CONTENTS

1.0 ABOUT THIS DOCUMENT

Please read this document carefully before mounting, starting, using and servicing **LP4** multi-beam safety light curtain; it contains detailed instructions that must be followed with care.
In addition, pay special attention to Chapter 2 "**With reference to safety**".

THIS DOCUMENT IS NOT IN ITS ORIGINAL LANGUAGE

1.1 Function of this document

This document provides the technical personnel of the manufacturer of a machine or the manager of the machine with the necessary instructions for safe mounting, electrical connection, starting and normal operation and maintenance of **LP4 safety light curtain.**
The design and use of safety devices that utilize **LP4** multi-beam safety light curtains require specific knowledge, but this is not entirely provided in this document.
The prescriptions of authorities and of the law must also be fundamentally respected for the installation and during normal operation of **LP4 safety light curtain.**

1.2 Symbols used in this document

Warning to avoid danger!
A warning indicates real or potential hazards.
Its task is to indicate procedures and behaviour that can avoid accidents.
Read and follow these instructions carefully.

Indication
Indications that can help achieve better performance.

Emitter or Passive reflector element symbol
This symbol identifies devices that have the function of a projector.

Receiver or Active element symbol
This symbol identifies devices that have the function of a receiver.

Body detection
This symbol marks devices designed to identify a person entering a protected area.
It refers to multi-beam light curtains with 2, 3 or 4 beams.
These light curtains are usually cost-effective and feature a long range, they enable creating protection for extensive areas and on more than one side, using diverter mirrors.
These models are available in the LP4 series.

Limb or presence detection
This symbol marks devices designed to identify limbs entering a protected area or to identify the presence of a person in a protected area.
For presence detection, with light curtains in a horizontal position, resolutions of between 50 and 116mm are to be used, the height off the ground is calculated in relation to these values.
For this function the LP4 series features models with resolutions of 50 and 90mm.

Hand detection
This symbol marks devices designed to identify a hand entering a protected area.
It refers to light curtains with a resolution less than or equal to 40mm; these resolutions allow safety distances compatible with short loading and unloading times and a low level of operator fatigue.
For this function the LP4 series features models with resolutions of 30 and 40mm.

Muting Function
This symbol marks devices that have the Muting and Override function.

2.0 WITH REFERENCE TO SAFETY

Warning!
The level of protection of the safety light curtain must be compatible with the dangerousness of the system to control, devices downstream from the safety light curtain must be compatible with the safety light curtain itself and with the required safety level.
- The machine must be able to be controlled electrically.
- It must be possible to stop the dangerous parts of the machine with an electric control achievable in a definite time and if necessary verified directly.

Warning!
The features of the safety light curtain must be chosen according to the size of the access area to the dangerous zone, the part of the human body subjected to the danger, the distance of the point of access from the dangerous point, the response time of the safety light curtain, the response time of the downstream devices and the time for stopping the dangerous movement.

Warning!
All the remaining hazardous conditions of the machine must be verified and suitable equipment must be used to neutralize them.
It must not be possible to reach the dangerous zone without going through the protection surface controlled by the safety light curtain.
It must not be possible to stop between the protection surface controlled by the safety light curtain and the dangerous zone.

Warning!
Check that the environmental conditions are compatible with the features of the safety light curtain.
Check the effect of reflective surfaces to the side of the path of the light beams, in general respect the indicated safety distances.
Consider the effect of putting transparent panels or the like in between that can change the beam angle of the safety light curtain.
Prevent the safety light curtain's optical window from getting damaged or altered with scratches and opacification.
Do not expose the receiver to strong natural or artificial sources of light, including flashing stroboscopic sources.
Avoid exposing the receiver directly to the projection of optical beams of other optical devices.
Check that the ambient temperature does not exceed the stated limits.
Consider the effect of smoke, vapours, liquids and powders that can alter the transparency of the air or foul the optical window.

Warning!
Periodically perform the procedures for checking the functionality of the safety light curtain.

2.1 Skilled personnel

Only qualified personnel are authorized to mount, start up, use and service the **LP4** multi-beam safety safety light curtain. A qualified person is one who:
- has adequate technical training
- has been educated by the person in charge of Machine Safety on its use and the current safety directives
- accesses the operating instructions.

2.2 Fields of use of the device

The **LP4** safety light curtains are Type-4 electro-sensitive protection equipment (ESPE) in accordance with IEC 61496-1 and IEC 61496-2. They can be employed in safety applications up to **Category 4** in conformity with EN ISO 13849, up to **SIL CL 3** in conformity with EN 62061 or up to **PL e** in conformity with EN 13849.
They meet the requirements of the Machinery Directive 2006/42/EC and are used to:
- protect the area of access to dangerous point.
- detect human presence in dangerous zones.
- protect the accesses to dangerous zones.
- ensure the safety of automated of palletizing and de-palletizing systems.
- ensure conditional access control in safety for passageways of machines, warehouses, loading/unloading bays.
- select alternative control of different danger zones in safety.

Use to standard
LP4 safety light curtains must be used only in accordance with Chapter 2.2 "Fields of use of the device". If the device is used for other purposes or if it is modified, even in the phase of mounting or installation, this invalidates all warranty rights with M. D. Micro Detectors.

2.3 General safety instructions and measures of protection

Safety instructions!
To ensure **LP4** safety light curtains are used to standard and in a safe manner it is necessary to observe the following points:

• For the installation and use of the **LP4** safety light curtain as for commissioning it and the repeated technical tests, national and international regulations apply, particularly:
– Machinery directive 2006/42/EC
– the Directive on work equipment operators 2009/104/EC
– the accident prevention prescriptions and safety rules
– other important safety prescriptions.
• The manufacturers and operators of the machine on which the **LP4** safety light curtain is used must, in agreement with the relevant authority and under their own responsibility, apply all the current safety rules and prescriptions and are also in charge of their observance.
• It is absolutely necessary to observe the guidelines on checking these operating instructions (see chapter 6 **"Commissioning"**).
• The checks must be carried out by qualified persons, that is by authorized and specially appointed persons, and they must be documented so as to be comprehensible at any moment.
• The operating instructions contained in this manual must be set at the disposal of the operator of the machine used with **LP4** safety light curtain.
The machine operator must be educated by qualified personnel and urged to read the operating instructions.

2.4 Disposal

Dispose of unusable or unrepairable devices always in observance of current national prescriptions on the subject of waste disposal.

3.0 DESCRIPTION OF THE PRODUCT

3.1 Brief description

The **LP4** series safety light curtains are multi-beam optico-electronic safety devices, built in compliance with the IEC 61496-1 and 2 standards, are **Type 4**, integrity level **SIL 3**, **SILCL 3**, performance level **PL** and **Category 4** and therefore applicable for the protection of the operators of systems or machines under conditions of frequent interaction with a dangerous area.

LP4 safety light curtains have a rectangular profile of **50x60mm**, the distance of 50mm refers to the front side, each of the remaining three sides has a groove for fastening; they are extremely reliable devices, they provide **two** protected static safety **PNP outputs**, so they are not subject to output contact wear or affected by strong vibration, they are able to detect internal faults, control external contacts (**EDM**) and, also in the event of a fault, ensure safe behaviour in any case.

With a free area the level of the two outputs is enabled to be high (status ON, outgoing current), with an occupied area or in case of fault the level is low (status OFF).

The **Manual** or **Automatic start/restart** mode and external contact control (**EDM)** can be selected with changes to the receiver wiring. Two ranges are normally available that can be selected on the emitter that can also be selected with changes to the wiring; a **Test** input is also available on many models.

There are models composed of pairs of Emitters and Receivers with **optics in a row** having resolutions (minimum measurable diameter) of **30, 40, 90mm**, heights from **300 to 1800mm** and ranges from **6 to 80m**, dedicated to secure detection of hand and limbs. In addition there are also **multi-beam** optics with **2, 3, 4 beams** dedicated to access control, for these models there are also pairs composed of an **Active** element that integrates **emitters/receivers** and a **Passive reflector** element with a maximum range of **6m**, these models are indispensable if it is not possible to take the power supply to the remote element.

The models with the **Muting** function enable maintaining the active state of the outputs and therefore not cause the movement to stop, also in case of breaks in the beams, if this movement has been evaluated as finished or in a phase that is no longer dangerous for the operator, or since the break was not caused by an operator but by material enabled to access the danger zone.

The models with **Muting** have **from two to four inputs** dedicated to standard sensors which supply information that, suitably processed, cause the safety function to be suspended; the guarantee that this happens safely is given by the redundancy of the signals, their dynamism and the safety procedure with which they are processed. Different types of Muting can be chosen via the wiring: with two or four sensors, two-way or mono, with safety logics based on the sequentiality or simultaneity of the signals.

These safety light curtain models also have an **Override** function that, after a manual command in safety, enables clearing the access if, because of incorrect recognition, the material remains blocked; they also provide an output for piloting and checking the light that indicates that the Muting function is in progress.

The emitters have an **M12 5 pole** connector. The receivers have different configurations depending on the complexity of the functions, models with an **M23 19 pole** connector and with one or two **M12 5 pole** front connectors for 2 or 4 Muting sensors, or a single **M23 19 pole** connector that has 2 inputs **for Muting sensors,** or a single **M23 19 pole** or **M12 8 pole** connector on models without Muting. For the power supply and output cables and the Muting sensors cables no shielding is required, lengths of up to 100m are permissible. The required power supply voltage is **24V_{DC} ±20%**, its current absorption is moderate (maximum **9W** per pair), the peak output current is **500mA**, suited to drive the power contactors directly too.

The degree of protection of the container is **IP65**, suitable also for dusty environments and tolerant of sprays, except for the front surface that has strict optical requirements.

The completeness of the available functions enables creating versatile and integrated protection systems.

3.1.1 Special models and accessories.

Arms are available composed of standard technical profiles of cross-section 30x30mm that, applied to safety light curtains with Muting, can support ready-wired Muting sensors and be a cost-effective solution integrated in standard applications for palletizing / de-palletizing.

3.2 Coding system

Tab.:1 gives the meaning of the codes of the available models.
The models are supplied in kit form composed of a pair (emitter/receiver), the single elements are available only to make up for a return.
For an overview of the main features of the models ready for delivery or available on request, see **Tab.:2** and **3** in this chapter.
For a complete and detailed list of the actually coded models and their related features, see **Chapter 9**.
Directly contact M. D. Micro Detectors for any explanation.

LP4 SERIES		CONSTRUCTION OF MODEL CODES
POSITION	**CODE**	**DESCRIPTION**
1	**LP4**	Type-4 safety light curtains in housing of cross-section 50x60mm
2	**R**	Receiver
	E	Emitter
	F	Active element, emitter + receiver with M12, 8 pole connector
	T	Active element, emitter + receiver with M23, 19 pole connector
	P	Passive element, reflector for active multiple beam elements
	ER, PF, PT	Pair, emitter + receiver, reflector + active M12, reflector + active M23
3	**/**	Separator
4	**30, 40, 90**	Light curtain, resolution in mm; 30, 40 hand protection; 90 limb protection
	0A, 0B, 0C	Multiple beams light grid, number of beams 2, 3, 4; body protection. Corresponding centre distance of the beams 500, 400, 300mm.
5	**-**	Separator
6	**030 to 160**	Nominal height of controlled area in cm for light curtain models: 030, 045, 060, 075, 090, 105, 120, 135, 150, 165, 180.
	050, 080, 090	Centre distance of the end beams in cm for light grid models.
7		Emitter or Passive or Receiver element without Muting function.
	M2	Elements with Muting function and inputs for two sensors
	M4	Elements with Muting function and inputs for four sensors
8	**L**	Long range
	S	Super extended range

Tab.:1; Chap.:3

3.3 Available models

Tab: 2 and **3** give an overview of the series actually available, are ordered from the smallest resolution to the highest one and light curtain to multi-beam greed, by Emitter/Receiver pair to Passive/Active elements, by Muting function.

Tab.:3 gives the preferential applications.

See also the tables of **Chap.:9** for a complete list of the available models and corresponding specifications.

SERIES LP4	OVERVIEW OF THE FUNCTIONAL CHARACTERISTICS OF THE AVAILABLE MODELS											
APPLICATION	RESOLUTION (mm)	HEIGHT OF OPTICS (mm)	STANDARD RANGES (SELECTABLE) (m)	EXTENDED RANGES (SELECTABLE) (m)	SUPER EXTENDED RANGES (SELECTABLE) (m)	ELEMENTS IN PAIRS	MUTING	MUTING SENSORS Type	MUTING SENSORS No.	PAIRED MODELS *: numbers #: letters	SEE NOTES in Tab.:3 Ref.
HAND PROTECTION Curtain of beams	30	300 to 1200	0 to 6 or 1 to 16	-	-	Emitter Receiver	Mono and Two-way	External	2 or 4	LP4ER/30-***M4	1
	40	600 900 1200	-	8 to 30 or 18 to 60	-	Emitter Receiver	-	-	-	LP4ER/40-***L	2
	40	300 to 1800	0 to 6 or 1 to 16	-	-	Emitter Receiver	Mono and Two-way	External	2 or 4	LP4ER/40-***M4	3
	40	600 900 1200	-	8 to 30 or 18 to 60	-	Emitter Receiver	Mono and Two-way	External	2 or 4	LP4ER/40-***M4L	4
LIMB PROTECTION Curtain of beams	90	300 to 1800	0 to 6 or 1 to 16	-	-	Emitter Receiver	Mono and Two-way	External	2 or 4	LP4ER/90-***M4	5
ACCESS PROTECTION Multiple beams	Beams / Pitch 2,3,4 / 500 400 300		0 to 6 or 1 to 16	8 to 30 or 18 to 60	18 to 40 or 25 to 80	Emitter Receiver	-	-	-	LP4ER/0#-0** LP4ER/0#-0**L LP4ER/0#-0**S	6
	2,3,4	500 400 300	0 to 6 or 1 to 16	8 to 30 or 18 to 60	-	Emitter Receiver	Mono and Two-way	External	2 or 4	LP4ER/0#-0**M4 LP4ER/0#-0**M4L	7
	2,3,4	500 400 300	0 to 6	-	-	Emitt./Rec. Passive Reflector	-	-	-	LP4PF/0#-0**	8
	2,3,4	500 400 300	0 to 6	-	-	Emitt./Rec. Passive Reflector	Mono and Two-way	External	2 or 4	LP4PT/0#-0**M4	9
	2,3,4	500 400 300	0 to 6	-	-	Emitt./Rec. Passive Reflector	Mono	External	2	LP4PT/0#-0**M2	10

Tab.:2; Chap.:3

LP4 SERIES — TYPICAL APPLICATIONS OF THE AVAILABLE MODELS

Relevant notes to Tab.:2	PROTECTION	INTEGRATED MUTING	DESCRIPTION OF THE TYPICAL APPLICATION	Data of models See Chap.:9 Tab.: number
1			**Hand** protection **Ø30mm** and **Muting** by external sensors over an area of **0.3 to 1.2m x 0 to 16m** and need to keep the safety distance **greatly reduced**. Need to exclude safety at specific intervals of manual work by Muting via limit stop sensors. Protection of windows for entering/leaving machines for making small items and with greatly reduced safety distances. The range of 16m enables controlling more than one side using deflector mirrors (range with one mirror **13m**, two mirrors **11m**).	1
2			**Hand** protection **Ø40mm** over an area of **0.6 to 1.2m x 8 to 60m** and need to keep the safety distance reduced. Possibility of connecting to safety modules or PLC to perform complex Muting logic. The range of **60m** enables controlling more than one side using deflector mirrors (range with one mirror **50m**, two mirrors **43m**) or better tolerate dusty environments. Can be used as a **presence sensor that can be mounted near the ground.** Pay attention to the deterioration of the beam angle in applications in dusty environments and with reflective surfaces.	2
3			**Hand** protection **Ø40mm** and **Muting** by external sensors over an area of **0.3 to 1.8m x 0 to 16m** need to keep the safety distance reduced. Need to exclude safety at specific intervals of manual work by Muting via limit stop sensors. The range of **16m** enables controlling more than one side using deflector mirrors (range with one mirror **12m**, two mirrors **9m**).	3
4			**Hand** protection **Ø40mm** and **Muting** by external sensors over an area of **0.3 to 1.8m x 8 to 60m** need to keep the safety distance reduced. Need to exclude safety at specific intervals of manual work by Muting via limit stop sensors. The range of **60m** enables controlling more than one side using deflector mirrors (range with one mirror **50m**, two mirrors **43m**). Pay attention to the deterioration of the beam angle in applications in dusty environments and with reflective surfaces.	4
5			**Limb** protection **Ø90mm** and **Muting** by external sensors over an area of **0.3 to 1.8m x 0 to 16**, presence check in danger area (in view or not in view from control position) with horizontal positioning at minimum height **600mm**. Need to exclude safety at specific intervals of manual work by Muting via limit stop sensors.	5
6			**Access** protection**, 2, 3, 4, beams**, models with ranges of **0 to 16**, **8 to 60**, **18 to 80m**, to detect a body entering a danger area (robotized areas, automatic machining centres). The range of **60m** or **80m** enables easily controlling perimeters with more than one side using deflector mirrors (maximum range with one mirror **68m**, two mirrors **57m**) or better tolerate dusty environments. Pay attention to the deterioration of the beam angle in applications in dusty environments and with reflective surfaces. The receiver models with a range of 60 and 80m use an **M12 8 pole connector**.	6
7			**Access** protection**, 2, 3, 4, beams** and **Muting** by **external** sensors, models with ranges of **0 to 16** or **8 to 60m**. Can be used to protect large infeeds/outfeeds of material from machining centres and loading/unloading bays; applications with a long range **are not in theory compatible with traditional Muting** in which the overall dimensions of the load help maintain protection, but require more complex systems.	7
8			Access protection **2, 3, 4 beams**, composed of an Active unit consisting of a multi-beam Emitter/Receiver and a **passive reflector element (not wired)**,working distance up to **0 to 6m**. The active element has an **M12, 8 pole connector**. To be used to detect a body entering a danger area (robotized areas, automatic machining centres) in which it is not possible to take the power supply to the second element.	8
9			**Access** protection **for palletizers with 2, 3, 4 beams,** with **passive reflector** and **Muting** by **2, 4 external sensors**, for ranges of up to **6m** without needing to wire the second element, in this case the main wired element is a multi-beam projector/receiver. **It is advised to use 2 to 4 Muting sensors of the reflex type** (with catadioptric reflector) in sympathy with the passive element. Optimal solution for standard applications, relatively long ranges and reduction in installation labour costs.	9
10			**Access** protection **for palletizers with 2, 3, 4 beams,** with **passive reflector** and **Muting** by **2 external sensors**, for ranges of up to **6m** without needing to wire the second element, in this case the main wired element is a multi-beam projector/receiver. **It is advised to use 2 Muting sensors of the reflex type** (with catadioptric reflector) in sympathy with the passive element. The sensor inputs are accessible via the M23 connector, no other connectors are present. Optimal solution for standard applications, relatively long ranges and reduction in installation labour costs.	10

Tab.:3; Chap.:3

4.0 INSTRUCTIONS FOR POSITIONING THE SAFETY LIGHT CURTAINS

4.1 Respecting the safety distance

A safety distance must be maintained between the protection surface composed of the beams of the safety light curtain and the point of danger.
This distance must ensure that, considering a maximum approach speed defined by the standard, the point of danger can only be reached when sufficient time has elapsed so that the dangerous state of the machine has ended.

