

# PHOTOELECTRIC DEVICES FOR SAFETY

## SE4 series

Type 4 *SAFEasy™* Base and Plus safety light curtains

- 150 to 1650 mm controlled heights
- 14, 20, 30, 35 mm resolution and 2, 3, 4 beams
- Finger, hand or body protection
- Versions with Blanking and EDM functions
- Cascade Master/Slave versions and EDM



### NEW MODELS

The **SE4** series offers the widest range of Type 4 safety light curtains, including standard Base versions and Plus models with Blanking, Master and Slave Cascadable and EDM functions. Models with 150 - 1650 mm controlled heights are available, with 14, 20, 30 or 35 resolution for finger or hand protection and with 2, 3 or 4 beams for body protection. The Restart and Muting configuration is made using dip-switches protected via HW and SW. The Fixed or Floating Blanking function allows to avoid the detection of objects in a fixed position or in a repetitive movement inside the detection area. The Master and Slave versions can be connected in cascade, forming for example vertical and horizontal 'L-shaped' light curtain systems. The EDM controls also the external relay.

## SE4-R series

Type 4 *SAFEasy™* Retroreflex safety light curtains

- 500 mm controlled height
- 2 beam model for body protection
- Passive unit with mirrors or reflectors
- Operating distance up to 7.5 m (linear version) or up to 3 m ('L' and 'T' versions)
- 'L' and 'T' versions with integrated Muting sensors



### NEW SERIES

The Type 4 retroreflex safety light curtains of the **SE4-R** series is formed by the active **SE4-RA1** unit and by the passive unit with reflectors integrated in the **SE4-RDB** light curtain or with two SE4-RSM accessory deviating mirrors. The detection height is 500 mm and the operating distance reaches 7.5 m for the linear version or 3 m for the 'L' and 'T' versions. The Restart, EDM and Muting functions are integrated and selectable through the dip-switches on the active unit. 'L' or 'T' shaped versions are available for applications requiring the Muting function. The **SE4-R** light curtains represent a reliable and cost-effective alternative to light curtains with active units on emitter and receiver sides thanks to reduced costs and installation time as well as the advantage of cabling only the active unit.

## SE4T-L series

Type 4 *SAFEasy™* safety light curtains with SE4 T/L Muting functions

- 500 or 800 mm controlled heights
- Models with 2 or 3 beams for body protection
- Integrated sensor and Muting lamp
- 'L' (one-way) or 'T' (two-way) system
- Linear model for external Muting sensors



### NEW PERFORMANCES

The Type 4 safety light curtains of the **SE4T-L** series have the Muting function completely integrated, thanks to the use of pre-assembled, pre-wired and pre-aligned sensors. Models with 'T' integrated Muting sensors for two-way Muting, 'L' integrated Muting sensors for one-way Muting and linear versions without integrated Muting sensors are available. Versions with 2 or 3 safety beams, with 500 and 800 mm detection heights and 3 m operating distances are available for the 'T' and 'L' versions or with 25 m operating distance for the linear version. Integrated Muting lamp and configuration carried-out by dip-switches protected HW and SW distinguish this product series. Muting is necessary when the material has to pass through the dangerous area as for example in palletisers/ depalletisers.

## SG2 series

Type 2 *SAFEasy*™ safety light curtains with the best performance/cost ratio

- 2 models: BASE and EXTENDED
- Resolution 30, 50 and 90 mm
- Operating distance up to 19 m and controlled height reaching 1800 mm
- Plus functions for EXTENDED models: EDM, Anti-Interference system, selectable Manual/Automatic Restart

