Type 4 self-contained light curtain

FF-SB Series

For the protection of operators in Industry

FEATURES

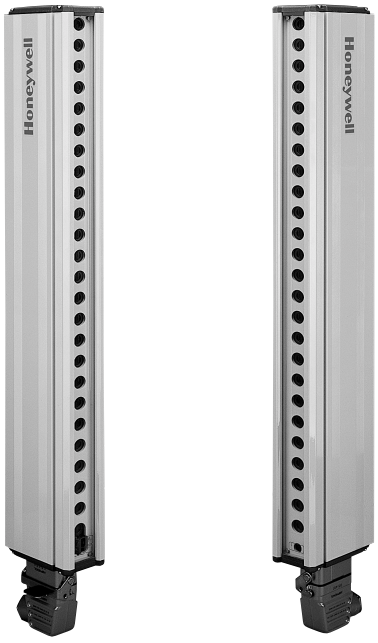
- Meets applicable parts of US OSHA 29CFR 1910.217, 1910.212 and ANSI B11.1, B11.2, B11.19 1990 and RIA 15.06 regulations for Control Reliability
- Through scan active optoelectronic protective equipment
- No-touch safety light curtain with permanent self-checking in compliance with the requirements of the IEC/EN 61496 - Parts 1 and 2 for Type 4 equipment
- No electrical connection necessary between emitter and receiver
- Self-contained and light-weight equipment with the following functions available to the user:
  . Automatic restart (after each operation)
  . Start interlock (at power up)
  . Restart interlock (after each operation)
  Furthermore, in order to monitor the final switching devices (FSDs: relays, contactors, parts of the machine safety related control system) a test input and an FSD monitoring input are provided
- 2 guided-contact safety relay outputs

TYPICAL APPLICATIONS

- Presses and punches for metals, plastics and leather
- Deep-drawing presses, moulding presses and filter presses
- Pressing, moulding and thermoforming machines
- Metal-forming, milling and drilling machines
- Conveyors, handling equipment and assembly lines
- Spot-welding machines and fine-boring machines
- Copying lathes and machining centres
- Door and gate, lift and hoist technology
- Stacking machines, transporting and conveyor technology
- Textile, packaging machines
- Jigging sieves, sorters and milling machines
- For all machines quoted in Annex IV of the Machinery Directive 98/37/EC

FF-SB14E/R❑❑K-❑-2 ONLY

Approved as Type 4 per pr EN 50100 - 1/2



The FF-SB multibeam industrial safety light curtain is an electrosensitive protective equipment designed to protect operators of power driven machinery.

The design of this device complies with the requirements of the European Directives and Standards as well as with the North American regulations. The German BG (E+ MIII) notified body granted the EC type examination certificate according to the essential requirements of the Machinery Directive 98/37/EC and according to the IEC/EN 61496-1/2 standards for the design and construction of Type 4 electrosensitive protective equipment. The Canadian cCSAus gave an approval to this device which meets applicable part of US ANSI B11.1, B11.2, and B11.19, RIA 15.06 and OSHA 29 CFR 1910 217 and 1910.212 regulations for Control Reliability.

Entry into the protection field is detected extremely reliably by the interruption of a single infrared beam. Each interruption or malfunction causes both an alarm and the disabling of the output relays. The high reliability of the equipment results from the permanent self-checking of the electronic switching circuit.

The invisible infrared beams have a high intensity and range up to 24 m / 78.73 ft. The SB Series emitter is optically synchronized with the receiver by a special beam transmitted from the receiver to the emitter (this is a “reverse” beam). **No interconnecting cables are required between emitter and receiver.** Installation time is greatly reduced. The FF-SB offers very high resistance to electrical interference and ambient light. LED indicators on the emitter and the receiver provide information about the reception of the synchronizing beam, protection field status (clear or interrupted), receiver signal strength and test input. The robust, compact housing is made of aluminium alloy with longitudinal T-shaped fixing grooves and three different brackets for rigid or swivel installation, thus simplifying mounting and adjustment.

⚠ WARNING

MISUSE OF DOCUMENTATION

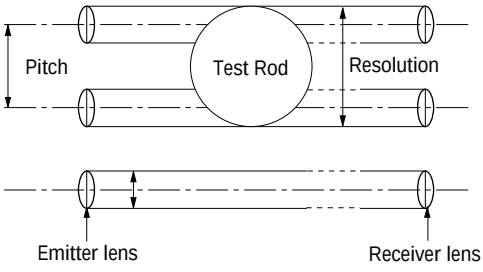
- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

Design and operation

The FF-SB industrial safety light curtain forms a grid of parallel infrared beams, which are activated in succession in a multiplexed process, with a high scanning frequency. A beam from the receiver to the emitter provides quartz accurate synchronization.

The nominal protection heights result from the number of beams and the lens pitch. The resolution or minimum detection size is independent of the scanning distance or the environment.

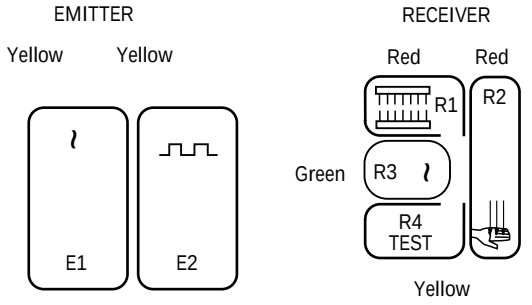


LED Status indicators

The emitter and receiver are fitted with LED status indicators. On the emitter, a yellow LED (E1) signals power on. The second yellow LED (E2) provides information on the synchronisation beam reception.

The receiver has a red contamination indicator R1, which under normal conditions does not light up and which flickers if the receiving level is too low and permanently lights up if no signal is received.

The bright red LED R2 illuminates if the protection field is entered, the green LED R3 if the protection field is clear. In addition, a signalling output is provided. This signal (optocoupler) is ON when the protection field is clear. This NPN output is capable of sinking a current up to 20 mA dc max. under 30 Vdc max. The yellow LED R4 illuminates during a test by means of a fault simulation on the test input of the device. The yellow LED R4 flickers when a restart of the system is necessary.