The safety distance in accordance with EN ISO 13855 depends:

- in direct proportion on the total time for stopping the machine or system, which corresponds to the sum of the individual times of reaction of the whole safety chain (the individual response times are indicated in the technical documentation of the safety devices and of the machine itself or must be verified with specific measures).
- in direct proportion on the approach speed.
- in direct proportion on the resolution of the safety light curtain, or inversely to the number of beams for the unit of height.

If the machine is subject to a specific standard of type **C**, the indications of this standard must be followed.

Danger of failed recognition!

Particularly in access protection applications, people may stop in the danger area, but not in the optical beam between the projector and the receiver, and their presence might not be recognized.

Make sure that dangerous states can only occur when there are no persons in the danger area.

Make sure that the system restart control is effected from a point providing full visibility of the danger area and that this control cannot be reached from within said area.

No protection function is secure if the safety distance is not correct!

It is indispensable to mount the safety light curtains at the correct safety distance to ensure the function of protection.

If there is a C-type standard for the application you are creating, follow its instructions!

The following instructions apply only to an industrial environment, that is to say where only adults of normal constitution are expected to be present.

The Muting sensors must correctly distinguish between access of material and access by persons!

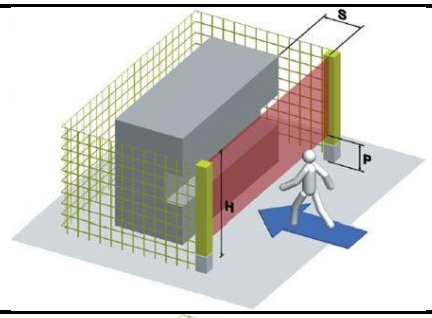
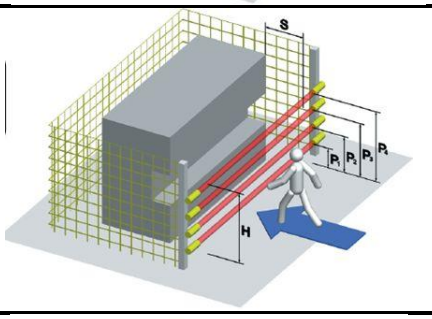
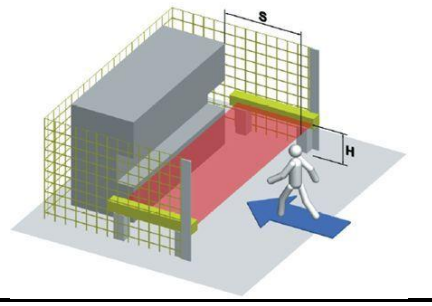
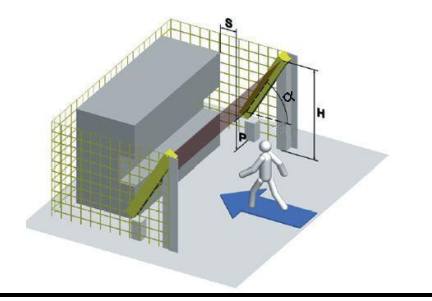
The sensors must detect the material and not the pallet on which the material stands, otherwise the distinction between material and people is not effective.
The sensors must not be activated simultaneously by unintentional behaviour of the personnel.
It is essential for the information on the state of the Muting sensors to reach the inputs via two completely separate channels (from two or more sensors connected to the safety light curtain with different cables); it is not permissible to process the signals with a single device that is not for safety before applying them to the safety light curtain input.

4.2 How to calculate the safety distance S in conformity with EN ISO 13855 and EN ISO 13857

Here we give the general procedures for calculating the minimum safety distance **S**, these instructions must be followed if there is not a specific standard of type **C** for the machine to make safe.
Depending on the application it is necessary to use different calculation schemes.
In general the formula has this form:
S = K * T + C
Where…
S = **[mm]** Safety distance
K = **[mm/s]** Approach speed, a speed of **2000mm/s** is indicated for the upper limbs and **1600** for the lower limbs.
T = **[s]** Total stopping time: response time of the entire safety device + machine stopping time.
C = **[mm]** Safety distance supplement, to ensure that the dangerous zone cannot be reached by climbing over the beams or inserting limbs between the beams. It is provided by the standard, it takes on a fixed value or is calculated according to the optical features of the safety light curtain and its utilization in the application.

The reaction time of the safety light curtain alone is stated on the product label of the receivers and in this document in the tables of Chap.:9.

The standard considers different methods of approach:

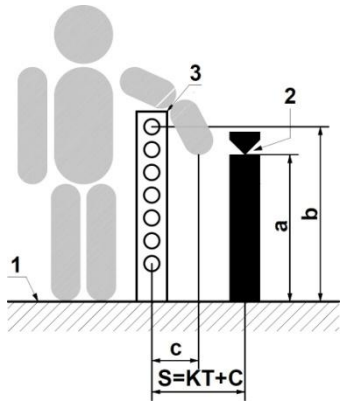
	**1) PERPENDICULAR APPROACH** **Safety light curtain in vertical position.** Angle between safety light curtain and surface of 90° ±5°
	**2) PERPENDICULAR APPROACH** **Safety light grid in vertical position.** Angle between safety light curtain and surface of 90° ±5°
	**3) HORIZONTAL APPROACH** **Safety light curtain in horizontal position.** Angle between safety light curtain and surface of 0° ±5°
	**4) OBLIQUE APPROACH** **Safety light curtain in angled position.** Two cases are considered for different angle values α With α **≥30°** we have the perpendicular approach With α **<30°** we have the horizontal approach

Tab.:1; Chap.:4

• Calculate S with the following procedure for applications of protection with optical safety light curtains over which it is possible to climb.

If an optical safety light curtain is installed without any supplementary mechanical protection on the top, and therefore it is possible to enter the protected area from above, it is necessary to define the safety distance considering two methods:
- Access from above.
- Access through the beams.
- Access from below, not considered now, can be excluded if the lowest beam has a maximum height of 200mm from the surface, or by installing mechanical protection.

The safety distance, considering access from above, must be such as not to allow reaching the danger area; this safety distance is obtained from **Tab,:2 of ISO 13855,** here Tab.:3; Chap.:4
The safety distance, considering access between the beams, is obtained from the procedures indicated below that envisage access only through the beams.
The safety distance to choose will be the greater one of the two.
To have indications of the dimensions of any mechanical protection to superimpose on the safety light curtain or only mechanical protection not closed on the top part, please refer to standard **EN ISO 13857.**



1) Reference surface

2) Dangerous point or danger area

3) Safety light curtain

a) Height above the surface of the dangerous point or of the higher point of the danger area

b) Height above the surface of the top of the optical window of the safety light curtain.

c) Minimum safety distance so as not to reach the danger area from above is obtained from **Tab.:2 of ISO 13855** here Tab.:3; Chap.:4

C) Length of the path of the limb through the beams, from the level of the optics until the two optics are completely darkened (resolution)

KT) Route of the limb through the safety light curtain during the total time **T** of the response to stopping, considering a specific approach speed **K**

S) Minimum safety distance between the safety light curtain and danger area calculated considering access through the beams, see the following cases

Tab.:2; Chap.:4

Tab.:2 from ISO 13855/ EN999

		[c] MINIMUM DISTANCE TO IMPLEMENT BETWEEN THE SAFETY LIGHT CURTAIN AND DANGER AREA											
[a] HEIGHT OF THE DANGER AREA	2600	0	0	0	0	0	0	0	0	0	0	0	0
	2500	400	400	350	300	300	300	300	300	250	150	100	0
	2400	550	550	550	500	450	450	400	400	300	250	100	0
	2200	800	750	750	700	650	650	600	550	400	250	0	0
	2000	950	950	850	850	800	750	700	550	400	0	0	0
	1800	1100	1100	950	950	850	800	750	550	0	0	0	0
	1600	1150	1150	1100	1000	900	800	750	450	0	0	0	0
	1400	1200	1200	1100	1000	900	850	650	0	0	0	0	0
	1200	1200	1200	1100	1000	850	800	0	0	0	0	0	0
	1000	1200	1150	1050	950	750	700	0	0	0	0	0	0
	800	1150	1050	950	800	500	450	0	0	0	0	0	0
	600	1050	950	750	550	0	0	0	0	0	0	0	0
	400	900	700	0	0	0	0	0	0	0	0	0	0
	200	600	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0
		900	1000	1100	1200	1300	1400	1600	1800	2000	2200	2400	2600
		[b] HEIGHT OF THE TOP EDGE OF THE OPTICAL WINDOW OF THE CURTAIN											

Tab.:3; Chap.:4

• **Calculate S with the following procedure for finger or hand protection applications, with vertical safety light curtains (90° ±5°) having the stated resolution D**

	Resolution	Formula	Description
	D≤40 (mm)	S (mm) = 2000 * T + 8x(D-14)	From finger protection to hand protection

If there is a value **S<100mm**, use **S=100mm**.
If there is a value **S>500mm**, it is permissible to calculate again using the approach speed **1600 m/s**:
S (mm) = 1600 * T + 8x(D-14)
If from this new calculation there is a value **S<500mm**, use **S=500mm**.
If there are any remaining uncontrolled access areas, they must have an access width of **≤75mm** to prevent limbs from reaching the danger zone, otherwise it is necessary to add more protection.

• **Calculate S with the following procedure for upper limb protection applications, with vertical safety light curtains (90° ±5°) having the stated resolution D**

	Resolution	Formula	Description
	40< D (mm) ≤70	S (mm) = 1600 * T + 850	Limb Protection

The height off the ground of the lowest beam must be **P≤300mm.**
The height off the ground of the highest beam must be **H≥900mm.**

• **Calculate S with the following procedure and use the beam height indicated off the reference surface for access protection applications, with vertical safety light curtains (90° ±5°) having stated resolution D**

	Resolution	Formula	Description
	D>70 (mm)	S (mm) = 1600 * T + 850	Access protection

For safety light curtains, the lowest beam must be no higher than **300mm** and the higher one must be no lower than **1200mm**.
When using safety light grid with multiple beams, it is necessary to observe the heights of the beams off the reference surface indicated in the following table:

No. of Beams	P1 (mm)	P2 (mm)	P3 (mm)	P4 (mm)
2	400	900		
3	300	700	1100	
4	300	600	900	1200

Tab.:4; Chap.:4

• **Use S and the beam height off the roller conveyor as stated for safety light grid with two or three beams in protection applications for passageways for palletizers and depalletizers (machines subject to the C-type product standard: EN 415-4).**

No. of Beams	P1 (mm)	P2 (mm)	P3 (mm)	S (mm)
2	400	900		1200
3	400	800	1200	900

Tab.:5; Chap.:4

• **Calculate S with the following procedure for body protection applications, with safety light curtains parallel to the direction of approach (0° ±5°) having height H off the surface and resolution D.**

	Resolution	Formula	Description
	116≥ D≥50 (mm)	S (mm) = 1600 * T + C C (mm) = (1200-0.4*H); C ≥ 850 D (mm) ≤ (H/15) + 50 15* (D – 50) ≤ H (mm) ≤ 1000	Access and presence protection

If **C** takes on values below **850 (mm),** use **C=850.**
The height of the safety light curtain off the ground must be **H≤1000 (mm).**
For **H>300mm,** install supplementary protection to avoid the risk of access from beneath.
It is possible to use smaller resolutions than **50mm**, but this brings no advantage (the minimum distance off the ground is null even with a resolution of **50mm**).

5.0 MINIMUM DISTANCE FROM REFLECTING SURFACES

The optical beams of the projector, having a beam angle that is not null, can partly be diverted by reflective surfaces located near to the safety light curtains. This may mean that a break in the direct path of the optical beam is not detected, which is why all reflective surfaces and reflective objects (in any position they may have with respect to the controlled area, above, under, inside or outside) must respect a minimum distance from the direct path of the beams of the safety light curtain.

Indication

It is likewise important to respect the minimum distance between the projector and receiver indicated by the manufacturer, in some cases the minimum distance may be greater than zero, especially for long-range models.
At smaller minimum distances than the ones stated, the beam angle may have an unpredictable breadth and so the safety distance may not be definable with certainty.
When using diverter mirrors, consider that the minimum distance from reflective surfaces must be respected for all the rectilinear segments of the beams, considering the sides both inside and outside the protected zone.
A reflective surface is any shiny surface, even a black one.
Any damage or opacification of the optics or inclusion of slabs of transparent or, even worse, semitransparent material on the optical path can produce an increase in the beam angle.
Checking the capacity of detection with the test rod, performed in the middle and at the ends of the controlled area, is an effective procedure to exclude the presence of dangerous reflections, see also Chap.:13.4.

5.1 How to calculate the minimum distance from reflective surfaces

The safety light curtains **LP4** respect the maximum beam angle defined by IEC / EN 61496-2 for **Type 4** (**a/2=±2.5°**), or less.
The safety distance **D** is calculated considering the entire beam angle **a=5°** and the safety light curtains reciprocally orientated towards the reflective surface by an angle **a**, in this way we evaluate the case of alignment at the limit of reciprocal visibility between the emitter and receiver, which corresponds to the most dangerous case due to the effects of the reflection and at the maximum safety distance **D**.

The safety distance **D** to take **P ≥3m** is calculated as follows: **D = tan (5°)*P/2 = 0.0875*P/2**

For **ranges less than 3m** the value calculated at **3m** applies: **D = 0.0875*1.5=0.131m**

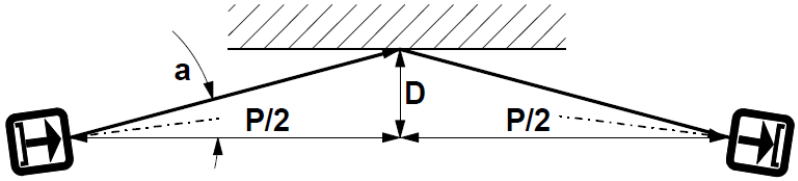


Fig.:1; Chap.:5; this figure shows the worst borderline case that can occur: safety light curtains not perfectly aligned, but tilted by an angle a/2 towards a reflective surface.

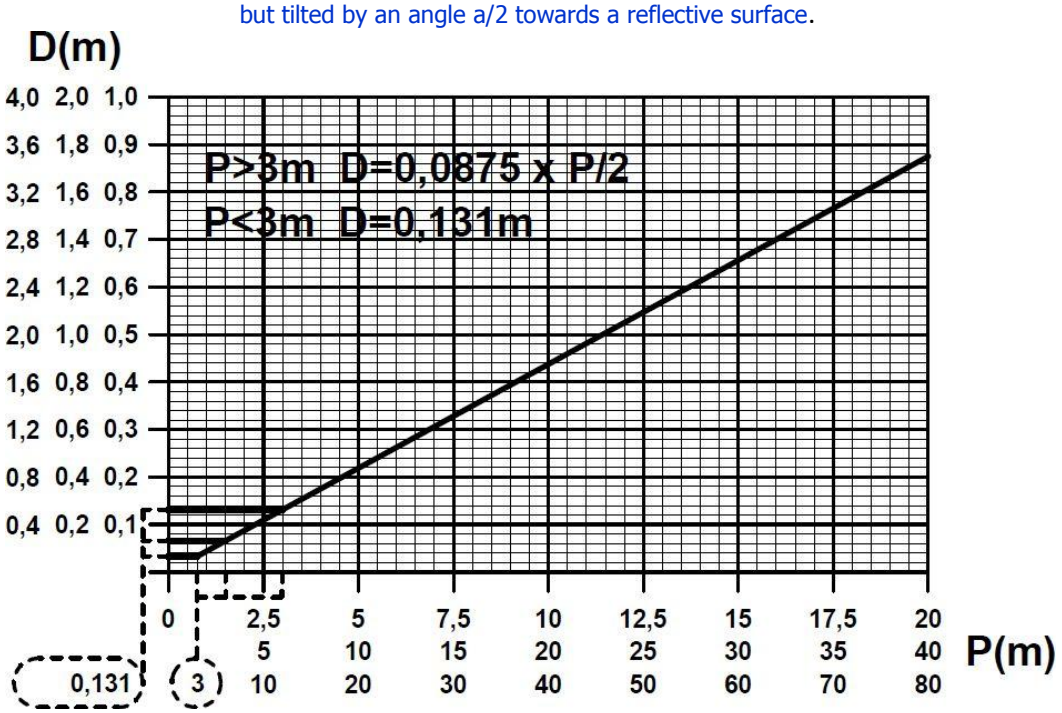


Fig.:2; Chap.:5; minimum distance "D" to maintain for the reflective surfaces in relation to the range "P".

6.0 COMMISSIONING

6.1 Mechanical mounting

This device is suited to work in protected environments, not outdoors.
It is extremely important to secure the safety light curtains to a rigid structure, not subject to deformation or strong vibration.
Choose the position of the receiver or active element so as not to subject it to strong sources of natural or artificial light or to luminous interference by other sensors.
Mount the emitter and receiver facing each other, at the same height off the reference surface and with the same orientation (for the active models refer to the BASE side that is the display side and for the passive models refer to the layout of the labels), the reciprocal distance must be within the field of the specification. To secure the safety light curtains to a support use the specific inserts to apply to the grooves on the three sides and the brackets normally provided.
If there is vibration in the application, but still compatible with the optical alignment, use the damping supports available as accessories.
In this phase classic tools such as a plumb line and/or a spirit level may be useful.
To facilitate the first phase of alignment, it is possible to use the specific **LASER STL 01 P** accessory for safety light curtains with a profile of 50x60mm.
In this first phase of mechanical alignment will have to follow a phase of functional alignment, thus lock securely but not in a definitive way the two elements of the light curtain so that they are aligned and parallel to each other. For the mechanical dimensions refer to the Chap.: 10.

