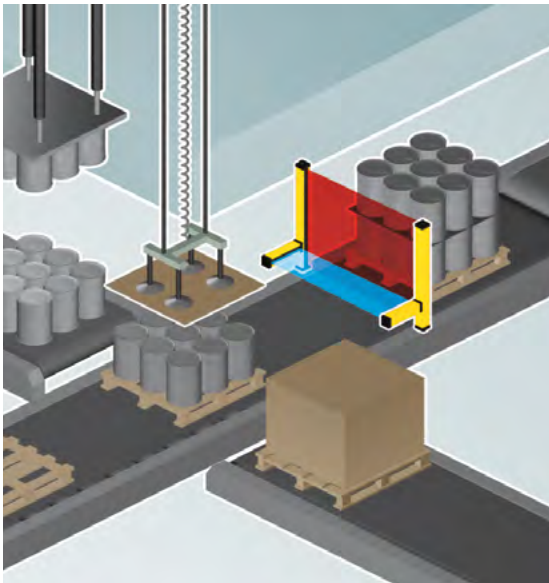


Example:

#### Positioning or removing the material to be processed

The safety light barrier providing protection from the dangerous tool is enabled. Another safety light barrier has the muting function on and allows the operator to load or unload the parts to be processed. The muting status of the two safety light barriers is reversed when the tool is active on the other side of the machine.

2. Material transport is enabled and persons are prohibited access.



Example:

#### Transport of pallets out of the danger zone

During muting, the muting sensors distinguish between human and material. Given a valid muting condition, the protective equipment is temporarily bypassed so that the material to be transported passes through the safety light barrier and can be conveyed out of the machine.

**The essential requirements for the muting function are described in the following standards:**

- IEC TS 62046: "Application of protective equipment to detect the presence of persons".
- EN 415-4: "Safety of packaging machines – Palletizers and depalletizers".
- IEC 61496-1: "Electro-sensitive protective equipment".

#### General requirements and tests:

- The muting function temporarily interrupts the safety function, which has to be automatically enabled and disabled.
- The muting function is allowed to be enabled and subsequently disabled only by using two or more wired and independent signals. This way, an individual malfunction cannot enable the muting function.
- It must be impossible for the muting function to be enabled when SLM4 disables the safety outputs.
- It is also prohibited for a muting function to be enabled by the device being switched off and on again.
- The muting function must be enabled at a suitable point of the machine cycle, i.e. when there are no risks for the operator.
- The muting sensors must be mechanically protected so that impacts do not change their alignment.

## 4 THE MUTING FUNCTION

### 4.1 MUTING ARMS WITH TWO CROSSED MUTING SENSORS, MATERIAL TRANSPORT OUT OF THE DANGER ZONE (L2X)

In this muting mode, the two muting arms are facing the danger zone in front of the vertically mounted safety light barrier and lie ahead of the dangerous passageway. This unidirectional mode is used for transporting material out of the danger zone.

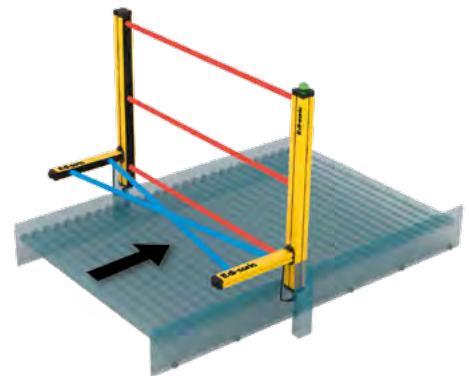
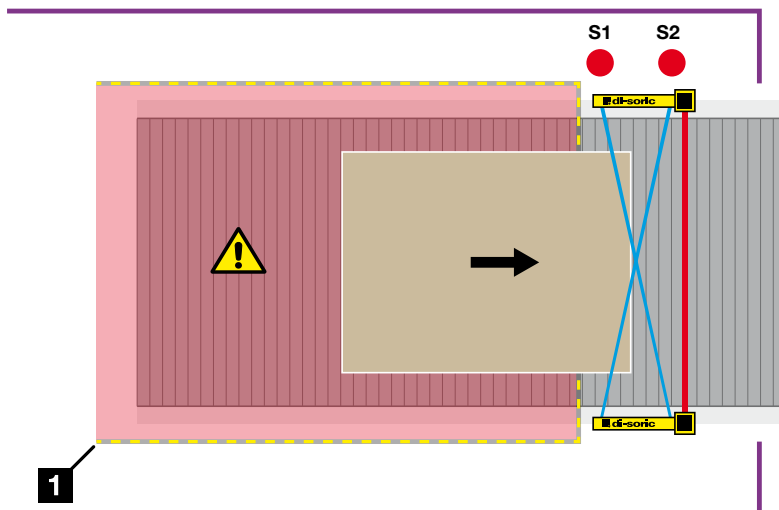
The muting function is enabled due to simultaneous interruption (within a maximum of 4 sec.) of sensors S1 and S2. As long as both sensors are occupied, the muting function remains enabled. When the first of the two sensors is enabled, the material still has 4 seconds to leave the area delineated and protected by the safety light barrier. The muting status is disabled as soon as the protected area is free. If the safety light barrier is still occupied after the 4 seconds, the OSSD outputs are disabled and the machine operation is simultaneously interrupted. For this mode, the selectable maximum duration of the muting status (muting timeout) is 30 seconds or 9 hours.



Programmable versions enable additional time configurations.



**WARNING!** For the L2X configuration to operate safely, the horizontal muting sensor elements absolutely must be facing the danger zone. The minimum distance between two successive pallets must be less than 10 cm or more than 32 cm.




1 Danger zone

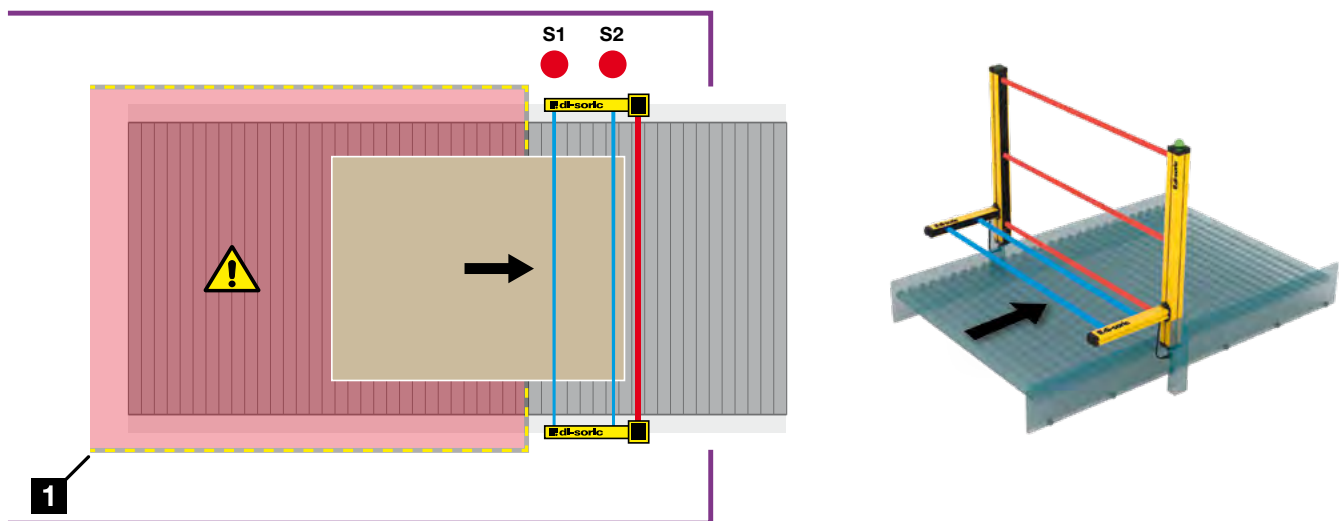
## 4 THE MUTING FUNCTION

### 4.2 MUTING ARM WITH TWO PARALLEL MUTING SENSORS, MATERIAL TRANSPORT OUT OF THE DANGER ZONE (L2P)

In this muting mode, sensors 1 and 2 are on the same side of the vertical safety light barrier and lie ahead of the dangerous passageway. This unidirectional mode is used for protecting material outputs. The muting function is enabled due to simultaneous interruption (within a maximum of 4 sec.) of sensors S1 and S2. As long as both sensors are occupied, the muting function remains enabled. When the first of the two sensors is enabled, the material still has 4 seconds to leave the area delineated and protected by the safety light barrier. The muting status is disabled as soon as the protected area is free. If the safety light barrier is still occupied after the 4 seconds, the OSSD outputs are disabled and the machine operation is simultaneously interrupted. For this mode, the selectable maximum duration of the muting status (muting timeout) is 30 seconds or 9 hours.

 Programmable versions enable additional time configurations.

 **WARNING!** For the configuration to function safely, the horizontal muting sensor elements absolutely must be facing the danger zone. The minimum distance between two successive pallets must be more than 40 cm.



1 Danger zone

## 4 THE MUTING FUNCTION

### 4.3 MUTING ARMS WITH TWO CROSSED MUTING SENSORS, MATERIAL TRANSPORT INTO AND OUT OF THE DANGER ZONE (T2X)

In this muting mode, one sensor (S1) is on the side of the vertically oriented safety light barrier facing the danger zone. The second sensor (S2) is on the side facing away from the danger zone. This bidirectional mode is used for transporting material out of and into the danger zone.

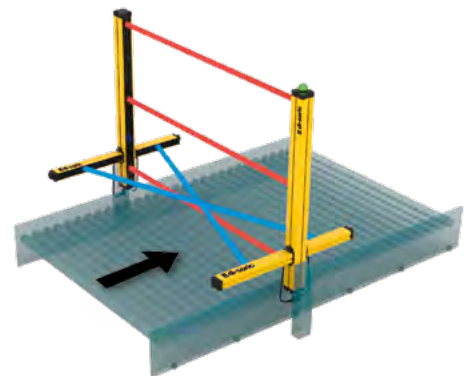
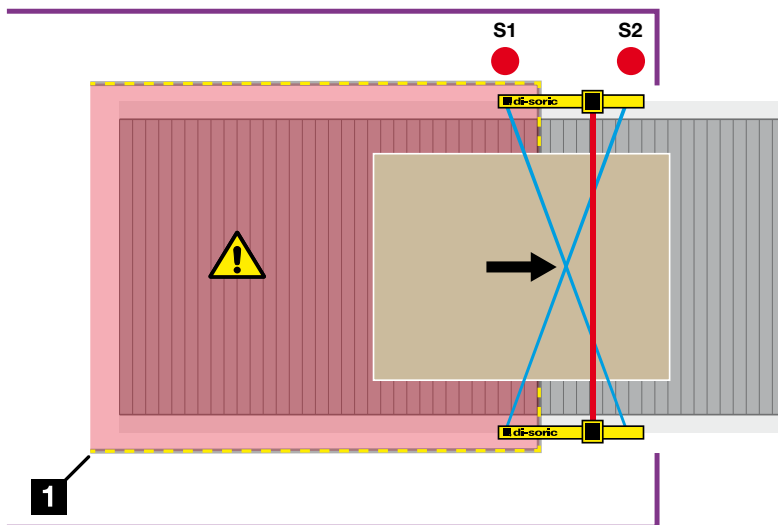


**WARNING!** The point at which the two muting sensors cross absolutely must be facing the danger zone to prevent unwanted and hazardous activation of the muting function.

The muting function is enabled due to simultaneous interruption (within a maximum of 4 sec.) of sensors S1 and S2. As long as both sensors are occupied, the muting function remains enabled. When the first of the two sensors is enabled, the muting function is disabled. For this mode, too, the selectable maximum duration of the muting status (muting timeout) is 30 seconds or 9 hours.



Programmable versions enable additional time configurations.



1 Danger zone

## 4 THE MUTING FUNCTION

### 4.4 MUTING ARMS WITH FOUR PARALLEL MUTING SENSORS, MATERIAL TRANSPORT INTO AND OUT OF THE DANGER ZONE (T4P)

In this muting mode, two sensors are on one side of the vertical safety light barrier and two are on the other side. This bidirectional mode is used for transporting material out of and into the danger zone.

Two operating modes are possible in this mode:

#### 4.4.1 SIMULTANEOUS

The muting function is enabled after sensors S1 and S2 are interrupted (within a max. of 4 s) (or S4 and S3 for material in the opposite direction).

The muting function ends after enabling of the passageway and of sensor S3 (or S2 for material in the opposite direction).

**i** For the T4 models (simultaneous operation) with hardware configuration, two muting timeouts are available: 1) 30 s; 2) 9 hours. Programmable versions enable additional time configurations

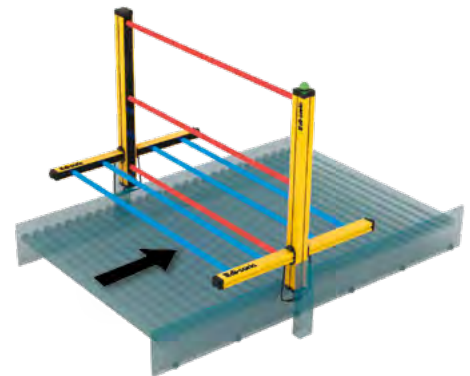
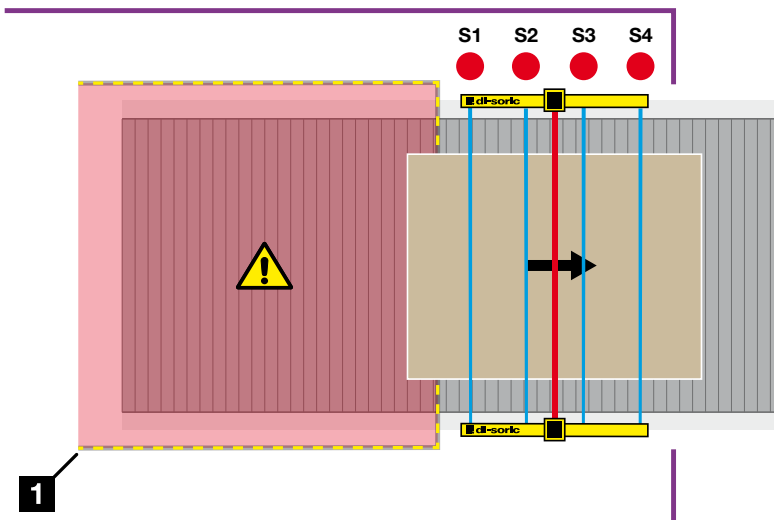
#### 4.4.2 IN SEQUENCE

The muting function is enabled after sensors S1 and S2 have been interrupted in sequence (or S4 and S3 for material in the opposite direction).

The muting function ends after enabling of the passageway and of sensor S3 (or S2 for material in the opposite direction).

**i** For the T4 models (operation in sequence) with hardware configuration, two muting timeouts are available: 1) 30 s; 2) ∞. Programmable versions enable additional time configurations.

**i** In both operating modes, the minimum length of the pallets is 70 cm (the required length to ensure that all four sensors are simultaneously occupied).



1 Danger zone



## 4 THE MUTING FUNCTION

### 4.5 TWO EXTERNAL CROSSED MUTING SENSORS, MATERIAL TRANSPORT INTO AND OUT OF THE DANGER ZONE (TX)

In this muting mode, one sensor is on one side of the vertical safety light barrier and the second is on the other side. This bidirectional mode is used for transporting material out of and into the danger zone.

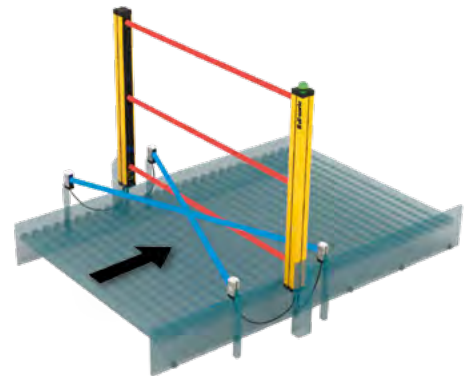
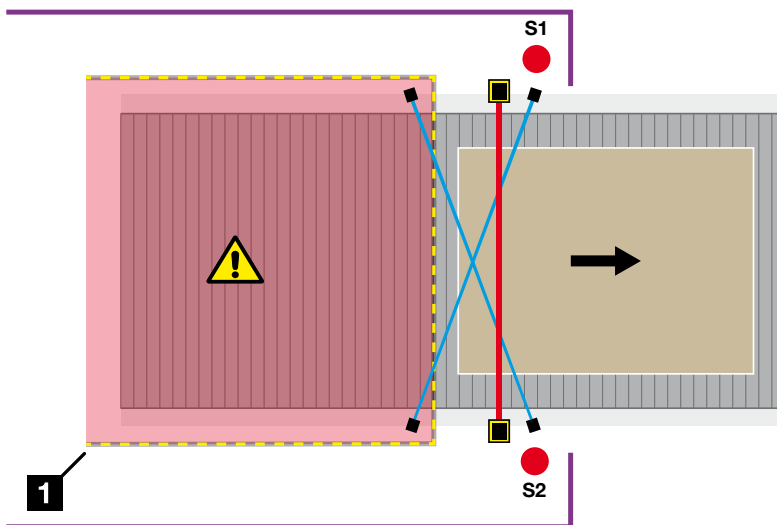


**WARNING!** The point at which the two sensors cross must be facing the danger zone to prevent unwanted and hazardous activation of the muting function.

The muting function is enabled due to simultaneous interruption (within a maximum of 4 sec.) of sensors S1 and S2. As long as both sensors are occupied, the muting function remains enabled. When the first of the two sensors is enabled, the muting function is disabled. For this mode, too, the selectable maximum duration of the muting status (muting timeout) is 30 seconds or 9 hours.



Programmable versions enable additional time configurations.



1 Danger zone

## 4 THE MUTING FUNCTION

### 4.6 FOUR EXTERNAL PARALLEL MUTING SENSORS, MATERIAL TRANSPORT INTO AND OUT OF THE DANGER ZONE (T4)

In this muting mode, two sensors are on one side of the vertical safety light barrier and two are on the other side. This bidirectional mode is used for transporting material out of and into the danger zone.

Two operating modes are possible in this mode:

#### 4.6.1 SIMULTANEOUS

The muting function is enabled after sensors S1 and S2 are interrupted (within a max. of 4 s) (or S4 and S3 for material in the opposite direction).

The muting function ends after enabling of the passageway and of sensor S3 (or S2 for material in the opposite direction).

**i** For the T4 models (simultaneous operation) with hardware configuration, two muting timeouts are available: 1) 30 s; 2) 9 hours. Programmable versions enable additional time configurations

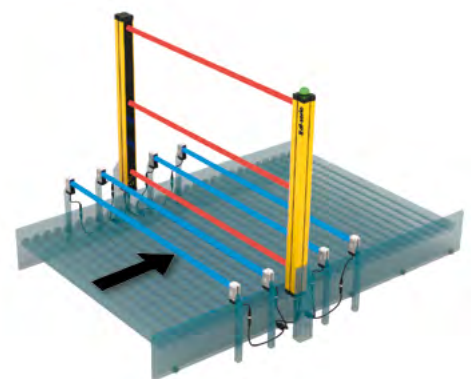
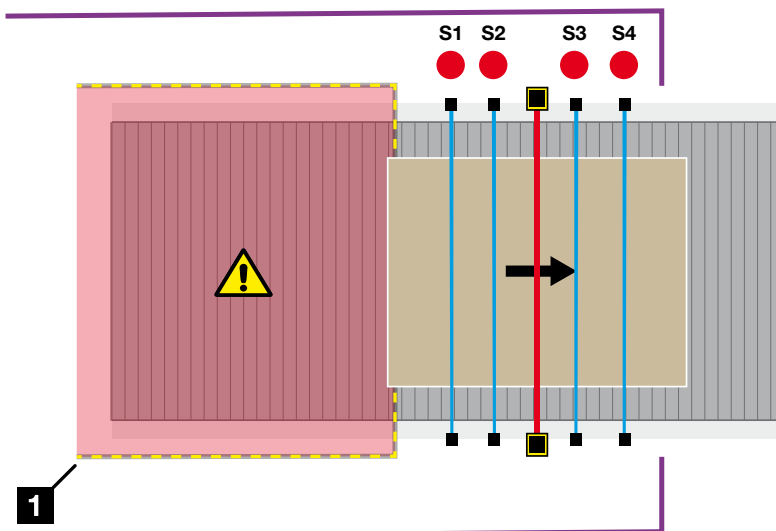
#### 4.6.2 IN SEQUENCE

The muting function is enabled after sensors S1 and S2 have been interrupted in sequence (or S4 and S3 for material in the opposite direction).

The muting function ends after enabling of the passageway and of sensor S3 (or S2 for material in the opposite direction).

**i** For the T4 models (operation in sequence) with hardware configuration, two muting timeouts are available: 1) 30 s; 2) ∞. Programmable versions enable additional time configurations.

**i** In both operating modes, the minimum length of the pallets is 70 cm (the required length to ensure that all four sensors are simultaneously occupied).



1 Danger zone

## 4 THE MUTING FUNCTION

### 4.7 MUTING OVERRIDE

The OVERRIDE function is required if the machine stops with material after a faulty muting sequence and material is blocking the dangerous passageway.

The OSSD outputs are disabled in this situation because the safety light barrier and/or at least one muting sensor are occupied. The OVERRIDE LED flashes in this state.



**DANGER!** This procedure enables the OSSD outputs and allows for removing the material blocking the output.

During the entire phase in which the OVERRIDE function is enabled, the Override/Muting lamp flashes. The efficiency of this lamp must be checked regularly (during the muting and override phases).

The override pulse command automatically enables the light barrier outputs until the safety light barrier and the muting sensors are clear again. The safety light barrier is not capable of protecting the input to the dangerous passageway for this time. Due to this, any work must be performed under strict supervision by specialist personnel.

The user uses the previously configured override type:

1. Override with sustained control system
2. Override with pulsed control system

#### **OVERRIDE WITH SUSTAINED CONTROL SYSTEM**

This function has to be enabled by inverting (within a time window of 400 ms) the wiring of pins 9 and 10 of the receiver by using a toggle switch.

The override takes a maximum of 15 minutes; it can end for two reasons.

1. When the switch is enabled or the 15 minutes have expired, the override ends; the outputs are set to OFF, the lamp is switched off and the display is reset to the normal state. However, it remains possible to start a new override by enabling the switch and then reactivating it.
2. The override ends when the safety light barrier and sensors are enabled (passageway is free) and the GUARD status is re-enabled (properly functioning safety light barrier) without requiring any other commands.

#### **OVERRIDE WITH PULSED CONTROL SYSTEM**

This function has to be enabled by inverting (within a time window of 400 ms) the wiring of pins 9 and 10 of the receiver by using a toggle switch.

#### **MAXIMUM OVERRIDE DURATION FOR MODELS WITH HARDWARE CONFIGURATION**

The override has a maximum duration of 15 minutes (repeatable). This function can start over from the beginning only if the button is pressed again (and the following conditions are observed):

1. Max. OVERRIDE duration overall (after x successive queries) = 60 min
2. Maximum number of successive OVERRIDE queries = 30.

#### **MAXIMUM OVERRIDE DURATION FOR MODELS WITH SOFTWARE CONFIGURATION**

This function can start over from the beginning only if the button is pressed again (and the following conditions are observed):

1. Max. OVERRIDE duration overall (after x successive queries) = **4 x override timeout**<sup>1</sup>
2. Maximum number of successive OVERRIDE queries = 30.

The override ends when the safety light barrier and sensors are enabled (passageway is free) and the GUARD status is re-enabled (properly functioning safety light barrier) without requiring any other commands.

The timer (point 1) and counter (point 2) are set to zero if one of the following conditions occurs:

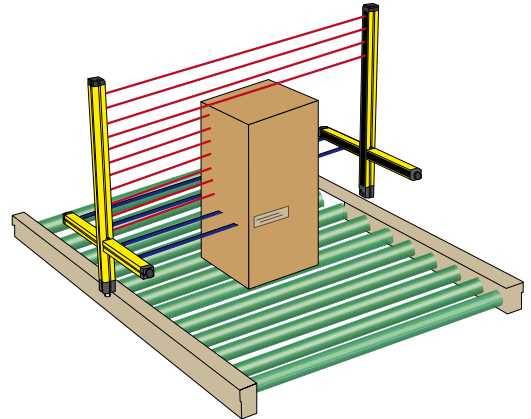
1. A correct muting sequence.
2. A reset (switching off and on again) of the system.

<sup>1</sup> The "timeout override" parameter is set using the configuration software

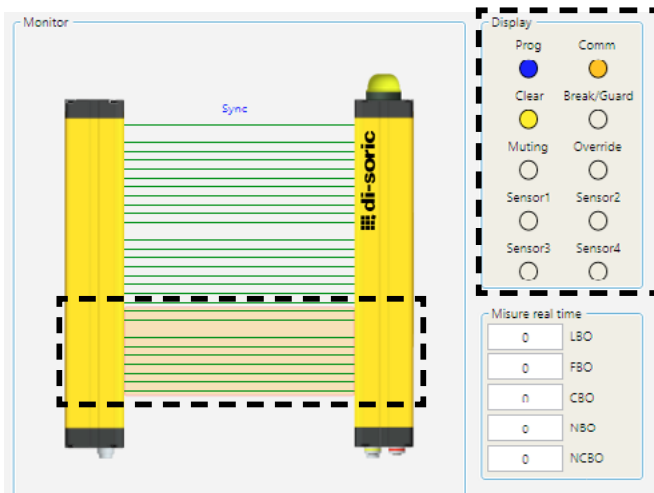
## 4 THE MUTING FUNCTION

### 4.8 PARTIAL MUTING

The partial muting function provides for the option of limiting the muting function to the specified range of beams for safety light curtains. This function can enable the muting function only for the beams of the safety light barrier that are interrupted by the material moving through the passageway (e.g. lower pallets at the end of the cycle). The other beams remain enabled to protect the dangerous passageway.



This function is available only for the SLM4PO models and must be managed using the SLM4 Configurator software (select “Enabling partial muting”).