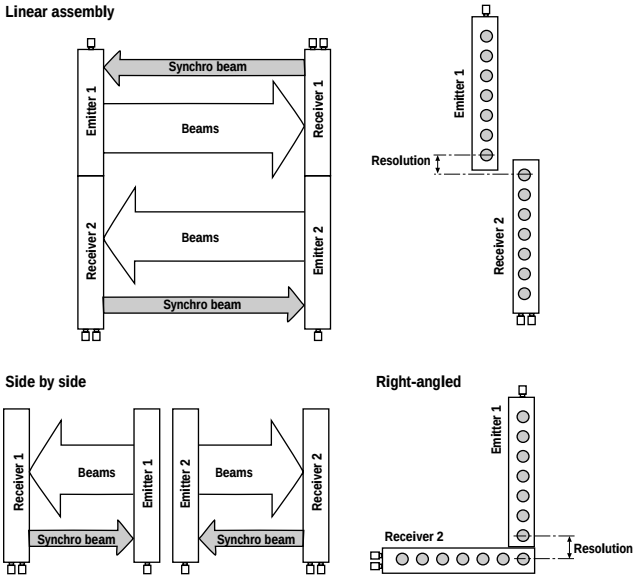


Mounting possibilities

Higher protection field heights can be achieved by means of adjacent rows or more safety light curtains. To prevent mutual interference between devices, the adjacent equipment should be operated in the reverse direction, as shown below. To avoid the less favourable resolution of 60 mm / 2.36 in between neighbouring protection fields, in the linear assembly, it is recommended to use the displaced mounting arrangement shown below with a continuous resolution. In a side by side assembly, the equipment should also be operated in the reverse direction.

In some applications, the right-angled mounting arrangement shown below offers the best solution.

For special applications, an arrangement with one or two deflection mirrors is possible (scanning distance is decreased by approximately 10% per added mirror).



Protection around presses

European regulations apply to the use of photoelectric barriers, grids and curtains with power-operated presses for metal processing. Some specific EN standards classified C type are available:

- EN 692 for mechanical presses
- pr EN 693 for hydraulic presses, press brakes, pneumatic presses, punches for metal, metal forming machines.

These C standards specify a specific formula in order to calculate the minimum installation distance between the safety light curtain and the dangerous zone (refer to C standard for calculation).

These guidelines state that safety light curtains should only be used as safety equipment and if the protection field is entered, the operation of the machinery is immediately interrupted. “Immediate interruption” means that any dangerous movement must stop before the operator can reach the dangerous zone on the basis of the speed of his movement.

The self-checking of the photoelectric barrier is essential. If a malfunction occurs in the safety equipment, dangerous movement of the machine must be automatically interrupted.

It should not be possible to resume machine operation until the malfunction has been rectified.

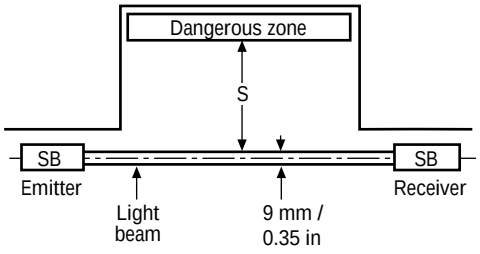
The safety light curtain should only allow the start of a dangerous movement if it is seen to be functioning correctly and if a reset push-button has been reactivated (start interlock). It is for this reason that it is important to refer to EN 954-1 for the design of the electrical interface between the safety barrier and the elements which stop the machine. The stopping time of the machine, the safety distance S and the speed of movement K are the decisive factors in order to ensure the conformity of the installation.

In all cases, the conformity of the installation must be ensured by local organisations and official safety specialists.

Notes

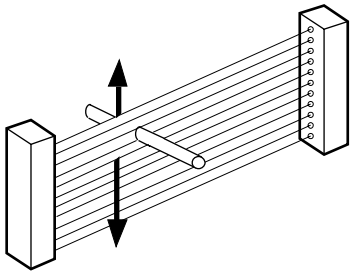
- If the tool can be changed (for instance in a press), calculate the distance “S” for the largest tool.
- It is very important that it must be impossible for the operator to remain undetected between the safety light curtain and the dangerous zone. In addition, the operator should not be able to reach the dangerous zone from above, below or laterally without being detected.

The safety light curtain should be protected against shocks, moving equipment, oil, dust, etc. by positioning it near walls and rigidly fixed on metal bars.



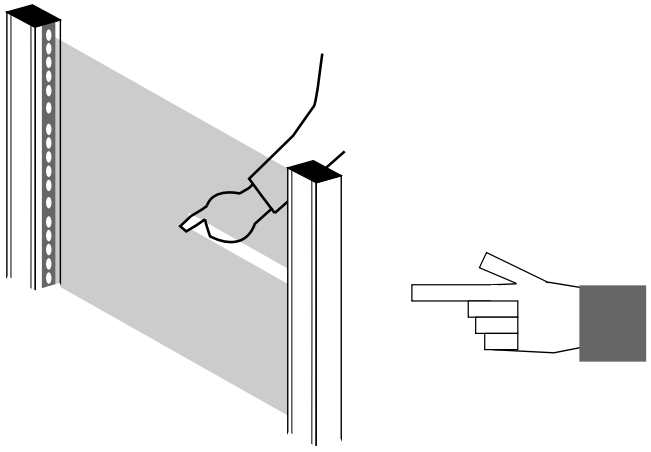
Functional testing

The response of a safety light curtain over the whole protection height should be regularly tested using a test rod with a diameter equal to the safety light curtain resolution. Each time the power-operated machinery is switched on, it should be verified whether an immediate shutdown occurs when any beam is interrupted by an opaque object.

