

Type 4 Safety light curtain

Compact, Universal, Smart and Full-featured

FF-SYB Series

FEATURES

- 1- or 2-beam floating blanking
- Manual or automatic restart
- External Device Monitoring (EDM)
- 2 or 4 inputs for muting signals
- Manual muting override
- Input for serial connection of an auxiliary safety device
- Unique patented configuration cards for quick set-up and easy replacement
- Self-contained with optical synchronisation
- 2 static (solid state) safety outputs with short-circuit and cross-fault detection
- Muting lamp/diagnosis output or static (solid state) non safety output for signalling
- Selection of the infrared emission power allows cross-talk reduction
- Enhanced diagnostic information includes the following indication: signal strength, cross-talk, muting, blanking, restart and failure diagnostic
- Test input with selectable test input type
- Resolutions available:
 - ø14 mm / 0.6 in for finger detection
 - ø30 mm / 1.2 in for hand detection
 - ø50 mm / 1.97 in for leg detection
- Protection height up to 1830 mm / 72 in
- Scanning range up to 20 m / 65 ft
- M12 connectors
- Mounting brackets included allowing multiple mounting positions
- Safety relay modules for more switching capability (to be ordered separately).

TYPICAL APPLICATIONS

- Presses and punches
- Metal-forming, milling and drilling machines
- Spot-welding machines and fine-boring machines
- Pressing, moulding and thermoforming machines
- Stacking machines, transporting and conveyor technology; handling equipment and assembly lines
- Palletizing industry



Approved as
Type 4
per IEC/EN 61496-1/2



The Honeywell FF-SYB light curtain is in compliance with IEC/EN 61496 - parts 1 and 2 standard and meets the requirements for a Type 4 Active Optoelectronic Protective Device, the highest level for safety products.

The product received an EC type test certificate from the French INRS notified body, required for safety equipment as per the 98/37/EC Machinery Directive. It meets the applicable parts of North American standards and regulations (OSHA 1910.212, OSHA 1910.217, ANSI standards including ANSI RIA 15.06 for Control Reliability and CSA Z434). The CSA marking makes it a product usable in most parts of the world.

As soon as an object is detected inside the protection field, the FF-SYB de-energizes its two static (solid state) safety outputs to signal the dangerous motion to stop. The FF-SYB is a self-contained light curtain that does not require a separate control unit for operation.

Functions such as floating blanking, muting, external device monitoring, manual restart and serial connection make it a comprehensive product and eliminate the need for additional control modules.

These built-in features, combined with the small size of the housing, help users reduce overall cost by saving space and installation time.

A unique patented configuration card system allows the user to set up the correct operating mode when swapping units, by simplifying and reducing the number of operations.

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 to be referenced for each product.

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

□ External Device Monitoring (EDM)

The FF-SYB is fitted with an EDM input which allows users to check the correct state of the final switching devices (relays or contactors with positively guided contacts). After each intrusion into the protection field, the FF-SYB will check that the EDM input loop is closed before switching the outputs back to ON. If the FF-SYB operates in automatic restart mode, it will restart immediately if the EDM loop is closed. If the FF-SYB operates in manual restart mode, it will restart when the restart push-button is pressed and if the EDM loop is closed. If the EDM loop remains open (meaning that the external device has a malfunction) the FF-SYB will keep its outputs open and will not restart.

□ Manual restart

The FF-SYB can be used in automatic or manual restart mode. In automatic mode, the outputs will switch back to ON after an interruption of the protection field, as soon as the field becomes clear again. In manual restart mode, the FF-SYB will not switch back its outputs to ON until a manual restart push-button is pressed and released. The push-button must be a normally open type button. The manual restart will not switch the OSSDs back to ON in case of light curtain lock out (internal failure, optical interference, etc.) or when the protection field is still interrupted.

□ Auxiliary output

An additional non safety output is available to either mimic the safety output status (solid state Normally Closed signalling output) or signal muting sequences and provide diagnostic information (mode selection depending).

□ Muting function

The FF-SYB is fitted with a built-in muting function. Muting is the ability to temporarily inhibit the outputs of a light curtain under certain conditions.

Sensors are connected to the light curtain through the main connector. An optional junction box is available to perform the electrical connections close to the location of the muting sensors.

Muting sensors are used to discriminate authorised materials from people. The muting sensors must be able to detect the passing material (pallets, vehicles, etc.) according to the material's length and speed.