Danger!
To perform the next steps it is necessary to power the emitter and receiver, make sure that during this phase the machine's movements are blocked irrespective of the state that the receiver will take on; an effective manner to obtain this is to physically cut off the supply to the actuators by permanently disconnecting their supply cables.

6.2 Safety light curtain Alignment

1) When switching on, all the emitter's LEDs will be on and stay on for approximately 5s this enables checking it works properly; see Tab.:1; Chap.:8; afterwards if LED 2 (ON, green) is lit and LED 4 (Test, yellow) is off, the emitter is in operation; if instead LED 4 is lit, it means that the Test contact is open, it is necessary to jumper it in order to proceed.
In case of difficulty with alignment, to make it easier, it is advisable to activate the High range function temporarily, if it is not temporarily enabled, LED 3 (orange, Range) lit; refer to Tab.:1 Chap.: 6.3 to check the emitter configuration mode.
2) Also for the receiver, when switching on there is an initial LED test phase and a setting indication phase, refer to Tab.:1, 2, 3 and 4 of Chap.:8 for the panel indications and Tab:1 to 9; of Chap.:6.4 for the wiring.
If it is possible to choose or temporarily change the configuration of the receiver, it is advised to use the "Automatic Restart without EDM" mode, that is able to clearly signal the state of LIGHT and outputs ON lighting up LED 2 (green ON); if the receiver has been configured differently (shutdown on restart with or without EDM), observe instead LED 4 (yellow, Clear), indicating the in this case it will be on if the receiver is in LIGHT.
To simplify, any receiver will be in light if LED 2 is on GREEN or LED 4 is on YELLOW.
To facilitate alignment, observe also LED 3 (orange, Weak) that stays lit if the signal is just sufficient, or just insufficient, the condition of a more than sufficient signal is LED 2 or LED 4 lit and LED 3 off.
3) Now try adjusting the receiver around the original position and define a zone in which the receiver is in the LIGHT.
More careful alignment than as obtained normally could be ensured by temporarily darkening the optics of the receiver with opaque adhesive tape precisely covering half of the optical window and then seeking the condition of LIGHT under these conditions; on obtaining the condition of LIGHT, on removing the tape the signal will be at least with margin 2.
Position the receiver in the middle zone or with the median orientation of the zone in the LIGHT defined before and temporarily lock it. Now check that with moderate mechanical stresses applied to the safety light curtain it always remains in the LIGHT, then proceed with step 5.
4) If you are not able to bring the receiver into the light or to ensure an adequate level of margin, correct the position of the emitter and try to align the receiver again, step 3.
5) Check that the receiver has an acceptable arrangement. If it is acceptable proceed with step 6, if it is not acceptable correct the alignment of the emitter accordingly and realign the receiver again, step 3.
6) After alignment, permanently lock the safety light curtains and restore all the required conditions for the application, including the electric connections.
7) Have complete functional testing carried out on the safety light curtain, including a resolution test and checking for the presence of reflective surfaces, using a test rod, of the same diameter as the rated resolution.
8) Make sure that during normal use no unfavourable conditions arise around, such as:
- presence of other emitters or other bright or modulated sources of light able to hit the receiver,
- presence or movement of reflective objects near the area,
- transparent or semi-transparent materials inserted in the path of the beams,
- systematic presence of dust or spray of liquids able to foul the surface of the optics.

6.3 Applying Muting sensors.

The Muting sensors are normal standard sensors, they can be of any type: photoelectric, inductive, capacitive, electromechanical switches, etc.; their secure operation depends on the control the safety light curtain exerts on the respective signals, using more than one sensor, using separate processing channels, comparing the signals with each other and checking their dynamics.
It is therefore essential not to perform any logical operations on the signals of the sensors that can make the signals interfere with each other before being applied separately at the safety light curtain entrance.
It is also important to prevent the possibility of the sensors taking on a high state simultaneously later on, for example, when there is a small common sensitive zone that is outside the danger zone, for example a point where optical beams cross.
In applications, such as palletizers, the sensors are generally optical and must be applied so that the ON/OFF sequence is respected only if the protected area is crossed by the material to process.
In applications in which Muting should be activated by limit switch sensors, where said sensors are used to signal the end of the dangerous part of a movement, the sensors are generally electromechanical or inductive.
For these sensors, too, the more that correct recognition is reliable the more the system can be considered secure and reliable.
It is necessary for the sensors to be able to detect material in a certain and repeatable manner, for the material to introduce no reflections that interfere with normal detection, for them to be firmly secured, well aligned and not subject to the influence of other sensors or of special environmental conditions.

Indication
Correct optical alignment with good excess gain enables avoiding instability in the behaviour of the safety light curtain, reducing optical interference, reflections from shiny surfaces and in general ensuring greater safety.

Danger!
Remember to restore the wiring and check the required mode of operation of the application again.

6.4 Electrical installation.

Before proceeding carefully read the data of Tab.:1; Chap.:7 in the sections: Supply, Outputs and Connections.
See Tab.: 1-4 in this chapter to make the required connections for the supply, load and configuration for the connectors. Preferably use ready-wired connectors.
Use PELV power supplies, in accordance with Chap.6.4. of EN 60204-1.
If using a non-stabilized power supply, the transformer must have double insulation and adequate power, the secondary winding must be 18V, bridge power factor correction, filtration capacity with a minimum value of 2200µF for absorptions up to 1A, for higher absorptions add 2200µF for every extra Ampere.
Connect the supply cables directly to the source and not downstream of other power or highly inductive devices.
Run the cables of the safety light curtains in dedicated raceways or, where only signals run, do not use raceways that carry power cables.
Check that the earth protection wire (PE) is actually connected to earth.
Before inserting the connector, check that the mains voltage and the supply voltage are within the required limits, apply or cut off the connector if there is no power supply and check again that the supply voltage has a correct nominal value and remains within the limits defined in all the working conditions, check the limits in the two extreme conditions of minimum and maximum absorption of all of the devices connected to the same power supply, especially if this is not a stabilized power supply.

6.5 Colours and symbols used to indicate the cables and LEDs of the display.

In the following the colours of the cables and LEDs are indicated with the abbreviations defined in IEC 60707 in English.

BK	BN	RD	YE	OG	GN	BU	GY	WH	PK	VT
Black	Brown	Red	Yellow	Orange	Green	Blue	Grey	White	Pink	Purple

☼	**Indication of LED lit permanently**
✥	**Indication of LED lit intermittently with periodical blinking.**
◐	**Indication of LED with continual blinking**
●	**Indication of LED off**

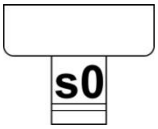
SERIES LP4

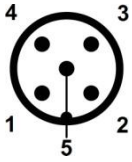
EMITTER FIVE POLE CONNECTOR

coupled with receiver models without Muting or with Muting and relevant external sensors LP4E/-***; LP4E/**-***M***

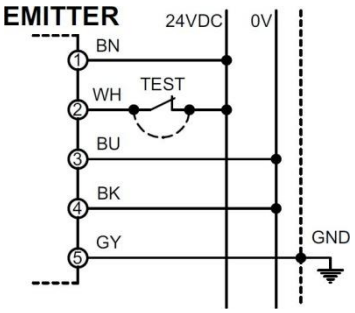
Configurations for range and test

Connector s0, M12, 5 pole male

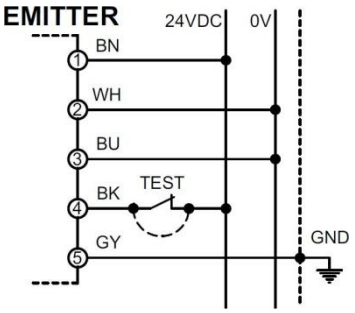




Wiring for low range



Wiring for high range



Pin	Colour	Signal	Type	Description
1	**BN**	$24V_{DC}$	POWER	Power supply input
2	**WH**	H range/Test	IN	Selection input
3	**BU**	0V	POWER	Power supply reference
4	**BK**	L range/Test	IN	Selection input
5	**GY**	PE	GND	Earth protection

Range selection with the logical levels of the pins		
Pin 2	**Pin 4**	**Selected function**
LO	**LO**	Test (no emission)
LO	**HI**	Emission with high range
HI	**LO**	Emission with low range
HI	**HI**	Not admitted
Levels: LO = <5V or open; **HI** = 11 to 30V		

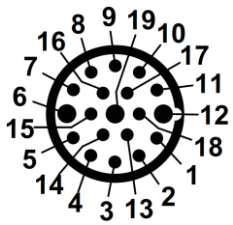
NOTE: The Test contact is necessary only if the entire safety chain of the receiver downstream must be tested. If the Test is not necessary replace the TEST contact with direct wiring at $24V_{DC}$.

Tab.:1; Chap.:6

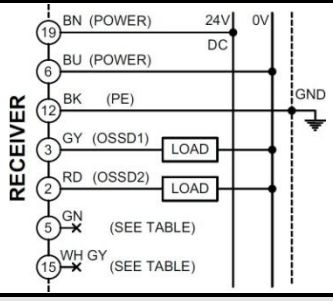
SERIES LP4

S0 CONNECTOR OF THE RECEIVER OR OF THE ACTIVE ELEMENT M23 19 POLES MALE, STANDARD MODELS OR WITH MUTING

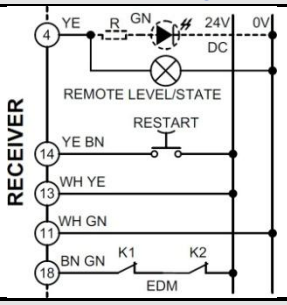
Connector S0 M23, 19 pole male



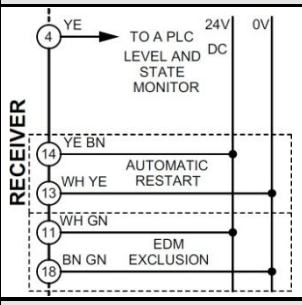
Power supply and loads. Some models use pins 5 as output and 15 as input.



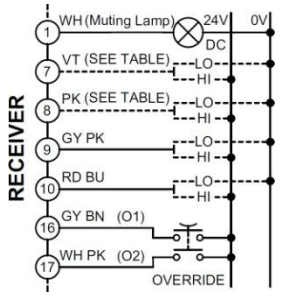
Manual Restart and EDM, pin 4 monitor for Status and Signal level



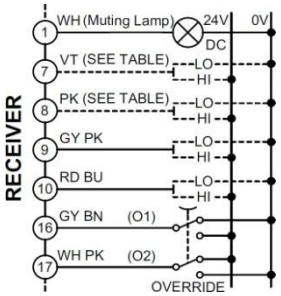
Automatic Restart without EDM



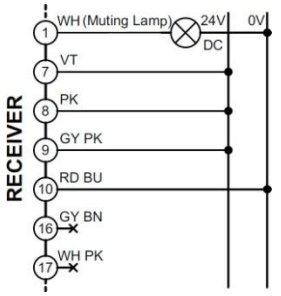
Muting lamp, pin 7-10 for Mode selection, continuous mode Override. Some models use pins 7 and 8 as sensors inputs.



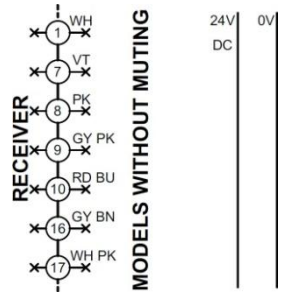
Muting lamp, pin 7-10 for Mode selection, shooting mode Override. Some models use pins 7 and 8 as sensors inputs.



Muting is not used, the presence of the lamp and a valid selection on pins 7-10 are required!



Models without muting, the pins are not internally connected



Pin	Colour	Signal	Type	Models a	b	c	d	Function	Notes
1	WH	N.C.	-	a				Not connected in models without Muting	
		Muting Lamp	OUT		b	c	d	Output for piloting the external Muting Lamp	
2	RD	OSSD2	OUT	a	b	c	d	Second safety static output (PNP)	
3	GY	OSSD1	OUT	a	b	c	d	First safety static output (PNP)	
4	GE	System Status	OUT	a	b	c	d	Repetition of OSSDs status, see note	
				a	b			+ low signal level indication, see note	
5	GN	N.C.	-	a	b			Not connected	
		Muting status	OUT			c	d	Active with Muting, HI:Muting ON; LO:Muting OFF	
6	BU	$0V_{DC}$	POWER	a	b	c	d	Supply voltage reference.	
7	VT	N.C.	-	a				Not connected in models without Muting	
		Sensor_1	IN				d	Input for Muting sensor (M2 models)	
		Mode_0	IN		b	c		Input config. for the other models with Muting	
8	PK	N.C.	-	a				Not connected in models without Muting	
		Sensor_2	IN				d	Input for Muting sensor (M2 models)	
		Mode_1	IN		b	c		Input config. for the other models with Muting	
9	GY-PK	N.C.	-	a				Not connected in models without Muting	
		Mode_2	IN		b	c	d	Input configuration for all models with Muting	
10	RD-BU	N.C.	-	a				Not connected in models without Muting	
		Mode_3	IN		b	c	d	Input configuration for all models with Muting	
11	WH-GN	Enabling EDM	IN	a	b	c	d	Enabling for external contactor control	
12	BK	PE	GND	a	b	c	d	Earth protection connection	
13	WH-YE	Man./Auto.	IN	a	b	c	d	Selection of the Start/Restart mode	
14	BN-YE	Start	IN	a	b	c	d	Connection to the Start/Restart button	
15	WH-GY	N.C.	-	a	b			Not connected	
		Enabling Muting	IN			c	d	Enable input for Muting, see note	
16	BN-GY	N.C.	-	a				Not connected in models without Muting	
		Override_1	IN		b	c	d	Input 1 for the forced control of Muting	
17	WH-PK	N.C.	-	a				Not connected in models without Muting	
		Override_2	IN		b	c	d	Input 2 for the forced control of Muting	
18	BN-GN	EDM	IN	a	b	c	d	Connection to the external control contacts	
19	BN	$24V_{DC}$	POWER	a	b	c	d	Supply voltage input	

Models a:
LP4R/40-***L
LP4R/0#-0**

Models b:
LP4R/30-***M4
LP4R/40-***M4#
LP4R/90-***M4
LP4R/0#-0**M4#

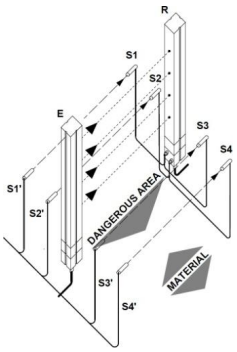
Models c:
LP4T/0#-0**M4

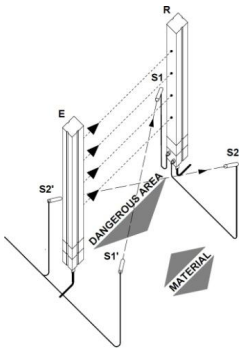
Models d:
LP4T/0#-0**M2

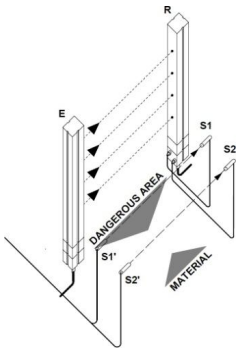
From this table are excluded models:
LP4F/0#-***
LP4R/0#-***L
LP4F/0#-***S
Where S0 is an M12, 8 poles.

NOTE: The Muting Enabling signal (pin 15) must be LO before the HI enabling signal of the single sensors, and it must remain low for the entire duration of the sensor enabling signal, otherwise Muting will stop. The System Status output signal (pin 4) repeats the state of the OSSD outputs, HI= safety light curtain ON, LO= safety light curtain OFF; on models in which the signal level indication is present, the output status is momentarily denied with a pulse lasting 15 to 45ms and period 800ms if the signal is weak.

SERIES LP4 — MUTING MODE CONFIGURATION







MUTING	**TWO-WAY**	**TWO-WAY**	**MONO-DIRECTIONAL**
SENSORS	**Two + two parallel sensors. For mode A and B do not use crossed external sensors (not a safe solution, the crossover point is accessible).**	**Two crossed sensors, with point of crossing inside the dangerous area.**	**Two parallel sensors or crossed inside the dangerous area.**

M23 connector			**A**			**B**			**C**			**D**			**E**			**F**			**G**			**H**		
Pin	**Colours**	**Signal**	**Levels**	**Expiration**	**Match**	**Levels**	**Expiration**	**Match**	**Levels**	**Expiration**	**Match**	**Levels**	**Expiration**	**Match**	**Levels**	**Expiration**	**Match**	**Levels**	**Expiration**	**Match**	**Levels**	**Expiration**	**Match**	**Levels**	**Expiration**	**Match**
7	VT	Mode_0	HI	30s	4s	LO	Limitless	4s	HI	30s	Sequence	LO	Limitless	Sequence	LO	30s	4S	LO	90min	4s	HI	30s	4S	HI	90min	4s
8	PK	Mode_1	LO			HI			LO			HI			LO			LO			HI			HI		
9	GY-PK	Mode_2	LO			LO			HI			HI			HI			LO			HI			LO		
10	RD-BU	Mode_3	LO			LO			HI			HI			LO			HI			LO			HI		

NOTE: On models with Muting with only two sensors (M2) pin 7 (Mode_0) and 8 (Mode_1) are not connected, in this case the functions are selected only by pins 9 (Mode_2) and 10 (Mode_3).
On G and F applications, from the moment the outgoing material frees a Muting sensor 4s remain to clear the safety light curtain too, otherwise the OSSD outputs will switch OFF.

Tab.:4; Chap.:6

SERIES LP4 — CONTINUOUS OVERRIDE CONTROL SEQUENCE

Sequence➔			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**3-8**	**9**	**10**	**11**	**12**
M23 connector			**Setup Levels when switching on**	**Starting status OSSDs outputs**	**Muting error OSSDs outputs**	**Override LED blinking**	**Override control**	**Signal matching**	**Muting lamp blinking**	**OSSDs outputs**	**The passage is not cleared within the expiration**	**OSSDs outputs**	**Control release**	**The blocked situation persists**	**Repetition of sequence from 3 to 8**	**The passage is cleared Within expiration**	**OSSDs outputs**	**Control release**	**Normal situation restored**
Pin	**Colours**	**Signal**																	
16	BN-GY	Override_1	LO	ON	OFF		HI	t≤400ms		ON	t>15min	OFF	LO			15min	ON	LO	
17	WH-PK	Override_2	LO				HI						LO					LO	

NOTE: This Override function requires an operator to be constantly present to keep the spring return key switch on. This Override function can be repeated a limitless number of times.