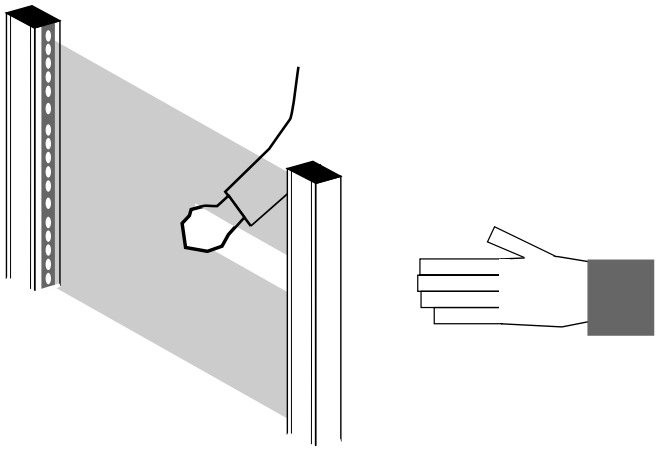


Test rod

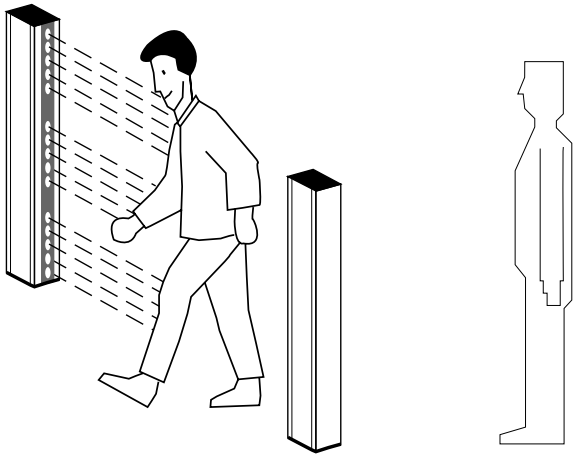
FF-SB12 Finger detection



FF-SB14 Hand / Limb detection

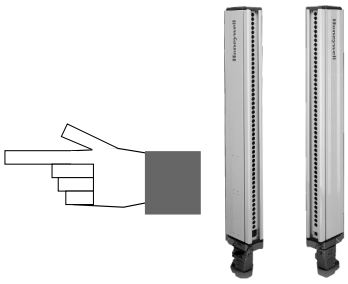


FF-SB15 Body detection



FF-SB12

- **Type 4 according to IEC/EN 61496 - 1 / 2 Standards**
- **Meets applicable parts of ANSI/RIA/OSHA regulations for Control Reliability**
- **ø22 mm / 0.86 in detection capability**
- **Scanning distance up to 10 m / 32.8 ft**



Approved as Type 4 per pr EN 50100 - 1/2

Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

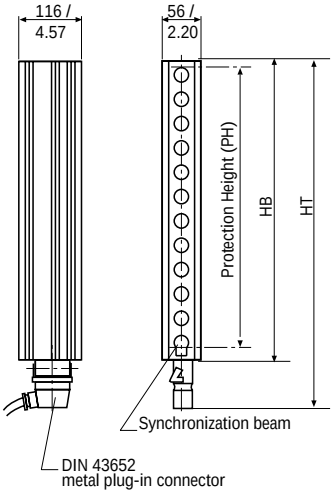
Specifications			
Supply voltage	120/240 Vac (+10%, - 20%) 48 to 62 Hz(1)	24 to 48 Vdc(2) ±15%
Power consumption	8 VA (120/240 Vac), 8 W (24 to 48 Vdc)	
Switching capacity	2 A/250 Vac, 2 safety relays with guided contacts (50 mA min.)	
Material	*Profile*: aluminium alloy yellow painted according to RAL 1021	
	Front face: polycarbonate	
Housing size	56 mm / 2.20 in width, 116 mm / 4.57 in depth, height according to protection height	
Emission	Modulated Light Source, infrared LED (880 nm)	
Scanning frequency	9,6 kHz	
Resolution	ø22 mm / 0.86 in min. target size	
Alignment tolerance	± 2° for emitter and receiver	
Ambient temperature	0 °C to 55 °C / 32 °F to 131 °F	
Sealing	IP 65 / NEMA 4 and 13	
Noise immunity	According to IEC 801-4: level IV (120/240 Vac), level III (24 to 48 Vdc)	
	according to IEC 801-3: level III	
Resistance to ambient light	*Sun*: 20 000 Lux • *Lamp*: 15 000 Lux	
Output indication	LEDs display on unit front face	
Scanning distance	*Standard:* 0 m to 10 m / 0 ft to 32.8 ft	
Electrical connection (connectors delivered with the equipment)	Metal connectors DIN 43652	

Ordering information (Emitter/Receiver)
FF-SB12E/R❑❑❑-S2

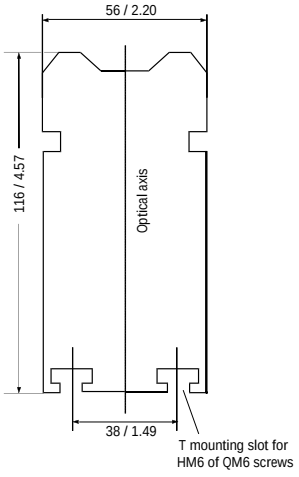
Power supply:
E: 120 Vac (for 200 mm / 7.87 in)
G: 240 Vac (for 200 mm / 7.87 in)
K: 120/240 Vac (Automatic selection)
4: 24 to 48 Vdc (2)

Protection Height (PH) (mm/in):
02: 212,7 / 8.38
04: 415,9 / 16.38
06: 619,1 / 24.39

The emitter and the receiver have the same dimensions

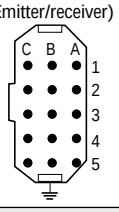


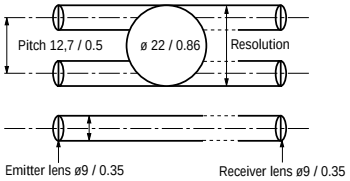
Cross section of the barrier



Metal Connector DIN 43652

(Emitter/receiver)

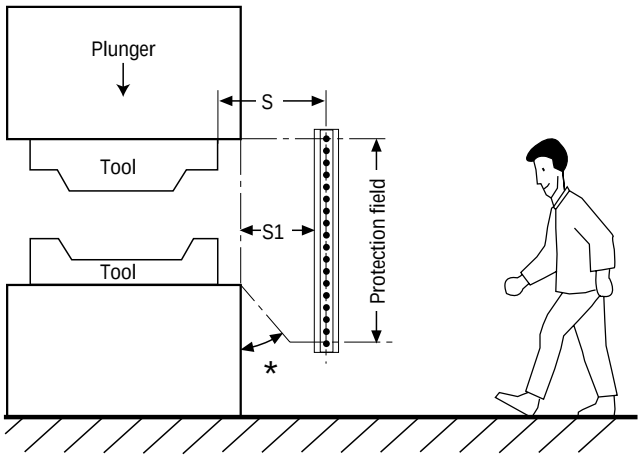




Notes:
(1) - 120 Vac or 240 Vac for the 200 mm / 7.87 in model.
(2) - The dc version is featured with a galvanic insulation (dc to dc converter) that provides immunity to external disturbances; this is essential to guarantee the safety integrity of the equipment**. Not available on 200 mm / 7.87 in models.**