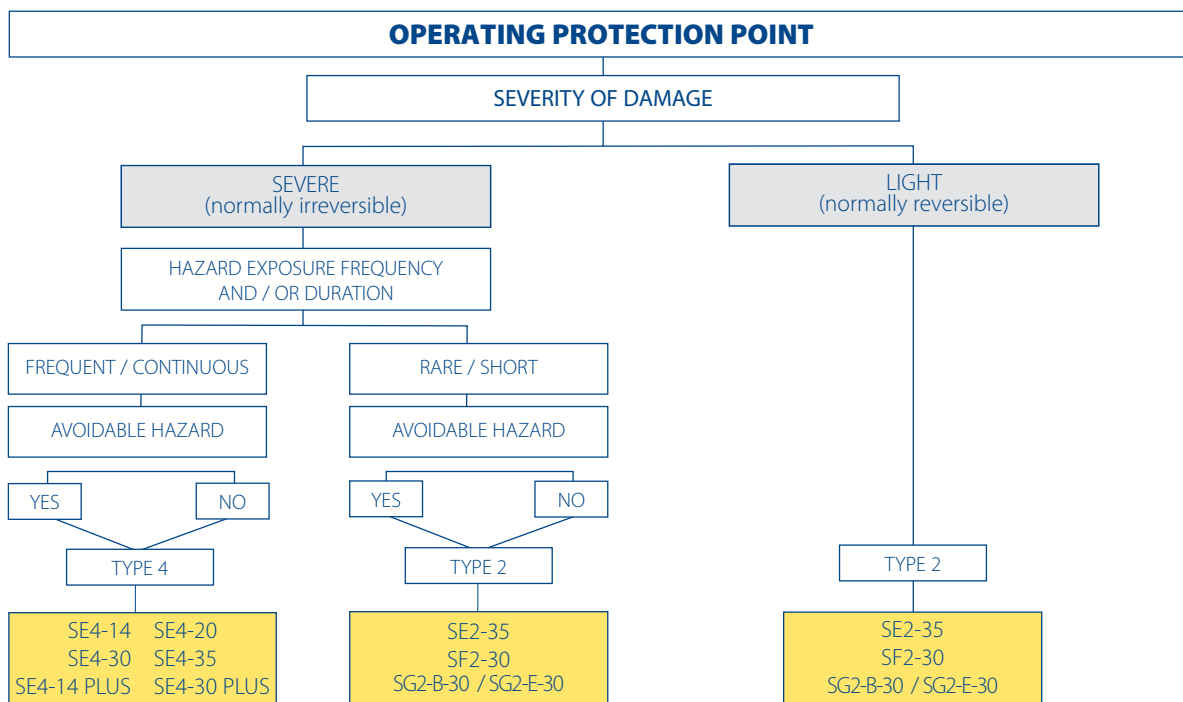


### NEW SERIES




The new **SG2** Type 2 safety light curtains represent the natural evolution of the SF2 series. Two models are available, **SG2-B** 'Base' and **SG2-E** 'Extended', in order to guarantee the maximum compatibility with the SF2 series (**SG2-B**) and the availability of advanced functions for a Type 2 safety light curtain, such as EDM and Anti-Interference (**SG2-E**). Other distinctive features include the operating distance reaching 19 m, controlled heights ranging from 150 to 1800 mm, one of the best response times available today, as well as the more functional new profile. The product is also supplied with new 'TOP-BOTTOM' rotating fixing brackets that simplify and speed the alignment of the TX and RX units, also at long distances and in applications with deviating mirrors.