Tab.:5; Chap.:6

SERIES LP4

PULSE OVERRIDE CONTROL SEQUENCE

Sequence➔			1	2	3	4	5	6	7	8	9	10	11	12	3-9	10	11	12
M23 connector			Setup Levels when switching on	Starting status OSSDs outputs	Muting error OSSDs outputs	Override LED blinking	Override control	Signal correspondence	Muting lamp blinking	Forced Muting OSSDs outputs	Override release	The passage is not cleared within the expiration	Muting stopped OSSDs outputs	The blocked situation persists	Repetition of sequence from 3 to 9	The passage is cleared within expiration	OSSDs outputs	Normal situation restored Zero setting the total timer for the durations of Override and of the Override controls counter
Pin	Colours	Signal																
16	BN-GY	Override_1	LO	ON	OFF		HI	t≤400ms		ON	LO	t>15min	OFF			≤15min	ON	
17	WH-PK	Override_2	HI				LO				HI							

NOTE: This Ovveride function does not require the constant presence of an operator that only has to start the function by momentarily turning on the spring return key switch.
The duration of the consecutive Override attempts is added up and the number of controls is counted.
The system accepts the control only if the total duration of the Override of 60min and a maximum number of 30 activations have not been exceeded. The timer and the counter are zeroed by a later correct Muting sequence or by switching the system off and back on again.

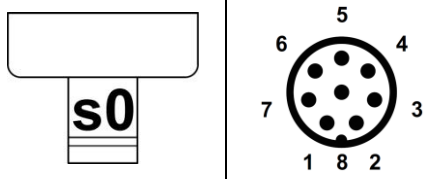
Tab.:6; Chap.:6

SERIES LP4

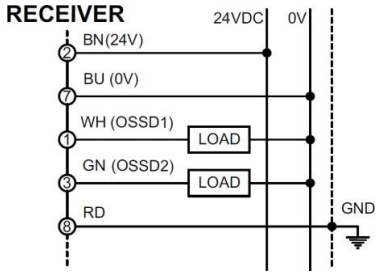
s0 CONNECTOR M12 EIGHT POLE OF THE RECEIVER

Models without Muting, standard, Long and Super range:
LP4F/*#-*, see Tab.:8 of Chp.:9; LP4R/*#-***L,S see Tab.:6 of Chp.:9.**

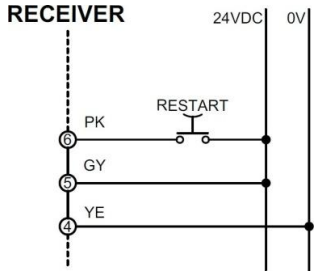
Connector s0, M12, 8 pole male



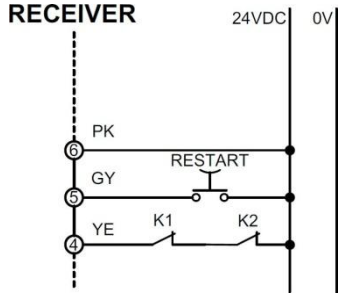
Power supply and loads



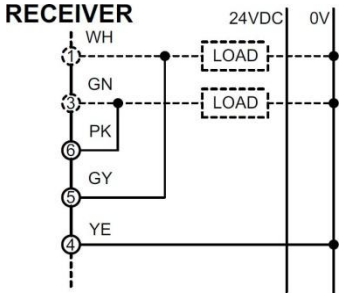
Manual restart without EDM



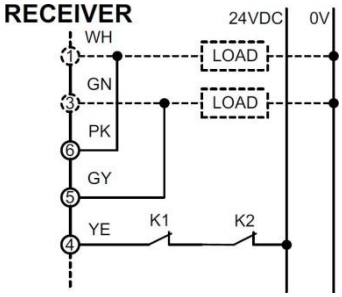
Manual restart with EDM



Automatic restart without EDM



Automatic restart with EDM



Pin	Colour	Signal	Type	Description
1	WH	OSSD1	OUT	First safety static output (PNP)
2	BN	$24V_{DC}$	POWER	Supply voltage
3	GN	OSSD2	OUT	Second safety static output (PNP)
4	YE	EDM	IN	Connection to the external control contacts (EDM) or connected at **0V** to exclude EDM
5	GY	Mode_A	IN	Selection of the manual or automatic Start/Restart mode, see wiring diagrams above.
6	PK	Mode_B	IN	
7	BU	0V	POWER	Supply voltage reference
8	RD	PE	GND	Protection earth

NOTE: On these models it is possible to choose the operating modes by changing the wiring. By using the EDM function it is possible to extend the safety control to the contactors controlled downstream, that must be the type with guided contacts and approved for safety applications.

Tab.:7; Chap.:6

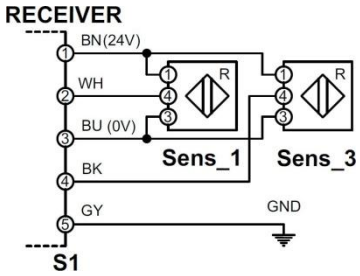
SERIES LP4

S1 CONNECTOR OF THE RECEIVER OR OF THE ACTIVE ELEMENT

Power supply and sensor inputs of Muting Sens_1 and Sens_3

Connector S1, M12 5 pole female

Wiring



Pin	Colour	Signal	Type	Function	Levels
1	BN	$24V_{DC}$	POWER	Supply voltage output	Max. total output current: 100mA
2	WH	Sens_1	IN	Muting 1 sensor input	**LO**: <5V or open; **HI**: 11 to 30V
3	BU	$0V_{DC}$	POWER	Power supply reference	
4	BK	Sens_3	IN	Muting 3 sensor input	**LO**: <5V or open; **HI**: 11 to 30V
5	GY	PE	GND	Earth protection	
NOTE:	The sensors can be of any type, the output level must be high when there is material (HI)				

Tab.:8; Chap.:6

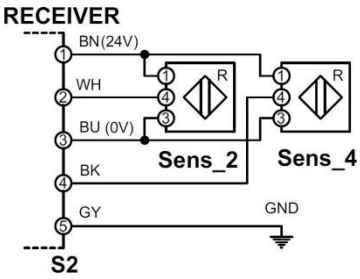
SERIES LP4

S2 CONNECTOR OF THE RECEIVER OR OF THE ACTIVE ELEMENT

Power supply and sensor inputs of Muting Sens_2 and Sens_4

Connector S2, M12 5 pole female

Wiring



Pin	Colour	Signal	Type	Function	Levels
1	BN	$24V_{DC}$	POWER	Supply voltage output	Max. total output current: 100mA
2	WH	Sens_2	IN	Muting 2 sensor input	**LO**: <5V or open; **HI**: 11 to 30V
3	BU	$0V_{DC}$	POWER	Power supply reference	
4	BK	Sens_4	IN	Muting 4 sensor input	**LO**: <5V or open; **HI**: 11 to 30V
5	GY	PE	GND	Earth protection	
NOTE:	The sensors can be of any type, the output level must be high when there is material (HI)				

Tab.:9; Chap.:6

7.0 TECHNICAL SPECIFICATIONS.

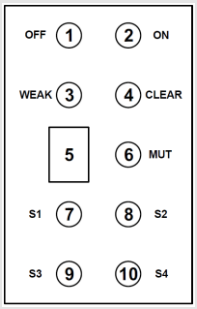
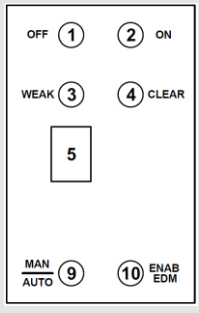
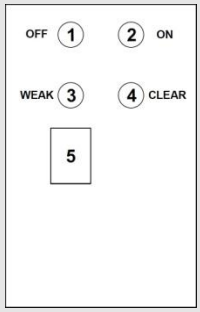
LP4 SERIES		TECHNICAL SPECIFICATIONS			
PARAMETERS		**Min.**	**Nom.**	**Max.**	**NOTES**
Power supply					
Supply voltage	**V_{DC}**	**19.2**	**24**	**28.8**	From PELV power supply according to EN 60204-1 Chap.6.4
Residual ripple	**V**			**1.2**	The limits of the power supply must not be exceeded
Absorbed power, Receiver	**W**			**6**	Excluding the load
Absorbed power, Emitter	**W**			**3**	Test excluded, maximum range
Safety outputs, OSSDs					
Output type			**2 x PNP**		Completely protected safety outputs. BEAMS FREE : ON (HI)
Current	**mA**			**500**	Higher values are interpreted as overload or shorting
Voltage drop @400mA	**V**			**1.2**	Reduction in output voltage compared to the power supply
Equivalent resistive load	**Ω**	**48**			Lower values are interpreted as shorting
Leakage current	**mA**			**2**	Value at which the OFF state of the load must be guaranteed.
OFF-state Voltage	**V**			**1**	Value at which the OFF state of the load must be guaranteed.
Tolerated capacitive load	**µF**			**2**	Higher values can be interpreted as shorting.
Auxiliary outputs					
Output type for signalling			**PNP**		All the outputs are controlled and protected PNP type
Muting lamp power	**W**	**0.5**		**5**	Values outside the specifications are interpreted as a lamp failure
Signal level and status signals	**mA**			**100**	Higher current values are interpreted as shorting
Sensors supply	**mA**			**100**	For each single sensor
Signal inputs and enablings					
Operating mode and Start control			**2**		Manual/Automatic mode selection and Start button
Operating mode and EDM signal			**2**		Selection of Disabling/Enabling mode and contact input
Muting operating mode			**2 or 4**		Selection of number of sensors, logic and times
Muting sensors			**2 or 4**		Input of signals from material in transit presence sensors
Muting enabling			**1**		Enables the interpretation of the signals of the muting sensors
Inputs for Override key button			**2**		Input for contacts and selection of operating mode (Cont./Pulsed)
Reaction times					
Time delay before availability	**s**			**15**	After application of the power supply
OSSDs DARK response time	**ms**			**30**	Depending on the number of optics, see model tables, Chap.:9
OSSDs LIGHT response time	**ms**		**100**		With EDM function not activated
OSSDs LIGHT response time	**ms**		**400**		With EDM function activated
OSSDs self-test pulse duration	**µs**			**100**	Should be ignored by downstream devices
Restart control signal duration	**ms**	**100**			Valid for input sequence **L►H** and minimum indicated duration of **H**
Test input signal duration	**ms**	**40**			Valid if it has at least the stated duration
Muting activation time delay	**ms**		**100**		From valid configuration of the sensor signals
Muting signal matching (2 sensors)	**s**			**4**	See Tab.:4; Chap.:6
Muting signal matching (4 sensors)			**or sequence**	**4 s**	Selectable see Tab.:4; Chap.:6
Muting duration expiration (2 sensors)			**30s or 90min**		Selectable see Tab.:4; Chap.:6
Muting duration expiration (4 sensors)			**30s or limitless**		Selectable see Tab.:4; Chap.:6
Override duration expiration	**min**		**15**		Renewable see Tab.:5,6; Chap.:6
Safety parameters					
Type			**4**		IEC 61496-1, 2004; IEC 61496-2, 2006
Optical beam angle	**Degrees**			**±2,5°**	IEC 61496-2, 2006
Safety integrity level			**SIL 3**		IEC 61508, 1998
Safety integrity level			**SILCL 3**		IEC 62061, 2005
Performance level			**PL e**		ISO 13849-1 2006
Class			**4**		ISO 13849-1 2006
Reliability, **MTTFd**	**Years**		**100**		ISO 13849-1 2006
Resistance to faults in com. mode, **CCF**	**Score**		**80**		ISO 13849-1 2006, IEC 62061, 2005 (min. score: 65)
Service time, **T_M**	**Years**		**20**		ISO 13849-1 2006
Ambient					
Artificial light immunity			**According to IEC 61496-2**		It respects the limits and conditions of the stated standard
Natural light immunity			**According to IEC 61496-2**		It respects the limits and conditions of the stated standard
Protection			**IP65**		Total protection from dust and jets of water
Working temperature	**°C**	**-10**		**55**	Without condensation, LS4ER models
Working temperature	**°C**	**0**		**55**	Without condensation, LS4PT,F models
Storage temperature	**°C**	**-25**		**70**	To be respected also during transportation
Humidity	**%**			**95%**	Without condensation
Vibration			**According to IEC 61496-1**		It respects the limits and conditions of the stated standard
Impact			**According to IEC 61496-1**		It respects the limits and conditions of the stated standard
Range correction factors					
Use of deflection mirrors			**0.85**		For each deflection with a mirror
Environmental factors			**0.50 / 0.25**		For the presence of dust, vapours / mist, fumes (indicative values)
Connections					
Total length of cables for supply / output	**m**			**100**	Use a section of 1mm^2 for L>50m
Dimensions / Materials					
Housing section	**mm**		**50 (front) x 60**		Painted aluminium, yellow RAL 1021
Groove for fixing	**mm**		**6/12/8.5**		Three, at the sides and on the back, depth/width/width
Front window width	**mm**		**40mm**		Useful central width 13mm, material PMMA IR
End closing	**No.**		**2**		Material PP + 30%GF, black
Closing screws	**No.**		**4+4**		Material Fe37 burnished
Connectors S0, Emitters			**1x M12 5p male**		LP4E models, nickel-plated brass
Connectors S0, Receivers or Active			**1x M23 19p male**		LP4R, LP4T models, nickel-plated brass
Connector S0, alternative (s0)			**1x M12 8p male**		LP4F models, nickel-plated brass
Conn. S1 and S2 (or S1) Receivers or Active			**M12 5p female**		LP4R, LP4T models with Muting, nickel-plated brass

Tab.:1; Chap.:7

8.0 PANEL AND DIAGNOSTICS INDICATIONS

SERIES LP4 — **INDICATIONS OF THE RECEIVER PANEL OR OF THE ACTIVE ELEMENT**

Indication of the LEDs and of the Display in sequences after the moment of switching on: initial Test period, indication of the setting, normal operation and failure.

Progressive times (s)				0…5 →	→ 5…15 →		→ 15…∞			
	Ref.	Colour	Function	TEST LED	Indication and verification of the configuration: LED OFF or ON		Indications during normal operation LED OFF, ON and blinking			Failure
					●	☼	●	☼	◐	
	1	RD	OFF	☼	Configuration OK	◐ Rejected	-	OSSDs OFF	-	☼
	2	GN	ON	☼	-	-	-	OSSDs ON	-	●
	3	OG	WEAK	☼	-	-	Strong signal	Weak signal	-	●
	4	YE	CLEAR (OVERRIDE)	☼	Continuous mode Override	Shooting mode Override		Beams free, awaiting Restart	Override request	●
	5	RD	DISPLAY	[8]	[C]:Configuration		-	[-]: OK In operation	[o]:Override in progress	[F]/[?]
	6	YE	MUTING	☼	Muting by 2 sensors	Muting by 4 sensors	Muting not in progress	Muting in progress	-	●
	7	YE	S1	☼	Timeout 90s	Timeout 30s	Sensor_1 OFF	Sensor_1 ON	-	●
	8	YE	S2	☼	With 4 sensors Match	With 4 sensors Sequential	Sensor_2 OFF	Sensor_2 ON	-	●
	9	YE	S3	☼	Automatic Restart	Manual Restart	Sensor_3 OFF	Sensor_3 ON	-	●
	10	YE	S4	☼	EDM disabled	EDM enabled	Sensor_4 OFF	Sensor_4 ON	-	●
Panel I	**Receiver models or Active with Muting:**				**LP4R/**-***M4;** tables of Chap.:9: **1, 3, 4, 5.** **LP4R,T/0#-0**M.;** tables of Chap.:9: **7, 9, 10.**					
	1	RD	OFF	☼	Configuration OK	◐ Rejected	-	OSSDs OFF	-	☼
	2	GN	ON	☼	-	-	-	OSSDs ON	-	●
	3	OG	WEAK	☼	-	-	Strong signal	Weak signal	-	●
	4	YE	CLEAR	☼	-	-	-	Beams free, awaiting Restart	-	●
	5	RD	DISPLAY	[8]	[C]: Configuration		-	-	-	[F]/[?]
	9	YE	MANUAL / AUTOMATIC	☼	Automatic Restart	Manual Restart	-	-	-	●
	10	YE	Enable EDM	☼	EDM disabled	EDM enabled	-	-	-	●
Panel II	**Receiver models without Muting:**				**LP4R/**-***;** table of Chap.:9: **2.** **LP4R/0#-0**;** table of Chap.:9: **6.**					
	1	RD	OFF	☼	Configuration OK	◐ Rejected	-	OSSDs OFF	-	☼
	2	GN	ON	☼	-	-	-	OSSDs ON	-	●
	3	OG	WEAK	☼	Restart Manual	Restart Automatic	Strong signal	Weak signal	-	●
	4	YE	CLEAR	☼	EDM disabled	EDM enabled	-	Beams free, awaiting Restart	-	●
	5	RD	DISPLAY	[8]	[C]:Configuration		-	[-]: OK In operation	-	[?]
Panel III	**Active Models without Muting:**				**LP4F/0#-0**;** table of Chap.:9: **8.**					

NOTE: In case of failure the LED 1 (OFF) remains lit while the display 5 show alternately F and another digit that identifies the cause of the fault, see Tab.:2.