Model		*02*	*04*	*06*
Protection Height	PH	212,7 / 8.38	415,9 / 16.38	619,1 / 24.39
Barrier Height	HB	274,6 / 10.81	477,8 / 18.82	681 / 26.83
Total Height (including connectors)	HT	369 / 14.53	569 / 22.41	769 / 30.29
Number of beams		17	33	49
Response time (10^{-3} s)	t1	25	27	29
Mass per device	kg/lbs	2,8 / 6.17	4 / 8.82	5,2 / 11.46

Safety distances



Note: Due to the FF-SB12 resolution, most of the time this equipment will be used in applications where the direction of approach is normal to the detection plane.

* Positioning of the unit should be made to prevent people from reaching the dangerous zone from the bottom or top of the unit (also refer to installation consideration page 75).

The safety distance between the protection field and the dangerous zone should be large enough to ensure that if the protection field is entered, the dangerous zone cannot be reached before the hazardous movement is interrupted. To determine the safety distance in an application, use the following formula:

- **Normal Approach**

Europe (EN 999)

S ≥ 2000 (t1 + t2) + 64 (mm), with S ≥ 100 mm
(or S ≥ 78.8 (t1+t2) + 2.5 (in), with S ≥ 3.9 in)

If the result of this calculation is greater or equal to 500 mm, then use the following formula:

S ≥ 1600 (t1 + t2) + 64 (mm), with S ≥ 500 mm
(or S ≥ 63 (t1+t2) + 2.5 (in), with S ≥ 19.7 in)

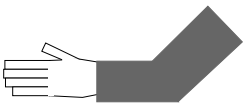
US (OSHA 29 CFR 1910.217, ANSI B11.19 1990)

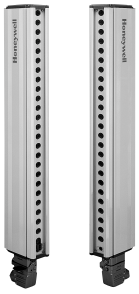
Ds ≥ 63 (t1 + t2) + 2.01 in Ds = S

Ds: minimum safety distance (mm / in)
t1: response time of the light curtain (s)
t2: Stopping time of the equipment guarded by the light curtain, including all mechanical, electromechanical and electronic parts (s)

FF-SB14

- **Type 4 according to IEC/EN 61496 - 1 / 2**
- **Meets applicable parts of ANSI/RIA/OSHA regulations for Control Reliability**
- **ø35 mm / 1.38 in detection capability**
- **Scanning range up to 24 m / 78.72 ft**





Approved as
Type 4
per pr EN 50100 - 1/2

FF-SB14E/R❑❑K-❑-2 ONLY

Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Specifications			
Supply voltage	120/240 Vac (+10%, -20%) 48 to 62 Hz	24 to 48 Vdc(1) ±15%
Power consumption	8 VA per unit	8 W per unit
Switching capacity	2 A/250 Vac, 2 safety relays with guided contacts (50 mA min.)	
Material	*Housing*: Aluminium alloy yellow painted according to RAL 1021	
	Front face: polycarbonate (filtered versions: shock and welding splash extra resistant)	
Housing size	56 mm / 2.20 in width, 116 mm / 4.57 in depth, height according to protection height	
Emission	Modulated Light Source, infrared (880 nm)	
Scanning frequency	9,6 kHz	
Resolution	ø35 mm / 1.38 in min. target size	
Alignment tolerance	±2° for emitter and receiver	
Ambient temperature	0 °C to 55 °C / 32 °F to 131 °F	
Sealing	IP 65 / NEMA 4 or 13	
Noise immunity	According to IEC 801-4: level IV (120/240 Vac), level III (24 to 48 Vdc)	
	According to IEC 801-3: level III	
Resistance to ambient light	*Sun*: 20 000 Lux / *Lamp*: 15 000 Lux	
Output indication	LEDs display on unit front face	
Scanning distance	*Standard:* 0 m to 10 m / 0 ft to 32.8 ft • *Long range:* 3 m to 24 m / 9.84 ft to 78.72 ft(2)	
	Filter: 0 m to 6 m / 0 ft to 19.7 ft	
Electrical connection (connectors delivered with the equipment)	Metal connector DIN 43652	

Ordering information (Emitter/Receiver)

FF-SB14E/R❑❑❑-S❑

- **Scanning range:**
  2: 10 m / 32.8 ft *(standard)*
  2L: 24 m / 78.72 ft *(Long range(2))*
  2F: 6 m / 19.7 ft (Filtered version for welding applications)
- **Connectors:** Metal DIN 43652
- **Power Supply:**
  K: 120/240 Vac (automatic selection)
  4: 24 to 48 Vdc (1)

Protection Height (PH) (mm/in):

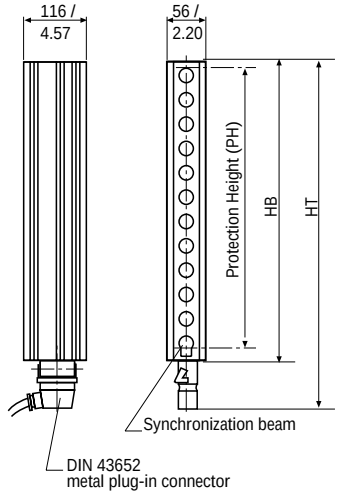
04: 417 / 16.42	*10:* 1024 / 40.34
06: 620 / 24.42	*12:* 1230 / 48.46
08: 824 / 32.46	*14:* 1434 / 56.49

Notes:

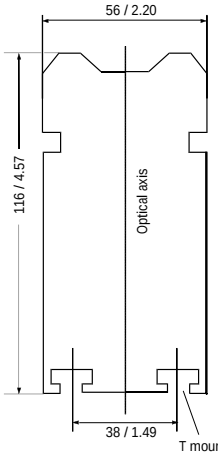
(1) - The 24 to 48 Vdc version is featured with a galvanic insulation (dc to dc converter) that provides the immunity to external disturbances; this is essential to guarantee the safety integrity of the equipment.