# PHOTOELECTRIC DEVICES FOR SAFETY

## Selection guide

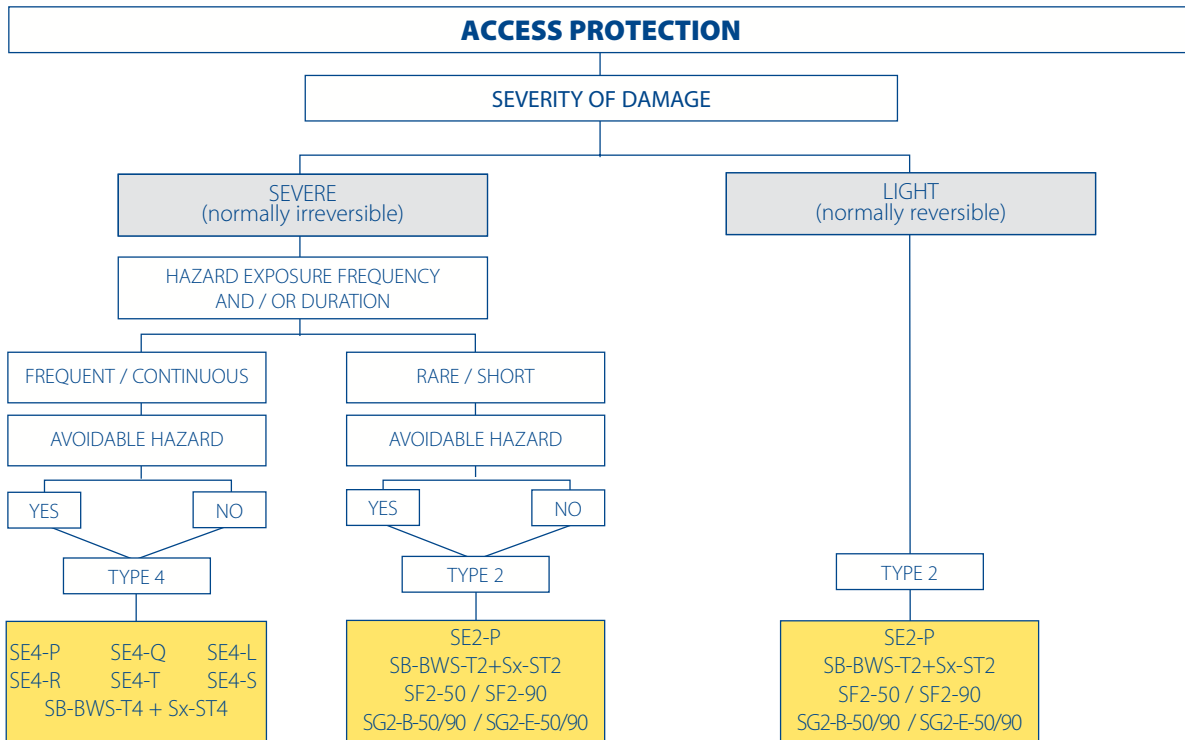


Note: The given information is indicative and synthetic; it is compulsory to refer to the complete **EN 954** standard for a correct risk and safety type evaluation.






	RESOLUTION (mm)	OPERATING RANGE (m)	
	SF2-30	30	15
	SG2-B-30	30	19
	SG2-E-30	30	9 / 19*
			* selectable maximum distance: 9 m or 19 m
	SE2-35	35	15
	SE4-14	14	6
	SE4-14 PLUS	14	6
	SE4-20	20	6
	SE4-30	30	15
	SE4-30 PLUS	30	15
	SE4-35	35	15

TYPE 2

TYPE 4



Note: The given information is indicative and synthetic; it is compulsory to refer to the complete **EN 954** standard for a correct risk and safety type evaluation.

	OPERATING RANGE (m)	OPERATING RANGE (m)
 Type 2	SE2-P 515 - 415 - 315	50
	SG2-B-50 / 90	19
 Type 2	SG2-E-50 / 90	9 / 19*
	SB-BWS-T2 + SX-ST2	up to 50*
		* 8 m with S5/S10-ST2; 50 m with S30-ST2
	SE4-Q 515 - 415 - 315	25
	SE4-P 515 - 415 - 315	50
 Type 4	SE4-T 515 - 415	3
	SE4-L 515 - 415	3
	SE4-S 515 - 415	25
	SE4-R 'T' 515	3
 Type 4	SE4-R 'L' 515	3
	SE4-R Linear 515	7.5
 Type 4	SB-BWS-T4 + Sx-ST4	up to 50*
		* 8 m with S5/S10-ST4; 40 m with SL5-ST4; 50 m with S30-ST4

TYPE 2

TYPE 4

# PHOTOELECTRIC DEVICES FOR SAFETY

## Selection guide

Note: The reference Standard is the **EN 999** 'Safety of machinery - the positioning of protective equipment in respect of approach speeds of parts of the human body'. The given information is indicative and synthetic; it is compulsory to refer to the complete **EN 999** standard for a correct safety distance calculation.