Use the software to select the number of beams affected by partial muting; when doing so, take into account that the first partial muting beam is located at the electrical connector.

For this process it can be useful to use the software's monitoring function (the free beams are displayed in a different color from the occupied beams) and the various pieces of numeric information on the side (LBO, FBO, etc.). During configuration of the number of beams affected by this function, only one value can be entered.

There are two types of partial muting, and the “Partial Muting” input pin (pin 6 of the M12 connector – 12 pins of the receiver) has to be used for both:

#### 4.8.1 PARTIAL MUTING WITH ENABLE

For this option, the partial muting function is usually disabled. Enabling the function requires the input signal to be changed (pin 6 of the receiver) from LO to HI (front side of rise) before the muting cycle is started.

#### 4.8.2 PARTIAL MUTING WITH DISABLE

For this option, the partial muting function is usually enabled. Disabling the function requires the input signal to be changed (pin 6 of the receiver) from LO to HI (front side of rise) before the muting cycle is started.



See section “3 Product description” for the correct setting of this function.

## 5 INSTALLATION



**DANGER!** For applications on packaging machines (palletizers and depalletizers), the provisions in the European standard EN 415-4 must be followed.

### 5.1 SAFETY DISTANCE



**DANGER!** The effectiveness of the protective function strongly depends on the safety light barrier being positioned correctly in relation to the danger. The safety light barrier distance must correspond to at least the safety distance  $S$  so that the dangerous point can be reached only after the machine's dangerous action is stopped.

The safety light barrier must be positioned as follows:

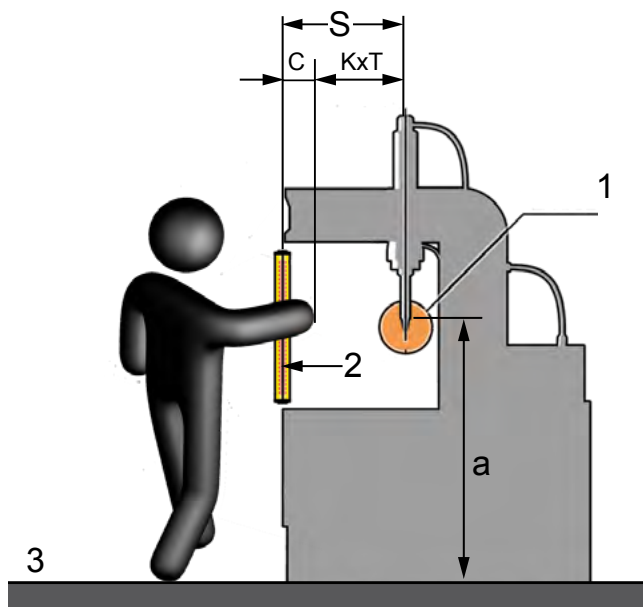
- It must be impossible to reach the dangerous point without crossing the monitored zone of the safety light barrier.
- No person is allowed to be in the danger zone without being detected. For this case, it may be necessary to have additional safety devices (e.g.: horizontal safety light barriers).

The standard ISO 13855 provides the elements for calculating the safety distance.

If the machine in question is subject to a specific standard of Type C, then this standard must be referenced.

If the calculated distance  $S$  is too large, proceed as follows:

- Reduce the total time of the machine downtime
- Improve the resolution of the safety light barrier



- 1. Dangerous point
- 2. Protected plane
- 3. Reference plane
- a. Height of the dangerous point
- S. Safety distance

### 5.2 GENERAL FORMULA FOR CALCULATING THE SAFETY DISTANCE

$$S = K \times T + C$$

S	Safety distance between the protection and the dangerous point, expressed in mm.
K	Speed at which the body or body parts are approaching, expressed in mm per second. K can assume the following values: K = 2000 mm per second for a safety distance up to 500 mm K = 1600 mm per second for a safety distance above 500 mm
T	The total duration of the machine downtime consists of: t1 Response time of the protective device in seconds t2 Response time of the machine for stopping the dangerous action, in seconds.
C	Additional distance in mm.

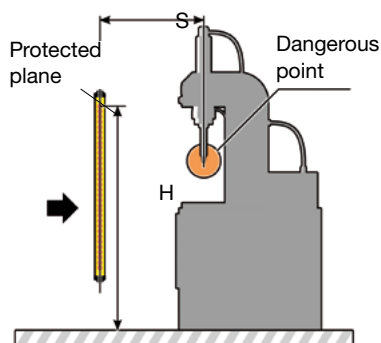
## 5 INSTALLATION

### 5.3 SAFETY DISTANCE FOR MODELS WITH A RESOLUTION OF 30 MM



Safety light barrier with a resolution of 30 mm for detecting a hand.

Barrier resolution (d) 30 mm



Calculating the minimum safety distance (S)

Refer to the general formula for calculating the safety distance:

$$S = K \times T + C$$

$$S = 2000 \times T + 8 \times (d - 14)$$

If the result of the formula is:  $S > 500$ , the following values can be used:

$$K = 1600$$

$$S = 1600 \times T + 8 \times (d - 14)$$

(with  $C = 8 \times (d - 14)$ )



**DANGER!** The distance S must not be less than 100 mm.

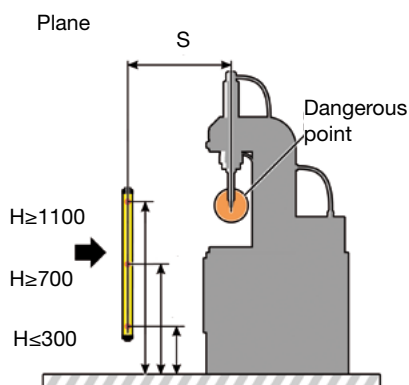
If the distance S is greater than 500 mm, it can be recalculated using  $K = 1600$ . In this case, the distance also must not be less than 500 mm.

### 5.4 SAFETY DISTANCE FOR MODELS WITH 2/3/4 BEAMS



Safety light barrier for detecting a body for perimeter access control.

Barrier with 2/3/4 beams



Calculating the minimum safety distance (S)

Refer to the general formula for calculating the safety distance:

$$S = K \times T + C$$

$$S = 1600 \times T + 850$$

Recommended height depending on the number of beams

N°	Recommended height
2	400 - 900 mm
3	300 - 700 - 1100 mm
4	300 - 600 - 900 - 1200 mm



**DANGER!** The distance S must not be less than 100 mm.

If the distance S is greater than 500 mm, it can be recalculated using  $K = 1600$ . In this case, the distance also must not be less than 500 mm.

## 5 INSTALLATION

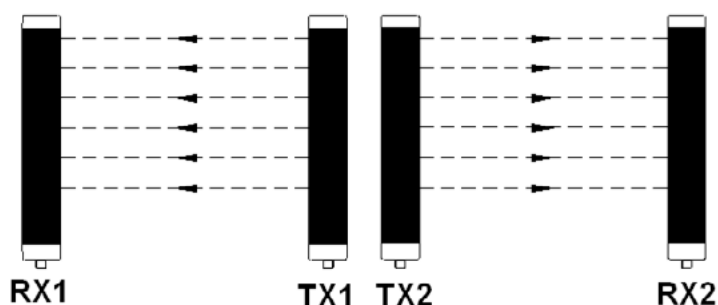
### 5.5 SYSTEMS WITH MULTIPLE DEVICES



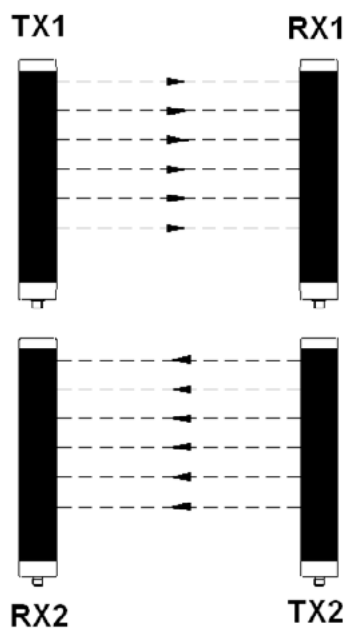
**WARNING!** If multiple safety light curtains / grids are used, it is necessary to prevent the systems from affecting each other. Install the safety light curtains / grids in such a way that the beam being emitted by the transmitter of a system can be detected only by the corresponding receiver.

The following figure shows some examples of correct positioning of the two safety light barriers. Incorrect positioning can result in the devices affecting each other, which could lead to malfunctions.

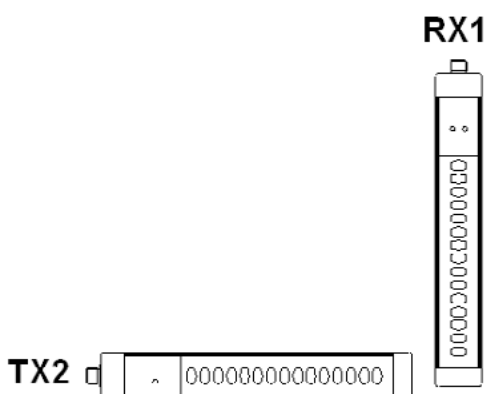
Position of transmitter 1 and transmitter 2 side-by-side



Position of transmitter 1 and receiver 2 one above the other



“L” combination



## 5.6 USING DEFLECTION MIRRORS

To protect or monitor areas with access on multiple sides, one or more deflection mirrors can be used in addition to the transmitter and receiver. Additional deflection mirrors allow for securing multiple sides of a danger zone.



If the beams emitted by the transmitter have to be deflected 90°, then there must be a 45° angle between the mirror surface and the beams.

The following figure “Fig. 5-b” shows an application where three sides of a danger zone are secured with two deflection mirrors.

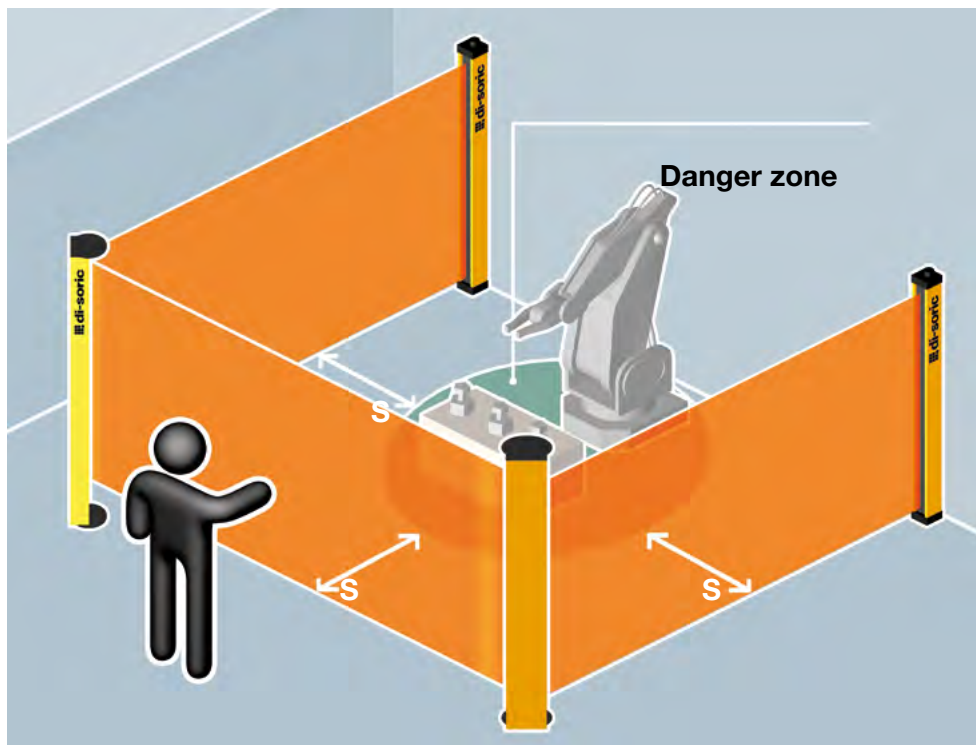


Fig. 5-b

When deflection mirrors are used, the following must be observed:

- The mirrors must be set up so that the safety distance  $S$  is maintained on each access side of the danger zone.
- The operating distance (range) is yielded from the sum of the lengths of all access sides of the monitored area. (Note that the maximally usable range from the transmitter to the receiver is reduced by 15% for each mirror.)
- During the installation phase, special care must be taken not to create any twisting along the longitudinal axis of the mirror.
- Position yourself near the receiver and in line with it to check whether the entire profile of the transmitter is visible in the first mirror.
- We recommend using no more than three deflection mirrors.



## 5 INSTALLATION

### 5.7 DISTANCE FROM REFLECTIVE SURFACES



**DANGER!** The presence of reflective surfaces near the safety light barrier can create disruptive reflections that prevent detection. Light beams of the transmitter can be deflected by reflective surfaces “S” and can result in the object “A” not being detected. Therefore, a minimum distance must be maintained between any reflective surfaces that are present and the protected area. To calculate the minimum distance, we recommend using the values from the standard IEC/EN 61496-2 intended for Type 4 systems.

The following figure “Fig. 5-c” specifies the aforementioned dimensions of distance  $d$  as a function of distance  $l$  between the transmitter and receiver.

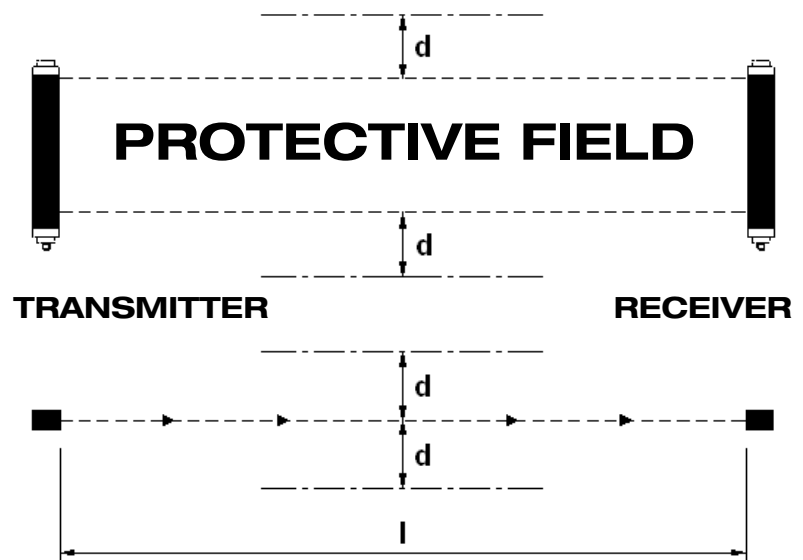
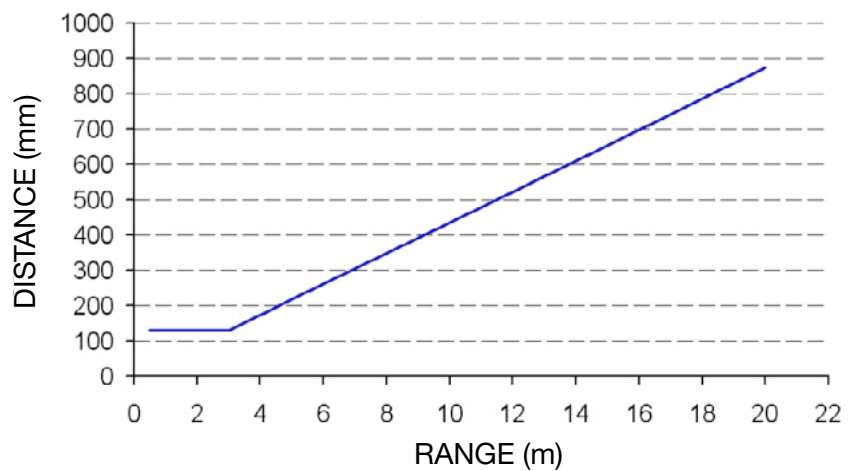
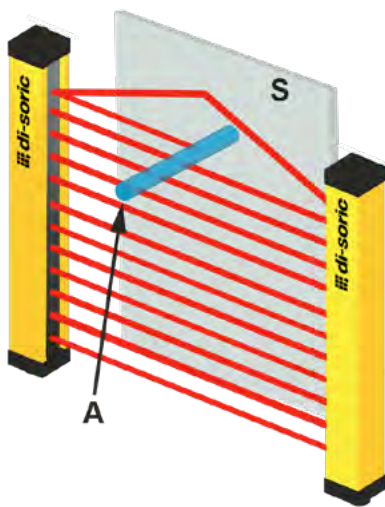


Fig. 5-c



When the installation is finished, check whether reflective surfaces are present and intercepting beams, first in the middle, then near the transmitter and receiver. During this process, the red LED of the receiver absolutely must not turn off.

## 5.8 MECHANICAL INSTALLATION AND OPTICAL ALIGNMENT

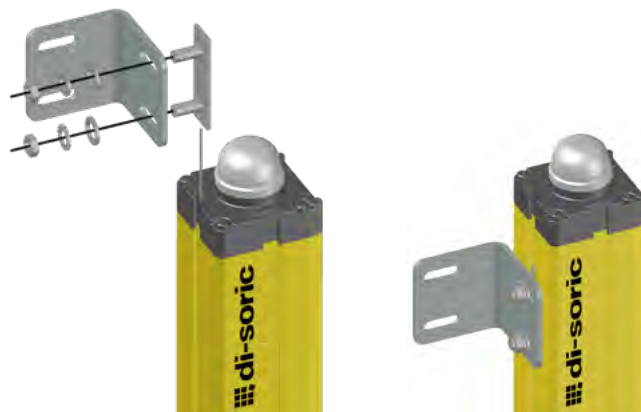


**DANGER!** The following tasks may be carried out only by qualified personnel, as otherwise the safety functions of the system are not guaranteed.

- The transmitter and receiver can be installed using the provided fastening materials.

### Scope of delivery

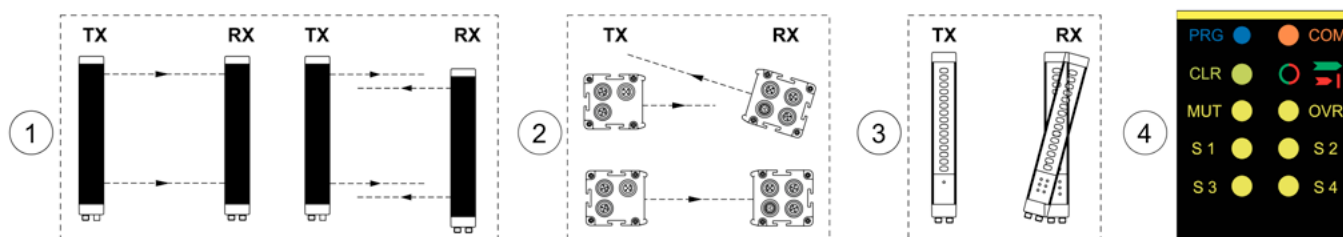
Light grids with 2 beams and light curtains with protective field height up to 620 mm	<ul style="list-style-type: none"> <li>■ 4 mounting brackets</li> <li>■ 4 mounting elements with M6 threaded bolts</li> <li>■ Nuts</li> <li>■ Washers</li> </ul>
Light grids with 3 or 4 beams and light curtains with a protective field height of 760 mm or more	<ul style="list-style-type: none"> <li>■ 6 mounting brackets</li> <li>■ 6 mounting elements with M6 threaded bolts</li> <li>■ Nuts</li> <li>■ Washers</li> </ul>



- The transmitter and receiver must be installed opposite one another and the distance between them must not be larger than the maximum value specified in the technical data. The provided elements and mounting brackets must be used to position the transmitter and receiver so that they are aligned with each other and parallel. The connectors must be turned to the same side.
- Correct alignment of the transmitter and receiver is essential for the safety light barrier to function properly; these tasks are made easier by the display of the signal LEDs of the transmitter and receiver.
- Establish the electrical connections as described in the respective chapter.

## 5 INSTALLATION

**i** Pay attention to which SLM4 model you are connecting.  
Connections may vary from model to model.



Position the optical axis of the first and last beam of the transmitter on the same axis of the corresponding beams of the receiver.

- Move the transmitter to find the range within which the green LED of the receiver remains on. Position the first beam of the transmitter (the one next to the display).
- Move the opposite side of the transmitter in small lateral movements in such a way that the green LED of the receiver remains on.
- Fasten transmitter and receiver.

**!** **NOTE!** If the transmitter and receiver are installed in areas subject to strong vibration, then the vibration dampers must be used to prevent impaired operation.

## 6 ELECTRICAL CONNECTION OF SLM4, SLM40 – HARDWARE CONFIGURATION OF SLM4



**NOTE!** Transmitter and receiver must be supplied with a voltage of 24 V DC  $\pm$  20%.

The external power supply must be in accordance with the EN 60204-1 standard.

To guarantee the declared environmental protection degree (IP65-IP67), any unused connectors must be equipped with the enclosed protective caps.

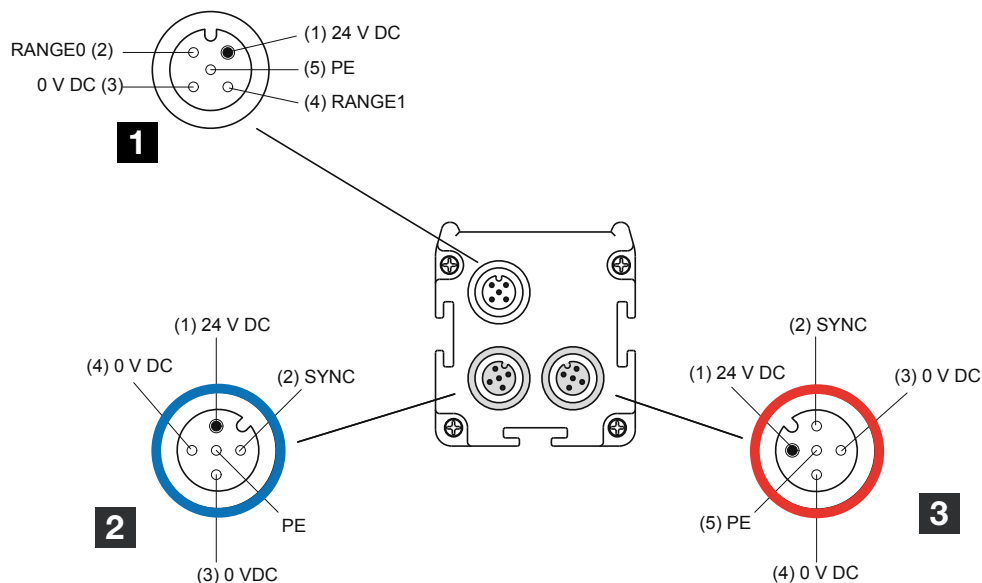
### SAFETY PRECAUTIONS

- Do not connect to ground until all other connections have been made.
- Establish all connections before the SLM4 is supplied with power.
- All system components must have a common ground connection (0 V DC).

### CONNECTION CABLE REQUIREMENT

- Cable cross-section 0.25 - 2.5 mm<sup>2</sup>.
- Keep the SLM4 power supply separate from the other electrical devices (electric motors, converters, frequency modulators) and other sources of interference.
- For connections with a length of more than 20 m, use cables with a cross-section of at least 0.5 mm<sup>2</sup> (AWG16) (1 mm<sup>2</sup> for a length of more than 50 m).