(2) - The safety light curtain, although always operational with scanning distances less than 3 m / 9.84 ft, does not fully comply with certain requirements of the IEC/EN 61496 - 2 standard at distances between 0 and 3 m / 0 to 9.84 ft. In this case, the version *0 to 10 m / 0 to 32.8 ft* should be used.

The emitter and the receiver have the same dimensions

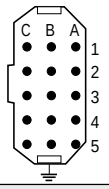


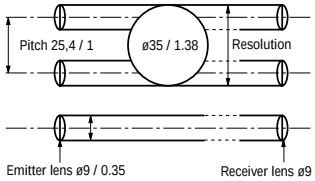
Cross section of the barrier



Metal Connector DIN 43652

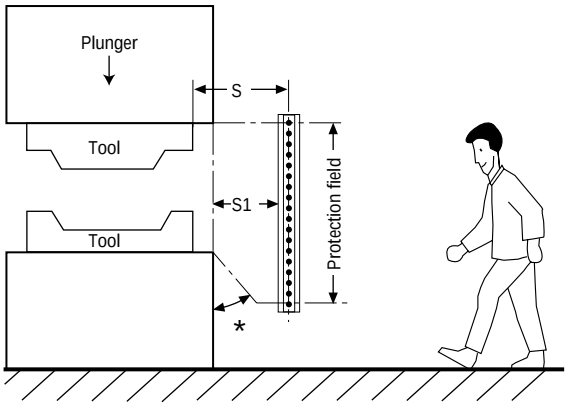
(Emitter/receiver)



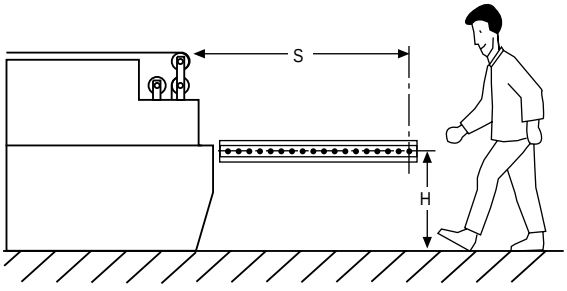


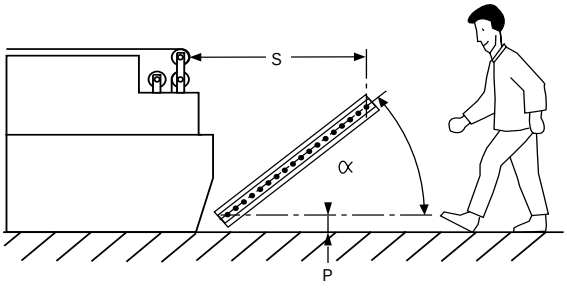
Model		*04*	*06*	*08*	*10*	*12*	*14*
Protection Height	PH	417 / 16.42	620 / 24.42	824 / 32.46	1024 / 40.34	1230 / 48.46	1434 / 56.49
Barrier Height	HB	488 / 19.22	688 / 27.10	888 / 34.98	1088 / 42.86	1288 / 50.74	1488 / 58.62
Total Height (including connectors)	HT	569 / 22.41	769 / 30.29	969 / 38.17	1169 / 46.05	1369 / 53.93	1569 / 61.81
Number of beams		17	25	33	41	49	57
Response time (10^{-3} s)	t1	25	26	27	28	29	30
Mass per device	(kg/lbs)	4 / 8.8	5,2 / 11.4	6,4 / 14.1	7,5 / 16.5	8,6 / 18.9	9,8 / 21.6

Safety distances



* Positioning of the unit should be made to prevent people from reaching the dangerous zone from the bottom or top of the unit (also refer to installation consideration page 75).





The safety distance between the protection field and the dangerous zone should be large enough to ensure that if the protection field is entered, the dangerous zone cannot be reached before the hazardous movement is interrupted. To determine the safety distance in an application, use the following formula:

- **Normal Approach**

Europe (EN 999)

S ≥ 2000 (t1 + t2) + 168 (mm), with S ≥ 100 mm
(or S ≥ 78.8 (t1+t2) + 6.6 (in), with S ≥ 3.9 in)

If the result of this calculation is greater or equal to 500 mm, then use the following formula:

S ≥ 1600 (t1 + t2) + 168 (mm), with S ≥ 500 mm
(or S ≥ 63 (t1+t2) + 6.6 (in), with S ≥ 19.7 in)

US (OSHA 29 CFR 1910.217, ANSI B11.19 1990)

Ds ≥ 63 (t1 + t2) + 3.75 in Ds = S

- **Parallel approach**

Europe (EN 999)

S ≥ 1600 (t1 + t2) + 1200-0.4H (mm)
where (1200-0.4 H) ≥ 850 mm
(or S ≥ 63 (t1+t2) + 47.3-0.4H (in)
where (47.3-0.4 H) ≥ 33.5 in)

If H is greater than 300 mm / 11.82 in, the risk of access from below must be taken into account. For this barrier, the minimum height allowed is H min. = 0 mm and the maximum height allowed is H max. = 1 000 mm / 39.4 in.

- **Angled approach**

Europe (EN 999)

30° < α < 90°

If the angle is greater than 30°, the approach should be considered as normal, and one of the above-mentioned formulas should be used.

0° < α ≤ 30°

If the angle is less than or equal to 30°, the approach should be considered as parallel, and one of the above-mentioned formulas should be used. In this case the minimum height allowed is P min. = 0 mm and the max. height allowed is H = 1 000 mm / 39.4 in max. However, if P > 300 mm / 11.82 in, the risk of inadvertent access from below must be taken into account.