Tab.:1; Chap.:8

SERIES LP4			**INDICATIONS OF ERROR CODES OF THE PANEL OF THE RECEIVER OR ACTIVE ELEMENT**				
Codes alternating, blinking or steady		**Type of fault**	**DIAGNOSIS**	**CORRECTIVE ACTIONS TO UNDERTAKE**	**CONNECTORS TO CHECK**	**TERMINALS TO CHECK**	**TYPE OF ASSOCIATED PANEL I, II, III**
F	**C**	**ERRORI DI CONFIGURAZIONE**	Incorrect configuration	Check that the configuration inputs are correctly polarized.	**S0**	**11,13,18**	**I, II**
					s0	**4,5,6**	**III**
	U		Fault on the output "SYSTEM STATUS"	Check that the output terminal is correctly connected to an adequate load.	**S0**	**4**	**I, II**
	2		OSSD outputs shorted to positive.	Check the connection between the output terminals and the loads, check that the return of the load is to $0V_{DC}$, or check that when OFF there is no residual voltage on the loads.	**S0**	**2, 3**	**I, II**
					s0	**1,3**	**III**
	E		Error in connection/configuration of EDM	Check that the configuration corresponds to the application and that the feedback contacts of the external relays (two NC in series), if required, are correctly connected between the input and **$24V_{DC}$**.	**S0**	**11, 18**	**I, II**
					s0	**4**	**III**
	H		Modified configuration without restarting	Perform a Restart	**s0**	**4,5,6**	**III**
	H	**MODELS WITH MUTING**	Error in connection/configuration of OVERRIDE	Verify that the key switch is connected properly and that this key switch is intact.	**S0**	**16, 17**	**I**
	J		Fault on the output "MUTING STATUS"	Check that the output terminal is correctly connected to an adequate load.	**S0**	**5**	**I**
	II		Inconsistency between the Muting sensor signals	Check that the number of sensors is consistent with the configuration, check that the signals are stable, check that the positioning of the sensors is correct.	**S0**	**7, 8, 9, 10**	**I**
					S1, S2	**2, 4**	
	L		Fault on the Muting signalling lamp	Check that the lamp is correctly connected, of adequate power and efficient.	**S0**	**1**	**I**
OFF	**t**		Cumulative pulse Override time expired	Check the causes that determine blocking materials through the access. To restart, switch the system OFF and back ON again.	**-**	**-**	**I**
6		**EXTERNAL FAULT**	Short circuit between the OSSD outputs	Check the wiring of the loads	**S0**	**2, 3**	**I, II**
					s0	**1, 3**	**III**
0			Overload of the OSSD outputs	Check that the type of load is adequate, the load could have too low impedance or too high capacity, (Imax.: 500mA, Cmax.: 2,2µF).	**S0**	**2, 3**	**I, II**
					s0	**1, 3**	**III**
1			Presence of an interfering signal. The signal persists for min. 30s.	Check whether there are any other emitters in the field of view of the receiver, try and darken them/shield them one by one. Find a reciprocal position that resolves the problem.	**-**	**-**	**I, II, III**
F	**A**	**INTERNAL FAULT**	Internal error	Return the safety light curtain to the supplier	**-**	**-**	**I, II, III**
	3		Internal error	Return the safety light curtain to the supplier	**-**	**-**	**I, II, III**
	4		Internal error	Return the safety light curtain to the supplier	**-**	**-**	**I, II, III**
	5		Probable internal error on the OSSD	Carefully check also the connection of the OSSD outputs, if there is no wiring error or an external short to **$24V_{DC}$** or **0V**, return the safety light curtain to the supplier.	**S0**	**2, 3**	**I, II**
					s0	**1,3**	**III**

Tab.:2; Chap.:8

SERIES LP4		**INDICATIONS OF THE EMITTER PANEL**								
Indication of the LEDs and Display starting from the moment of power on: initial Test period, indication of the setting and operation, fault.										
Time since power on (s)				**0…5➔**	**➔ 5…∞**		**Fault signalling**			
	Ref.	**Colour**	**Function**	**TEST LED**	**Indication of the setting: LED OFF or ON**		**Type of fault**			
					●	☼	**Not defined**	**Internal**	**Internal**	**Range selection**	**Internal**
FAULT 1 2 ON RANGE 3 4 TEST	**1**	**RD**	**FAULT**	☼	-	-	☼	◐	◐	◐	◐
	2	**GN**	**ON**	☼	-	System OK	●	●	◐	●	●
	3	**OG**	**RANGE**	☼	Low Range	High Range	●	●	●	◐	●
	4	**YE**	**TEST**	☼	Not in Test	Test in progress	●	●	●	●	◐
Panel IV	Corrective actions to undertake						Wait or Restart	Send to supplier	Send to supplier	Check wiring	Send to supplier
MODELS	**LP4E/**-***, L, S, M4, M4L**										

Tab.:3; Chap.:8

9.0 LISTS OF AVAILABLE MODELS AND MAIN CHARACTERISTICS

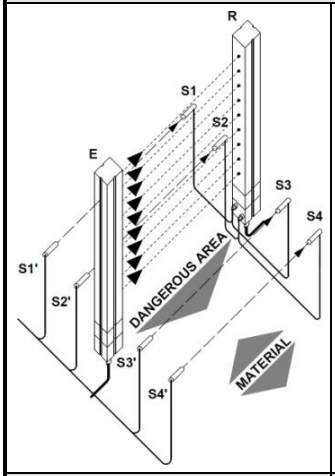
LP4 SERIES — **SAFETY LIGHT CURTAINS FOR HAND PROTECTION WITH RESOLUTION 30mm, FUNCTION OF INTEGRATED MUTING BY EXTERNAL SENSORS**

MODELS PAIRED	LP4	ER	/	30	-	030	to	120	M4		Model variables

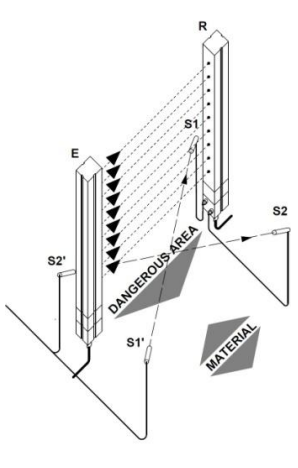
FUNCTIONS: Muting and Override complete and selectable; heights from 300mm to 1200mm; selectable restart and EDM; selectable standard ranges; M23, 19 pole receiver connector and two M12, 5 poles

MODELS	BEAMS	RESOLUTION	OPTICAL HEIGHT	HOUSING HEIGHT	RANGE SELECTION	RESPONSE TIME	PFH_d	DC_{avg}	$MTTF_d$	CCF	Connectors		DESCRIPTION
											Em.	Rec.	
	No.	mm	mm	R/E mm	m	ms	Fail./h	%	years	score	No., Ø, Poles		
LP4ER/30-030M4	16	30	310	458 423	0 to 6 1 to 16	12	9,06E-09	98,24	100	80	M12-5	M23-19 2x M12-5	**MUTING** Two-way 2-4 beams. Mono-directional 2 beams. Configurations:Tab.:4; Chap.:6 **RECEIVER** Dimensions: Fig.:1; Chap.:10 Connections:Tab.:3 (b); Chap.:6 Panel: I: Tab.:1; Chap.:8 **EMITTER** Dimensions: Fig.:2; Chap.:10 Connections: Tab.:1; Chap.:6 Panel: IV: Tab.:3; Chap.:8
LP4ER/30-045M4	24	30	460	608 573	0 to 6 1 to 16	15	9,89E-06	98,35	100	80	M12-5	M23-19 2x M12-5	
LP4ER/30-060M4	32	30	610	758 723	0 to 6 1 to 16	18	1.09E-08	98,44	100	80	M12-5	M23-19 2x M12-5	
LP4ER/30-075M4	40	30	760	908 873	0 to 6 1 to 16	21	1,18E-08	98,50	100	80	M12-5	M23-19 2x M12-5	
LP4ER/30-090M4	48	30	910	1058 1023	0 to 6 1 to 16	24	1,28E-08	98,55	100	80	M12-5	M23-19 2x M12-5	
LP4ER/30-105M4	56	30	1060	1173 1058	0 to 6 1 to 16	27	1,37E-08	98,56	100	80	M12-5	M23-19 2x M12-5	
LP4ER/30-120M4	64	30	1210	1358 1323	0 to 6 1 to 16	30	1,46E-08	98,63	100	80	M12-5	M23-19 2x M12-5	

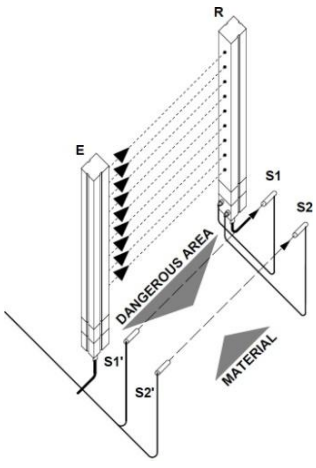
APPLICATION



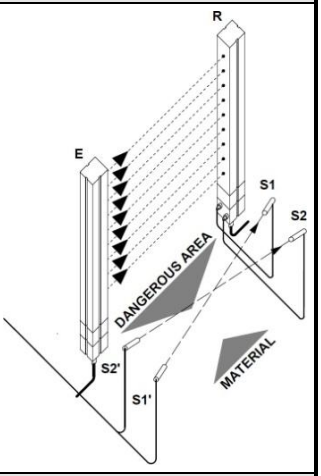
Two-way Muting with two pairs of parallel sensors and check on sequence or simultaneity.



Two-way Muting with a pair of crossed sensors and check on simultaneity only.



Mono-directional Muting with a pair of parallel sensors and check on simultaneity.



Mono-directional Muting with a pair of crossed sensors and check on simultaneity.

Tab.:1; Chap.:9

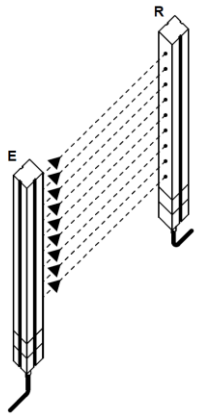
LP4 SERIES — SAFETY LIGHT CURTAINS FOR HAND PROTECTION WITH RESOLUTION 40mm LONG RANGE

MODELS PAIRED	LP4	ER	/	40	-	060 : 090 : 120	L		Model variables	

FUNCTIONS: heights from 600mm to 1200mm; selectable restart and EDM; selectable long ranges; M23, 19 pole receiver connector

MODELS	BEAMS	RESOLUTION	OPTICAL HEIGHT	HOUSING HEIGHT	RANGE SELECTION	RESPONSE TIME	PFH_d	DC_{avg}	$MTTF_d$	CCF	Connectors		DESCRIPTION
											Em.	Rec.	
	No.	mm	mm	R=E mm	m	ms	Fail./h	%	years	score	No., Ø, Poles		
LP4ER/40-060L	30	40	610	723	8 to 30 18 to 60	17	1,02E-08	98,37	100	80	M12-5	M23-19	**Receiver** Dimensions: Fig.:3; Chap.:10 Connections: Tab.:3 (a); Chap.:6 Panel: II: Tab.:1; Chap.:8 **Emitter** Dimensions: Fig.:4; Chap.:10 Connections: Tab.:1; Chap.:6 Panel: IV: Tab.:3; Chap.:8
LP4ER/40-090L	45	40	910	1023	8 to 30 18 to 60	23	1,17E-08	98,49	100	80	M12-5	M23-19	
LP4ER/40-120L	60	40	1210	1323	8 to 30 18 to 60	28,5	1,32E-08	98,57	100	80	M12-5	M23-19	

APPLICATION



Tab.:2; Chap.:9

LP4 SERIES

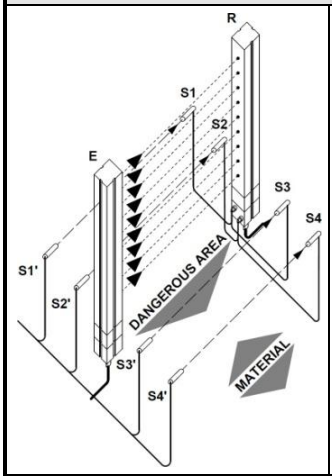
SAFETY LIGHT CURTAINS FOR HAND PROTECTION WITH RESOLUTION 40mm, FUNCTION OF INTEGRATED MUTING BY EXTERNAL SENSORS

MODELS PAIRED	LP4	ER	/	40	-	030	to	180	M4		Model variables	

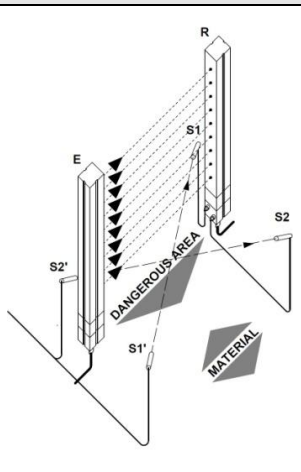
FUNCTIONS: Muting and Override complete and selectable; heights from 300mm to 1200mm; selectable restart and EDM; selectable standard ranges; M23, 19 pole receiver connector and two M12, 5 poles

MODELS	BEAMS	RESOLUTION	OPTICAL HEIGHT	HOUSING HEIGHT	RANGE SELECTION	RESPONSE TIME	PFH_d	DC_{avg}	$MTTF_d$	CCF	Connectors		DESCRIPTION
											Em.	Rec.	
	No.	mm	mm	R/E mm	m	ms	Fail./h	%	years	score	No., Ø, Poles		
LP4ER/40-030M4	10	40	310	458 423	0 to 6 1 to 16	9,5	8,71E-09	98,19	100	80	M12-5	M23-19 2x M12-5	**MUTING** Two-way 2-4 beams. Mono-directional 2 beams. Configurations: Tab.:4; Chap.:6 **RECEIVER** Dimensions: Fig.:1; Chap.:10 Connections:Tab.:3 (b);Chap.:6 Panel: I: Tab.:1; Chap.:8 **EMITTER** Dimensions: Fig.:2; Chap.:10 Connections: Tab.:1; Chap.:6 Panel: IV: Tab.:3; Chap.:8
LP4ER/40-045M4	15	40	460	608 573	0 to 6 1 to 16	11	9,45E-09	98,29	100	80	M12-5	M23-19 2x M12-5	
LP4ER/40-060M4	20	40	610	758 723	0 to 6 1 to 16	13	1,02E-08	98,37	100	80	M12-5	M23-19 2x M12-5	
LP4ER/40-075M4	25	40	750	908 873	0 to 6 1 to 16	15	1,10E-08	98,44	100	80	M12-5	M23-19 2x M12-5	
LP4ER/40-090M4	30	40	910	1058 1023	0 to 6 1 to 16	17	1,17E-08	98,49	100	80	M12-5	M23-19 2x M12-5	
LP4ER/40-105M4	35	40	1060	1208 1173	0 to 6 1 to 16	19	1,25E-08	98,53	100	80	M12-5	M23-19 2x M12-5	
LP4ER/40-120M4	40	40	1210	1208 1173	0 to 6 1 to 16	21	1,32E-08	98,57	100	80	M12-5	M23-19 2x M12-5	
LP4ER/40-135M4	45	40	1360	1508 1473	0 to 6 1 to 16	23	1,40E-08	98,60	100	80	M12-5	M23-19 2x M12-5	
LP4ER/40-150M4	50	40	1510	1658 1623	0 to 6 1 to 16	25	1,47E-08	98,63	100	80	M12-5	M23-19 2x M12-5	
LP4ER/40-165M4	55	40	1660	1808 1773	0 to 6 1 to 16	27	1,55E-08	98,65	100	80	M12-5	M23-19 2x M12-5	
LP4ER/40-180M4	60	40	1810	1958 1923	0 to 6 1 to 16	28,5	1,62E-08	98,67	100	80	M12-5	M23-19 2x M12-5	

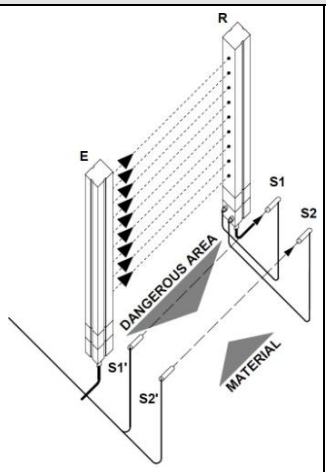
APPLICATION



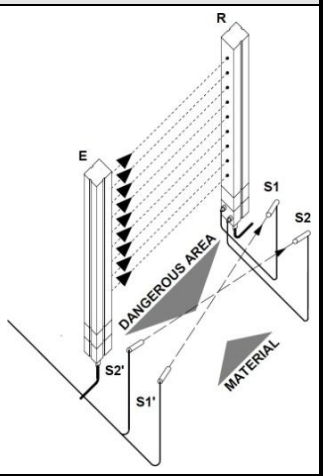
Two-way Muting with two pairs of parallel sensors and check on sequence or simultaneity.



Two-way Muting with a pair of crossed sensors and check on simultaneity only.



Mono-directional Muting with a pair of parallel sensors and check on simultaneity.



Mono-directional Muting with a pair of crossed sensors and check on simultaneity.

Tab.:3; Chap.:9

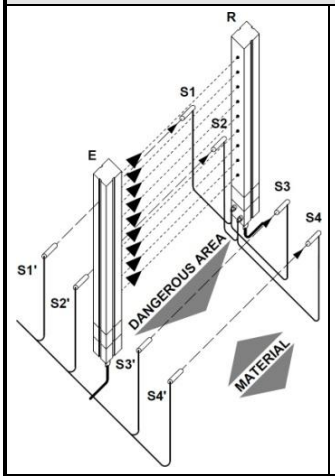
LP4 SERIES — SAFETY LIGHT CURTAINS FOR HAND PROTECTION WITH RESOLUTION 40mm, LONG RANGE AND FUNCTION OF INTEGRATED MUTING BY EXTERNAL SENSORS

MODELS PAIRED	LP4	ER	/	40	-	060	090	120	M4	L		Model variables	

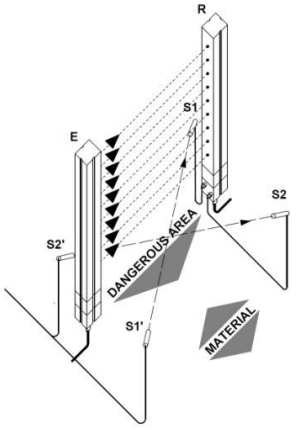
FUNCTIONS: Muting and Override complete and selectable; heights from 300mm to 1200mm; selectable long ranges; selectable restart and EDM; M23, 19 pole receiver connector and two M12, 5 poles.