Figure 1 shows an FF-SYB placed on a conveyor, with the corresponding muting sensors. The muting activation sensors temporarily inhibit the FF-SYB light curtain as soon as they detect the object. The outputs of these sensors are connected to the muting inputs of the FF-SYB receiver. Muting sensors must be successively actuated for a correct muting sequence to start.

Whenever one of the two muting sensors is released, the muting sequence stops. In case of an incorrect muting sequence, a temporary manual muting (override) procedure may be performed to clear the FF-SYB light curtain detection field and revert back to normal operation.

Suitable optoelectronic, mechanical, proximity sensors, etc. can be used as muting sensors.

Inputs for muting sensors accept sensors with relay or static (solid state) outputs (NPN or PNP). 2-wire sensors are also accepted.

A muting lamp output is available on the FF-SYB receiver to drive an external muting indicator that should be installed in a suitable location on the machine.

The following are some configuration examples when using the muting function:

Figure 1 - Bi-directional application with two optoelectronic sensors

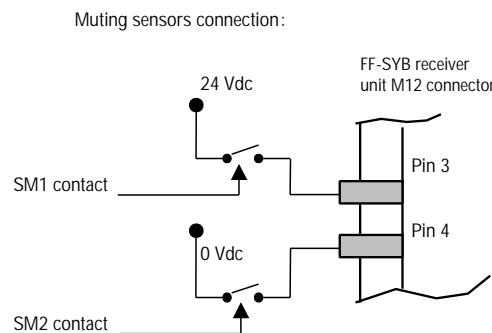
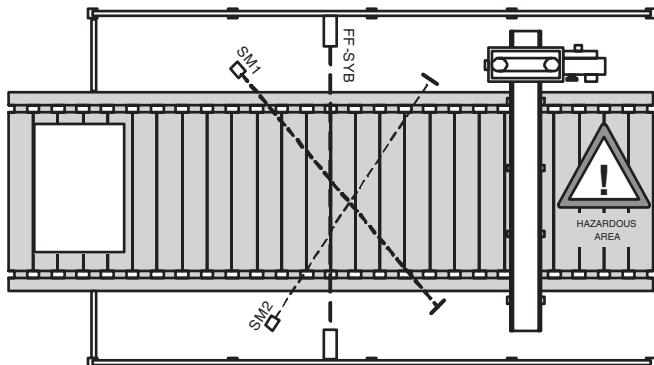
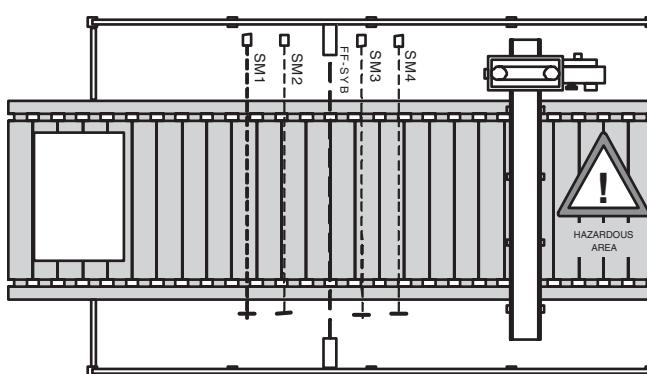
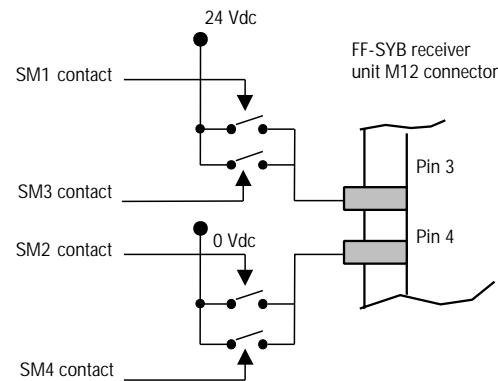


Figure 2 - Bi-directional application with four photoelectric sensors

2 sensors can be wired in parallel on each of the 2 muting inputs of the light curtain, creating a 4 sensor bi-directional muting.