S: Minimum safety distance (mm / in)

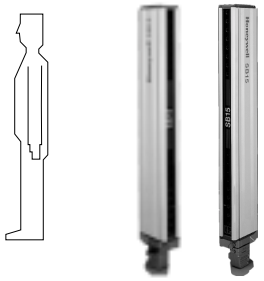
t1: Response time of the light curtain (s)

t2: Stopping time of the equipment guarded by the light curtain, including all mechanical, electromechanical and electronic parts (s)

H: Height of the detection zone above the floor (mm / in)

FF-SB15

- **Type 4 according to IEC/EN 61496 - 1 / 2**
- **Meets applicable parts of ANSI/RIA/OSHA regulations for Control Reliability**
- **ø235 mm / 9.25 in detection capability**
- **Scanning range up to 24 m / 78.72 ft**



Approved as Type 4 per pr EN 50100 - 1/2

Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

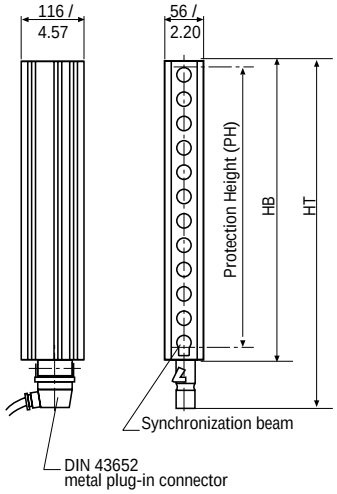
Specifications			
Supply voltage	120/240 Vac +10% -20%, 48 to 62 Hz	24 to 48 Vdc(1) ±15%
Power consumption	8 VA per unit	8 W per unit
Switching capacity	2 A/250 Vac, 2 safety relays with guided contacts (50 mA min.)	
Material	*Housing*: aluminium alloy yellow painted according to RAL 1021	
	Front face: polycarbonate	
Housing size	56 mm / 2.20 in width, 116 mm / 4.57 in depth, height according to protection height	
Emission	Modulated Light Source, infrared LED (880 nm)	
Scanning frequency	9,6 kHz	
Resolution	ø235 mm / 9.25 in minimum target size	
Alignment tolerance	± 2° for emitter and receiver	
Ambient temperature	0 °C to 55 °C / 32 °F to 131 °F	
Sealing	IP 65 / NEMA 4 or 13	
Noise immunity	According to IEC 801-4: level IV (120/240 Vac), level III (24 to 48 Vdc)	
	according to IEC 801-3: level III	
Resistance to ambient light	*Sun*: 20 000 Lux • *Lamp*: 15 000 Lux	
Output indication	LEDs display on unit front face	
Scanning distance	3 m to 24 m / 9.84 ft to 78.72 ft	
Electrical connection	Metal connectors DIN 43652	
(connectors delivered with the equipment)		

Ordering information (Emitter/Receiver)
FF-SB15E/R❑❑❑-S2

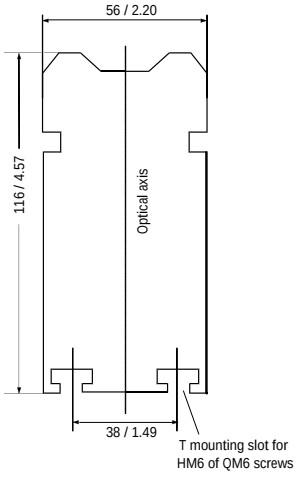
Power supply:
K: 120/240 Vac (Automatic selection)
4: 24 to 48 Vdc (1)

Number of beam sets (PH: mm/in):
06: 2 sets of beams (620 / 24.42)
10: 3 sets of beams (1027 / 40.46)
14: 4 sets of beams (1434 / 56.49)

The emitter and the receiver have the same dimensions

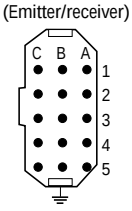


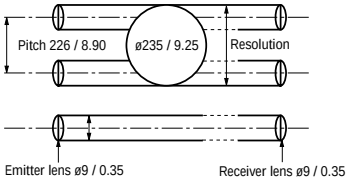
Cross section of the barrier



Metal Connector DIN 43652

(Emitter/receiver)

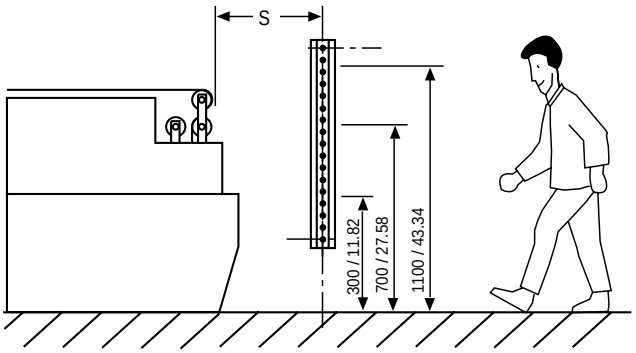




Model		*06*	*10*	*14*
Protection Height	PH	620 / 24.42	1027 / 40.46	1434 / 56.49
Barrier Height	HB	688 / 27.10	1088 / 42.86	1488 / 58.62
Total Height (including connectors)	HT	769 / 30.29	1169 / 46.05	1598 / 62.96
Number of beams		2	3	4
Response time (10^{-3} s)	t1	25	26	27
Mass per device	kg/lbs	5,2 / 11.4	7,5 / 16.5	9,8 / 21.6

Note:
(1) - The 24 to 48 Vdc version is featured with a galvanic insulation (dc to dc converter) that provides the immunity to external disturbances; this is essential to guarantee the safety integrity of the equipment.

Safety distances



Models	Beam height mm	Beam height in
FF-SB15E/R06❑-S2	400 / 900	15.76 / 35.46
FF-SB15E/R10❑-S2	300 / 700 / 1100	11.82 / 27.58 / 43.34
FF-SB15E/R14❑-S2	300 / 700 / 1100 / 1500	11.82 / 27.58 / 43.34 / 59.1

The safety distance between the protection field and the dangerous zone should be large enough to ensure that if the protection field is entered, the dangerous zone cannot be reached before the hazardous movement is interrupted. To determine the safety distance in an application, use the following formula:

- **Normal Approach**

  Europe (EN 999)

  S ≥ 1600 (t1 + t2) + 850 (mm)
  (or S ≥ 63 (t1 + t2) + 33.5 (in))

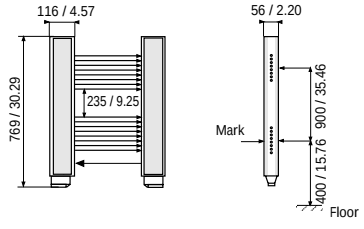
S: Minimum safety distance (mm / in)

t1: Response time of the light curtain (s)