### 6.1 CONNECTIONS OF THE TRANSMITTER



Key

1 Connection 1, [Page 33](#)

Table 1, [Page 33](#)

2 Connection 2, [Page 33](#)

3 Connection 3, [Page 33](#)

## 6 ELECTRICAL CONNECTION OF SLM4, SLM40 – HARDWARE CONFIGURATION OF SLM4

### Connection 1 main connector

PIN	COLOR	SIGNAL	IN/OUT	DESCRIPTION	ELECTRICAL LEVEL
1	Brown	24 V DC	-	Power supply 24 V DC	Positive
2	White	RANGE 0	Input	Selection of the range	(see "Table 1: Selection of the range and test - connection 1")
3	Blue	0 V DC	-	Power supply 0 V DC	Negative
4	Black	RANGE 1	Input	Selection of the range	(see "Table 1: Selection of the range and test - connection 1")
5	Gray	PE	-	Ground connection	-

Table 1: Selection of the range and test - connection 1

PIN 2	PIN 4	FUNCTION	
24V DC	0 V DC	Short range	For the range values, see "10 Technical data", page 61
0V DC	24 V DC	Long range	
0V DC	0 V DC	Test of the barrier	(see section, "6.3 Test function", page 36)
24V DC	24 V DC	-	Prohibited status

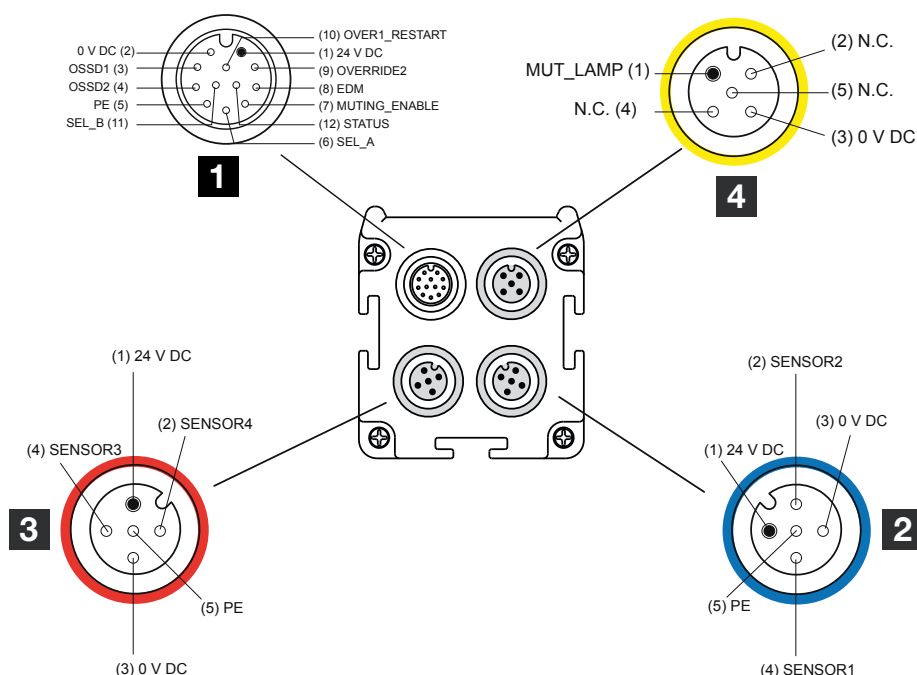
### Connection 2 muting sensors 1 - 2 (blue marking)

PIN	COLOR	SIGNAL	IN/OUT	DESCRIPTION	ELECTRICAL LEVEL
1	Brown	24 V DC	-	Power supply for sensors 24 V DC	24 V DC
2	White	SYNC	Output	Synchronization with M5 arms	Coded proprietary signal
3	Blue	0 V DC	-	Power supply for sensors 0 V DC	0 V DC
4	Black	0 V DC	-	Power supply for sensors 0 V DC	0 V DC
5	Gray	PE	-	Ground connection	-

### Connection 3 muting sensors 3 - 4 (red marking)

PIN	COLOR	SIGNAL	IN/OUT	DESCRIPTION	ELECTRICAL LEVEL
1	Brown	24 V DC	-	Power supply for sensors 24 V DC	24 V DC
2	White	SYNC	Output	Synchronization with M5 arms	Coded proprietary signal
3	Blue	0 V DC	-	Power supply for sensors 0 V DC	0 V DC
4	Black	0 V DC	-	Power supply for sensors 0 V DC	0 V DC
5	Gray	PE	-	Ground connection	-

## 6.2 CONNECTIONS OF THE RECEIVER



## Key

- 1 Connection 1, Page 34  
 2 Connection 2, Page 35  
 3 Connection 3, Page 35  
 4 Connection 4, Page 35

Connection 1 main connector					
PIN	COLOR	SIGNAL	IN/OUT	DESCRIPTION	ELECTRICAL LEVEL
1	Brown	24 V DC	-	Power supply 24 V DC	-
2	Blue	0 V DC	-	Power supply 0 V DC	-
3	White	OSSD1	Output	Static safety outputs	PNP high enabled
4	Green	OSSD2	Output		
5	Pink	PE	-	Ground connection	-
6	Yellow	SEL_A	Input	Muting configuration	See section “6.4 Selecting the operating mode”, page 36
7	Black	MUT_ENABLE	Input	External Muting Enable	The SLM4 regards the muting cycle as correct if the system detects a rising edge of the signal “6.9 Muting Enable”, page 40 before the sensors are occupied.
8	Gray	EDM	Input	Feedback K1/K2	Feedback of external contactors “6.5 EDM”, page 37
9	Red	OVERRIDE 2	Input	Override request	See section “6.6 Override”, page 38
		OVERRIDE 1		Override request	
10	Purple	RESTART	Input	Interlock at restart	See section “6.7 Manual operation (restart)”, page 39
11	Gray/pink	SEL_B	Input	Muting configuration	See section “6.4 Selecting the operating mode”, page 36
12	Red/blue	STATUS	Output	System status	PNP high enabled

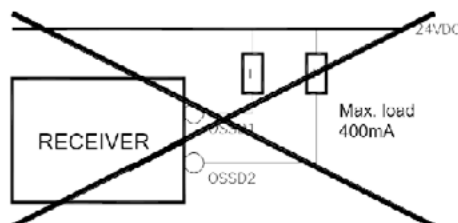
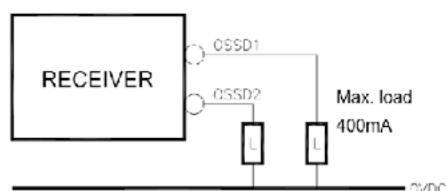
## 6 ELECTRICAL CONNECTION OF SLM4, SLM40 – HARDWARE CONFIGURATION OF SLM4



**NOTE!** When connecting highly inductive loads to OSSDs, use suitable voltage suppressors at the outputs.



**NOTE!** If a protective field is free, the receiver returns a voltage of 24 VDC at BOTH outputs. The load has to be connected between BOTH output terminals and 0 VDC.



### Connection 2 muting sensors 1 - 2 (blue marking)

PIN	COLOR	SIGNAL	IN/OUT	DESCRIPTION	ELECTRICAL LEVEL
1	Brown	24 V DC	-	Power supply for sensors 24 V DC	Positive
2	White	SENSOR 2	Input	Status of sensor 2	< 5V DC : FREE SENSOR 11-30 V DC : ENABLED SENSOR
3	Blue	0 V DC	-	Power supply for sensors 0 V DC	Negative
4	Black	SENSOR 1	Input	Status of sensor 1	< 5V DC : FREE SENSOR 11-30 V DC : ENABLED SENSOR
5	Gray	PE	-	Ground connection	-

### Connection 3 muting sensors 3 - 4 (red marking)

PIN	COLOR	SIGNAL	IN/OUT	DESCRIPTION	ELECTRICAL LEVEL
1	Brown	24 V DC	-	Power supply for sensors 24 V DC	Positive
2	White	SENSOR 4	Input	Status of sensor 4	< 5V DC : FREE SENSOR 11-30 V DC : ENABLED SENSOR
3	Blue	0 V DC	-	Power supply for sensors 0 V DC	Negative
4	Black	SENSOR 3	Input	Status of sensor 3	< 5V DC : FREE SENSOR 11-30 V DC : ENABLED SENSOR
5	Gray	PE	-	Ground connection	-

### Connection 4 external muting lamp (yellow marking)

PIN	COLOR	SIGNAL	IN/OUT	DESCRIPTION	ELECTRICAL LEVEL
1	Brown	MUT_LAMP	-	Muting Enable command lamp	24 V DC when muting is enabled
2	White	n.c.	-	-	-
3	Blue	0 V DC	Output	Muting lamp 0 V DC	0 V DC
4	Black	n.c.	-	-	-
5	Gray	n.c.	-	-	-



For the LX or TX configuration with 2 sensors, wiring of sensor 1 is mandatory. The operator can select the position of the second muting sensor between sensor 2 and sensor 3. Sensor 2: Muting arms MALX; Sensor 3: Muting arms MATX or external muting sensors.

### 6.3 TEST FUNCTION

By simulating occupation of the protected area, the test function enables a function check of the safety light barrier with an external monitor (e.g. PLC, control module, etc.). By having an automatic system for detecting defects, the SLM4 safety light barrier is capable of detecting a defect within the response time.

This detection system is continuously enabled and requires no external intervention. If the user wants to check the devices upstream of the safety light barrier (without physically reaching into the protected area), the TEST command is available. This command permits switching the OSSD from the ON status to the OFF status as long as the command remains active.



The minimum duration of the TEST command must be at least 40 ms.

### 6.4 SELECTING THE OPERATING MODE

The inputs of the SLM4 receiver (main connector - M12 - 2 pin) enable both operating modes to be configured.

At switch-on, the inputs of the SLM4 receiver must be connected correctly, as specified in the following, to function properly.

The following tables enable the user to configure the muting type to be used in relation to: MUTING MODE, MUTING TIMEOUT, MANUAL MODE and AUTOMATIC MODE.

MANUAL MODE	SEL_A (pin 6)	SEL_B (pin 11)	MUTING MODE	MUTING TIMEOUT
	24 V DC (1)	OSSD1 (3)	4 sensors in sequence	30 s
	24 V DC (1)	OSSD2 (4)	4 sensors in sequence	∞
	OSSD 2 (4)	OSSD1 (3)	2 sensors "Tx" mode	30 s
	OSSD1 (3)	OSSD2 (4)	2 sensors "Tx" mode	9 hours
	OSSD 1 (3)	24 V DC (1)	2 sensors "L" mode	30 s
	OSSD 2 (4)	24 V DC (1)	2 sensors "L" mode	9 hours
	OSSD 2 (4)	OSSD2 (4)	4 sensors simultaneous	30 s
	OSSD 1 (3)	OSSD1 (3)	4 sensors simultaneous	9 hours
	n.c. / 0 V DC	n.c. / 0 V DC	Configuration error	
	n.c. / 0 V DC	n.c. / 0 V DC	SLM4PO models: Configuration required	

AUTOMATIC MODE	SEL_A (pin 6)	SEL_B (pin 11)	MUTING MODE	MUTING TIMEOUT
	24 V DC (1)	24 V DC (1)	4 sensors in sequence	30 s
	STATUS (12)	STATUS (12)	4 sensors in sequence	∞
	24 V DC (1)	STATUS (12)	2 sensors "Tx" mode	30 s
	STATUS (12)	24 V DC (1)	2 sensors "Tx" mode	9 hours
	STATUS (12)	OSSD1 (3)	2 sensors "L" mode	30 s
	OSSD1 (3)	STATUS (12)	2 sensors "L" mode	9 hours
	STATUS (12)	OSSD2 (4)	4 sensors simultaneous	30 s
	OSSD2 (4)	STATUS (12)	4 sensors simultaneous	9 hours
	n.c. / 0 V DC	n.c. / 0 V DC	Configuration error	
	n.c. / 0 V DC	n.c. / 0 V DC	SLM4PO models: Configuration required	



## 6.5 EDM

The EDM function (control of the external K1/K2) is enabled / disabled by the hardware ("Fig. 6-d"):

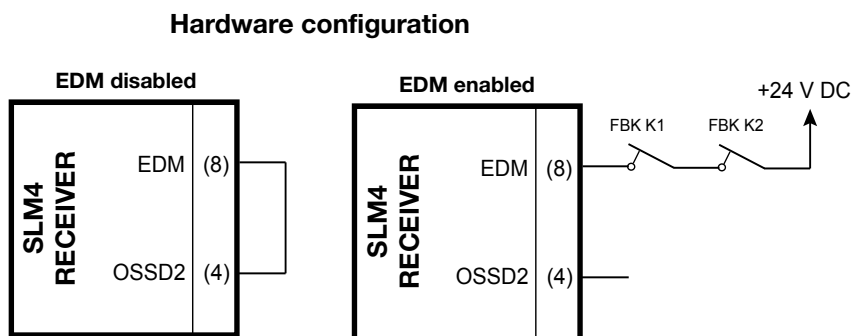


Fig. 6-d

### EDM ENABLED

SLM4 waits for a signal with inversed logic for the status of the external relays.

- OSSD1/OSSD ON: External contacts K1/K2 closed: EDM = CIRCUIT OPENED
- OSSD1/OSSD OFF: External contacts K1/K2 opened: EDM = CIRCUIT CLOSED

Connect pin 8 of the 12-pin connector on the receiver as specified.



The time that has to pass between activation of the OSSD outputs and opening of the FBK contacts must be  $t < 500$  ms ("Fig. 6-e").

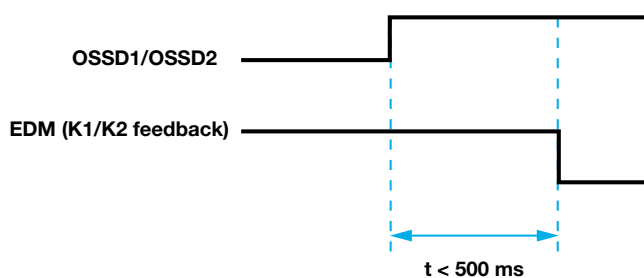


Fig. 6-e

## 6.6 OVERRIDE

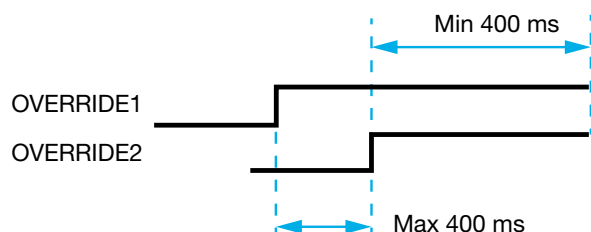
SLM4 enables the configuration of two types of override; (see section “4.7 Muting override”, page 23 for a description of the following function).

**i** All it takes to activate the **OVERRIDE** for muting type “L” is for the safety light barrier to be occupied, while for muting type “T” the safety light barrier and at least one sensor must be occupied.

CONNECTIONS AT SWITCH-ON		
OVERRIDE1 (pin 10)	OVERRIDE2 (pin 9)	SELECTION
0	0	Override with sustained control system
0	1	Override with pulsed control system
1	0	Configuration incorrect
1	1	

### OVERRIDE WITH SUSTAINED CONTROL SYSTEM

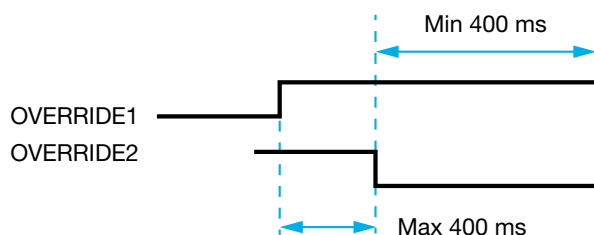
This function is started by simultaneously enabling both **OVERRIDE** inputs as shown in the following diagram:



This function is started only if the signals are activated simultaneously, in the same moment (with a delay no greater than 400 ms), and the button is pressed and held for at least 400 ms.

### OVERRIDE WITH PULSED CONTROL SYSTEM

This function is started by simultaneously enabling both **OVERRIDE** inputs as shown in the following diagram:



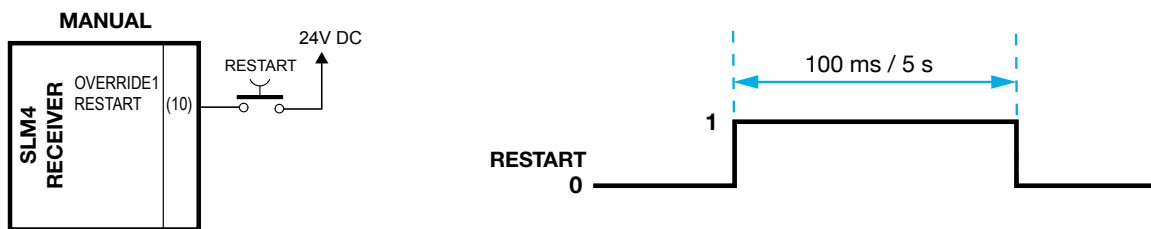
This function is started only if the signals are activated simultaneously (with a delay no greater than 400 ms) and the control system is kept active for at least 400 ms.

## 6.7 MANUAL OPERATION (RESTART)

See “8.1.1 Hardware configuration, manual operating mode”, page 51.

Pin 10 has the RESTART function. In connection with the occupation of the protected area, the outputs are disabled (manual operation – start/restart interlock enabled).

**i** Safety outputs OSSD 1 and OSSD 2 are enabled if the protective field is free and the restart command is given by a start button “(NO)” connected to 24 V DC. The pulse duration must be 100 ms to 5 s; the logical sequence is 0 > 1 > 0.



**DANGER!** Operation in manual mode (start/restart interlock enabled) is mandatory if a protective device is monitoring the passageway to the danger zone. Persons can stop in the danger zone without being detected after they have crossed through the passageway.

In manual mode, the safety light curtains / grids act as a trip device in accordance with IEC 61496. Failure to comply with this standard can lead to very high risk for exposed persons.

The restart command (RESTART) must come from outside of the protected area, where there is a good view of the protected area and the entire affected work zone.

It must be impossible to reach the button for the restart command from inside the protected area.

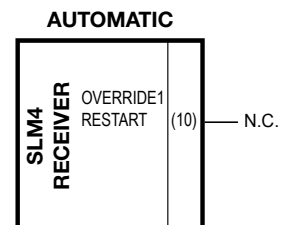
## 6.8 AUTOMATIC OPERATION

See “8.1.3 Hardware configuration, automatic operating mode”, page 53.

For automatic function, safety outputs

OSSD1 and OSSD2 follow the status of the safety light barrier:

- The outputs are enabled when the protective field is free.
- The outputs are disabled when the protective field is occupied.



**DANGER!** If the SLM4 safety light barrier is to be used in AUTOMATIC mode, it has no restart inhibitor at restart (start/restart interlock). If the protective field is free, the safety light grids automatically return to operation; the outputs (OSSDs) are enabled.

In most applications, this safety function is mandatory. In this regard, pay close attention to the risk analysis for your device.

## 6.9 MUTING ENABLE

The SLM4 can be configured so that the muting cycle does not begin until after a valid MUTING ENABLE signal. Pins 7 (MUTING\_ENABLE) and 12 (STATUS) must be connected as follows ("Fig. 6-f"):

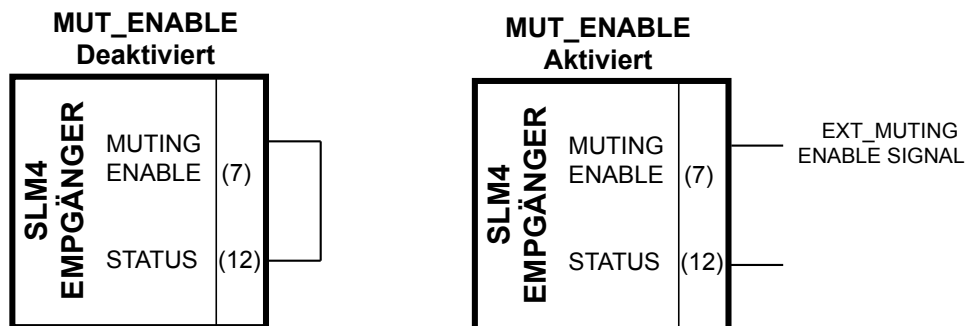


Fig. 6-f

FUNCTION	
Disabled	The muting cycle is begun regardless of the MUTING ENABLE signal.
Enabled	The muting cycle is begun only if the MUTING ENABLE signal is correct ("Fig. 6-g") and ends when the last sensor is enabled.

### MUTING ENABLE IS ENABLED: MUTING SEQUENCE

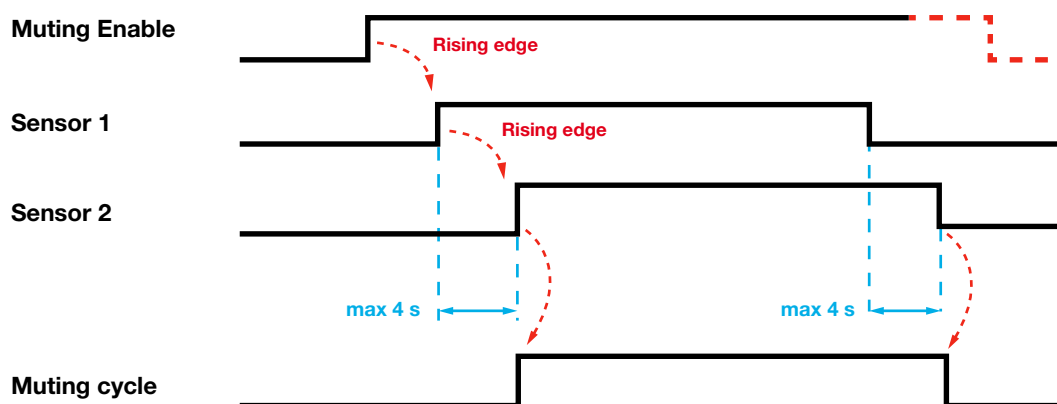


Fig. 6-g

## 7 ELECTRICAL CONNECTION – CONFIGURATION OF SLM4PO



**NOTE!** Transmitter and receiver must be supplied with a voltage of 24 V DC  $\pm$  20%.

The external power supply must be in accordance with the EN 60204-1 standard.

To guarantee the declared environmental protection degree (IP65-IP67), any unused connectors must be equipped with the enclosed protective caps.

### SAFETY PRECAUTIONS

- Do not connect to ground until all other connections have been made.
- Establish all connections before the SLM4 is supplied with power.
- All system components must have a common ground connection (0 V DC).

### REQUIREMENTS FOR CONNECTION CABLES

- Dimensions of the cables: 0.25-2.5 mm<sup>2</sup>.
- Keep the SLM4 power supply separate from the other electrical devices (electric motors, converters, frequency modulators) and other sources of interference.
- For connections with a length of more than 20 m, use cables with a cross-section of at least 0.5 mm<sup>2</sup> (AWG16) (1 mm<sup>2</sup> for a length of more than 50 m).

### 7.1 SOFTWARE CONFIGURATION

If the operator wants to configure the SLM4PO models using the software included in the scope of delivery, he or she must connect pins 1 and 2 of the main connector of the receiver (do NOT connect any of the other pins).



Connection diagrams for the SLM4PO model with software configuration are in section [“8.2 SLM4PO software configuration”](#), page 55.



**NOTE!** If the operator wants to switch from the hardware configuration to the software configuration, he or she must connect the main connector of the receiver as follows at switch-on:

CONNECTIONS AT SWITCH-ON			
SEL_A (pin 6)	SEL_B (pin 11)	MUT_ENABLE (pin 7)	EDM (pin 8)
0 V DC (or circuit opened)	0 V DC (or circuit opened)	0 V DC (or circuit opened)	<ul style="list-style-type: none"> <li>■ 0 V DC if not required by the software configuration.</li> <li>■ Connection to 24 V DC (via the NC contacts of the external relays).</li> </ul>

### 7.2 HARDWARE CONFIGURATION

If the operator wants to configure the SLM4PO models with hardware wiring, the connection diagrams are in section: [“8.1 Hardware configuration with cable”](#), page 51. No configuration is preset in factory condition. Notes about the hardware configuration are in chapters [“6.3 Test function”](#), page 36 to [“6.9 Muting Enable”](#), page 40.

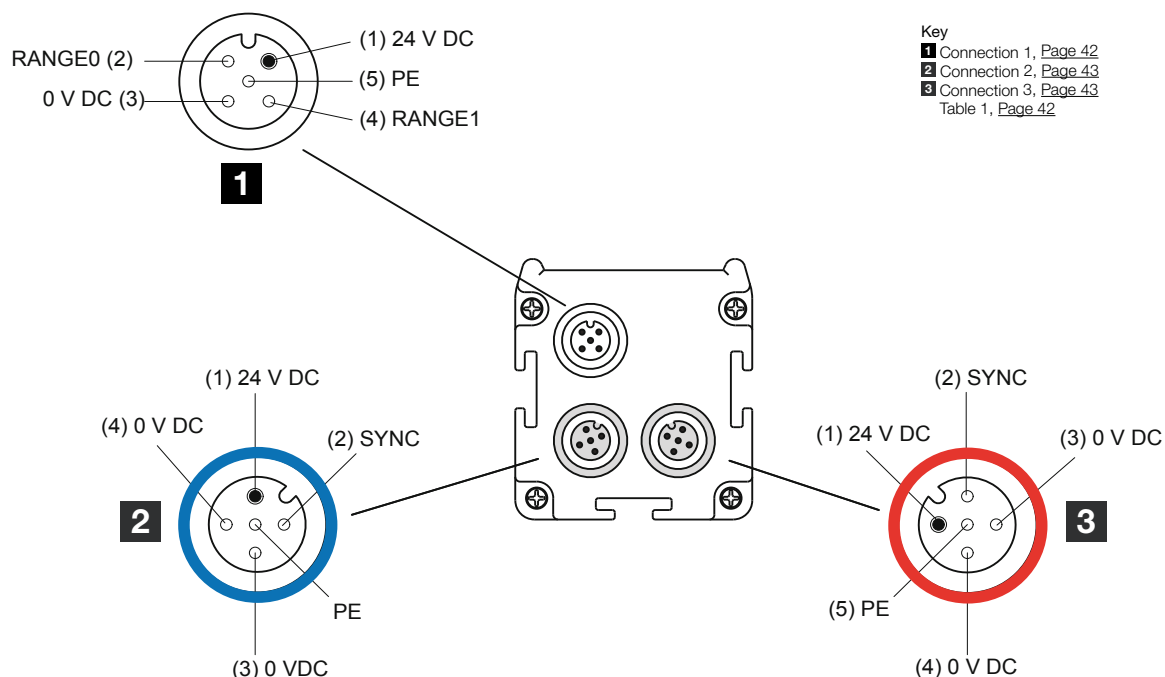


**NOTE!** If SLM4PO has been configured with the SLM4 software before (blue programming LED at the receiver is on), resetting the saved configuration using the “DELETE CONFIGURATION” command in the toolbar of the PC configuration software (see section [“12 SLM4PO software configuration”](#), page 71) is mandatory in order to restore the factory settings.