MODELS	BEAMS	RESOLUTION	OPTICAL HEIGHT	HOUSING HEIGHT	RANGE SELECTION	RESPONSE TIME	PFH_d	DC_{avg}	$MTTF_d$	CCF	Connectors		DESCRIPTION
											Em.	Rec.	
	No.	mm	mm	R/E mm	m	ms	Fail./h	%	years	score	No., Ø, Poles		
LP4ER/40-060M4L	20	40	610	758 723	8 to 30 18 to 60	13	1,02E-08	98,37	100	80	M12-5	M23-19 2x M12-5	**MUTING** Two-way 2-4 beams. Mono-directional 2 beams. Configurations:Tab.:4; Chap.:6 **RECEIVER** Dimensions: Fig.:1; Chap.:10 Connections:Tab.:3 (b);Chap.:6 Panel: I: Tab.:1; Chap.:8 **EMITTER** Dimensions: Fig.:2; Chap.:10 Connections: Tab.:1; Chap.:6 Panel: IV: Tab.:3; Chap.:8
LP4ER/40-090M4L	30	40	910	1058 1023	8 to 30 18 to 60	23	1,17E-08	98,49	100	80	M12-5	M23-19 2x M12-5	
LP4ER/40-120M4L	40	40	1210	1358 1323	8 to 30 18 to 60	28,5	1,32E-08	98,57	100	80	M12-5	M23-19 2x M12-5	

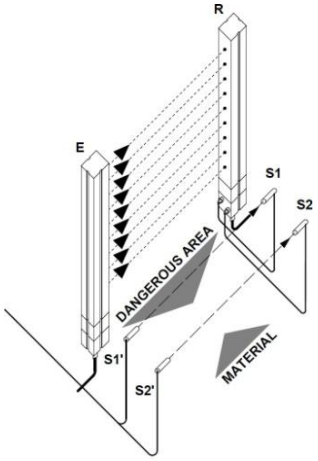
APPLICATION



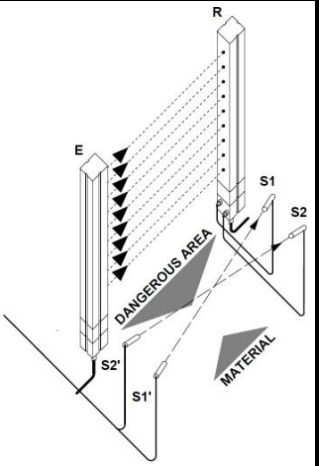
Two-way Muting with two pairs of parallel sensors and check on sequence or simultaneity.



Two-way Muting with a pair of crossed sensors and check on simultaneity only.



Mono-directional Muting with a pair of parallel sensors and check on simultaneity.



Mono-directional Muting with a pair of crossed sensors and check on simultaneity.

Tab.:4; Chap.:9

LP4 SERIES

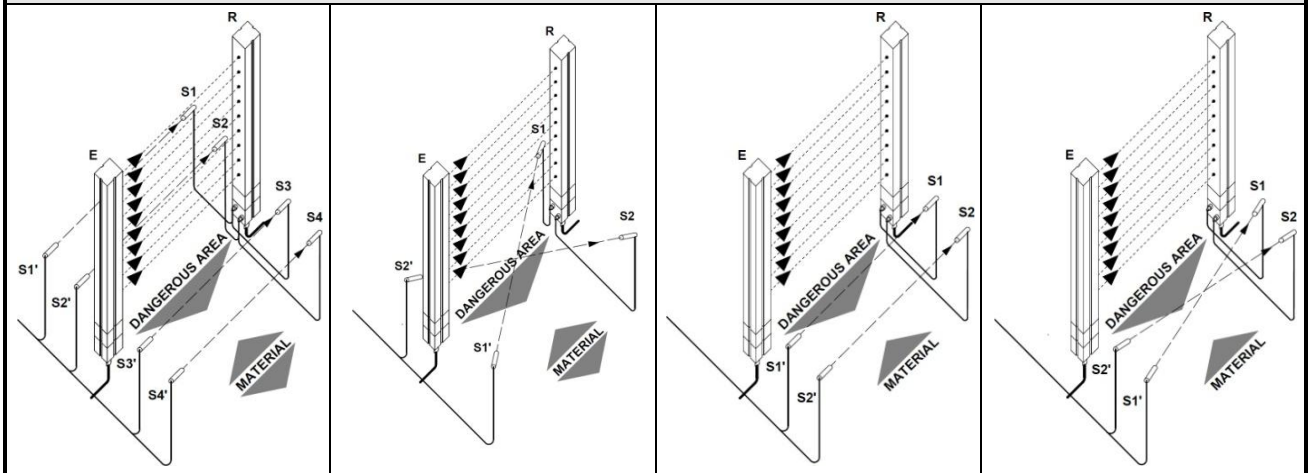
SAFETY LIGHT CURTAINS FOR LIMB PROTECTION WITH RESOLUTION 90mm, AND FUNCTION OF INTEGRATED MUTING BY EXTERNAL SENSORS

MODELS PAIRED	LP4	ER	/	90	-	030	to	180	M4		Model variables

FUNCTIONS: Muting and Override complete and selectable; heights from 300mm to 1200mm; standard ranges; selectable restart and EDM; M23, 19 pole receiver connector and two M12, 5 poles.

MODELS	BEAMS	RESOLUTION	OPTICAL HEIGHT	HOUSING HEIGHT	RANGE SELECTION	RESPONSE TIME	PFH_d	DC_{avg}	$MTTF_d$	CCF	Connectors		DESCRIPTION
											Em.	Rec.	
	No.	mm	mm	R/E mm	m	ms	Fail./h	%	years	score	No., Ø, Poles		
LP4ER/90-030M4	5	90	310	458 423	0 to 6 1 to 16	7	8,91E-09	98,22	100	80	M12-5	M23-19 2x M12-5	**MUTING** Two-way 2-4 beams. Mono-directional 2 beams. Config.:Tab.:4;Chap.:6 **RECEIVER** Dimensions: Fig.:1; Chap.:10 Connections:Tab.:3(b);Chap.:6 Panel: I: Tab.:1; Chap.:8 **EMITTER** Dimensions: Fig.:2; Chap.:10 Connections Tab.:1; Chap.:6 Panel: IV: Tab.:3; Chap.:8
LP4ER/90-045M4	7	90	460	608 573	0 to 6 1 to 16	8	9,48E-09	98,30	100	80	M12-5	M23-19 2x M12-5	
LP4ER/90-060M4	9	90	610	758 723	0 to 6 1 to 16	9	1,01E-08	98,36	100	80	M12-5	M23-19 2x M12-5	
LP4ER/90-075M4	11	90	760	908 873	0 to 6 1 to 16	10	1,06E-08	98,41	100	80	M12-5	M23-19 2x M12-5	
LP4ER/90-090M4	13	90	910	1058 1023	0 to 6 1 to 16	10,5	1,12E-08	98,46	100	80	M12-5	M23-19 2x M12-5	
LP4ER/90-105M4	15	90	1060	1208 1173	0 to 6 1 to 16	11	1,18E-08	98,50	100	80	M12-5	M23-19 2x M12-5	
LP4ER/90-120M4	17	90	1210	1358 1323	0 to 6 1 to 16	12	1,24E-08	98,53	100	80	M12-5	M23-19 2x M12-5	
LP4ER/90-135M4	19	90	1360	1508 1473	0 to 6 1 to 16	13	1,29E-08	98,56	100	80	M12-5	M23-19 2x M12-5	
LP4ER/90-150M4	21	90	1510	1658 1623	0 to 6 1 to 16	13,5	1,35E-08	98,58	100	80	M12-5	M23-19 2x M12-5	
LP4ER/90-165M4	23	90	1660	1808 1773	0 to 6 1 to 16	14	1,41E-08	98,61	100	80	M12-5	M23-19 2x M12-5	
LP4ER/90-180M4	25	90	1810	1958 1923	0 to 6 1 to 16	15	1,47E-08	98,63	100	80	M12-5	M23-19 2x M12-5	

APPLICATION



Two-way Muting with two pairs of parallel sensors and check on sequence or simultaneity.	**Two-way** Muting with a pair of crossed sensors and check on simultaneity only.	**Mono-directional** Muting with a pair of parallel sensors and check on simultaneity.	**Mono-directional** Muting with a pair of crossed sensors and check on simultaneity.

Tab.:5; Chap.:9

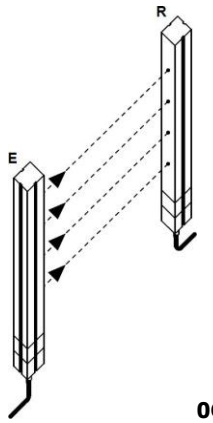
LP4 SERIES — SAFETY LIGHT GRID WITH MULTI-BEAM OPTICS FOR ACCESS PROTECTION

MODELS PAIRED	LP4	ER	/	0A	0B	0C	-	050	080	090		L	S		Model variables

FUNCTIONS: 2, 3, 4 beams; standard, long and super ranges; selectable restart and EDM; M23, 19 pole or M12, 8 pole receiver connector.

MODELS	BEAMS	PITCH	OPTICAL HEIGHT	HOUSING HEIGHT	RANGE SELECTION	RESPONSE TIME	PFH_d	DC_{avg}	$MTTF_d$	CCF	Connectors		DESCRIPTION
											Em.	Rec.	
	No.	mm	mm	R=E mm	m	ms	Fail./h	%	years	score	No., Ø, Poles		
LP4ER/0A-050	2	500	510	723	0 to 6 1 to 16	7	7,53E-09	97,94	100	80	M12-5	M23-19	**RECEIVER** Dimensions: Fig.:3; Chap.:10 Connections:Tab.:3(a);Chap.:6 Panel: II: Tab.:1; Chap.:8 **EMITTER** Dimensions: Fig.:4; Chap.:10 Connections Tab.:1; Chap.:6 Panel: IV: Tab.:3; Chap.:8
LP4ER/0B-080	3	400	810	1023	0 to 6 1 to 16	7	7,70E-09	97,99	100	80	M12-5	M23-19	
LP4ER/0C-090	4	300	910	1123	0 to 6 1 to 16	7	7,87E-09	98,03	100	80	M12-5	M23-19	
LP4ER/0A-050L	2	500	510	723	8 to 30 18 to 60	7	7,53E-09	97,94	100	80	M12-5	M23-19	
LP4ER/0B-080L	3	400	810	1023	8 to 30 18 to 60	7	7,70E-09	97,99	100	80	M12-5	M23-19	
LP4ER/0C-090L	4	300	910	1123	8 to 30 18 to 60	7	7,87E-09	98,03	100	80	M12-5	M23-19	
LP4ER/0A-050L12	2	500	510	723	8 to 30 18 to 60	7	7,53E-09	97,94	100	80	M12-5	M12-8	**RECEIVER** Dimensions: Fig.:4; Chap.:10 Connections: Tab.:7; Chap.:6 Panel: II; Tab.:1; Chap.:8 **EMITTER** Dimensions: Fig.:4; Chap.:10 Connections Tab.:1; Chap.:6 Panel: IV: Tab.:3; Chap.:8
LP4ER/0B-080L12	3	400	810	1023	8 to 30 18 to 60	7	7,70E-09	97,99	100	80	M12-5	M12-8	
LP4ER/0C-090L12	4	300	910	1123	8 to 30 18 to 60	7	7,87E-09	98,03	100	80	M12-5	M12-8	

APPLICATION



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Tab.:6; Chap.:9

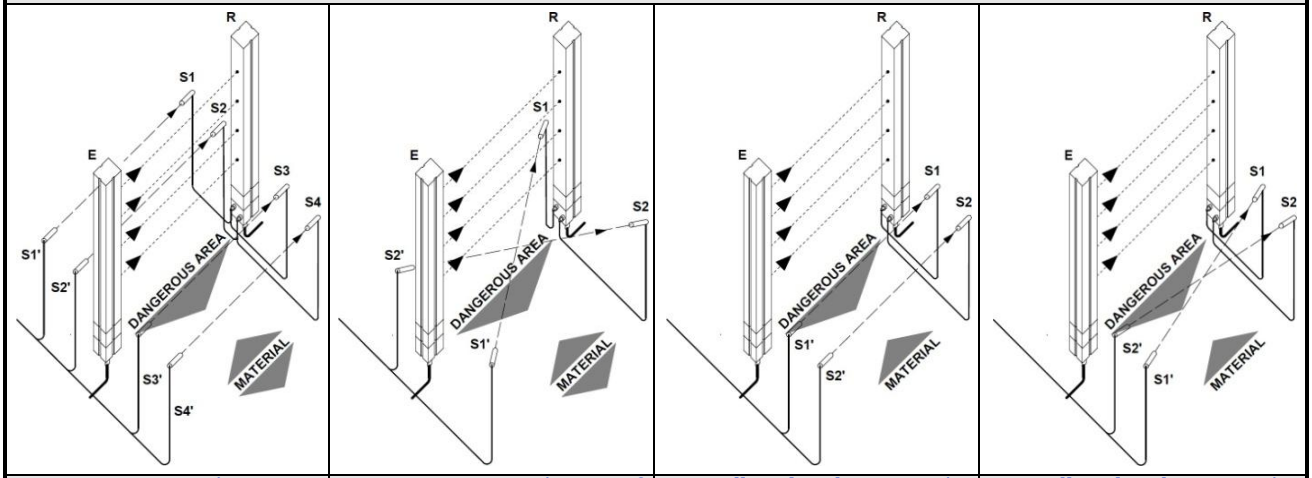
LP4 SERIES — SAFETY LIGHT GRID WITH MULTI-BEAM OPTICS FOR ACCESS PROTECTION AND FUNCTION OF INTEGRATED MUTING BY EXTERNAL SENSORS

MODELS PAIRED	LP4	ER	/	0A	0B	0C	-	050	080	090	M4		L		Model variables

FUNCTIONS: 2, 3, 4 beams; heights from 300mm to 1200mm; standard ranges; selectable restart and EDM; M23, 19 pole receiver connector and two M12, 5 poles.

MODELS	BEAMS	PITCH	OPTICAL HEIGHT	HOUSING HEIGHT	RANGE SELECTION	RESPONSE TIME	PFH_d	DC_{avg}	$MTTF_d$	CCF	Connectors		DESCRIPTION
											Em.	Rec.	
	No.	mm	mm	R/E mm	m	ms	Fail./h	%	years	score	No., Ø, Poles		
LP4ER/0A-050M4	2	500	510	758 723	0 to 6 1 to 16	7	7,53E-09	97,84	100	80	M12-5	M23-19 2x M12-5	**MUTING** Two-way 2-4 beams. Mono-directional 2 beams. Configurations:Tab.:4;Chap.:6 **RECEIVER** Dimensions: Fig.:1; Chap.:10 Connections:Tab.:3(b);Chap.:6 Panel: I: Tab.:1; Chap.:8 **EMITTER** Dimensions: Fig.:2; Chap.:10 Connections Tab.:1; Chap.:6 Panel: IV: Tab.:3; Chap.:8
LP4ER/0B-080M4	3	400	810	1058 1023	0 to 6 1 to 16	7	7,70E-09	97,99	100	80	M12-5	M23-19 2x M12-5	
LP4ER/0C-090M4	4	300	910	1158 1123	0 to 6 1 to 16	7	7,87E-09	98,03	100	80	M12-5	M23-19 2x M12-5	
LP4ER/0A-050M4L	2	500	510	758 723	8 to 30 18 to 60	7	7,53E-09	97,84	100	80	M12-5	M23-19 2xM12-5	
LP4ER/0B-080M4L	3	400	810	1058 1023	8 to 30 18 to 60	7	7,70E-09	97,99	100	80	M12-5	M23-19 2x M12-5	
LP4ER/0C-090M4L	4	300	910	1158 1123	8 to 30 18 to 60	7	7,87E-09	98,03	100	80	M12-5	M23-19 2x M12-5	

APPLICATION



Two-way Muting with two pairs of parallel sensors and check on sequence or simultaneity.	**Two-way** Muting with a pair of crossed sensors and check on simultaneity only.	**Mono-directional** Muting with a pair of parallel sensors and check on simultaneity.	**Mono-directional** Muting with a pair of crossed sensors and check on simultaneity.

Tab.:7; Chap.:9

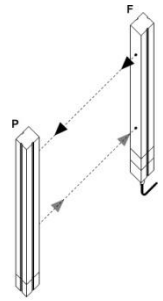
LP4 SERIES — SAFETY LIGHT GRID WITH MULTI-BEAM OPTICS FOR ACCESS PROTECTION E/R ACTIVE ELEMENT AND PASSIVE REFLECTOR ELEMENT

MODELS PAIRED	LP4	PF	/	0A	0B	0C	-	050	080	090		Model variables	

FUNCTIONS: 2, 3, 4 beams; heights from 300mm to 900mm; standard range; selectable restart and EDM; active element M12, 8 pole connector

MODELS	BEAMS	PITCH	OPTICAL HEIGHT	HOUSING HEIGHT	RANGE	RESPONSE TIME	PFH_d	DC_{avg}	$MTTF_d$	CCF	Connectors P (Ref)	Connectors F (E/R)	DESCRIPTION
	No.	mm	mm	F=P mm	m	ms	Fail./h	%	years	score	No., Ø, Poles		
LP4PF/0A-050	2	500	510	723	0 to 6	≤7	4,83E-09	98,14	100	80	-	M12-8	**ACTIVE ELEMENT** Dimensions: Fig.:5; Chap.:10 Connections: Tab.:7; Chap.:6 Panel: III; Tab.:1; Chap.:8 **PASSIVE REFLECTOR** Dimensions: Fig.:6; Chap.:10
LP4PF/0B-080	3	400	810	1023	0 to 6	≤7	4,92E-09	98,16	100	80	-	M12-8	
LP4PF/0C-090	4	300	910	1123	0 to 6	≤7	5,01E-09	98,19	100	80	-	M12-8	

APPLICATION



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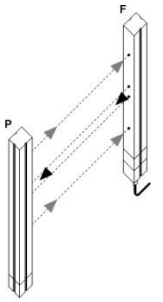
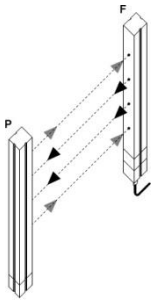


0B



0C

Tab.:8; Chap.:9

LP4 SERIES

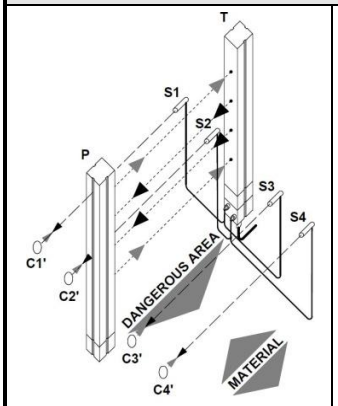
SAFETY LIGHT GRID WITH MULTI-BEAM OPTICS WITH PASSIVE REFLECTOR FOR ACCESS PROTECTION AND FUNCTION OF INTEGRATED MUTING BY REFLEX-TYPE EXTERNAL SENSORS

MODELS PAIRED	LP4	PT	/	0A	0B	0C	-	050	080	090	M4		Model variables	

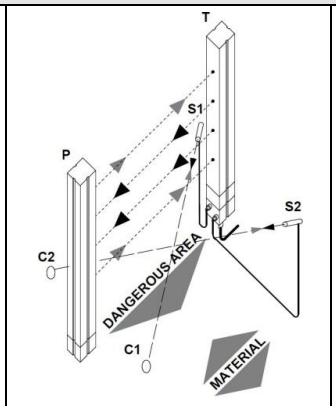
FUNCTIONS: 2, 3, 4 beams; heights from 300mm to 1200mm; standard range; selectable restart and EDM; M23, 19 pole active element connector and two M12, 5 poles.