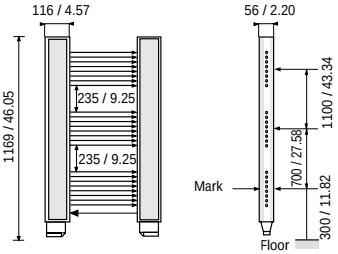
t2: Stopping time of the equipment guarded by the light curtain, including all mechanical, electromechanical and electronic parts (s)

Mounting: The barrier has a mark on its front plate on the connector side. This mark should be positioned as follows:

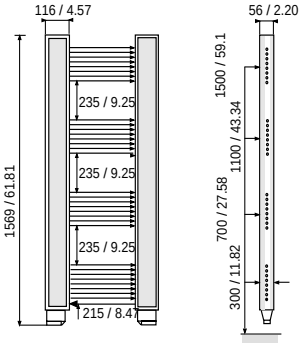
Figure 1



FF-SB15E/R06❑-S2



FF-SB15E/R10❑-S2

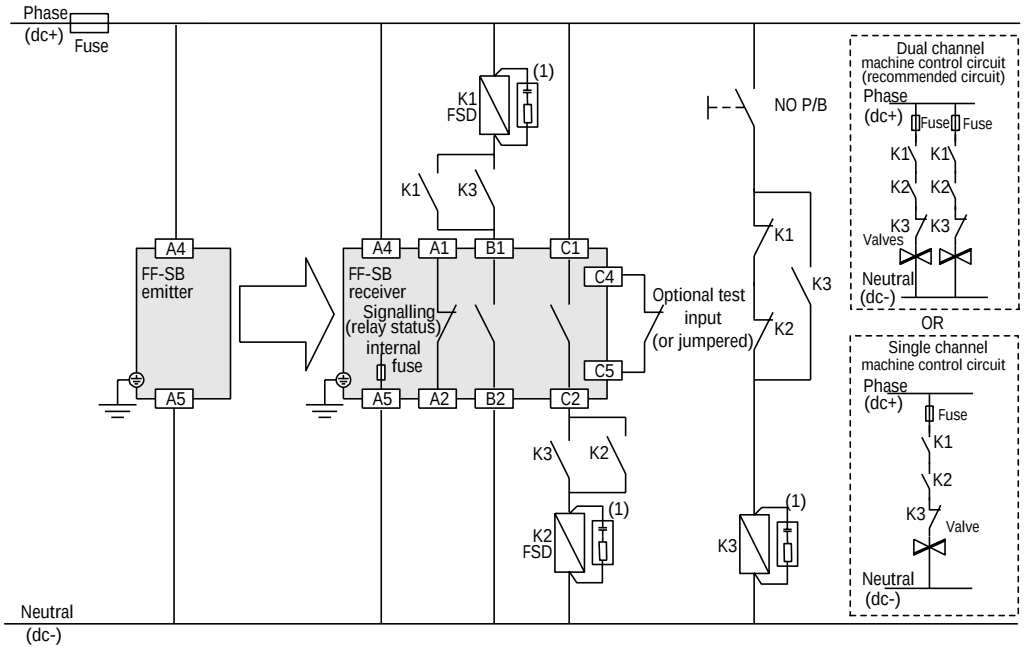


FF-SB15E/R14❑-S2

Connection diagrams (Please refer to EN 954 for electrical interface).
(Possible use of Honeywell safety control module to replace K1, K2 and K3 external safety relays and simplify / ease wiring).

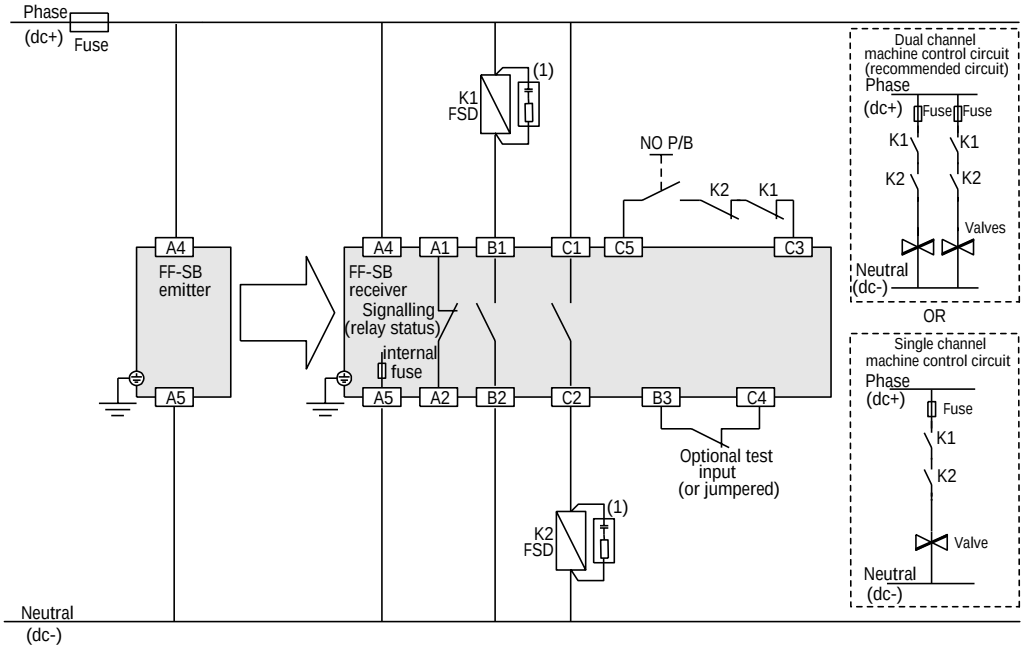
FF-SB12E/R02 ❑ -S2 models (These models provide 2 NO output contacts only)

Figure 1



Other FF-SB models (with exception of the 200 mm / 7.87 in, these models provide 2 NO and 1 NC safety output contacts).