## 7 ELECTRICAL CONNECTION – CONFIGURATION OF SLM4PO

### 7.3 CONNECTIONS OF THE TRANSMITTER



Connection 1 main connector

Pin	COLOR	SIGNAL	IN/OUT	DESCRIPTION	ELECTRICAL LEVEL
1	Brown	24 V DC	-	Power supply 24 V DC	Positive
2	White	RANGE 0	Input	Selection of the range	(see "Connection 2 muting sensors 1 – 2 (blue marking)", page 43)
3	Blue	0 V DC	-	Power supply 0 V DC	Negative
4	Black	RANGE1	Input	Selection of the range	(see "Connection 2 muting sensors 1 – 2 (blue marking)", page 43)
5	Gray	PE	-	Ground connection	-

Table 1: Selection of the range and test - connection 1

Pin 2	Pin 4	FUNCTION	
24 V DC	0 V DC	Short range	(For the values of the range, we refer to "10 Technical data", page 61)
0 V DC	24 V DC	Long range	
0 V DC	0 V DC	Test of the barrier	(see section "7.4 Receiver connections", page 44)
24 V DC	24 V DC	-	Prohibited status

## 7 ELECTRICAL CONNECTION – CONFIGURATION OF SLM4PO

### Connection 2 muting sensors 1 – 2 (blue marking)

Pin	COLOR	SIGNAL	IN/OUT	DESCRIPTION	ELECTRICAL LEVEL
1	Brown	24 V DC	-	Power supply for sensors 24 V DC	24 V DC
2	White	SYNC	Output	Synchronization with M5 arms	Coded proprietary signal
3	Blue	0 V DC	-	Power supply for sensors 0 V DC	0 V DC
4	Black	0 V DC	-	Power supply for sensors 0 V DC	0 V DC
5	Gray	PE	-	Ground connection	-

### Connection 3 muting sensors 3 – 4 (red marking)

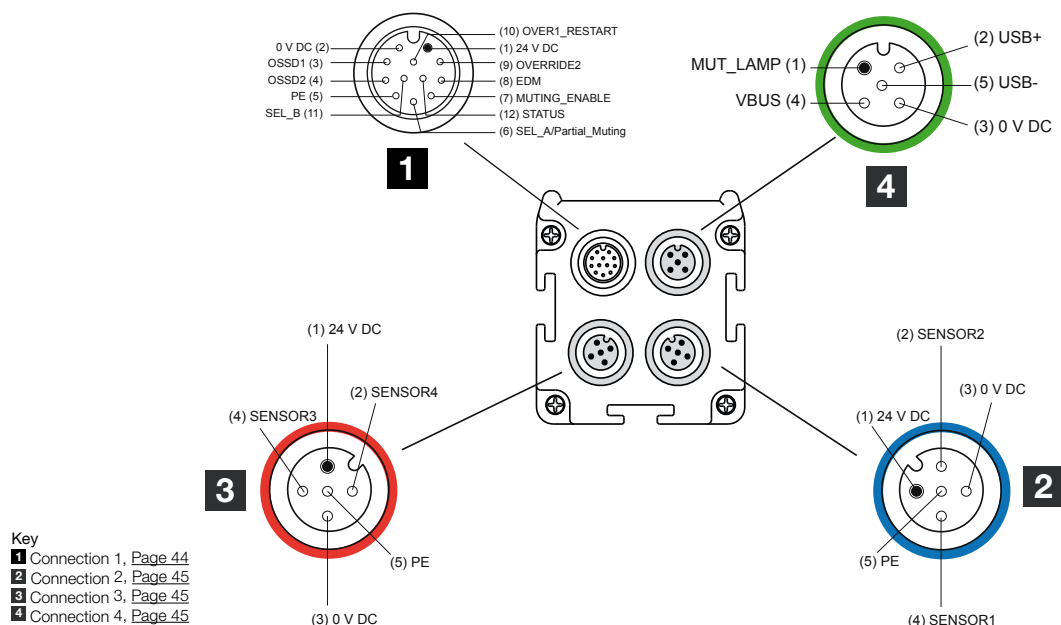
Pin	COLOR	SIGNAL	IN/OUT	DESCRIPTION	ELECTRICAL LEVEL
1	Brown	24 V DC	-	Power supply for sensors 24 V DC	24 V DC
2	White	SYNC	Output	Synchronization with M5 arms	Coded proprietary signal
3	Blue	0 V DC	-	Power supply for sensors 0 V DC	0 V DC
4	Black	0 V DC	-	Power supply for sensors 0 V DC	0 V DC
5	Gray	PE	-	Ground connection	-



For the LX or TX configuration with 2 sensors, wiring of sensor 1 is mandatory. The operator can select the position of the second muting sensor between sensor 2 and sensor 3 from the end through here. Sensor 2: MALX muting sensor elements; sensor 3: MATX sensor elements or external muting sensors.

## 7 ELECTRICAL CONNECTION – CONFIGURATION OF SLM4PO

### 7.4 RECEIVER CONNECTIONS



Possible configurations of the safety light barrier:

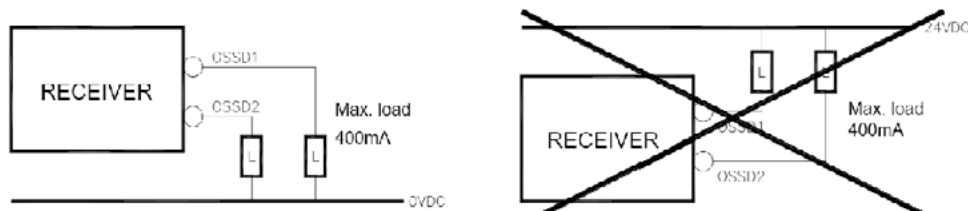
Connection 1 main connector					
Pin	COLOR	SIGNAL	IN/OUT	DESCRIPTION	ELECTRICAL LEVEL
1	Brown	24 V DC	-	Power supply 24 V DC	-
2	Blue	0 V DC	-	Power supply 0 V DC	-
3	White	OSSD1	Output	Static safety outputs	PNP high enabled
4	Green	OSSD2	Output		
5	Pink	PE	-	Ground connection	-
6	Yellow	SEL_A	Input	Muting configuration	See section “7.6 Selecting the function”, <a href="#">page 46</a> .
		Partial_MUTING		Check of partial muting	The software configuration determines the logical stage of the “7.12 Partial muting (configuration using a computer)”, <a href="#">page 50</a> signal.
7	Black	MUT_ENABLE	Input	External Muting Enable	The SLM4 regards the muting cycle as correct if the system detects a rising edge of the signal
8	Gray	EDM	Input	Feedback K1/K2	Feedback of external contactors, section “EDM”, <a href="#">page 44</a>
9	Red	VERRIDE 2	Input	Override request	See section “7.7 Override (configuration using a computer)”, <a href="#">page 46</a>
		VERRIDE 1		Override request	
		RESTART	Input	Interlock at restart	See section “7.8 Manual operation (configuration using a computer)”, <a href="#">page 47</a>
11	Gray/pink	SEL_B	Input	Muting configuration	See section “7.6 Selecting the function”, <a href="#">page 46</a>
12	Red/blue	STATUS	Output	System status	PNP high enabled



## 7 ELECTRICAL CONNECTION – CONFIGURATION OF SLM4PO

**NOTE!** When connecting highly inductive loads to OSSDs, use suitable voltage suppressors at the outputs.

**NOTE!** If a protective field is free, the receiver returns a voltage of 24 VDC at BOTH outputs. The load has to be connected between BOTH output terminals and 0 VDC.



### Connection 2 muting sensors 1 – 2 (blue marking)

Pin	COLOR	SIGNAL	IN/OUT	DESCRIPTION	ELECTRICAL LEVEL
1	Brown	24 V DC	-	Power supply for sensors 24 V DC	Positive
2	White	SENSOR 2	Input	Status of sensor 2	< 5 V DC: FREE SENSOR 11–30 V DC: ENABLED SENSOR
3	Blue	0 V DC	-	Power supply for sensors 0 V DC	Negative
4	Black	SENSOR 1	Input	Status of sensor 1	< 5 V DC: FREE SENSOR 11–30 V DC: ENABLED SENSOR
5	Gray	PE	-	Ground connection	-

### Connection 3 muting sensors 3 – 4 (red marking)

Pin	COLOR	SIGNAL	IN/OUT	DESCRIPTION	ELECTRICAL LEVEL
1	Brown	24 V DC	-	Power supply for sensors 24 V DC	Positive
2	White	SENSOR 4	Input	Status of sensor 4	< 5 V DC: FREE SENSOR 11–30 V DC: ENABLED SENSOR
3	Blue	0 V DC	-	Power supply for sensors 0 V DC	Negative
4	Black	SENSOR 3	Input	Status of sensor 3	< 5 V DC: FREE SENSOR 11–30 V DC: ENABLED SENSOR
5	Gray	PE	-	Ground connection	-

### Connection 4 USB connection (green marking)

Pin	COLOR	SIGNAL	IN/OUT	DESCRIPTION	ELECTRICAL LEVEL
1	Brown	MUT_LAMP	Output	Muting Enable command lamp	24 V DC when muting is enabled
2	White	USB+	In/Out	USB data	-
3	Blue	0 V DC	-	Muting lamp 0 V DC	0 V DC
4	Black	VBUS	Input	USB supply	5 V DC
5	Gray	USB-	In/Out	USB data	-

## 7 ELECTRICAL CONNECTION – CONFIGURATION OF SLM4PO

### 7.5 TEST FUNCTION

By simulating occupation of the protected area, the test function enables a function check of the safety light barrier with a PLC, control module, etc. By having an automatic system for detecting defects, the SLM4 safety light barrier is capable of detecting a defect within the response time.

This detection system is continuously enabled and requires no external intervention. If the user wants to check the devices upstream of the safety light barrier (without physically reaching into the protected area), the TEST command is available. This command permits switching the OSSD from the ON status to the OFF status as long as the command remains active.



The minimum duration of the TEST command must be at least 40 ms.

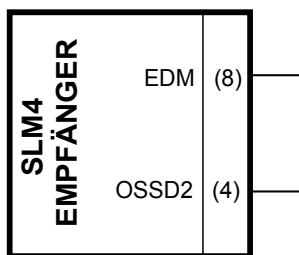
### 7.6 SELECTING THE FUNCTION

The SLM4 CONFIGURATOR configuration software is used for configuring the various operating modes in the SLM4PO models.

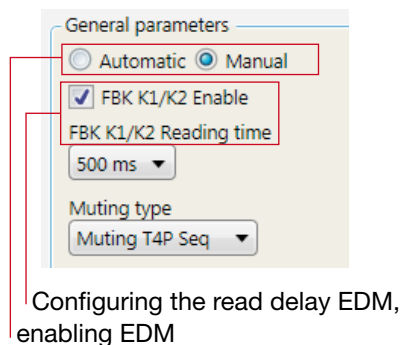
#### CONFIGURATION USING A COMPUTER

The EDM function (control of the external K1/K2) can be enabled / disabled by the software.

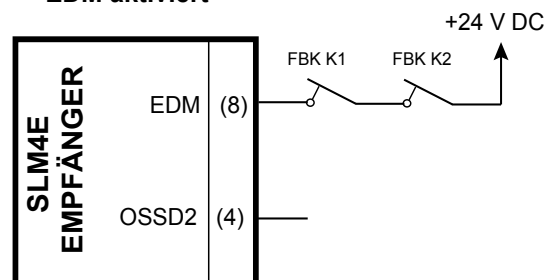
##### EDM deaktiviert



##### EDM aktiviert



##### EDM aktiviert



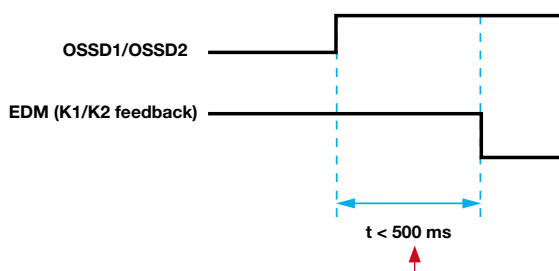
EDM enabled

SLM4PO waits for a signal with inversed logic for the status of the external contactors.

- OSSD1/OSSD ON: External contacts K1/K2 closed: EDM = CIRCUIT OPENED
- OSSD1/OSSD OFF: External contacts K1/K2 opened: EDM = CIRCUIT CLOSED

Connect pin 8 of the 12-pin connector on the receiver as specified.

The time that has to pass between activation of the OSSD outputs and opening of the FBK contacts must correspond to the time in the following figure.



Software configuration:  
FBK K1/K2 reading time:  
Possible values: from 100 ms to 1300 ms (increments of 100 ms).

### 7.7 OVERRIDE (CONFIGURATION USING A COMPUTER)

## 7 ELECTRICAL CONNECTION – CONFIGURATION OF SLM4PO

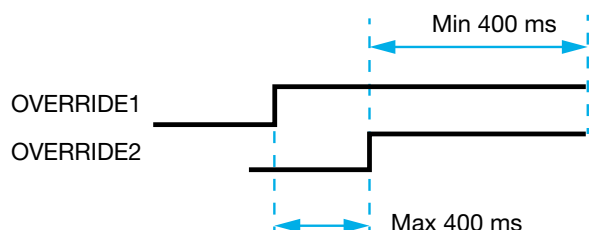
SLM4PO enables the configuration of two types of override; (see section “4.7 Muting override”, page 23 for a description of the following function).

CONNECTIONS AT SWITCH-ON		
OVERRIDE 1 (pin 10)	OVERRIDE 2 (pin 9)	SELECTION
0	0	Override with sustained control system
0	1	Override with pulsed control system

### OVERRIDE WITH SUSTAINED CONTROL SYSTEM

The operator can use the configuration software to select which OVERRIDE type (in this case BUTTON WITH SUSTAINED CONTROL SYSTEM) and which associated timeout should be activated.

**i** For the selection “With occupied sensors”: Activation of the OVERRIDE requires that at least one sensor be activated and that the safety light barrier be in the BREAK condition.



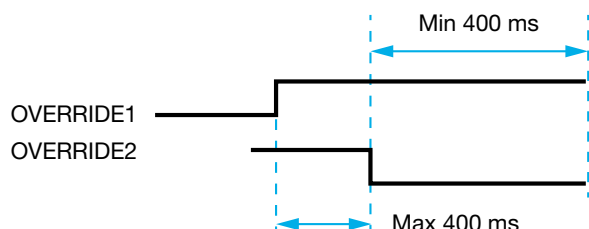
Both signals are activated at 24 V DC. This function is started only if both signals are activated simultaneously (with a maximum delay of 400 ms) and the signal or keyswitch is kept active for at least 400 ms.

### OVERRIDE WITH PULSED CONTROL SYSTEM

The operator can use the configuration software to select which OVERRIDE type (in this case WITH PULSE) and which associated timeout should be activated.

**i** For the selection “With occupied sensors”: Activation of the OVERRIDE requires that at least one sensor be activated and that the safety light barrier be in the BREAK condition.

This function is started by both OVERRIDE inputs being enabled simultaneously as shown in the following diagram:



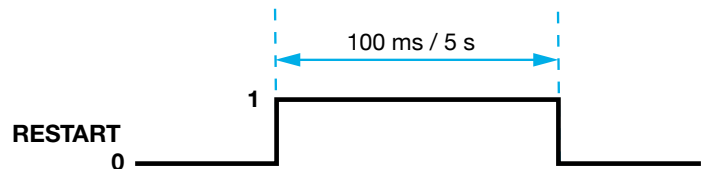
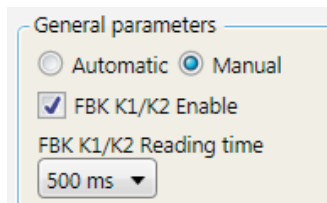
This function is started only if the signals are activated simultaneously (with a delay no greater than 400 ms) and the button is pressed and held for at least 400 ms.

## 7.8 MANUAL OPERATION (CONFIGURATION USING A COMPUTER)

## 7 ELECTRICAL CONNECTION – CONFIGURATION OF SLM4PO

Pin 10 has the RESTART function. In connection with the occupation of the protected area, the outputs are disabled (manual operation – start/restart interlock enabled).

**i** Safety outputs OSSD 1 and OSSD 2 are enabled if the protective field is free and the restart command is given by a start button connected to 24 V DC. The pulse duration must be 100 ms to 5 s; the logical sequence is 0 > 1 > 0.



**⚠ DANGER!** Operation in manual mode (start/restart interlock enabled) is mandatory if a protective device is monitoring the passageway to the danger zone. Persons can stop in the danger zone without being detected after they have crossed through the passageway. In manual mode, the safety light curtains / grids act as a trip device in accordance with IEC 61496. Failure to comply with this standard can lead to very high risk for exposed persons.

The restart command (RESTART) must come from outside of the protected area, where there is a good view of the protected area and the entire affected work zone.

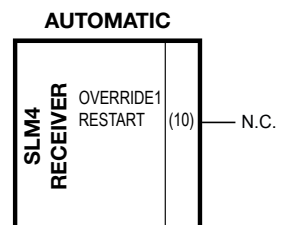
It must be impossible to reach the button for the restart command from inside the protected area.

### 7.9 AUTOMATIC OPERATION (CONFIGURATION USING A COMPUTER)

The SLM4 can be configured so that the muting cycle does not begin until after a valid MUTING ENABLE signal.

For automatic function, safety outputs OSSD1 and OSSD2 follow the status of the safety light barrier:

- The outputs are enabled when the protective field is free.
- The outputs are disabled when the protective field is occupied.



**⚠ DANGER!** If the SLM4 safety light barrier is to be used in AUTOMATIC mode, it has no restart inhibitor at restart (start/restart interlock). If the protective field is free, the safety light grids automatically return to operation; the outputs (OSSDs) are enabled. In most applications, this safety function is mandatory. In this regard, pay close attention to the risk analysis for your device.

### 7.10 MUTING ENABLE IS ENABLED: MUTING SEQUENCE

## 7 ELECTRICAL CONNECTION – CONFIGURATION OF SLM4PO

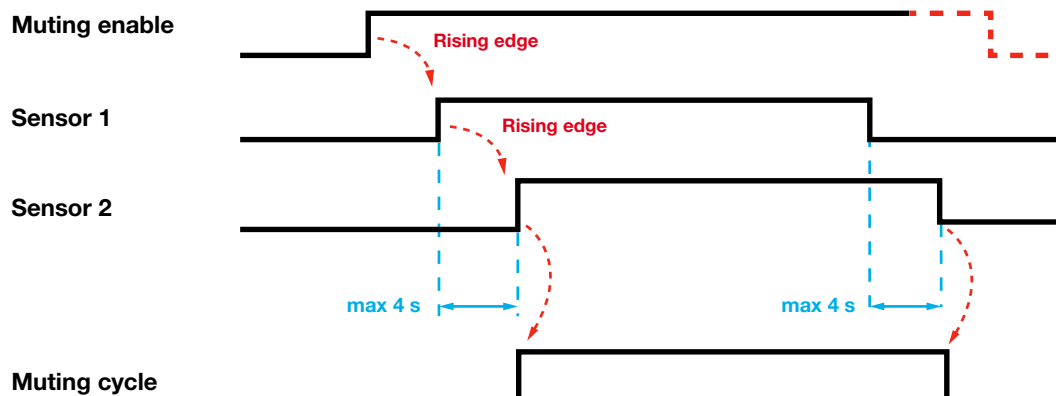
### (CONFIGURATION USING A COMPUTER)

☒ With Enable

Enable Type

Enable Only ▾

The SLM4PO can be configured so that the muting cycle is activated by a valid MUTING ENABLE signal. The configuration software can be used to select whether the MUTING ENABLE signal enables or disables the muting function.



### 7.11 MUTING ENABLE/DISABLE MUTING SEQUENCE (CONFIGURATION USING A COMPUTER)

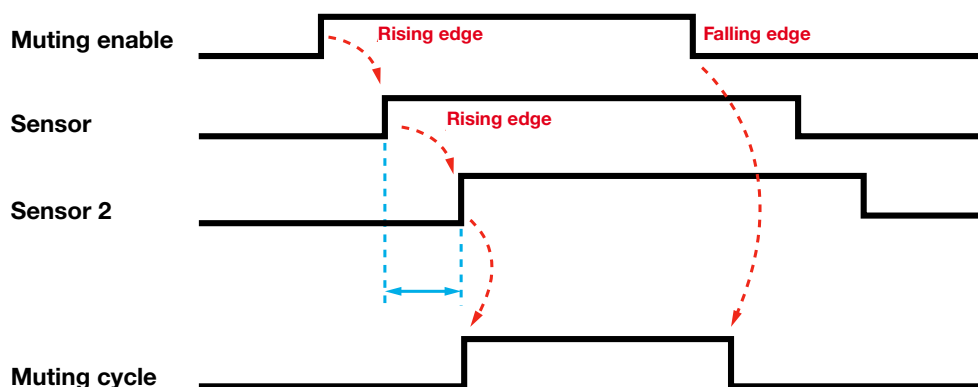
☒ With Enable

Enable Type

Enable/Disable ▾

The configuration software can be used to select whether the MUTING ENABLE signal enables or disables the muting function.

#### MUTING ENABLE /DISABLE IS ENABLED: MUTING SEQUENCE



## 7 ELECTRICAL CONNECTION – CONFIGURATION OF SLM4PO

### 7.12 PARTIAL MUTING (CONFIGURATION USING A COMPUTER)

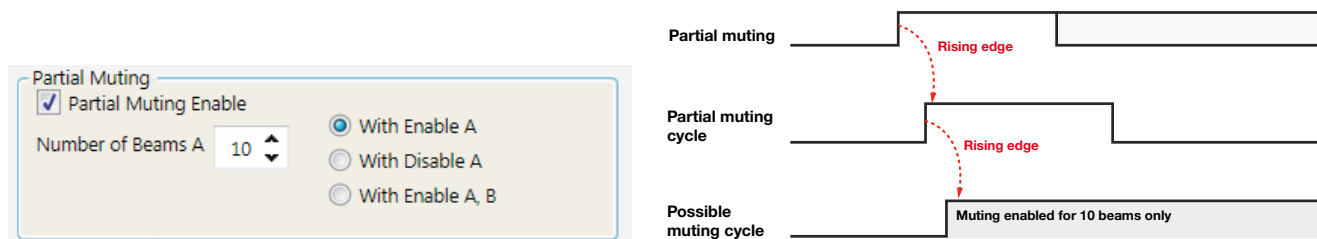
There are two types of partial muting, and the “Partial MUTING” input pin (pin 6 of the receiver's 12-pin M12 connector) has to be used for both:

**i** This function is available only for models with the software configuration (SLM4PO).

#### 7.12.1 PARTIAL MUTING WITH ENABLE

For this option, the partial muting function is usually disabled. Enabling the function requires the input signal to be changed (pin 6 of the receiver) from LO to HI (rising edge) before the muting cycle is started. Changing this input signal enables the partial muting function only for the first selected beams (example with 10 beams as in the figure).

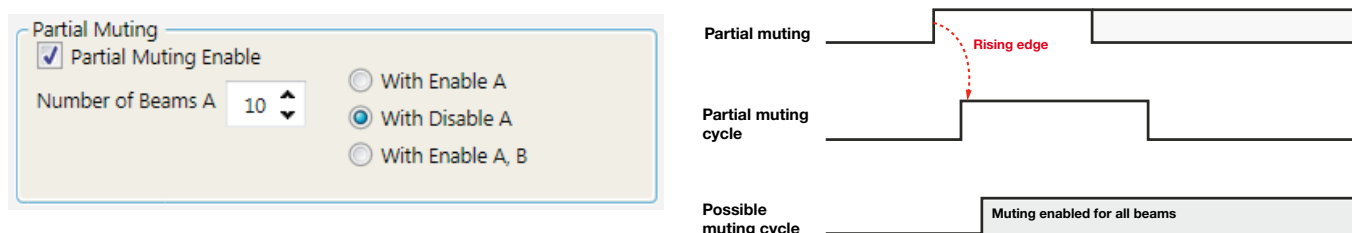
**i** This function is available only for a SINGLE MUTING CYCLE; therefore, the enabling of partial muting has to be reconfirmed each time before the muting function is enabled anew.



#### 7.12.2 PARTIAL MUTING WITH DISABLE

For this option, the partial muting function is usually enabled (example with 10 beams as in the figure). Disabling the function requires the input signal to be changed (pin 6 of the receiver) from LO to HI (rising edge) before the muting cycle is started. Therefore, a change in the input signal disables the partial muting function.

**i** This function is available only for a SINGLE MUTING CYCLE; therefore, the disabling of the partial muting function has to be reconfirmed each time before the muting function is enabled anew.