MODELS	BEAMS	PITCH	OPTICAL HEIGHT	HOUSING HEIGHT	RANGE	RESPONSE TIME	PFH_d	DC_{avg}	$MTTF_d$	CCF	Connectors		DESCRIPTION
											P (Ref)	T (E/R)	
	No.	mm	mm	T/P mm	m	ms	Fail./h	%	years	score	No., Ø, Poles		
LP4PT/0A-050M4	2	500	510	758 723	0 to 6	10	4,83E-09	98,14	100	80	-	M23-19 2x M12-5	**MUTING** Two-way 2-4 beams. Mono-directional 2 beams. Configurations:Tab.:4; Chap.:6 **ACTIVE ELEMENT** Dimensions: Fig.:7; Chap.:10 Connections:Tab.:3 (b);Chap.:6 Panel: I: Tab.:1; Chap.:8 **PASSIVE REFLECTOR** Dimensions: Fig.:8; Chap.:10
LP4PT/0B-080M4	3	400	810	1058 1023	0 to 6	10	4,92E-09	98,16	100	80	-	M23-19 2x M12-5	
LP4PT/0C-090M4	4	300	910	1158 1123	0 to 6	10	5,01E-09	98,19	100	80	-	M23-19 2x M12-5	

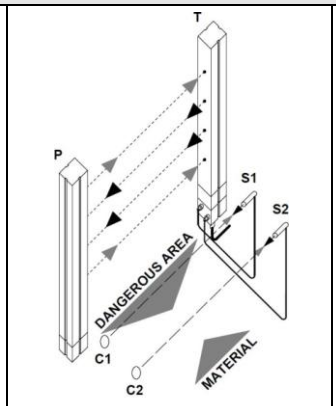
APPLICATION



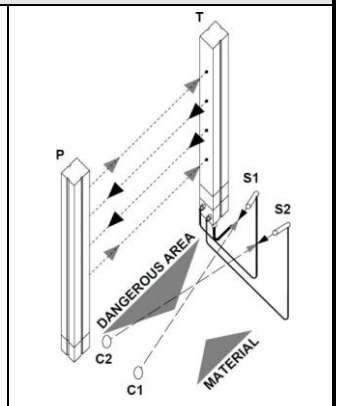
Two-way Muting with two pairs of parallel sensors and check on sequence or simultaneity.



Two-way Muting with a pair of crossed sensors and check on simultaneity only.



Mono-directional Muting with a pair of parallel sensors and check on simultaneity.



Mono-directional Muting with a pair of crossed sensors and check on simultaneity.

Tab.:9; Chap.:9

LP4 SERIES

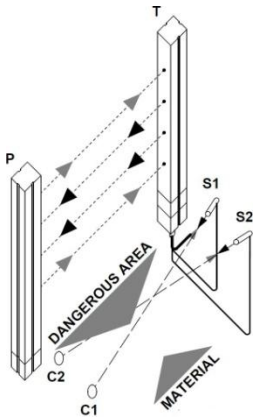
SAFETY LIGHT GRID WITH MULTI-BEAM OPTICS WITH PASSIVE REFLECTOR FOR ACCESS PROTECTION AND FUNCTION OF INTEGRATED MUTING BY TWO REFLEX-TYPE EXTERNAL SENSORS

MODELS PAIRED	LP4	PT	/	0A : 0B : 0C	-	050 : 080 : 090	M2		Model variables	

FUNCTIONS: 2, 3, 4 beams; heights from 300mm to 1200mm; standard range; selectable restart and EDM; M23, 19 pole active element connector.

MODELS	BEAMS	PITCH	OPTICAL HEIGHT	HOUSING HEIGHT	RANGE	RESPONSE TIME	PFH_d	DC_{avg}	$MTTF_d$	CCF	Connectors		DESCRIPTION
											P (Ref)	T (E/R)	
	No.	mm	mm	T=P mm	m	ms	Fail./h	%	years	score	No., Ø, Poles		
LP4PT /0A-050M2	2	500	510	723	0 to 6	10	4,83E-09	98,14	100	80	-	M23-19	**MUTING** Mono-directional 2 beams. Configurations: Tab.:4; Chap.:6 **ACTIVE ELEMENT** Dimensions: Fig.:9; Chap.:10 Connections: Tab.:3 (d); Chap.:6 Panel: I: Tab.:1; Chap.:8 **PASSIVE REFLECTOR** Dimensions: Fig.:10; Chap.:10
LP4PT /0B-080M2	3	400	810	1023	0 to 6	10	4,92E-09	98,16	100	80	-	M23-19	
LP4PT /0C-090M2	4	300	910	1123	0 to 6	10	5,01E-09	98,19	100	80	-	M23-19	

APPLICATION



Mono-directional Muting by pair of crossed sensors (reflex) whose inputs are accessible via the M23 connector, check on simultaneity only.

Tab.:10; Chap.:9

10.0 MECHANICAL DIMENSIONS OF THE LIGHT CURTAINS AND STANDARD ACCESSORIES

SAFETY LIGHT CURTAINS AND MULTI-BEAM LIGHT GRIDS WITH INTEGRATED MUTING FUNCTION ENABLED BY FOUR SENSOR INPUTS AVAILABLE ON TWO FIVE-PIN M12 FEMALE CONNECTORS.

MECHANICAL DIMENSIONS — See also Chap.:9; Tab.:1,3,4,5,7

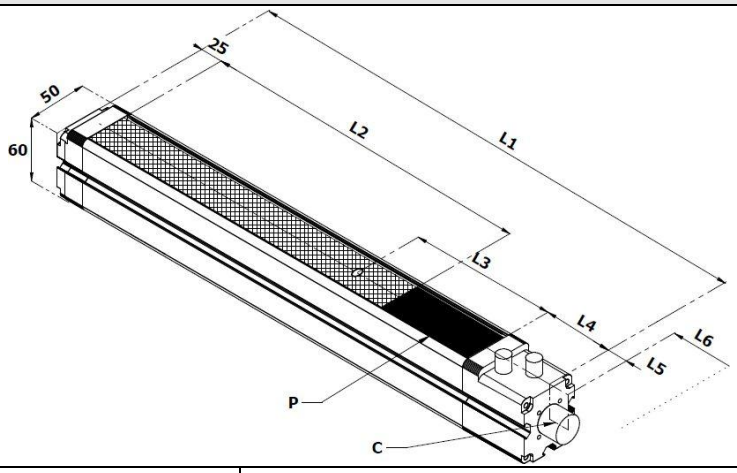


Fig.:1; Chap.:10	LP4R/**-***M4#	Receivers with Muting, standard or long range

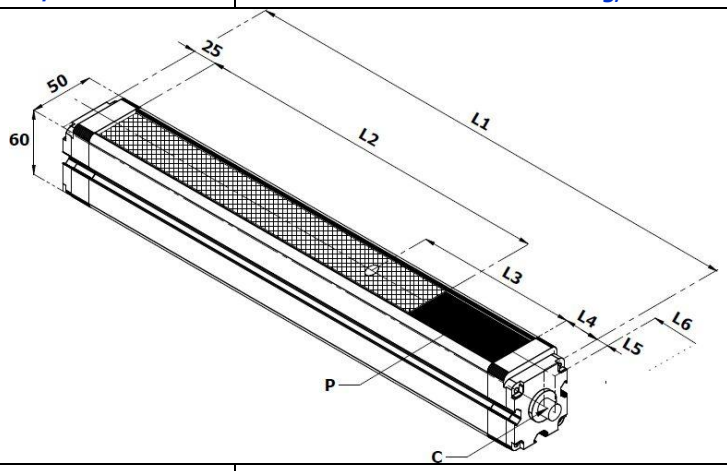


Fig.:2; Chap.:10	LP4E/0#-***#	Emitter, standard or long range

			RESOLUTIONS	30; 40; 90												MULTI-BEAM					
			MODELS	LP4ER/**-***M4#												LP4ER/*#-***M4			LP4ER/*#-***M4L		
			TABLES OF CHAPTER 9	1; 3; 4; 5												7			7		
			HEIGHT (cm)	030	045	060	075	090	105	120	135	150	165	180		050	080	090	050	080	090
LP4R	1	L1	Housing height	458	608	758	908	1058	1208	1358	1508	1658	1808	1958		758	1058	1158	758	1058	1158
LP4E	2	L1	Housing height	423	573	722	873	1023	1173	1323	1473	1623	1773	1923		723	1023	1123	723	1023	1123
LP4ER	1; 2	L2	Protected area	310	460	610	760	910	1060	1210	1360	1510	1660	1810		-	-	-	-	-	-
LP4ER	1; 2		Number of optics	-												2	3	4	2	3	4
LP4ER	1; 2		Resolution / Pitch	30 ; 40 ; 90												500	400	300	500	400	300
LP4ER	1; 2	L3	Beam 1 position	72												120			76		
LP4R	1	L4	Base	60																	
LP4E	2	L4	Base	25																	
LP4R	1	L5	Height pin C	18 (M23; 19 poles)																	
LP4E	2	L5	Height pin C	14 (M12; 5 poles)																	
LP4R	1	L6	Encumbrance conn.	with connector C: M23 straight; 120 (not screwed); 110 (screwed) and cable bent 90°																	
LP4E	2	L6	Encumbrance conn.	with connector C: M12 straight; 60 (not screwed); 53 (screwed) and cable bent 90°																	
LP4R	1	P	Panel	I (see Tab.:1; Chap.:8)																	
LP4E	2	P	Panel	IV (see Tab.:3; Chap.:8)																	

All dimensions in mm.

SAFETY LIGHT CURTAINS AND MULTI-BEAM LIGHT GRIDS WITHOUT MUTING FUNCTION

MECHANICAL DIMENSIONS

See also Chap.:9; Tab.:2, 6

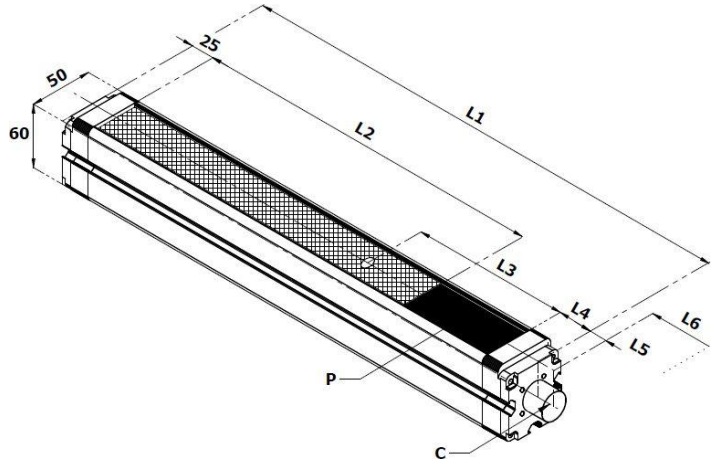


Fig.:3; Chap.:10	LP4R/40-***# LP4R/0#-***#	Receivers with standard range

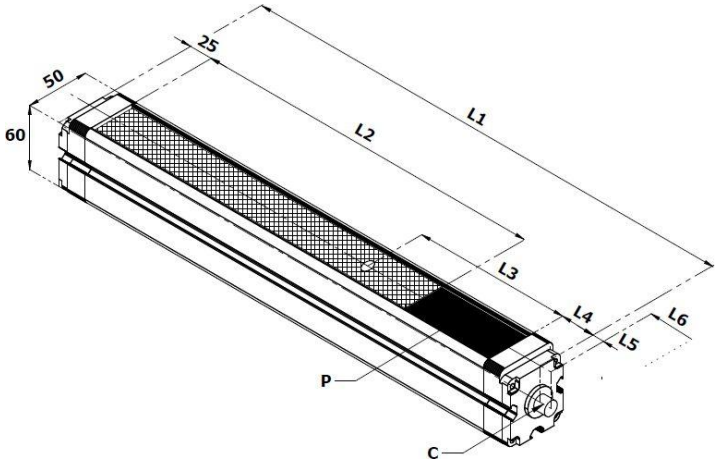


Fig.:4; Chap.:10	LP4R/0#-***L12 LP4E/40-***#	Receivers with standard, extended Emitters with standard, extended

			RESOLUTION	40			MULTI-BEAM			MULTI-BEAM (s0:M12)		
			MODELS	LP4ER/40-***L			LP4ER/0#-***			LP4ER/*#-***###		
			TABLES OF CHAPTER 9	2			6			6		
			HEIGHT (cm)	060	090	120	0A-050	0B-080	0C-090	050	080	090
LP4ER	3; 4	L1	Housing height	723	1023	1323	723	1023	1123	723	1023	1123
LP4ER	3; 4	L2	Protected area	610	910	1210	510	810	910	510	810	910
LP4ER	3; 4		Number of optics	-	-	-	2	3	4	2	3	4
LP4ER	3; 4		Resolution / Pitch	40			500	400	300	500	400	300
LP4ER	3; 4	L3	Beam 1 position	76			120			76		
LP4ER	3; 4	L4	Base	25								
LP4R	3	L5	Height pin C	18 (M23; 19 poles)						14 (M12; 8 poles)		
LP4E	4	L5	Height pin C	14 (M12; 5 poles)								
LP4R	3	L6	Encumbrance conn.	with connector C: M23 straight; 120 (to screw); 110 (screwed) and cable bent 90°								
LP4E	4	L6	Encumbrance conn.	with connector C: M12 straight; 60 (to screw); 53 (screwed) and cable bent 90°								
LP4R	3	P	Panel	II (see Tab.:1; Chap.:8)								
LP4E	4	P	Panel	IV (see Tab.:3; Chap.:8)								
Type	Fig.		Quote									

All dimensions in mm.

SAFETY MULTI-BEAM LIGHT GRID CONSISTING OF AN ACTIVE ELEMENT, EQUIPPED WITH A MAIN M12 CONNECTOR AND A PASSIVE REFLECTOR

MECHANICAL DIMENSIONS

See also Chap.:9; Tab.:8

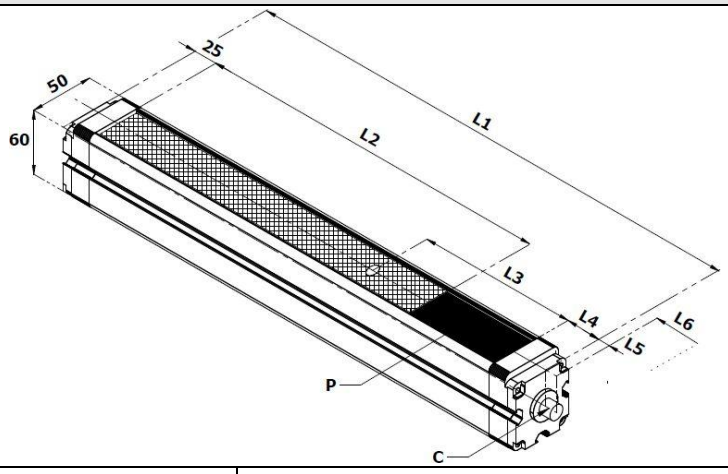


Fig.:5; Chap.:10	LP4F/0#-***	Active Element, Emitter/Receiver

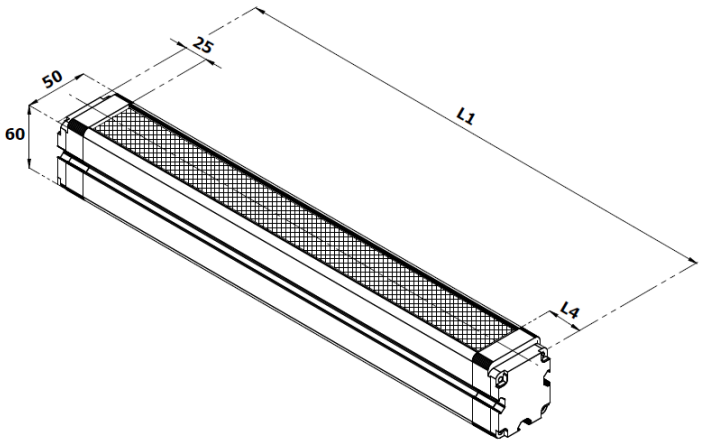


Fig.:6; Chap.:10	LP4P/0#-***	Passive reflector

			RESOLUTION	MULTI-BEAM		
			MODELS	LP4PF/0#-***		
			HEIGHT (cm)	LP4PF/0A-050	LP4PF/0B-080	LP4PF/0C-090
LP4PF	5, 6	L1	Housing height	723	1023	1123
LP4PF	5, 6		Number of optics	2	3 (4 beams, 1 double central)	4
LP4PF	5, 6		Pitch	500	400	300
LP4PF	5, 6	L3	Beam 1 position	76	76	76
LP4PF	5, 6	L4	Base	25		
LP4F	5	L5	Height pin C	14 (M12; 8 poles)		
LP4F	5	L6	Encumbrance conn.	with connector C: M12 straight; 60 (to screw); 53 (screwed) and cable bent 90°		
LP4F	5	P	Panel	III (see Tab.:1; Chap.:8)		
Type	Fig.		Quote			

All dimensions in mm.