Figure 2

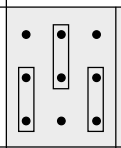
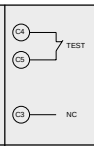
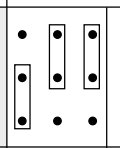
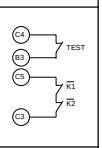
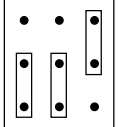
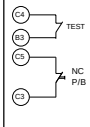
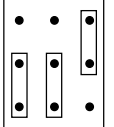
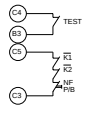
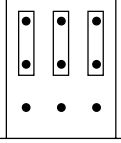
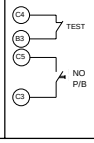
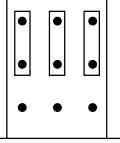
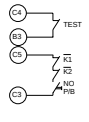


(1): RC (220 Ω + 0.22 µF) for ac interfaces, varistors for dc interfaces; NO P/B: normally open contact of a push-button; FSD: Final Switching Device

Important

The shutdown of the machine should not be carried out by a programmable controller, but by the power supply. The NC contacts can be used for signalling to the programmable controller. For more information, please refer to the installation and maintenance manual.

Selection of the restart mode

RESTART	WITHOUT FSD(1) MONITORING		WITH FSD(1) MONITORING	
AUTOMATIC				
START INTERLOCK				
START & RESTART INTERLOCK				

This equipment is able to operate in any of the following restart modes:

- Automatic: Automatic restart after power up or after any beam interruption.
- Start Interlock: Manual restart after power up and automatic restart after any beam interruption.
- Start & Restart Interlock: Manual restart after power up and after any beam interruption.

The equipment is delivered in the Automatic mode without FSD(1) monitoring. Any other mode can be selected by changing the internal jumper links position. These jumper links are located on the receiver power supply board. The following instructions must be followed to select one of 3 restart modes:

NC: Not Connected.

NC P/B: NC contact of a push-button

NO P/B: NO contact of a push-button.

(1) FSD: Final Switching Device (refer to the connection diagram).

Position of jumper links on delivery

Spare parts

- **Special front plate** (recommended for the FF-SB14 Series only in welding applications)

FF-SBZFL40 ❑❑ 1 shock-proof optical filter (improves immunity to light interference. High temperature resistant. Reduces scanning ranges by 40%). For receiver filter version units only. Nominal protected height (ex.: FF-SBZFL4006 to be fixed on a FF-SB14R06... receiver)

FF-SBZFL00 ❑❑ 1 shock-proof transparent front plate (high temperature resistant). Nominal protected height (ex.: FF-SBZFL0006 to be fixed on a FF-SB14E06... emitter)

- **DIN 43652 connecting plugs** (parts supplied with the equipment)

FF-SBZ1721137	Female supply plug for emitter
FF-SBZ1721202	Female supply and signal plug for receiver

- **Accessories**

FF-SBZ0130010	Assortment of Torx screws for end covers and internal circuits
FF-SBZ172115	Kit of 100 female crimping contacts for DIN 43652 metal connector
FF-SBZ666144	Kit of reducer and cable glands for metal connectors of a complete set FF-SB14E/❑❑❑-S2 ❑

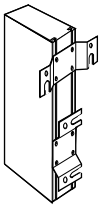
- **Tools**

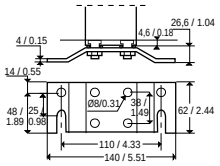
FF-SBZROD22	Ø22 mm / 0.86 in test rod for FF-SB12 series
FF-SBZROD35	Ø35 mm / 1.38 in test rod for FF-SB14 series
FF-SBZ0140010	Torx screw driver ACX 20
FF-SBZCRIMP	Crimping tool for DIN 43652 metal connectors
FF-SBZREMOV	Removal tool for DIN 43652 metal connectors

FF-SB accessories

Mounting brackets (brackets are not supplied with light curtains and need to be ordered separately).

FF-SBZS5000 (1)



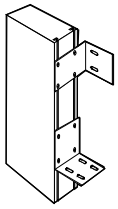


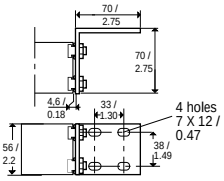
Kit of 2 brackets with anti-vibration inserts

The brackets can be assembled transversally or longitudinally (4 possible positions).

Application: Recommended for vertical or horizontal mountings.

FF-SBZS6000 (1)



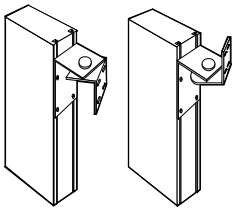


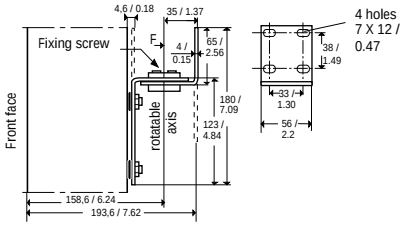
Kit of 2 right angle brackets with anti-vibration inserts

The corner plate can be fitted in 4 different positions at 90° to each other.

Application: Recommended for vertical or horizontal mountings.

FF-SBZS7000 (1)





Kit of 2 rotatable brackets with anti-vibration inserts

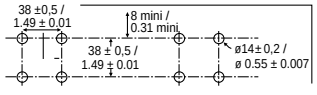
The bracket may be reversed.

These brackets are strongly recommended for precise optical alignment at max. range.

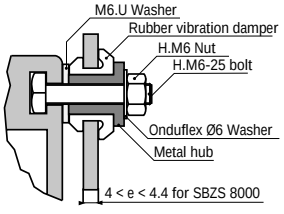
Application: Recommended for vertical mounting only.

FF-SBZS8000 (1)

Drilling gauge



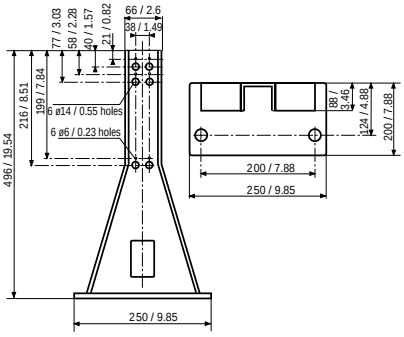
Detail



Kit of accessories for direct mounting

All installations must use this kit (8 bolts, 8 nuts, 16 washers, 8 anti-vibration dampers, 8 metal hubs).

FF-SBZS9010 (1)



Floor mounting column for FF-SB15

Floor mounting column for FF-SB15E/R❑❑-S2 only.
(black epoxy painting)

06 or 10

(1) Order 2 kits for a complete set (emitter and receiver)