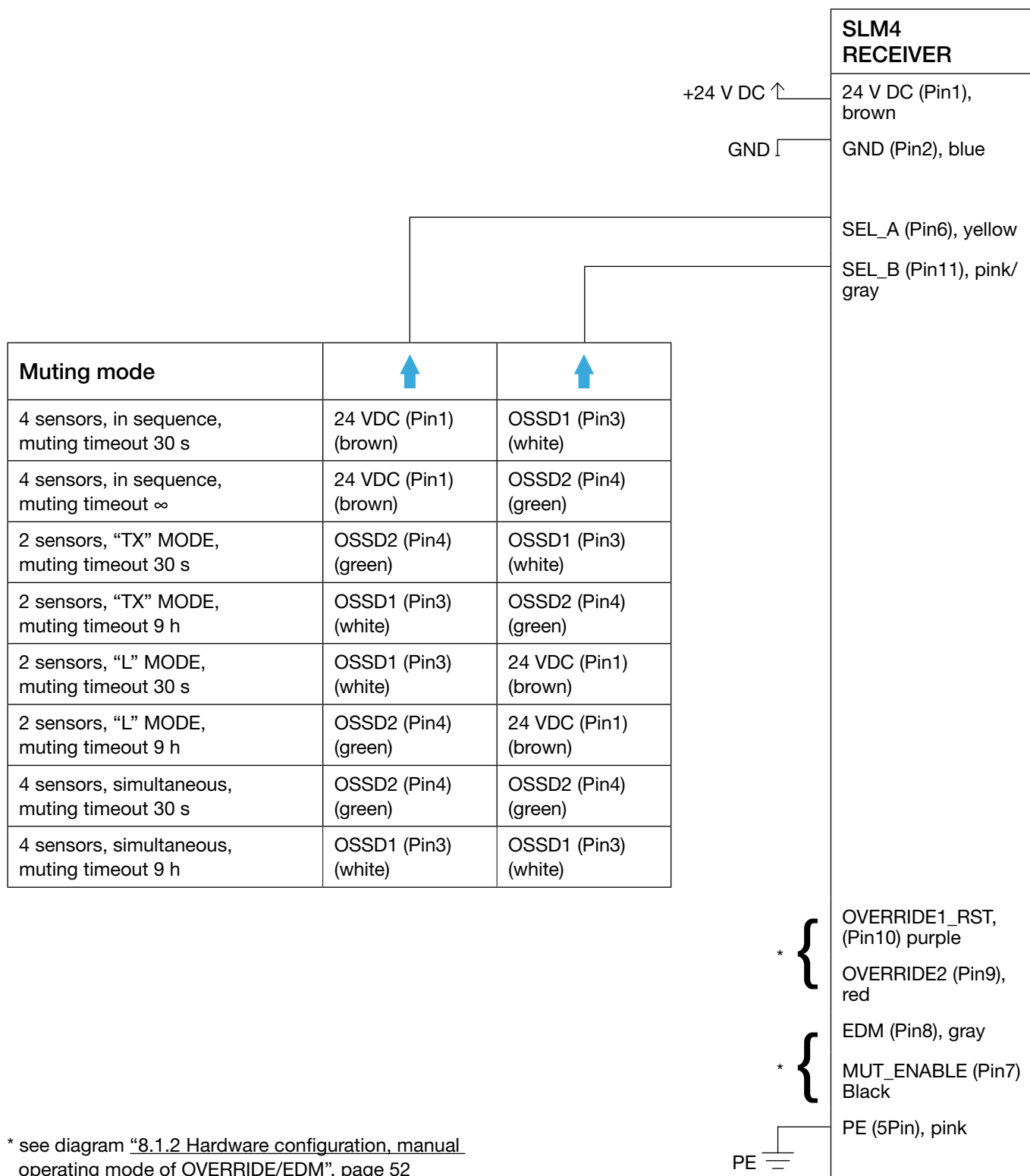


## 8 WIRING EXAMPLES

### 8 WIRING EXAMPLES

#### 8.1 HARDWARE CONFIGURATION WITH CABLE

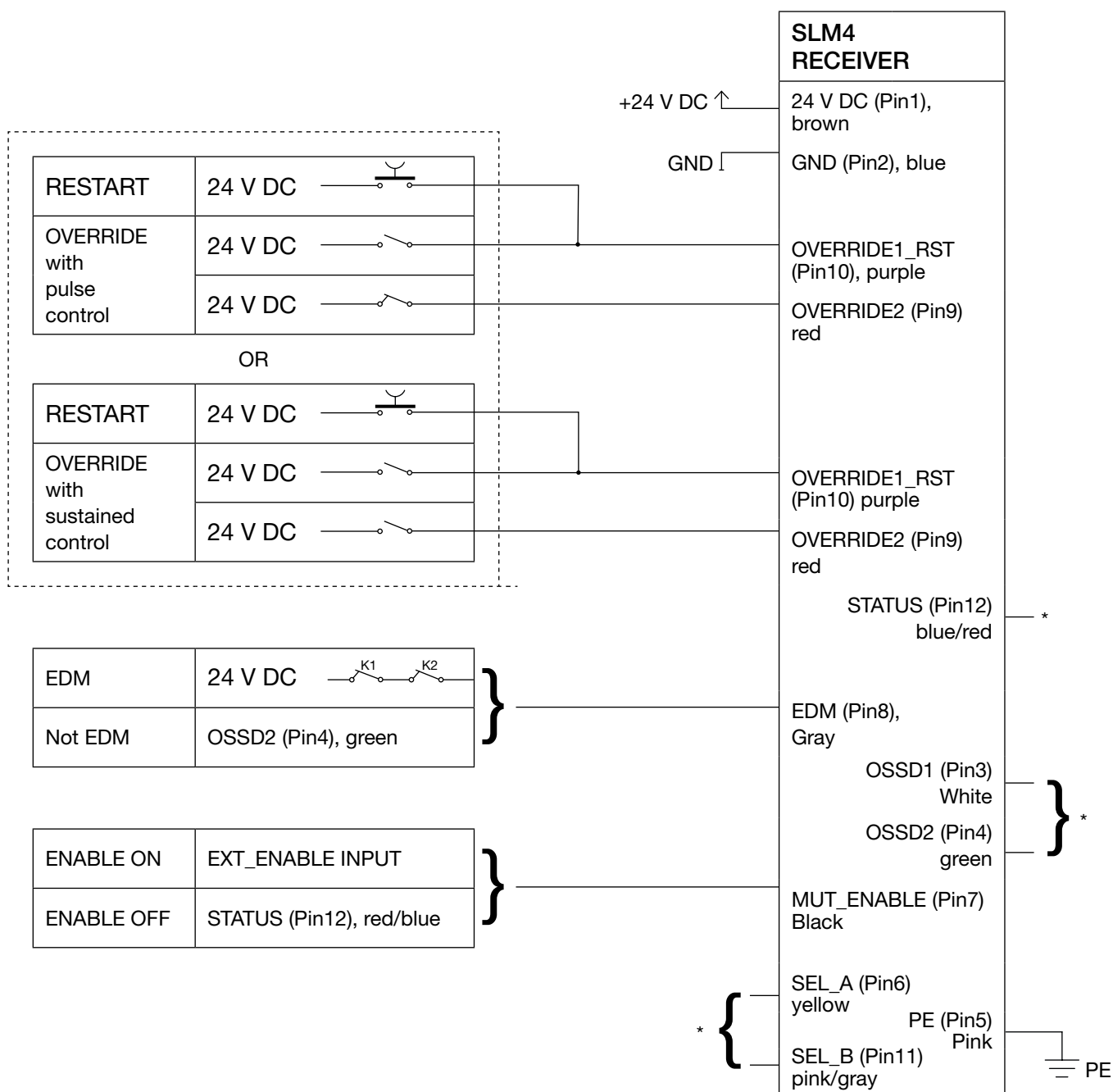
##### 8.1.1 HARDWARE CONFIGURATION, MANUAL OPERATING MODE



\* see diagram "8.1.2 Hardware configuration, manual operating mode of OVERRIDE/EDM", page 52

## 8 WIRING EXAMPLES

### 8.1.2 HARDWARE CONFIGURATION, MANUAL OPERATING MODE OF OVERRIDE/EDM

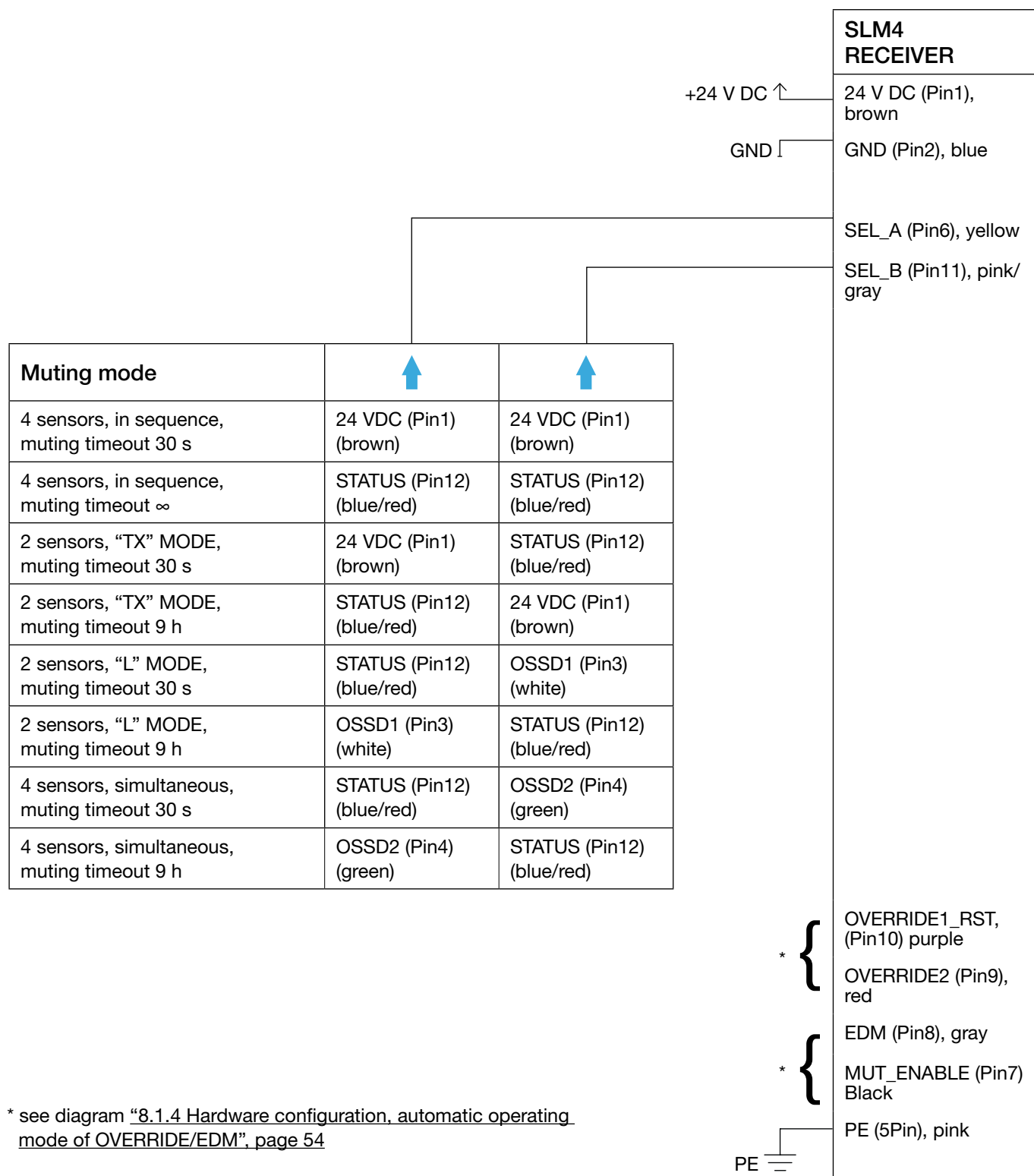


\* see diagram "8.1.1 Hardware configuration, manual operating mode", page 51



## 8 WIRING EXAMPLES

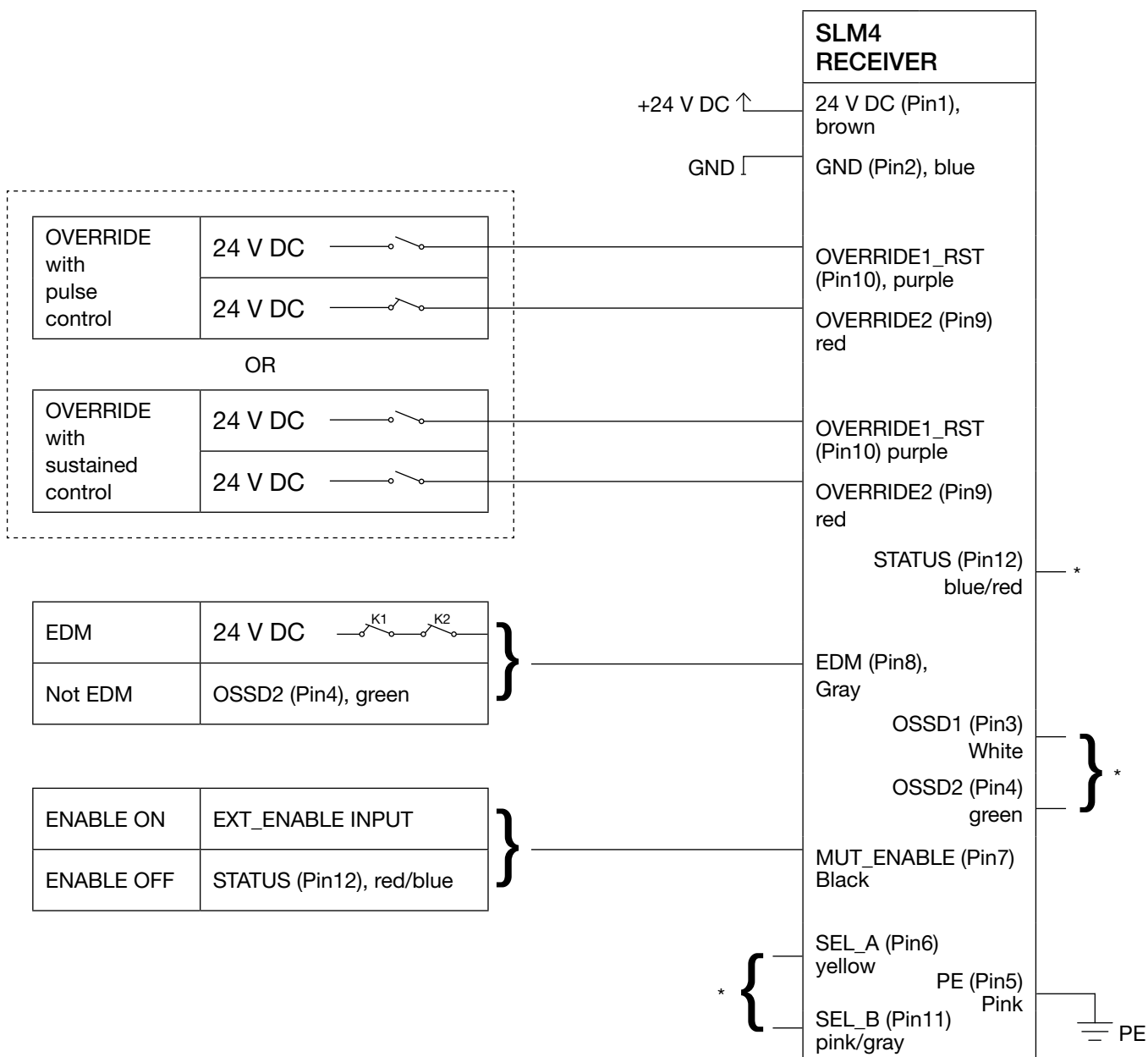
### 8.1.3 HARDWARE CONFIGURATION, AUTOMATIC OPERATING MODE



\* see diagram "8.1.4 Hardware configuration, automatic operating mode of OVERRIDE/EDM", page 54

## 8 WIRING EXAMPLES

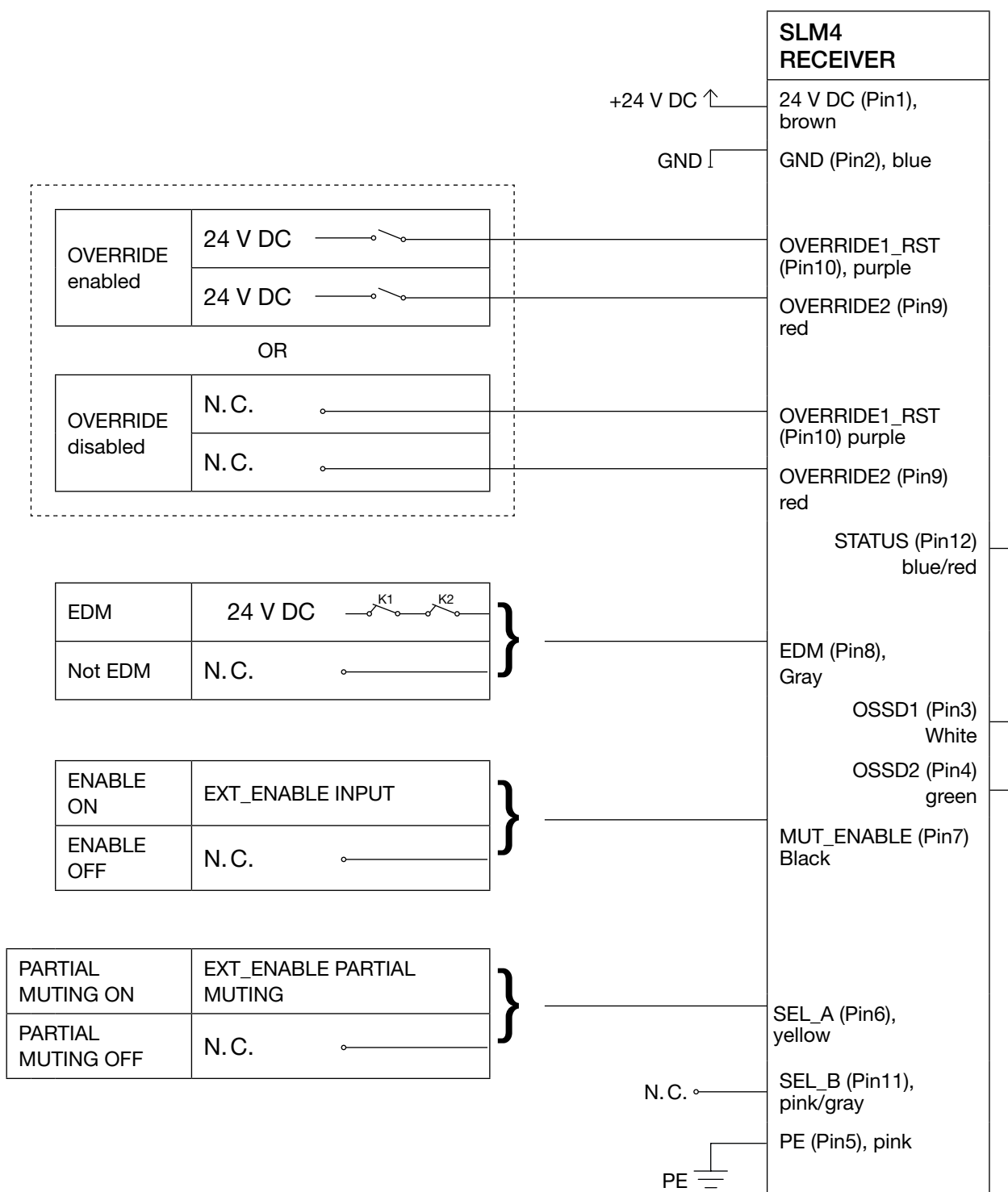
### 8.1.4 HARDWARE CONFIGURATION, AUTOMATIC OPERATING MODE OF OVERRIDE/EDM



\* see diagram "8.1.3 Hardware configuration, automatic operating mode", page 53

## 8 WIRING EXAMPLES

### 8.2 SLM4PO SOFTWARE CONFIGURATION



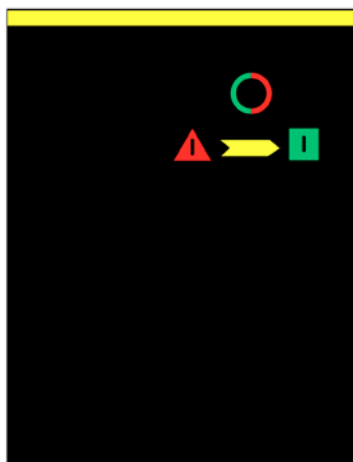
## 9 DISPLAY ELEMENTS




### 9 DISPLAY ELEMENTS

Transmitter and receiver of SLM4 are equipped with LED display elements to indicate their operating status in real time. Furthermore, the receiver (SLM4O and SLM4PO models) is equipped with an LED signal lamp integrated into the upper cap.

The following tables indicate which signals are active.

#### 9.1 DISPLAYS OF THE TRANSMITTER



THREE-COLOR LED			
			MEANING
Switched on	-	-	Switching on – initial test
Flashing	-	-	Fail status
-	Switched on	-	Test of the barrier
-	-	Switched on	Normal operation

## 9 DISPLAY ELEMENTS

### 9.2 DISPLAYS OF THE RECEIVER



LED							MEANING
PRG	COM	CLR		MUT	OVR	S 1 S 2 S 3 S 4	
Blue							Light barrier programmed via USB
	Orange						Communication with computer enabled
		yellow					Restart required (passageway clear)
			green				Normal operation (passageway clear)
			red				Passageway occupied
			Red flashing				Error detected (see "ERROR DIAGNOSTICS")
				yellow			Muting enabled
					yellow		Override enabled
					Red flashing		Override requested
						yellow	Sensor
Blue flashing	Orange flashing						No safety light barrier configuration
Blue flashing	Orange flashing		Red flashing				Double configuration available (hardware and software)

## 9 DISPLAY ELEMENTS

### 9.3 DISPLAYS OF THE RECEIVER (INTEGRATED LAMP)



Flashing



Flashing  
yellow/red



Flashing

**BREAK**  
Light barrier  
occupied At  
least one beam  
occupied

**FAIL**  
Error

**CLEAR**  
Restart  
required

**GUARD**  
Normal

**MUTING**  
enabled

**OVERRIDE**  
requested


**OVERRIDE**  
enabled

LAMP	MEANING
Yellow/Green	Light barrier waiting for RESTART (passageway clear)
green	Normal operation (passageway clear)
red	Passageway occupied
Red flashing	Error (→ DIAGNOSTICS)
yellow	Muting enabled
Yellow flashing	Override enabled
Yellow/Red	Override requested

## 9 DISPLAY ELEMENTS

### 9.4 ERROR DIAGNOSTICS – TRANSMITTER








NUMBER OF FLASHES	ERROR	POSSIBLE CAUSE
		
2	Incorrect RANGE0 / RANGE1 configuration	Pin 2 and 4 connections, main connectors –M12
3/4	Internal error	Please contact the di-soric customer service
5	SYNC error	Pin 2 connection, socket of muting sensors

## 9 DISPLAY ELEMENTS

### 9.5 ERROR DIAGNOSTICS – RECEIVER



If SLM4PO is connected to the computer, a pop-up window with the error code appears in the computer configuration software

NUMBER OF FLASHES					ERROR	POSSIBLE CAUSE
						
2					Incorrect SEL_A/SEL_B/EDM configuration	Pin 6-8-11 connections at the connector on RX
3					Incorrect EDM configuration	Pin 8 connections at the connector on RX
3	3				EDM malfunction feedback	Contactors of EDM contact connections
3		3			STATUS input malfunction	Pin 12 connections at the connector on RX
3			3		OVERRIDE_1 / OVERRIDE_1 input malfunction	Pin 9-10 connections at the connector on RX
3				3	SENSORS input malfunction	Connections 2-4 at the sensor connections
3	3	3	3		MUTING LAMP malfunction	Connections at the auxiliary lamp connections
4					OSSD1 / OSSD2 error	Pin 3-4 connections at the connector on RX
5					BASE PCB error	Please contact the di-soric customer service
5	5				BASE PCB error	Please contact the di-soric customer service
5			5		BASE PCB error	Please contact the di-soric customer service
6					BASE PCB error (microcontroller)	Please contact the di-soric customer service
6	6				General BASE PCB error	Pin 6-7-8-9-10-11 connections at the connector on RX
6		6			Beam error	Please contact the di-soric customer service
6			6		Overload of 24 V DC power supply	Possible short-circuit at the OSSD outputs
6	6	6	6		Excess current at LAMP/STATUS	Possible short-circuit at pin 12 or at the connection of the auxiliary lamp
7					Malfunction in beam reception	Please contact the di-soric customer service
8					Interfering transmitter detected	Check whether another available light barrier has been positioned correctly (see "multiple systems")



## 10 TECHNICAL DATA

TECHNICAL CHARACTERISTICS		
Safety	Type 4	EN 61496-1:2013 IEC 61496-2:2013
	SIL 3	IEC 61508-1: (ed.2) IEC 61508-2: (ed.2) IEC 61508-3: (ed.2) IEC 61508-4: (ed.2)
	PL e	EN ISO 13849-1:2015
	Cat. 4	EN ISO 13849-1:2015
Resolution	30 mm	
Range	0 to 4 m (low) / 0 to 12 m (high)	
Protective field height, light curtains (mm)	310 / 460 / 610 / 760 / 910 / 1060 / 1210 / 1360 / 1510 / 1660 / 1810 / 1960 / 2110 / 2260	
Number of beams, light grid	2 / 3 / 4 beams	
Power supply	24 VDC $\pm$ 20 %	
Power consumption	1 W (transmitter) / 2 W (receiver)	
Connections	Power connection on TX: M12 – 5-pin connector Power connection on RX: M12 – 12-pin connector Connections of muting sensors / muting lamp / M12 configuration – 5-pin socket	
Configuration	Hardware at the RX connections of the SLM4 and SLM4O models Hardware or software with USB connection <-> computer on the SLM4PO model	
Dimensions of the cables	0.25 to 2.5 mm <sup>2</sup> (0.5 mm <sup>2</sup> for length > 20 m / 1 mm <sup>2</sup> for length > 50 m)	
Maximum connection distance	100 m	
Safety outputs (OSSD)	2 PNP – 400 mA @ 24 V DC	
Status of output	PNP – 100 mA @ 24 V DC (indicates the status of the OSSD outputs)	
EDM input	Available on RX, selectable	
Automatic/manual restart	Available on RX, selectable	
Response time	5.5 ms to 28 ms (see table of models)	
Input test	Available on RX, selectable	
Signals and diagnostics	Signals via LED on transmitter and display elements SLM4O and SLM4PO models: MUTING / OVERRIDE / LIGHT BARRIER STATUS signals with integrated lamp in the upper RX cap, LED technology	
Operating temperature	-30°C to +55°C	
Degree of protection	IP 65 and IP 67	
Dimensions of cross-section (LxW)	50 mm x 55 mm	

## 10 TECHNICAL DATA

MUTING FUNCTION	
Maximum current supply to the muting sensors	50 mA
Muting lamp output	24 V DC / 0.5 to 5 W
Response time to muting signals (sensors)	100 ms
Logical levels of muting signals (sensors)	< 5 V DC: SENSOR CLEAR 11 to 30 V DC: SENSOR OCCUPIED
Timeout, max. muting time	Hardware configuration: with MA-T4P: 30 s or $\infty$ other models: 30 s or 9 hours  Software configuration configurable with SLM4 Configurator 10 s to $\infty$
Muting override	Pulse command or manual and pressed (dead man's button). Configurable by means of software (SLM4PO models)
Muting timeout, max. override time	15 minutes (can be renewed) Configurable by means of software (SLM4PO models)
Maximum number of successive OVERRIDE	30
Muting logic	With crossed beams (LX / TX logic) and successively
Muting logic (SLM4PO)	Logic completely configurable by means of di-soric software
Partial muting (SLM4PO)	Option of suppressing a specified number of beams (SLM4PO models)
Tolerance time between sensor 1 and sensor 2	4 seconds, can be configured by means of the software (only SLM4PO models)
Muting lamp (internal)	Integrated in the upper RX cap, LED technology
Muting enable	Pin on main connection, disabled if not requested and monitored

Light curtains SLM4PO models														
30 mm models	303	453	603	753	903	1053	1203	1353	1503	1653	1803	1953	2103	2253
Beams	16	23	31	38	46	53	61	68	76	83	91	98	106	113
Response time	8	9.5	11	12.5	14.5	16	17.6	19	20.5	22	23.5	25	26.5	28
Protected area	310	460	610	760	910	1060	1210	1360	1510	1660	1810	1960	2110	2260
PFH <sub>d</sub>	1.78E-08	1.91E-08	2.02E-08	2.15E-08	2.26E-08	2.39E-08	2.50E-08	2.63E-08	2.74E-08	2.87E-08	2.98E-08	3.11E-08	3.22E-08	3.35E-08
MTTF <sub>d</sub>	223.2	198.2	179.0	162.5	149.4	137.8	128.2	119.5	112.3	105.6	99.9	94.5	89.9	85.6
DC <sub>avg</sub>	97.1%	97.2%	97.3%	97.4%	97.4%	97.5%	97.5%	97.6%	97.6%	97.6%	97.7%	97.7%	97.7%	97.7%
CCF	80%													