SAFETY MULTI-BEAM LIGHT GRID CONSISTING OF AN ACTIVE ELEMENT AND A PASSIVE REFLECTOR, WITH INTEGRATED MUTING FUNCTION ACTIVATED BY TWO SENSOR INPUTS AVAILABLE ON TWO FIVE-PIN M12 FEMALE CONNECTORS

MECHANICAL DIMENSIONS

See also Chap.:9; Tab.:9

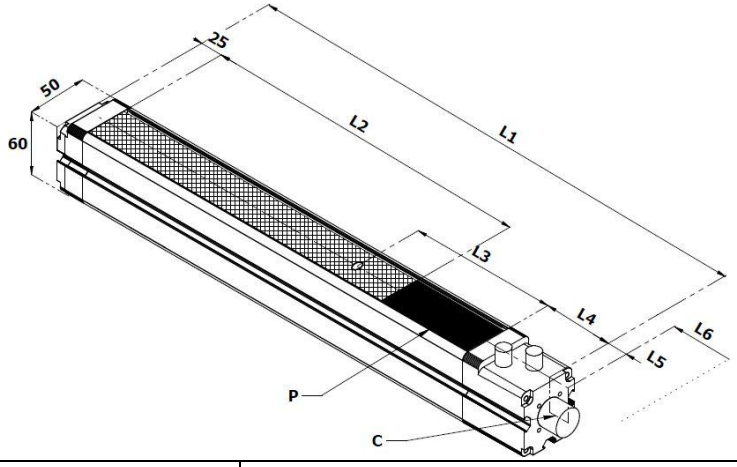


Fig.:7; Chap.:10	LP4T/0#-***M4#	Active Element, Emitter/Receiver with Muting with four sensors

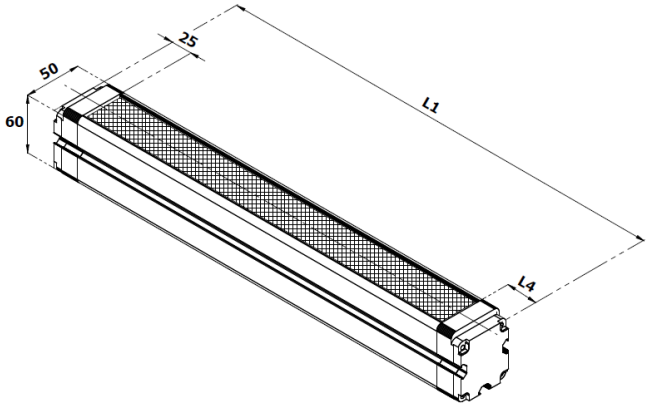


Fig.:8; Chap.:10	LP4P/0#-***	Passive reflector

				RESOLUTION	MULTI-BEAM		
				MODELS	LP4PT/0#-***M4		
				HEIGHT (cm)	LP4PT/0A-050M4	LP4PT/0B-080M4	LP4PF/0C-090M4
LP4T	7, 8	L1	Housing height		758	1058	1158
LP4P	8	L1	Housing height		723	1023	1123
LP4PT	7, 8		Number of optics		2	3 (4 beams, 1 double central)	4
LP4PT	7, 8		Pitch		500	400	300
LP4PT	7, 8	L3	Beam 1 position		76	76	76
LP4PF	7	L4	Base		60		
LP4PF	8	L4	Base		25		
LP4T	7	L5	Height pin C		18 (M23; 19 poles)		
LP4F	7	L6	Encumbrance conn.		with connector C: M23 straight; 120 (not screwed); 110 (screwed) and cable bent 90°		
LP4F	7	P	Panel		I (see Tab.:1; Chap.:8)		
Type	Fig.		Quote				

All dimensions in mm.

SAFETY MULTI-BEAM LIGHT GRID CONSISTING OF AN ACTIVE ELEMENT AND A PASSIVE REFLECTOR, WITH INTEGRATED MUTING FUNCTION ACTIVATED BY TWO SENSOR INPUTS AVAILABLE ON THE MAIN M23 MALE CONNECTOR

MECHANICAL DIMENSIONS

See also Chap.:9; Tab.:10

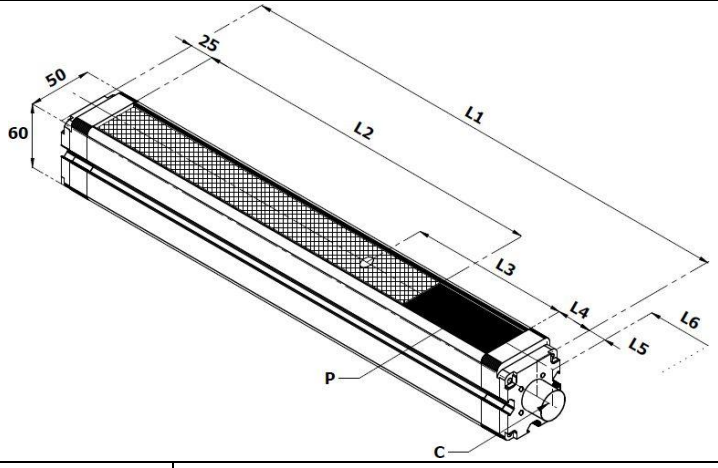


Fig.:9; Chap.:10	LP4T/**-***M2	Active Element, Emitter/Receiver with Muting with 2 sensors

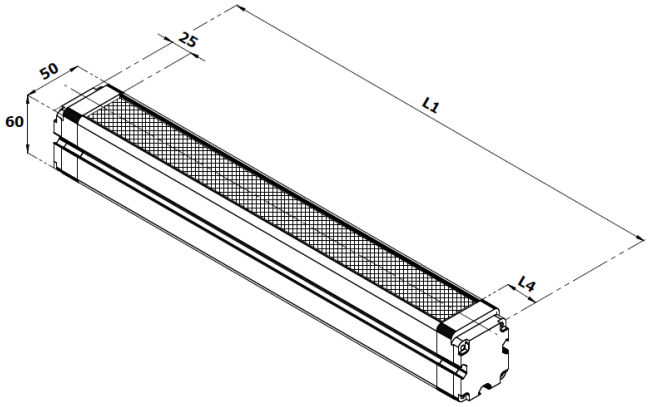


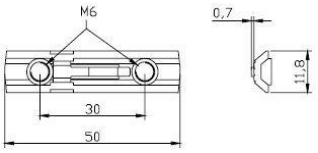
Fig.:10; Chap.:10	LP4P/0#-***	Passive reflector

				RESOLUTION	MULTI-BEAM		
				MODELS	LP4PT/0#-***M2		
				HEIGHT (cm)	LP4PT/0A-050M2	LP4PT/0B-080M2	LP4PF/0C-090M2
LP4PT	9, 10	L1	Housing height		723	1023	1123
LP4PT	9, 10		Number of optics		2	3 (4 beams, 1 double central)	4
LP4PT	9, 10		Pitch		500	400	300
LP4PT	9, 10	L3	Beam 1 position		76	76	76
LP4PF	9, 10	L4	Base		25		
LP4T	9	L5	Height pin C		18 (M23; 19 poles)		
LP4F	9	L6	Encumbrance conn.		with connector C: M23 straight; 120 (not screwed); 110 (screwed) and cable bent 90°		
LP4F	9	P	Panel		I (see Tab.:1; Chap.:8)		
Type	Fig.		Quote				

All dimensions in mm.

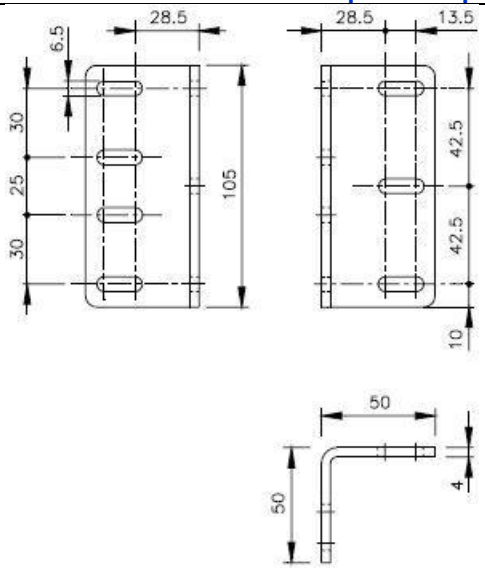
FASTENER ACCESSORIES SUPPLIED ALSO AS STANDARD

MECHANICAL DIMENSIONS



ST 203

Fig.:19; Chap.:10.
Fastening insert for 50x60 profile. Part of the standard kit. Two pieces are provided for each bracket ST202.



ST 202

Fig.:20; Chap.:10.
Long bracket. Part of the standard kit. Two pieces are provided for each couples.
Must be applied in the central part of the body.

All dimensions in mm.

11.0 CONTENT OF THE PACKAGE

Each single kit package corresponding to a pair code contains:

- A pair of light curtains composed of a Receiver or an active element and an emitter or passive reflector.
- An adequate number of brackets and inserts for the height of the model (see Fig.: 18, 19, 20).
- A CD ROM containing multilingual technical documentation, including the declaration of conformity.
- Brief multilingual installation sheet.

12.0 LIST OF APPLICABLE ACCESSORIES

MODEL	DESCRIPTION
	RELAY INTERFACE MODULES
LP/BOX-1	Module with M23 and M12 male connectors for connection to the receiver and transmitter with extension cords female / female, 24VDC power supply, two NA output (series), one NC output (parallel), panel with Start button, Override command, Muting lamp and fully programmable functions
SB 300	Safety relay module for DIN bar, two 24VDC relays, two output NO contact (single), one output NO contact (series) for EDM. Max. switching voltage 250V AC/DC, contact rating 690VA@230V_{AC}, 72W@24V_{DC}
	M23 SUPPLY CONNECTORS WITH CABLE FOR RECEIVERS OR ACTIVE ELEMENTS
CD23M/0R-030A1	M23 connector, straight, 19 poles, female, 3m PVC cable
CD23M/0R-050A1	M23 connector, straight, 19 poles, female, 5m PVC cable
CD23M/0R-100A1	M23 connector, straight, 19 poles, female, 10m PVC cable
CD23M/0R-150A1	M23 connector, straight, 19 poles, female, 15m PVC cable
CD23M/0R-200A1	M23 connector, straight, 19 poles, female, 20m PVC cable
CD23M/0R-300A1	M23 connector, straight, 19 poles, female, 30m PVC cable
CD23M/0R-200A1LM	M23 connector, straight, 19 poles, female, PVC cable, length 20m and 2m cable for the Muting lamp
CD23M/0R-300A1LM	M23 connector, straight, 19 poles, female, PVC cable, length 30m and 2m cable for the Muting lamp
	EXTENSIONS CABLES WITH M23 CONNECTORS FOR INTERCONNECTION BETWEEN RECEIVERS OR ACTIVE AND MODULES
CDP23/0R-030AC	Extension, M23-M23 connectors, straight, 19 poles, female/female, 3m PVC cable
CDP23/0R-050AC	Extension, M23-M23 connectors, straight, 19 poles, female/female, 5m PVC cable
CDP23/0R-100AC	Extension, M23-M23,connectors, straight, 19 poles, female/female, 10m PVC cable
	M12 SUPPLY CONNECTORS WITH CABLE FOR RECEIVERS OR ACTIVE ELEMENTS
CD12M/0E-050A1	M12 connector, straight, 8 poles, female, 5m PVC cable
CD12M/0E-100A1	M12 connector, straight, 8 poles, female, 10m PVC cable
CD12M/0E-150A1	M12 connector, straight, 8 poles, female, 15m PVC cable
CD12M/0E-250A1	M12 connector, straight, 8 poles, female, 25m PVC cable
CD12M/0E-400A1	M12 connector, straight, 8 poles, female, 40m PVC cable
CD12M/0E-050C1	M12 connector, right-angle, 8 poles, female, 5m PVC cable
CD12M/0E-100C1	M12 connector, right-angle, 8 poles, female, 10m PVC cable
CD12M/0E-150C1	M12 connector, right-angle, 8 poles, female, 15m PVC cable
	M12 SUPPLY CONNECTORS WITH CABLE FOR EMITTERS
CD12M/0H-050A3	M12 connector, straight, 5 poles, female, 5m PVC cable
CD12M/0H-100A3	M12 connector, straight, 5 poles, female, 10m PVC cable
CD12M/0H-150A3	M12 connector, straight, 5 poles, female, 15m PVC cable
CD12M/0H-250A3	M12 connector, straight, 5 poles, female, 25m PVC cable
CD12M/0H-500A3	M12 connector, straight, 5 poles, female, 50m PVC cable
CD12M/0H-050C3	M12 connector, right-angle, 5 poles, female, 5m PVC cable
CD12M/0H-100C3	M12 connector, right-angle, 5 poles, female, 10m PVC cable
CD12M/0H-150C3	M12 connector, right-angle, 5 poles, female, 15m PVC cable
	M12 SUPPLAY CONNECTORS WITH CABLE FOR INTERCONNECTION OF MUTING SENSOR
CD12M/0H-050D1	M12 connector, right-angle, 5 poles, male, 5m PVC cable
	EXTENSIONS CABLES WITH M12 CONNECTORS FOR INTERCONNECTION BETWEEN EMITTERS AND LP/BOX-1 MODULE
CDP12/0H-030AC	Extension, M12/M12 connectors, straight, 5 poles, female/female, 3m PVC cable
CDP12/0H-050AC	Extension, M12/M12 connectors, straight, 5 poles, female/female, 5m PVC cable
CDP12/0H-100AC	Extension, M12/M12 connectors, straight, 5 poles, female/female, 10m PVC cable
CDP12/0H-250AC	Extension, M12/M12 connectors, straight, 5 poles, female/female, 25m PVC cable
	TEST RODS
ST2230	Test rod Ø 30mm
ST2240	Test rod Ø 40mm
	BRACKETS
ST 202 4	Kit of 4 long L brackets; see Fig.:20; Chap.:10
ST 203 4	Kit of 4 fixing inserts; see Fig.:19; Chap.:10
ST 203 6	Kit of 6 fixing inserts; see Fig.:19; Chap.:10
	VIBRATION DAMPING SUPPORTS
ST VP 4	Kit of 4 vibration-damping supports
ST VP 6	Kit of 6 vibration-damping supports
	TRACKING SYSTEM
STL 01 P	Specific tracking LASER for alignment of the light curtains with profile 50x60mm

Tab.:1; Chap.:12

13.0 CHECKING THE SYSTEM

13.1 Purpose of the checks.

The purpose of the checks described below is to confirm the safety requirements of the national or international prescriptions, particularly the safety requirements of the Machinery Directive or the Directive for operators of work equipment (conformity with EU directives).
These checks are also for detecting interference on the protection effect caused by undesired sources of light, including sensors of the same type and in general by photoelectric sensors, reflections and other particular environmental factors. These checks must necessarily be carried out.

13.2 Checks prior to commissioning

- It must be possible to enter the danger area only via a route that breaks the beam of light between the projector and the receiver.
- It must be impossible to climb over, crawl under or be able to avoid the optical beam between the projector and receiver.
- It must not be possible to stop inside the protected area without this condition being detected.
- It must not be possible to operate the system start/restart controls from within the protected area.
- The start/restart controls must be in a position enabling full visibility of the protected area.
- There must be at least two Muting sensors, the signals must reach the inputs directly and via separate channels, without crossing single devices with a lower level of integrity than as required.
- The Muting sensors must detect the material and not the pallet, they must allow a distinction between materials and persons, it must not be possible for a person to be able to activate them simultaneously or in the intended sequence with an unintentional operation.
- All the protection devices must be correctly mounted and firmly locked in position with systems that require specific tools or keys for handling.
- The maximum time for stopping the dangerous movements of the machine must be known with certainty or verified, and this time, added to the other reaction times of the entire chain of safety devices, must have been used to determine the safety distance.
- The protection device must be effective in all the machine's operating modes.
- The dangerous movement must be stopped if a different operating mode is selected.
- Ensure that the machine's operators have been educated by qualified personnel or by the person in charge of machine safety before beginning work. The person in charge of machine safety is responsible for this training.
- Make sure that the documentation is visible/available for the machine's operators.
- Verify the effectiveness of the system of protection, carrying out a test as indicated hereunder in this Chap.:13.4 "Regular checks on the effectiveness of the protection device".

13.3 Regularity of the checks by qualified personnel

- Check the system in conformity with current national prescriptions and within the terms they require.
- Check that there have been no modifications to or tampering with the protection devices after commissioning.
- Check the system again as if for commissioning if any major changes have been made to the machine or the protection device, or after installing new equipment or replacing the protection devices.

13.4 Regular checks on the effectiveness of the protection device

The state and effectiveness of the protection device must be checked regularly, for example daily or each time before beginning work, with the specific test rod, by authorized and appointed persons.
- Check that there is no damage or dirt on the surface of the optical windows; scratches, scoring and misting can deteriorate the resolution of the light curtain.
- If necessary clean the optical surface with a moist antistatic cloth, do not use alcohol, solvents or abrasive substances.
- Slowly slide the test rod, of diameter corresponding to the resolution of the light curtain, in a perpendicular direction to the optical beams in the following positions:

- directly upstream from the emitter and any diverter mirrors.
- in the centre between the projector and receiver (or the diverter mirrors)
- immediately upstream from the receiver

The following result must be obtained:
- as long as the test rod is located inside the area identified by the optical windows, the light curtains must stay in the DARK and it must not be possible to create any danger.

In the case of multi-beam light curtains, the dark state refers to interception of single beams that must be tested individually.

14.0 CE DECLARATION OF CONFORMITY

The multi-beam safety light curtains of the family of LP sensors have been produced in conformity with the following directives:
– Machinery directive 2006/42/EC
– EMC directive 2004/108/EC
You can find the complete version of the CE declaration of conformity on the internet website:
http:// **www.microdetectors.com**

15.0 GUARANTEE

All new LP4 systems are guaranteed by M.D. Micro Detectors for e period of 24 (twenty-four) months under normal working conditions, against defects due to faulty materials and workmanship.
During the aforesaid period, M.D. Micro Detectors promises to replace faulty parts free of charge.
This guarantee covers both material and labour.
M.D. Micro Detectors reserves the right to decide whether to repair equipment or replace it with equipment of the same type or having the same characteristics.

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

Repairs will be carried out at M.D. Micro Detectors's laboratories, to which the material must be consigned or forwarded; transport costs and any damage or loss of material during transportation will be charged to the Customer.
All replaced products and parts are property of M.D. Micro Detectors.
M.D. Micro Detectors does not recognise any other form of guarantee or rights other than those expressly stated above; no requests for compensation for damages incurred for costs, suspension of activities or any other events or circumstances related in any way to malfunctioning of the product or any parts thereof will be taken into consideration.

In order re ensure the correct operation of the photoelectric light curtain, careful and full compliance with all the rules, instruction and warnings stated in this manual is essential. M.D. Micro Detectors declines all responsibility for events arising from non-compliance with all or part of the aforesaid instruction.