The minimum distance *S* in mm between the hazardous area and the detection point is expressed by the formula:

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

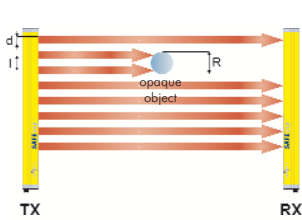
*K* is a parameter (mm/sec) linked to the approach speed of the human body or parts








*T* is the total time (sec) necessary to stop the machine, where  $T = t_1 + t_2$

$t_1$  = max. time between the detection actuation and the change of the device switching status

$t_2$  = max. machine response time

*C* is an additional distance (mm) based on the device typology used in terms of resolution, where the resolution is the minimum dimension of an opaque object able to obscure at least one of the beams of the sensitive detection area.



<b>R ≤ 40 mm</b>	<b>Finger or hand protection</b>				<b>R=resolution</b>
<b>R &gt; 70 mm</b>	<b>Body protection</b>				
<b>R &lt; 116 mm</b>	<b>Presence detection</b>				

### NORMAL APPROACH TO THE DETECTION AREA

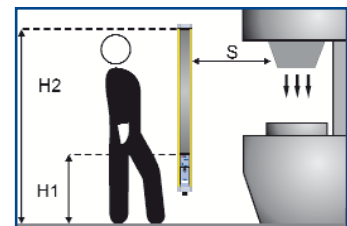
#### Safety light curtains with 40 mm maximum resolution

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

where  $K = 2000$  mm/sec,  $C = 8(d - 14)$  mm but not smaller than 0, *d* = device resolution (mm)

This formula is valid for safety distances *S* up to 500 mm.

If the result of the formula gives *S* higher than 500 mm,  $K = 1600$  mm/sec and  $S = (1600 \text{ mm/sec} \times T) + 8(d - 14)$  mm



#### Safety light curtains with 40 to 70 mm resolution

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

where  $K = 1600$  mm/sec,  $C = 850$  mm

In all cases, the highest beam height is  $\geq 900$  mm and the lowest beam is  $\leq 300$  mm.

#### Safety light grid with separate multiple beams

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

where  $K = 1600$  mm/sec,  $C = 850$  mm

A light grid with 2, 3, 4 separate beams is often used to detect the intrusion of the human body or parts in a specific area; the number of beams and the distance between them depends on the risk estimation made and by specific machine applications. Risks such as slipping under the lower beam, passing over the higher beam, passing through two beams have to be considered.

The following table provides the heights from the ground or from reference plane for different beams.

Number of beams	Heights of single beams from the plane (mm)
4	300, 600, 900, 1200
3	300, 700, 1100
2	400, 900

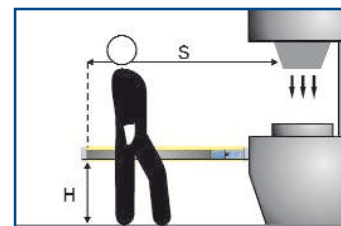
In case of use of a single beam, in an industrial environment, a height of 750 mm is considered appropriate, with the device positioned at a machine distance, where

$$S = (1600 \text{ mm/sec} \times T) + 1200 \text{ mm.}$$

### PARALLEL APPROACH TO THE DETECTION AREA

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

where  $K = 1600 \text{ mm/sec}$ ,  $C = (1200 \text{ mm} - 0,4 H)$ , not less than 850 mm  
 $H_{\text{max}} = 1000 \text{ mm}$ ,  $H_{\text{min}} = 15 (d - 50 \text{ mm})$ , where  $d =$  resolution of the safety light curtain



### ANGLED APPROACH RESPECT TO THE DETECTION AREA

For foreseeable approach angles bigger than 30°, follow the normal approach procedure, while for angles inferior to 30° follow the parallel approach procedure.

**Note:** The reference Standard is the **EN 999** 'Safety of machinery - the positioning of protective equipment in respect of approach speeds of parts of the human body'. The given information is indicative and synthetic; it is compulsory to refer to the complete **EN 999** standard for a correct safety distance calculation.