## 10 TECHNICAL DATA

SLM4, SLM4O, SLM4PO MODELS, light grids			
Beams	2	3	4
Response time (ms)	5.5	5.5	5.5
PFH <sub>d</sub>	8.97E-09	9.63E-09	1.03E-08
MTTF <sub>d</sub>	272.2	262.4	253.3
DC <sub>avg</sub>	98.6%	98.5%	98.4%
CCF	80%		

MZ-L2XP muting sensor elements L logic with 2 crossed / parallel M5 photocells (TX+RX)	
Number of beams per photocell	5
Response time (ms)	100
Range (m)	0 to 3.5
Sensor beam coding	Via SYNCHRO signal at TX
PFHd (individual M5)	2.73E-07

MA-L2P muting sensor elements L logic, 2 parallel beams (TX+RX)	
MA-T4P muting sensor elements T logic, 4 parallel beams (TX+RX)	
Beams	2 (MA-L2P) / 4 (MA-T4P)
Response time (ms)	100
Range (m)	0 to 3.5

MZ-T2X muting sensor elements T logic with 2 crossed M5 photocells (TX+RX)	
Number of beams per photocell	5
Response time (ms)	100
Range (m)	0 to 3.5
Sensor beam coding	Via SYNCHRO signal at TX
PFHd (individual M5)	2.73E-07

MA-L2X muting sensor elements L logic, 2 crossed beams (TX+RX)	
MA-T2X muting sensor elements T logic, 2 crossed beams (TX+RX)	
Beams	2
Response time (ms)	100
Range (m)	1 to 2.5

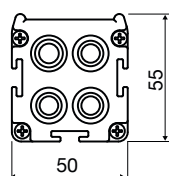
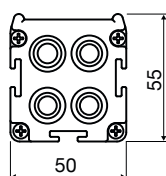
MZ-T4P muting sensor elements with 4 parallel M5 photocells (TX+RX)	
Number of beams per photocell	5
Response time (ms)	100
Range (m)	0 to 3.5
Sensor beam coding	Via SYNCHRO signal at TX
PFHd (individual M5)	2.73E-07

MA-L2P-TRX muting sensor elements (TRX-V) (TRX-G) – L logic, 2 parallel beams (TX / RX + reflector)	
MA-T4P-TRX muting sensor elements (TRX-V) (TRX-G) – T logic, 4 parallel beams (TX / RX + reflector)	
Beams	2 (MA-L2P-TRX) / 4 (MA-T4P-TRX)
Response time (ms)	100
Range (m)	0 to 3.5 (MA-L2P-TRX-TRX-V) / (MA-T4P-TRX-TRX-V)
Range (m)	0 to 2 (MA-L2P-TRX-G) / (MA-T4P-TRX-G)

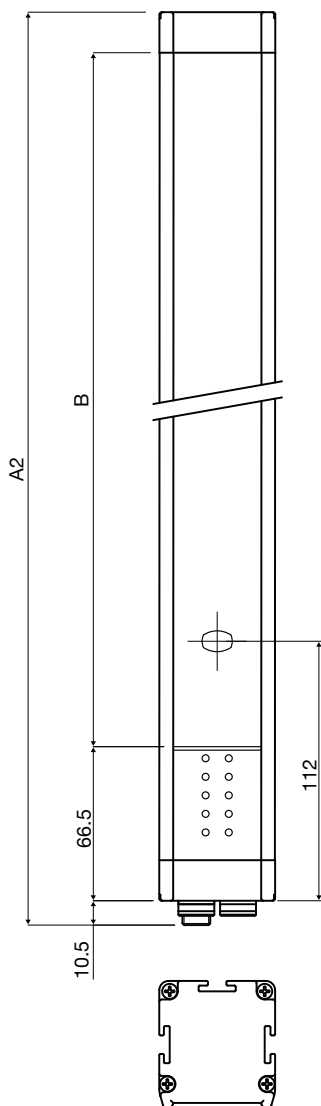
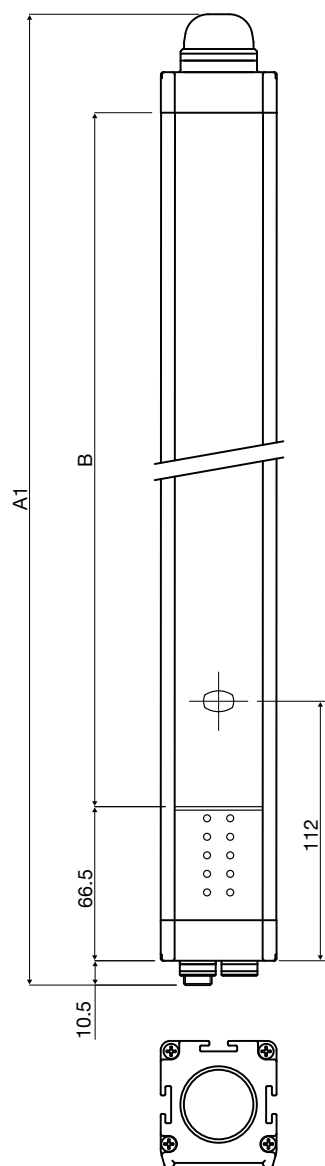
## 11 DIMENSIONS

## 11 DIMENSIONS

## 11.1 LIGHT GRIDS AND LIGHT CURTAINS

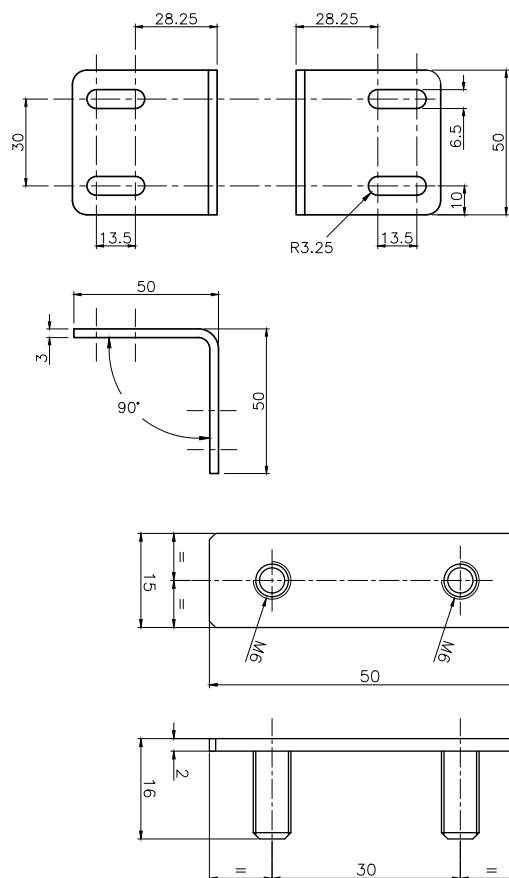
LIGHT GRID  
WITH MUTING LAMPLIGHT GRID  
WITHOUT MUTING LAMP

Models	A1 (mm)	A2 (mm)	B (mm)
2B	710	685	590
3B	1010	985	890
4B	1110	1085	990



Included mounting materials:

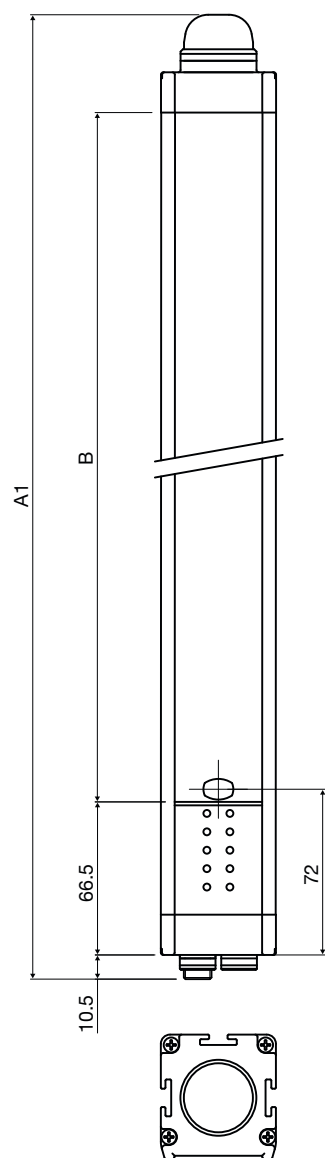
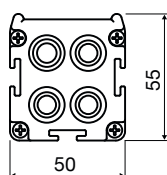
- Mounting bracket
- Mounting element with M6 threaded bolts



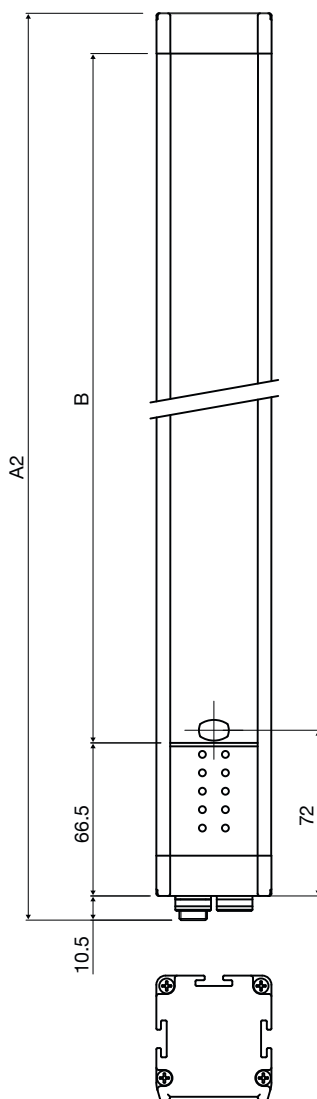
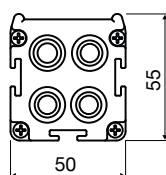
## LIGHT CURTAIN WITH MUTING LAMP

LIGHT CURTAIN WITH  
MUTING LAMP

## RECEIVER

LIGHT CURTAIN WITHOUT  
MUTING LAMP

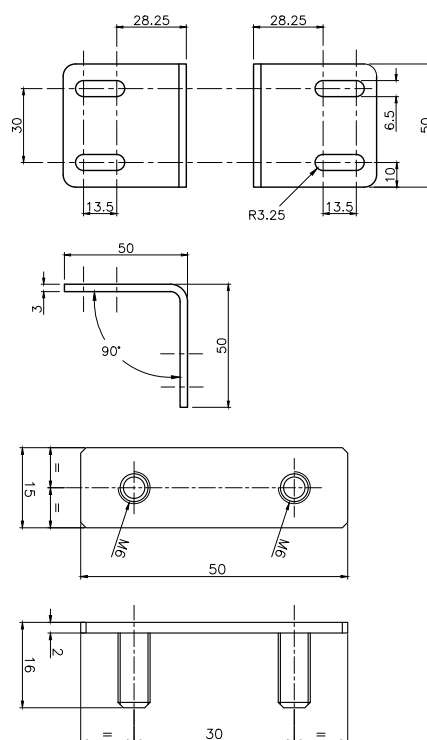
## TRANSMITTER



Models	A1 (mm)	A2 (mm)	B (mm)
303	420	395	300
453	570	545	450
603	720	695	600
753	870	845	750
903	1020	995	900
1053	1170	1145	1050
1203	1320	1295	1200
1353	1470	1445	1350
1503	1620	1595	1500
1653	1770	1745	1650
1803	1920	1895	1800
1953	2070	2045	1950
2103	2220	2195	2100
2253	2370	2345	2250

Included mounting materials:

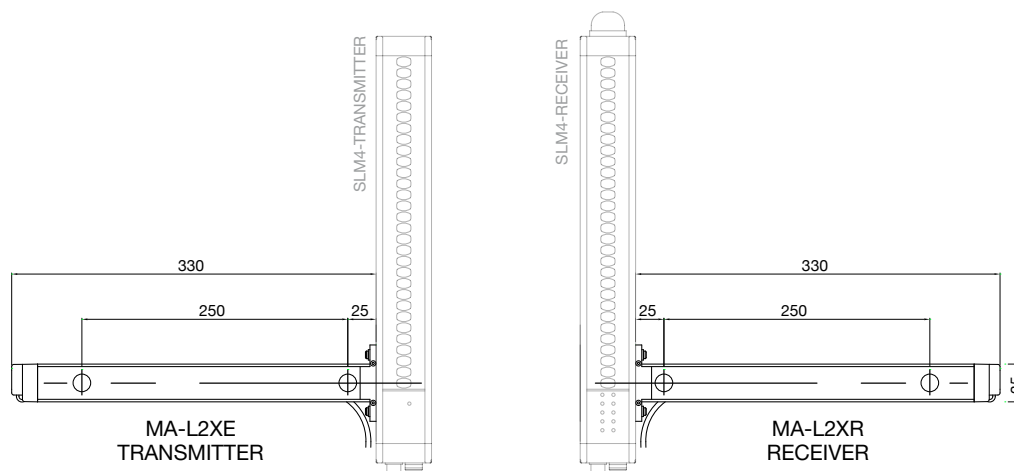
- Mounting bracket
- Mounting element with M6 threaded bolts



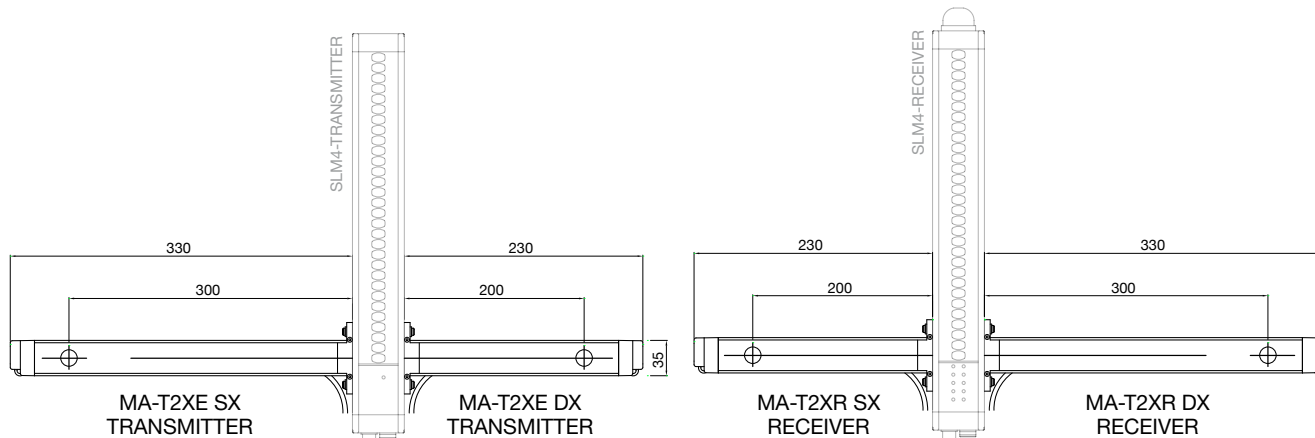
## 11 DIMENSIONS

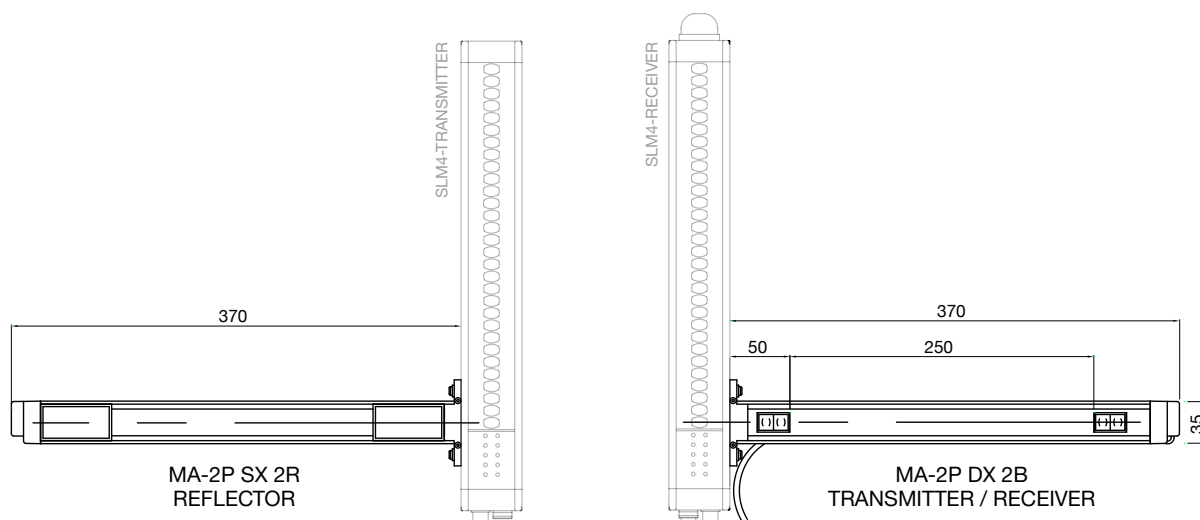
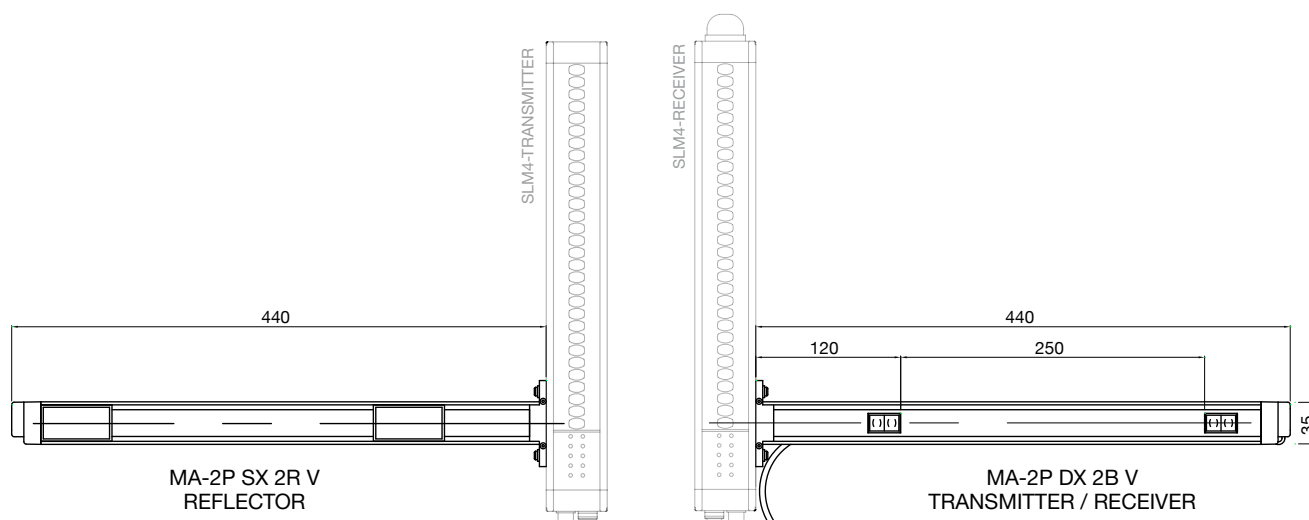
### 11.2 DIMENSIONS WITH MUTING ARMS (OPTIONAL ACCESSORY)

#### MA-L2X - L ARMS WITH 2 CROSSED TX/RX BEAMS, 1 BEAM PER MUTING SENSOR

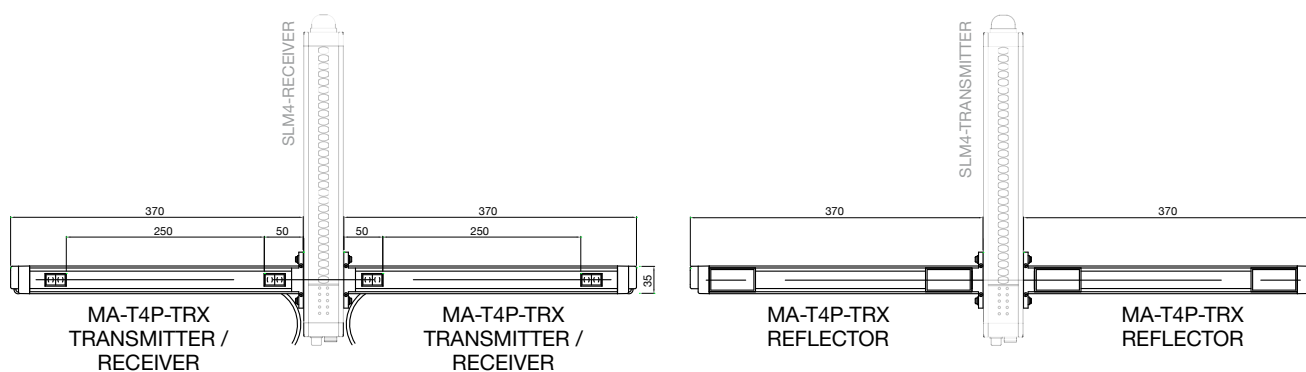
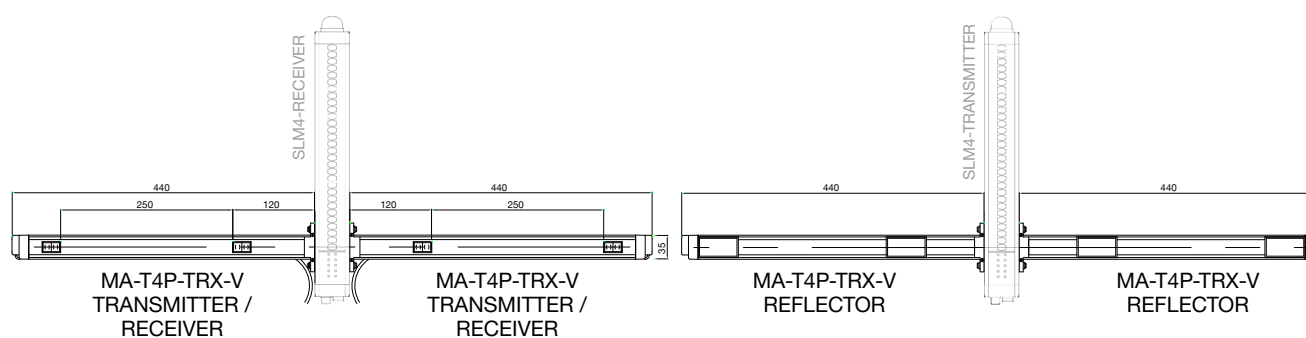


#### MA-T2X - T ARMS WITH 2 CROSSED TX/RX BEAMS, 1 BEAM PER MUTING SENSOR



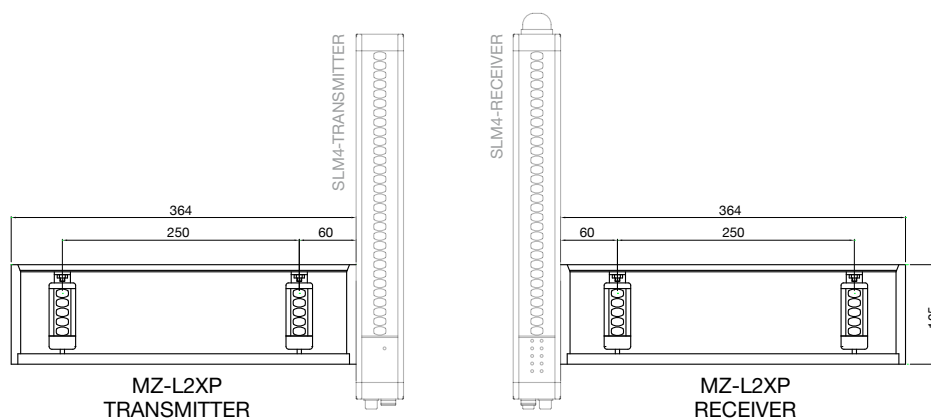
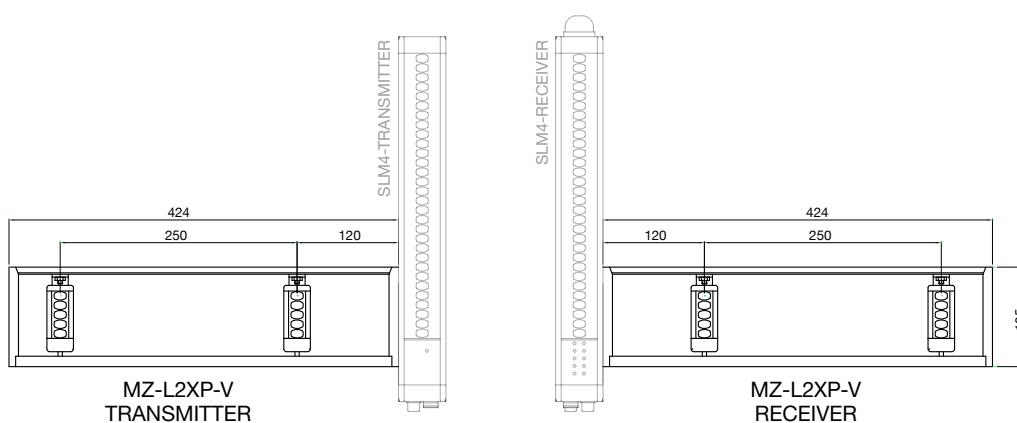
**11 DIMENSIONS****MA-L2P-TRX, MA-L2P-TRX-G - L-ARMS WITH 2 PARALLEL BEAMS AND REFLECTOR, 1 BEAM PER MUTING SENSOR****MA-L2P-TRX - L ARMS WITH 2 PARALLEL BEAMS AND REFLECTOR, 1 BEAM PER MUTING SENSOR, FOR HIGH SPEED**

## 11 DIMENSIONS

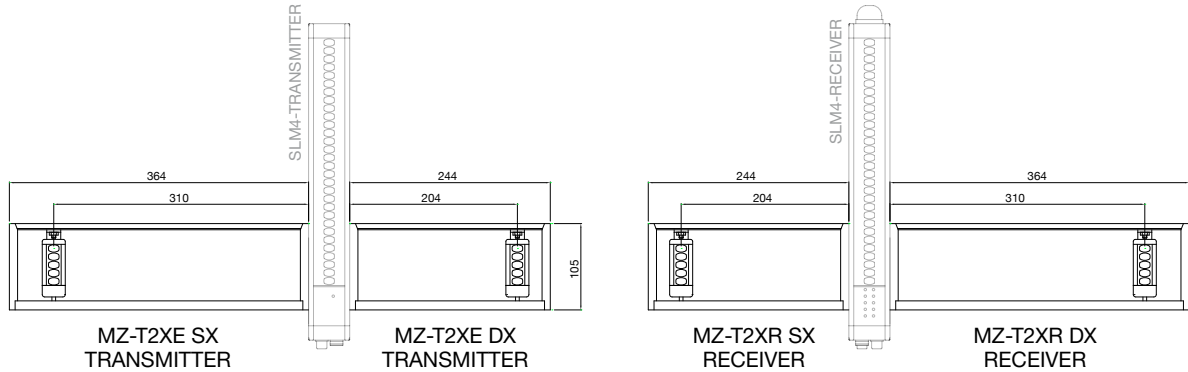
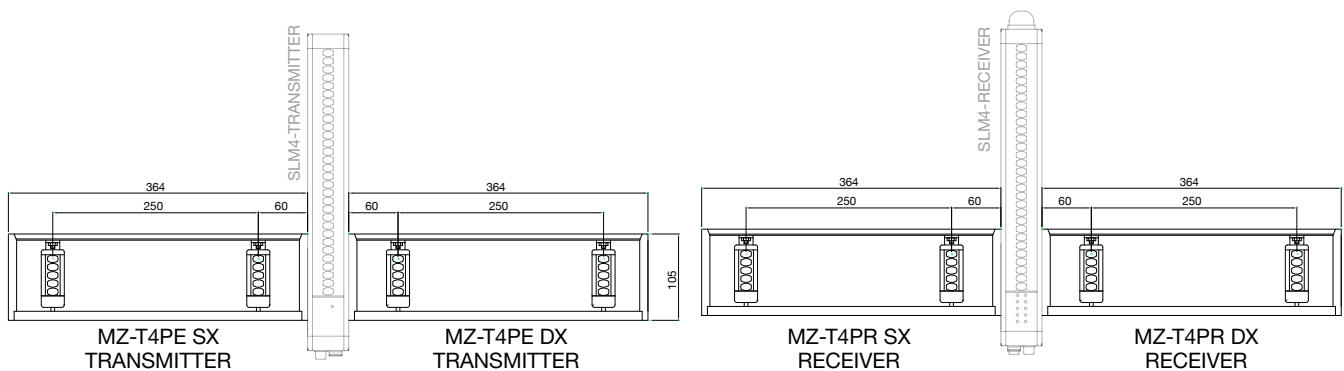
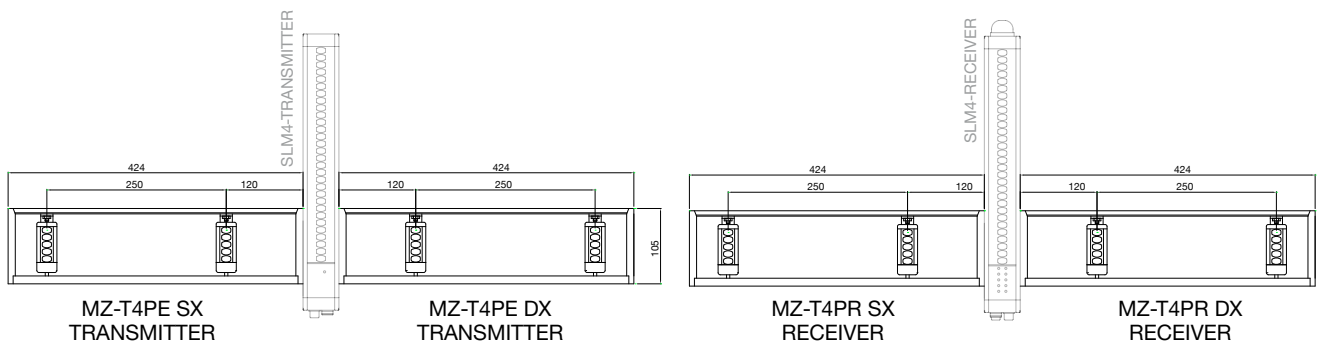
**MA-T4P-TRX, MA-T4P-TRX-G - T-ARMS WITH 4 PARALLEL BEAMS AND REFLECTOR, 1 BEAM PER MUTING SENSOR**

**MA-T4P-TRX-V - T-ARMS WITH 4 PARALLEL BEAMS AND REFLECTOR, 1 BEAM PER MUTING SENSOR, FOR HIGH SPEED**




## 11 DIMENSIONS

**MZ-L2XP - L-ARMS WITH 2 ADJUSTABLE CROSSED/ PARALLEL M5 RX/TX PHOTO-CELLS. 5 BEAMS PER MUTING SENSOR**

**MZ-L2XP-V - L-ARMS WITH 2 ADJUSTABLE CROSSED/ PARALLEL M5 RX/TX PHOTOCELLS. 5 BEAMS PER MUTING SENSOR, FOR HIGH SPEED**


## 11 DIMENSIONS

**MZ-T2X - T-ARMS WITH 2 ADJUSTABLE CROSSED M5 RX/TX PHOTOCELLS.  
5 BEAMS PER MUTING SENSOR**

**MZ-T4P - T-ARMS WITH 4 ADJUSTABLE PARALLEL M5 RX TX PHOTOCELLS. 5  
BEAMS PER MUTING SENSOR**

**MZ-T4P-V - T-ARMS WITH 4 ADJUSTABLE PARALLEL M5 RX/TX PHOTOCELLS.  
5 BEAMS PER MUTING SENSOR, FOR HIGH SPEED**


## 12 SLM4PO SOFTWARE CONFIGURATION



For configuring the SLM4PO models, pins 6 and 11 of the main connector must detect 0 V DC on the receiver when switching on (or open circuit).

The “SLM4 CONFIGURATOR” application makes it possible to configure the properties of the SLM4PO light barrier and is used for setting all parameters for proper function of the barrier and the muting function.

After the operator has verified that the system functions correctly, he/she no longer needs a connection to the computer, and SLM4PO can function autonomously.

However, if the light barrier function is to be monitored by the computer continuously, the USB connection can remain connected to SLM4PO. Thanks to the versatile graphic user interface of the SLM4 CONFIGURATOR, configuration can be done in just a few easy steps.

### 12.1 SOFTWARE INSTALLATION

---

#### COMPUTER HARDWARE REQUIREMENTS

- RAM: 1 GB (sufficient for operation with Windows 7 SP1 + Framework 4.0)
- Hard drive: free capacity > 500 Mbytes
- USB connection: 1.1, 2.0 or 3.0
- CD-ROM reader

#### COMPUTER SOFTWARE REQUIREMENTS

Windows 7 with Service Pack 1 (or higher).

Microsoft Framework 4.0 (or higher) must be installed on the computer.

Downloading and installing a configuration from the Internet

- Go to the di-soric homepage: [www.di-soric.com](http://www.di-soric.com)
- Go to the product page of the device, where you will find the configuration software
- Download SLM4 CONFIGURATOR configuration software
- Double-click Setup.exe
- After successful installation, a window appears with the prompt to close the setup program

## 12 SLM4PO SOFTWARE CONFIGURATION

### 12.2 TOOLBAR

The following illustration depicts the toolbar and explains the meaning of the various symbols:



- |    |   |  |   |
|----|---|--|---|
| 1  | → |  | CHANGE LIGHT BARRIER CONFIGURATION                                |
| 2  | → |  | SAVE CONFIGURATION on the hard drive                              |
| 3  | → |  | LOAD CONFIGURATION from the hard drive                            |
| 4  | → |  | PROJECT INFORMATION   |
| 5  | → |  | PRINT CONFIGURATION REPORT  |
| 6  | → |  | VALIDATE CONFIGURATION  |
| 7  | → |  | CONNECTION  |
| 8  | → |  | CONFIGURATION DOWNLOAD  |
| 9  | → |  | CONFIGURATION UPLOAD  |
| 10 | → |  | END CONNECTION (or RESTART if the light barrier is not connected) |
| 10 | → |  | MONITOR LIGHT BARRIER STATUS (graphic and text)                   |
| 11 | → |  | CONFIGURATION HISTORY   |
| 12 | → |  | DOWNLOAD ERROR LOG  |
| 13 | → |  | DELETE MASTER DATA ERRORS   |
| 14 | → |  | CHANGE PASSWORD   |
| 15 | → |  | DELETE CONFIGURATION  |

## 12 SLM4PO SOFTWARE CONFIGURATION

### 12.3 CONFIGURATION SOFTWARE

The various software functions are described below.

When starting the software, the following start screen appears ("Fig. 12-h").

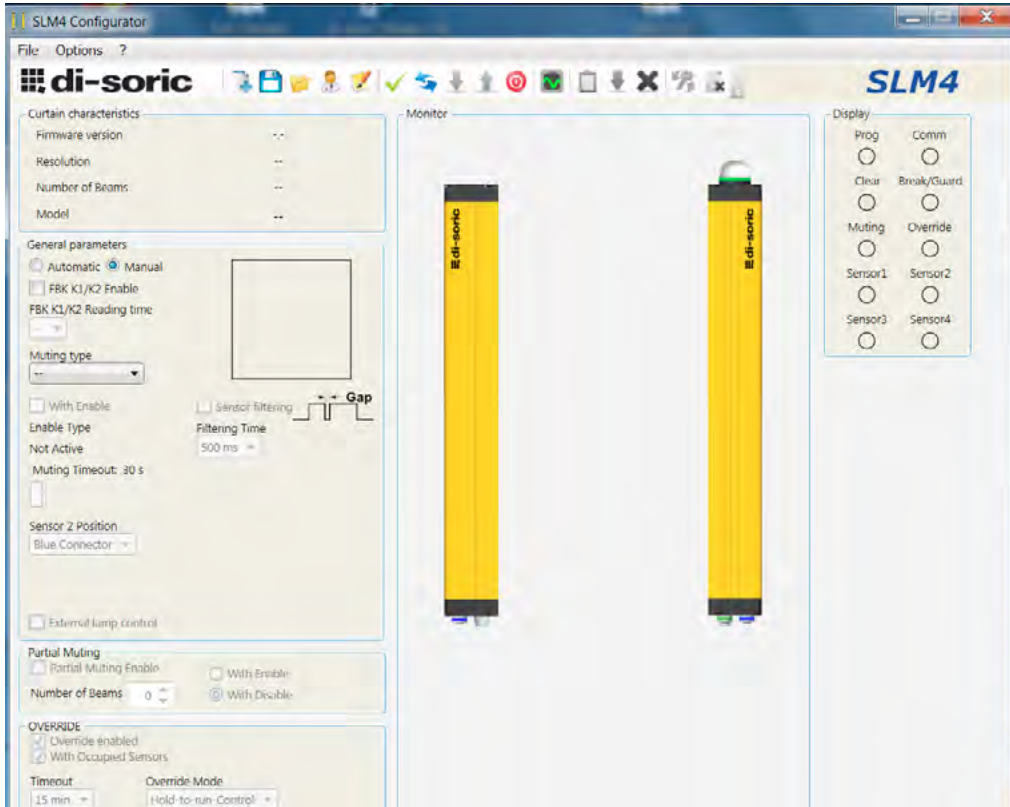



Fig. 12-h

The user has the following choices:

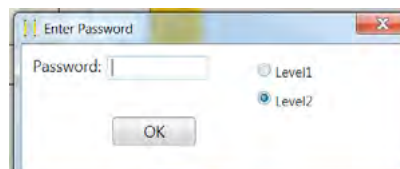
- Creating a new configuration.
- Loading a previously created configuration (  symbol).



To continue a configuration after connecting to SLM4PO, the user is prompted to enter a password:

#### LEVEL 1 PASSWORD

- When initializing the system for the first time, the operator must use the password "" (ENTER key). An operator who knows the Level 2 password is authorized to enter a new password for Level 1 (alphanumeric, max. 8 characters).




#### LEVEL 2 PASSWORD

- An operator authorized to create the configuration must know the Level 2 PASSWORD. When initializing the system for the first time, the operator must use the password "SAFEPASS" (in all caps). An operator who knows the Level 2 password is authorized to enter a new password for Level 1 (alphanumeric, max. 8 characters).

## 12 SLM4PO SOFTWARE CONFIGURATION

### 12.4 CONNECTING SLM4PO TO THE COMPUTER

- Connect the computer to the SLM4PO (  symbol)
- After entering the PASSWORD, the following screen appears

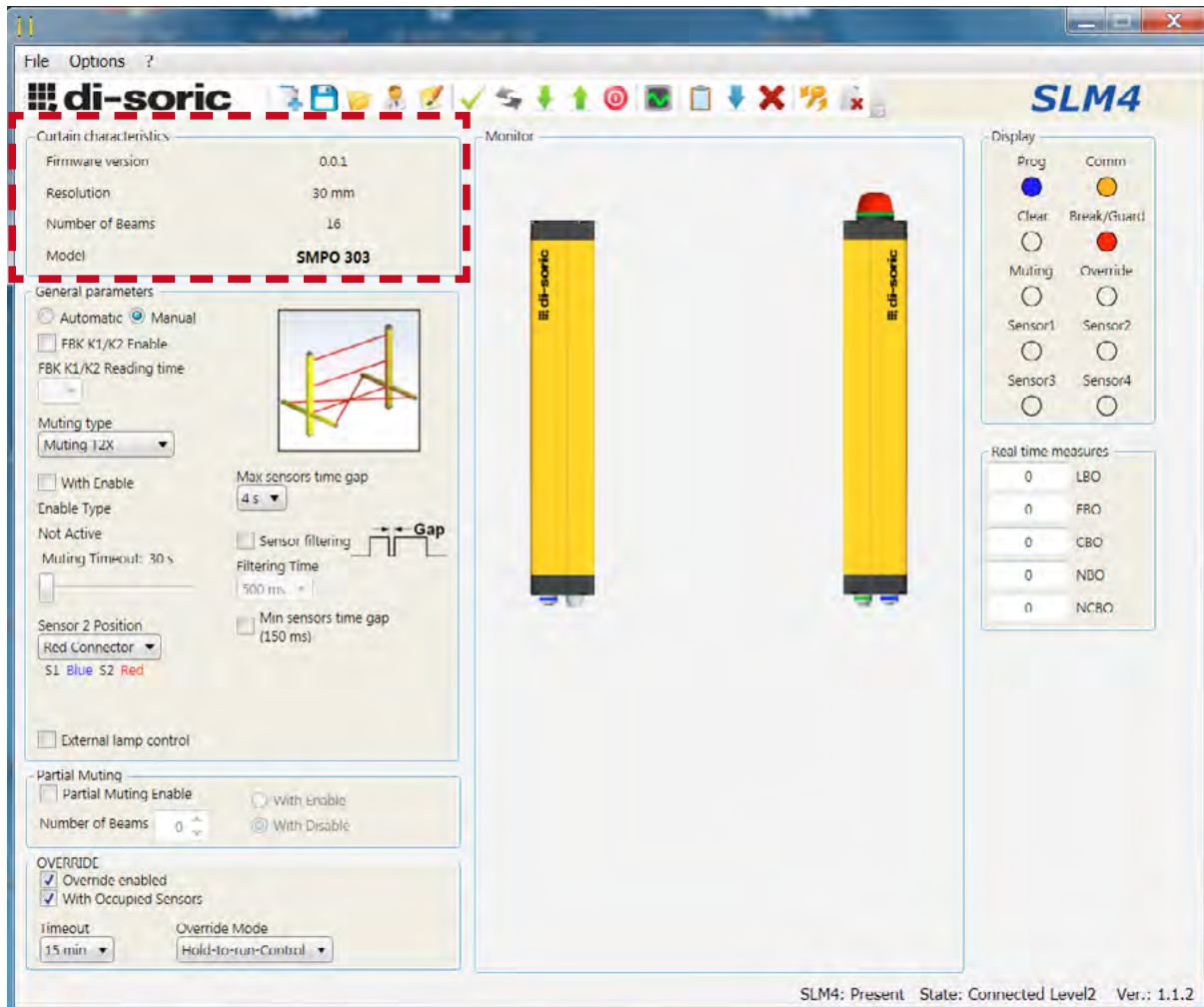



Fig. 12-i

In this phase, the reading process of the SLM4PO status is static because the light barrier is not yet operating. The following information is displayed in the marked fields ("Fig. 12-i"):

- General features of the light barrier
- Password stage
- Connected/disconnected
- Software version

### 12.5 CONFIGURATION DOWNLOAD

- To have the light barrier configuration displayed, the configuration must be downloaded (  symbol).

## 12 SLM4PO SOFTWARE CONFIGURATION

### 12.6 LIGHT BARRIER CONFIGURATION


The dashed box indicates which area must be completed for the correct configuration of the light barrier.

#### LEVEL 2 PASSWORD

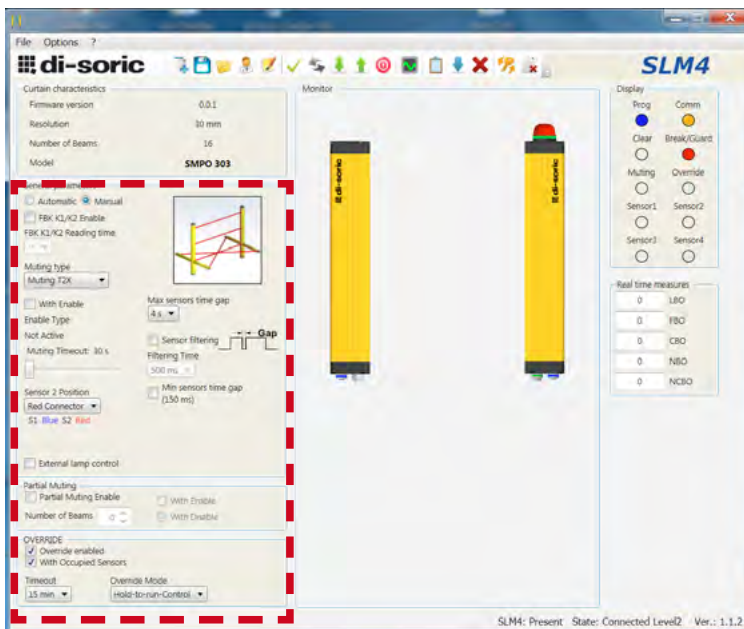
- An operator authorized to create the configuration must know the Level 2 password. When initializing the system for the first time, the operator must use the password "SAFEPASS" (in all caps). An operator who knows the Level 2 password is authorized to enter a new password for Level 2 (alphanumeric, max. 8 characters).





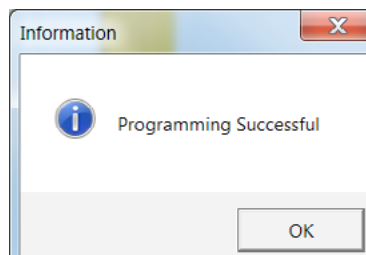
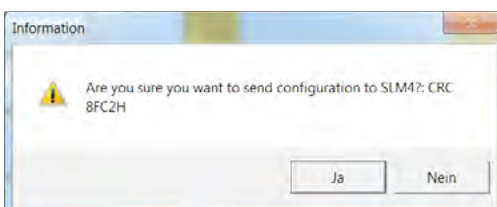
In the configuration phase, the programming LED (BLUE) and the communication LED (YELLOW) engage. See section "CONFIGURATION PARAMETERS" regarding the meaning of the various parameters and their possible options.

- After proper configuration of the light barrier, this information can be saved (  symbol).

### 12.7 VALIDATING AND LOADING THE CONFIGURATION




- Check the correctness of the configuration using the validation procedure (  symbol).
- Then send the configuration to SLM4 (  symbol) and confirm the following questions:





## 12 SLM4PO SOFTWARE CONFIGURATION

### 12.8 PRINTING THE CONFIGURATION REPORT

- With the function for printing the report (  symbol), the most important parameters entered by the operator during configuration can be printed out (report).

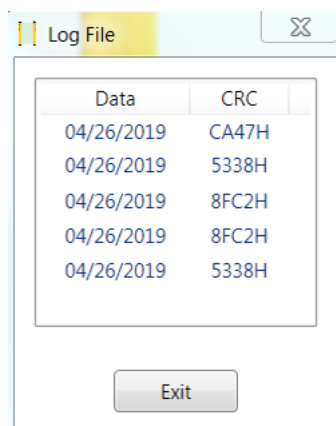


This function allows for the immediate verification of the configuration just completed.


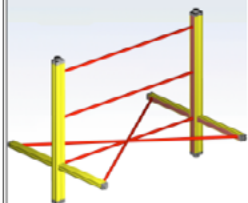
### 12.9 CONFIGURATION LOG

The creation data and the CRC (identification by four hexadecimal digits) of the project are located inside the configuration file. The log file can record a maximum of five events in sequence. After that, the log is overwritten beginning with the oldest event. The LOG file can be displayed using the corresponding symbol from the standard menu.


(  symbol)



#### SLM4

Print Report SLM4 Configurator Ver.: 1.1.2			
Company: Unternehmen			
<ul style="list-style-type: none"> <li>User: Name</li> <li>Project: Project</li> </ul>			
Date: 04.29.2019		CRC: CA47H	
General parameters			
Manual			
Feedback K1_K2 disabled		-	
Muting			
Muting type	Muting T2X		
Muting Timeout	30 s		
With Enable	NO		
Max sensors time gap	4 s		
Min sensors time gap (150 ms)	NO		
Sensor 2 Position	Red Connector		
Sensor filtering	NO		
External lamp control	NO		
Partial Muting			
Partial Muting Enable	NO		
OVERRIDE			
Override enabled	YES		
Override Mode	Hold-to-run-Control		
Timeout	15 min		
With Occupied Sensors	YES		
Signature:			

### 12.10 DOWNLOADING THE ERROR LOG

By clicking the (  ) symbol, the operator can download the

error log file, which includes the error code, the affected micro and the address of the error itself. Refer to the error table at the end of this manual to take the appropriate corrective action.

Störungen melden Mikro A			Störungen melden Mikro B		
	Fehlercode	Fehleradresse		Fehlercode	Fehleradresse
1	107D	1584H	1	107D	1584H
2	35D	2423H	2	50D	038CH
3	50D	038CH	3	35D	2423H



Verlassen



## 12 SLM4PO SOFTWARE CONFIGURATION

### 12.11 ENABLING SLM4PO

The light barrier is operated and its status is displayed using the following two commands:

- End connection (  symbol). SLM4 is now ready to operate.
- Light barrier status monitor (  symbol).

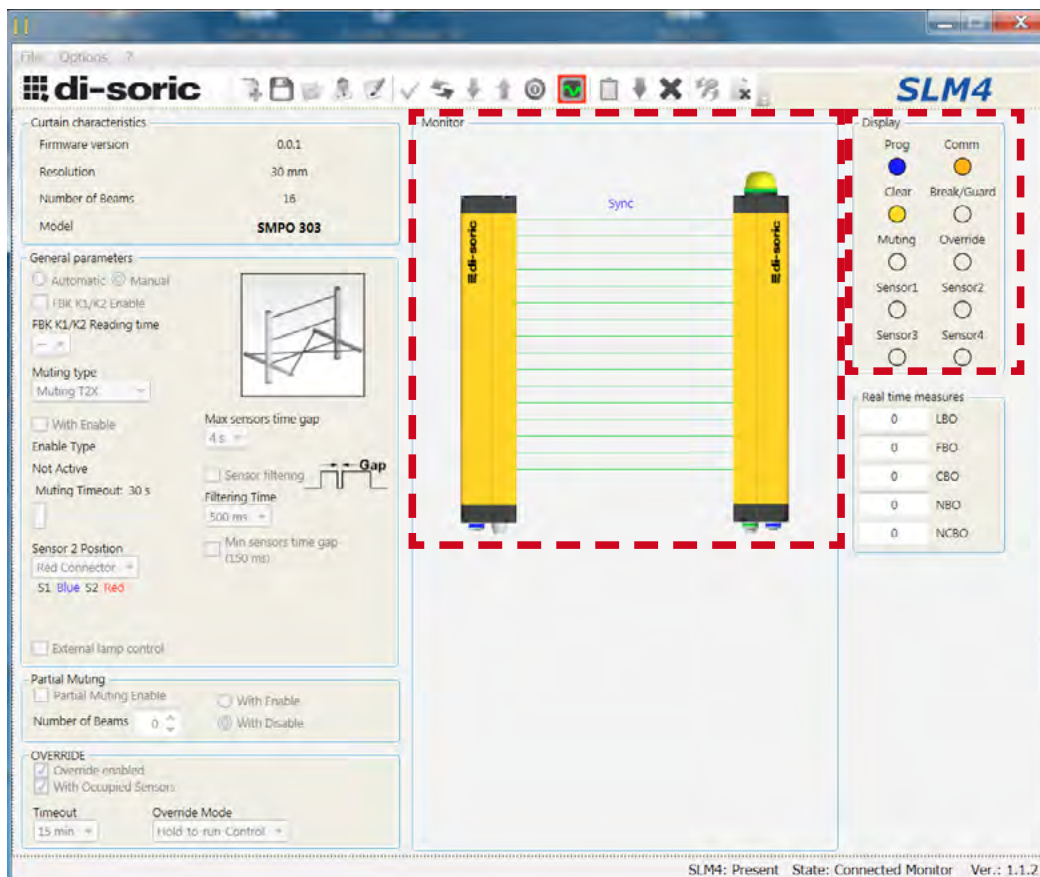
### 12.12 MONITORING THE LIGHT BARRIER STATUS

In this phase, the reading process of the SLM4 operating status is dynamic.

The following is displayed in particular:

- A graphic representation of the light barrier with integrated lamp (if present) with real-time coloring.
- A graphic representation of the display elements with coloring in real time; blue programming LED and yellow communication LED are switched on = *barrier is programmed and in communication*.

### 12.13 SETTING THE GENERAL PARAMETERS



**Automatic/manual:** Selection of automatic or manual operation (see section “7.8 Manual operation (configuration using a computer)”, page 47 and “7.9 Automatic operation (configuration using a computer)”, page 48).

**Enabling FBK K1/K2:** If the option is selected, an external EDM signal must be connected (see section “7.6 Selecting the function”, page 46).

**FBK K1/K2 reading time:** Setting a delay for reading off the external FBK signal. Possible values: from 100 ms to 1300 ms (increments of 100 ms).

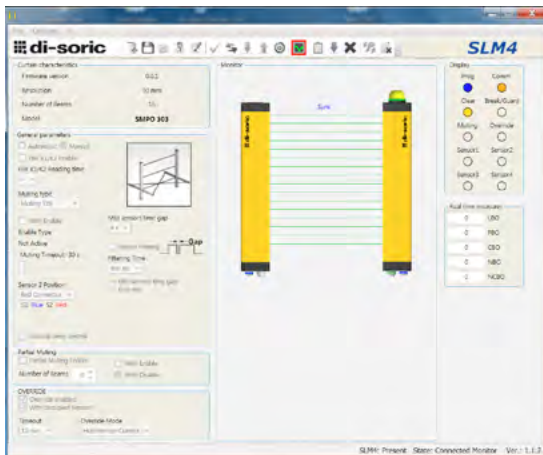
## 12 SLM4PO SOFTWARE CONFIGURATION

### 12.14 SETTING THE MUTING PARAMETERS

#### 12.14.1 “SIMULTANEOUS” MUTING



The muting function is enabled after an interruption of the sensors S1 and S2 (the sequence is not relevant) within a time period of 2 s to 5 s, which is defined by the operator (or S4 and S3 if the material is moving in reverse direction). The simultaneous muting enables the muting function via the input of the sensors S1, S2, S3 and S4. Prerequisite: The muting cycle can start once all sensors are set to 0 V DC and the light barrier is clear.



#### PARAMETERS

- **With enable:** The selection of this option makes it possible to use external “MUT\_ENABLE” signals to enable muting. Otherwise, the muting function is always enabled. There are two types of enabling: “Enable/Disable” and “Enable”. (see section “7.1 Software configuration”, page 41 and “7.11 Muting Enable/Disable muting sequence (configuration using a computer)”, page 49).

- **Muting timeout:** Setting a time from 10 s to ∞ within which the muting cycle must end. If muting is not completed once this time has elapsed, the muting function is disabled at once.
- **Sensor simultaneity time:** A maximum time (from 2 to 5 seconds) that may elapse between the activation of two muting sensors can be set.
- **Sensor gaps:** If non-homogeneous material is located on the pallets, “gaps” in the interruption of the muting sensors can occur. Using this parameter, the filter can be adjusted in the case of the sensor signal so that the muting sequence remains unchanged. This parameter can measure 500 ms or 1000 ms.
- **Sensor 2 position:** Not permitted.
- **Direction:** The sequence of the assignment of the sensors can be entered. If BIDIR is set, assignment can proceed in both directions, both from S1 & S2 to S3 & S4 and from S3 & S4 to S1 & S2. If UP is selected, assignment proceeds from S1 & S2 to S3 & S4. If DOWN is selected, assignment proceeds from S3 & S4 to S1 & S2.
- **Closing muting:** There are two options for this: CURTAIN or SENSOR: If CURTAIN is selected, the end of the muting sequence comes when the passageway is enabled. If SENSOR is selected, the end of the muting sequence comes after the penultimate sensor has been enabled.
- **Sensor minimum time:** If this option is selected, muting can only be enabled if a time of >150 ms elapses between the activation of sensor 1 and sensor 2 (or sensor 4 and sensor 3).
- **Outer control lamp:** This option renders the muting lamp mandatory.

## 12 SLM4PO SOFTWARE CONFIGURATION

### 12.14.2 MUTING “IN SEQUENCE”



The muting function is enabled by the successive interruption of the sensors S1 and S2 and then S3 and S4 (without time limit). If the pallet travels in reverse direction, the sequence is: S4, S3, S2, S1.

The screenshot shows the 'General parameters' window for muting configuration. It includes the following settings:

- Mode:** Automatic (selected), Manual
- FBK K1/K2 Enable:** ☐
- FBK K1/K2 Reading time:** --
- Muting type:** Muting T4P Seq
- With Enable:** ☐
- Enable Type:** Not Active
- Muting Timeout:** 30 s
- Sensor 2 Position:** Blue Connector
- Muting ending:** SENSOR
- External lamp control:** ☐
- Sensor filtering:** ☐ (with a diagram showing a gap in the sensor signal)
- Filtering Time:** 500 ms
- Direction:** BIDIR

### PARAMETERS

- With enable:** The selection of this option makes it possible to use external “MUT\_ENABLE” signals for *enabling muting*: The selection of this option makes it possible to use external “MUT\_ENABLE” signals to enable muting. Otherwise, the muting function is always enabled. There are two types of enabling: “Enable/Disable” and “Enable”. (see section “7.10 Muting Enable is enabled: Muting sequence (configuration using a computer)”, page 48 and “7.11 Muting Enable/Disable muting sequence (configuration using a computer)”, page 49).

- Muting timeout:** Setting a time from 10 s to  $\infty$  within which the muting cycle must end. If muting is not completed once this time has elapsed, the muting function is disabled at once.
- Sensor gaps:** If non-homogeneous material is located on the pallets, “gaps” in the interruption of the muting sensors can occur. Using this parameter, the filter can be adjusted in the case of the sensor signal so that the muting sequence remains unchanged. This parameter can measure 500 ms or 1000 ms.
- Sensor 2 position:** Not permitted.
- Direction:** The sequence of the assignment of the sensors can be entered. If BIDIR is set, assignment can proceed in both directions, both from S1 & S2 to S3 & S4 and from S3 & S4 to S1 & S2. If UP is selected, assignment proceeds from S1 & S2 to S3 & S4. If DOWN is selected, assignment proceeds from S1 & S4 to S1 & S2.
- Sensor minimum time:** If this option is selected, muting can only be enabled if a time of >150 ms elapses between the activation of sensor 1 and sensor 2 (or sensor 4 and sensor 3).
- Outer control lamp:** This option renders the muting lamp mandatory.

## 12 SLM4PO SOFTWARE CONFIGURATION

### 12.14.3 “L” MUTING



The muting function is enabled after an interruption of the sensors S1 and S2 (the sequence is not relevant) within a time of 2 s to 5 s, which is decided by the operator.  
The muting cycle ends after the passageway has been enabled.

The screenshot shows the 'General parameters' window for the 'L' muting function. It includes several settings:

- Automatic** (radio button) and **Manual** (radio button, selected).
- FBK K1/K2 Enable** (checkbox, unchecked).
- FBK K1/K2 Reading time** (dropdown menu, set to '--').
- Muting type** (dropdown menu, set to 'Muting L2X/L2P').
- With Enable** (checkbox, unchecked).
- Enable Type** (checkbox, unchecked).
- Not Active** (checkbox, unchecked).
- Muting Timeout: 30 s** (slider control).
- Sensor 2 Position** (dropdown menu, set to 'Blue Connector').
- S1 - S2 Blue** (text label).
- External lamp control** (checkbox, unchecked).
- Max sensors time gap** (dropdown menu, set to '4 s').
- Sensor filtering** (checkbox, unchecked).
- Filtering Time** (dropdown menu, set to '500 ms').
- End Muting Time** (dropdown menu, set to '4.0 s').
- Blind Time** (dropdown menu, set to '500 ms').
- Min sensors time gap (150 ms)** (checkbox, unchecked).

A diagram of a pallet on a conveyor system is shown in the top right corner of the window.

### PARAMETERS

- **With enable:** The selection of this option makes it possible to use external “MUT\_ENABLE” signals to enable muting. Otherwise, the muting function is always enabled. There are two types of enabling: “Enable/Disable” and “Enable”. (see section “7.10 Muting Enable is enabled: Muting sequence (configuration using a computer)”, page 48 and “7.11 Muting Enable/Disable muting sequence (configuration using a computer)”, page 49).

- **Muting timeout:** Setting a time from 10 s to ∞ within which the muting cycle must end. If muting is not completed once this time has elapsed, the muting function is disabled at once.
- **Sensor simultaneity time:** A maximum time (from 2 to 5 s) that may elapse between the activation of two muting sensors can be set.
- **Sensor gaps:** If non-homogeneous material is located on the pallets, “gaps” in the interruption of the muting sensors can occur. Using this parameter, the filter can be adjusted in the case of the sensor signal so that the muting sequence remains unchanged. This parameter can measure 500 ms or 1000 ms.
- **Sensor 2 position:** The S2 position makes it possible to select the connection (blue or red) to which the external S2 muting sensor is to be connected. If muting arms (L) are used, the **blue** connection must be selected. If two separate sensors are used, the **red** connection must be selected.
- **Time to end of muting:** The time (from 2.5 to 6 seconds, in increments of 500 ms) that must elapse between the enable signal of the first sensor and the enable signal of the dangerous passageway can be adjusted. The muting function is terminated at the end of this time span.
- **Blind time:** Blind time is enabled only in the event of a muting conclusion with curtain in case it is known that objects can protrude after the complete passage of the pallet (conclusion of the muting cycle) and set the light barrier to BREAK by their occupation. The OSSD outputs remain active during blind time. Blind time can vary between 250 ms and 1 second.
- **Sensor minimum time:** If this option is selected, muting can only be enabled if a time of >150 ms elapses between the activation of sensor 1 and sensor 2 (or sensor 4 and sensor 3).
- **Outer control lamp:** This option renders the muting lamp mandatory.

## 12 SLM4PO SOFTWARE CONFIGURATION

### 12.14.4 “T” MUTING



The muting function is enabled after an interruption of the sensors S1 and S2 (the sequence is not relevant) within a time of 2 s to 5 s, which is decided by the operator.  
The muting cycle ends after one of the two sensors has been enabled.

#### PARAMETERS

- **With enable:** The selection of this option makes it possible to use external “MUT\_ENABLE” signals to enable muting. Otherwise, the muting function is always enabled. There are two types of enabling: “Enable/Disable” and “Enable”. (see section “7.10 Muting Enable is enabled: Muting sequence (configuration using a computer)”, page 48 and “7.11 Muting Enable/Disable muting sequence (configuration using a computer)”, page 49).

- **Muting timeout:** Setting a time from 10 s to  $\infty$  within which the muting cycle must end. If muting is not completed once this time has elapsed, the muting function is disabled at once.
- **Sensor gaps:** If non-homogeneous material is located on the pallets, “gaps” in the interruption of the muting sensors can occur. Using this parameter, the filter can be adjusted in the case of the sensor signal so that the muting sequence remains unchanged. This parameter can measure 500 ms or 1000 ms.
- **Sensor 2 position:** The S2 position makes it possible to select the connector (blue or red) to which the external S2 muting sensor is to be connected. If sensors with an output to individual connectors are used, the **blue** connector must be selected. If two separate sensors (that is, two connectors) are used, the **red** connector must be selected.
- **Sensor minimum time:** If this option is selected, muting can only be enabled if a time of >150 ms elapses between the activation of sensor 1 and sensor 2 (or sensor 4 and sensor 3).
- **Outer control lamp:** This option renders the muting lamp mandatory.

## 12 SLM4PO SOFTWARE CONFIGURATION

### 12.15 PARTIAL MUTING

In SLM4PO light curtains, the muting function can be limited to a specific number of beams (from the first beam at the bottom).

This function, called partial muting, has the following features:

**i** The only way to enable it is by using the SLM4 Configurator software (“check partial muting enabling”). The first beam of the partial muting is at the bottom (connection side).

#### PARTIAL MUTING WITH ENABLE

When selecting partial muting WITH ENABLE, SLM4 enables the partial muting function after a rising edge of the “Partial MUTING” signal (pin 6 of the receiver), before the start of the muting cycle, for the first beams only (10 in the example “Fig. 12-j”).

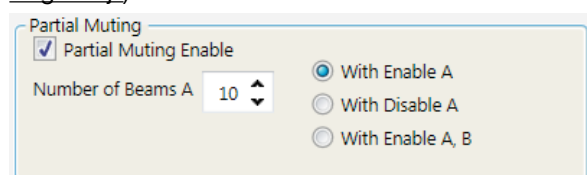
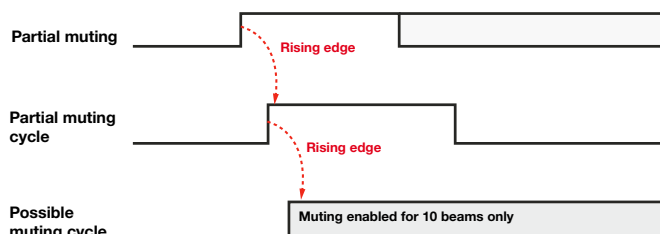


Fig. 12-j



#### PARTIAL MUTING WITH DISABLE

When selecting partial muting WITH DISABLE, SLM4 enables the partial muting function for the first n beams only (10 in the example “Fig. 12-k”). The normal muting cycle is enabled only after a rising edge of the “Partial MUTING” signal (pin 6 of the receiver), before the start of the muting cycle.

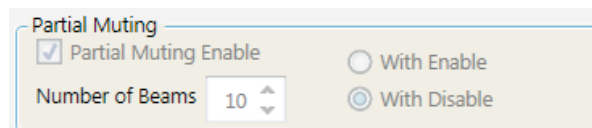
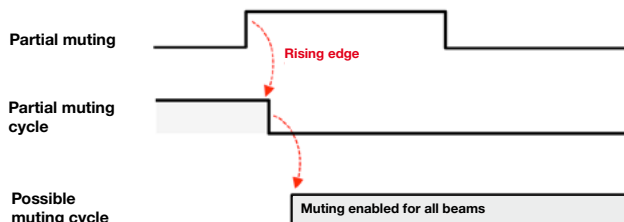


Fig. 12-k



#### PARTIAL MUTING: MONITOR

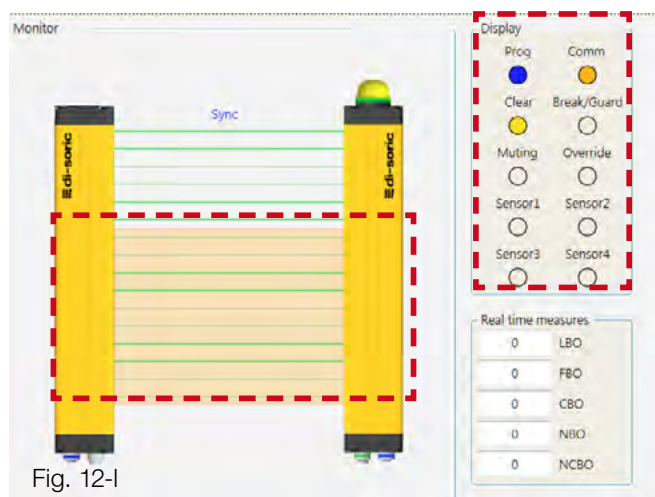


Fig. 12-l

The following is displayed:

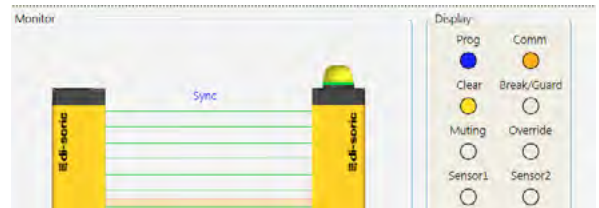
- Representation of the light barrier and muting lamp
- Representation of the display elements
- Representation of the light barrier with highlighted partial muting beams

The partial muting function was enabled for the first 10 beams in the example (“Fig. 12-l”). The beams affected by partial muting are marked in yellow; the green color signals beams in regular operation: “Safety light curtain enabled.”



## 12.16 MUTING OVERRIDE

The OVERRIDE function is required if the machine stops with material after a faulty muting sequence and there is material blocking the dangerous passageway.



**WARNING!** The OSSD outputs are disabled in this situation because the light barrier and/or at least one muting sensor are occupied. The OVERRIDE LED flashes in this state. This procedure enables the OSSD outputs and allows for removing the material blocking the output; in addition, the Override/Muting lamp flashes.

During the entire phase while the OVERRIDE is enabled, the Override/Muting lamp flashes.

The function of this lamp must be checked every now and then (during the muting and override phases).

**Caution!** The override pulse command automatically enables the light barrier outputs until the light barrier and the muting sensors are clear again. The light barrier is not capable of protecting the input to the dangerous passageway for this time. Due to this, any work must be performed under strict supervision by specialist personnel.

The override can only be enabled if muting is disabled and at least one muting sensor is occupied (or the light barrier is occupied). The override ends after the light barrier and the sensors have been cleared.

The override can be configured in two ways:

- Override with sustained control system.
- Override with pulsed control system.

### OVERVERRIDE WITH SUSTAINED CONTROL SYSTEM

This function can be enabled if the override command is sustained for the entire duration of the subsequent processes. However, it remains possible to launch a new override by releasing the command and activating it again. The override ends, without any further commands being required, if the light barrier and the sensors (clear passageway) have been cleared or if the timeout has elapsed.

### OVERVERRIDE WITH PULSED CONTROL SYSTEM

This function can be enabled when the override command is activated.

The override ends when the light barrier and the sensors (free passageway) have been cleared or when the timeout has elapsed.

This function can restart only if the override command is activated again.

### PARAMETERS

If sensors are occupied: For activating the OVERRIDE, the minimum requirement is the activation of one sensor and the BREAK condition of the light barrier.

**Timeout:** Allows for entering a time period of 5 min to 30 min within which the override function must be ended.

## 12 SLM4PO SOFTWARE CONFIGURATION

### 12.17 SLM4 DIAGNOSTICS - ERRORS

ERROR	ERROR DESCRIPTION	CORRECTIVE ACTION
0 – 25	Internal error	Send the device to di-soric for repair.
34 35, 37, 40, 47, 49, 50,	OSSD error	Check the connection of pins 3 and 4 at the main connection of the RECEIVER.
32, 33, 36, 38, 39, 41, 42, 43, 44, 45, 46, 48, 51	Internal OSSD error	Send the device to di-soric for repair.
64 - 73	Error in the base PCB	Send the device to di-soric for repair.
74, 75,	Excess current on 24 VDC line	Ensure that the maximum current consumption is < 1.6 A.
76 - 85 90	Error in the base PCB	Send the device to di-soric for repair.
86, 87,	Error at STATUS output	Check the connection of pin 12 at the main connection of the RECEIVER.
88	Excess current on external lamp	Check the connection of pin 1 at the LAMP/USB connection of the RECEIVER.
89	See 86, 87, 88	See 86, 87, 88
105, 106,	Interfering transmitter detected	<ul style="list-style-type: none"> <li>Change position of transmitter and receiver</li> <li>Move the interfering transmitter to a different location to prevent it from shedding light onto the receiver.</li> <li>Shield the beams coming from the interfering transmitter by opaque protective devices</li> </ul>
128	Configuration error	Check the connection of pin 6.11 at the main connection of the RECEIVER.
129	Initial configuration changed	Check the connection of pin 6.11 at the main connection of the RECEIVER.
130	See 128, 129	See 128, 129
131, 132,	Incorrect status of pin 8 while EDM is active	Check the connection of pin 8 at the main connection of the RECEIVER.
133	EDM contact stuck (closed)	Check external contactors
134	EDM contact open	Check external contactors
135	See 133, 134	See 133, 134
136	OVERRIDE configuration incorrect	Check the connection of pin 9.10 at the main connection of the RECEIVER.
137	Maximum number of possible requests exceeds OVERRIDE	Switch off SLM4 and switch on again
138	See 137	See 137
139	24 V DC at the STATUS output	Check the connection of pin 12 at the main connection of the RECEIVER.
140	Excess current at STATUS output	Check the connection of pin 12 at the main connection of the RECEIVER.
141	See 139, 140	See 139, 140
142	Error in the integrated lamp	Send the device to di-soric for repair.
143, 144,	Error in the external lamp	Check the connection of pin 1 at the LAMP/USB connection of the RECEIVER.
146, 147,	Incorrect configuration of the muting sensors	<ul style="list-style-type: none"> <li>Check connections of the muting sensors</li> <li>Check position of sensor 2 using the software</li> <li>If no errors are detected, send the device to the di-soric shop for repair</li> </ul>



## 13 CHECKS, CARE AND MAINTENANCE

### 13.1 CHECKLIST BEFORE START-UP





**WARNING!** Verify the following checklist to ensure that SLM4 has been configured correctly before you start up the product for the first time.

1. Check whether the electric connections have been executed correctly.
2. Check whether the voltage is 24 V DC  $\pm$  20 % (PELV, in conformity with EN 60204-1 ("6 Electrical connection of SLM4, SLM4O – hardware configuration of SLM4", page 32 and "7 Electrical connection – configuration of SLM4PO", page 41).
3. Check whether access to the danger zone is possible only through the passageway protected by SLM4.
4. Check whether physical guards exist preventing access to the danger zone.
5. The contactors operating the dangerous machine must correspond to the safety level of the light barrier: SIL 3 - PL e - Cat.4.
6. The RESTART and OVERRIDE commands must not be accessible from inside the danger zone.
7. The safety distance must be measured beforehand and taken into account during the installation phase.
8. There must not be any reflective surfaces in the proximity of the dangerous passageway.
9. Make sure that the MUTING/OVERRIDE signal lamp is positioned in a place where the operator can see it.
10. Make sure that there are no light sources that could impair the proper function of SLM4.
11. Make sure that the operating personnel have been correctly instructed in the operation of the SLM4.

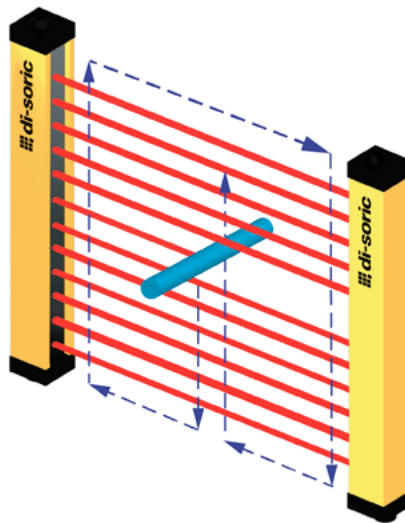
### 13.2 PERIODIC CHECK




**WARNING!** Functional checks must be run with a certain regularity (e.g. daily) depending on the risk analysis and the environment in which the light barrier is used.

1. Check whether transmitter and receiver have been properly connected to the power supply. (24 VDC  $\pm$  20%).
2. Check whether the blue "PRG" LED is illuminated (only if SLM4 is programmed using the software).
3. Check the configuration settings.
  - a) **MANUAL:**  
When switched on, the light barrier expects a RESTART command for the activation of its operating cycle (START INTERLOCK). Check whether this control is positioned in such a way that it cannot be activated from within the danger zone.  
Interrupt at least one beam of the protected area to ensure that the red LED at the receiver cuts in  (RESTART INTERLOCK).
  - b) **AUTOMATIC:**  
Interrupt at least one beam of the protected area to ensure that the green LED indicating proper operation cuts in again .

## 13 CHECKS, CARE AND MAINTENANCE



4. Check the resolution of the protected area: Use the correct test specimen for this test (opaque cylinder with diameter corresponding to the resolution of the light barrier).  
Place the test specimen in the controlled area and slowly shift it from top to bottom (or vice versa), first to the center and then to area near the transmitter and the receiver. Safety light grid: Interrupt the beams one after another using an opaque object and then move it to the proximity of the transmitter and the receiver. Check in any phase of the movement of the test object whether the red LED on the receiver remains on and whether the dangerous machine is stopped.
5. Verify the test function in accordance with the “6 Electrical connection of SLM4, SLM4O – hardware configuration of SLM4”, page 32 and “7 Electrical connection – configuration of SLM4PO”, page 41.  
Enable the test function on the transmitter and make sure that the red LED at the receiver switches on .

### 13.3 CARE AND MAINTENANCE

SLM4 does not require any specific maintenance work. We recommend, however, periodic cleaning of the front protective surfaces of the optical equipment of both devices.

Clean the surfaces using a damp cloth. In particularly dusty environments, it is recommended to spray the surfaces with an anti-static product after cleaning.



**NOTE!** Do not use abrasive or corrosive products, solvents, or alcohol in any case because these can damage the surface. To ensure that the front side of the light barrier is protected from electrostatic charge, do not use woolen cloths either.

Even very light scratches on the surface can widen the beam of the light barrier and thus impair the effectiveness of the detection when lateral reflective surfaces are present.

Therefore, practice extreme care when cleaning the front window of the light barrier, particularly in any environment where unusually abrasive dust is present (e.g. in the cement industry, etc.).

## 14 WARRANTY

For every newly manufactured SLM4 system, di-soric guarantees twelve months of freedom from material defects and manufacturing defects, assuming normal operating conditions.

For this time period, di-soric undertakes to eliminate possible product defects by repair or replacement of the defective parts completely free of charge with regard to both material costs and labor costs.

However, di-soric reserves the right to replace the defective device with another one having identical or equivalent features instead of repairing it.

The warranty applies under the following conditions:

- The user reports the defect to di-soric within twelve months after the date of handover.
- The device and its components are in the condition in which they have been handed over by di-soric.
- The defect or malfunction is not related—directly or indirectly—to one of the following circumstances:
  - a) Improper use of the device
  - b) Insufficient adherence to the operating instructions
  - c) Negligence, lack of specialist expertise, incorrect maintenance
  - d) Repairs, modifications or adaptations on the device not executed by di-soric personnel, tampering, etc.
  - e) Accidents or impacts (also as a consequence of transport or due to force majeure)
  - f) Other causes not related to di-soric

The device may be repaired by the manufacturer only. The device must be sent to di-soric for repair. The transport costs and the risks of potential damage or loss of material during shipment are the liability of the customer.

All replaced products and components become the property of di-soric.

di-soric does not recognize any warranties or rights other than those described above. No indemnity claims can be filed in any case for costs, interruptions of work or other factors or circumstances that are related to the malfunction of the product or its components in any way.

**Accurate and complete compliance with all prescriptions, notes and prohibitions included in this manual is an essential condition for proper operation. di-soric disclaims any liability for the consequences of insufficient adherence to these instructions.**

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**SOLUTIONS. CLEVER. PRACTICAL.**

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