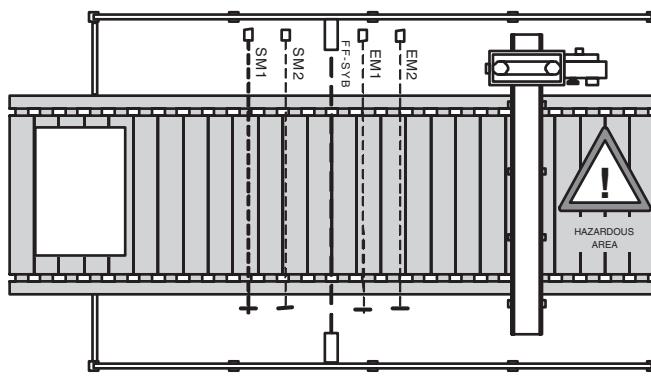


Muting sensors connection:

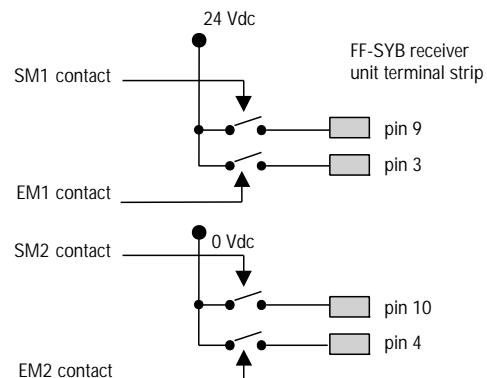


FF-SYB

Figure 3 - Uni-directional application with four optoelectronic sensors



Muting sensors connection:

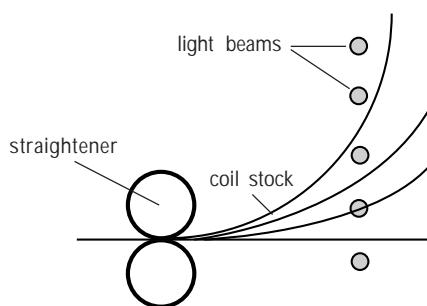


Note: this mode of operation requires direct connections to the receiver internal terminal strip. A M20 cable gland is delivered with the package. Male M23 cordsets are available on option (see "Accessories" section).

□ Floating blanking function

The FF-SYB is fitted with a selectable floating blanking function which allows users to inhibit 1 or 2 beams anywhere within the protection field, except the bottom beam which is used for synchronisation. If 2 beam floating blanking is selected, the interruption of 1 or 2 beams will not lead to the opening of the outputs. The 2 beams can be adjacent or not. It is useful in those applications where material or air ejected parts randomly travel through or within the sensing field. You can also disable light beams in an area where a fixture penetrates the light field, and you can permit stationary objects to protrude into the light curtain's sensing field.

Figure 4



When using floating blanking, the resolution of the light curtain is altered according to the following table:

| Model | Resolution without floating/blanking | Resolution with 1-beam floating blanking | Resolution with 2-beam floating blanking |
|----------|--------------------------------------|--|--|
| FF-SYB14 | 14 mm / 0.55 in | 24 mm / 0.94 in | 34 mm / 1.33 in |
| FF-SYB30 | 30 mm / 1.18 in | 50 mm / 1.97 in | 70 mm / 2.75 in |
| FF-SYB50 | 50 mm / 1.97 in | 90 mm / 3.54 in | 130 mm / 5.12 in |

The maximum size of an undetected object is also affected by floating blanking:

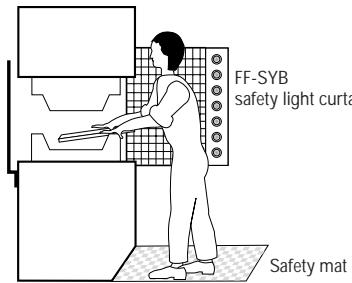
| Model | Maximum size of undetected object with 1-beam floating blanking | Maximum size of undetected object with 2-beam floating blanking |
|----------|---|---|
| FF-SYB14 | 6 mm / 0.23 in | 16 mm / 0.63 in |
| FF-SYB30 | 10 mm / 0.39 in | 30 mm / 1.18 in |
| FF-SYB50 | 30 mm / 1.18 in | 70 mm / 2.75 in |

□ Serial connection

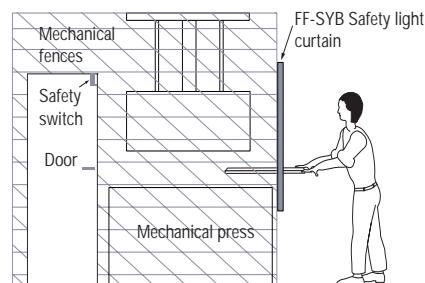
The FF-SYB safety light curtain allows the connection of another safety device with dual outputs through 2 inputs on the receiver unit. The auxiliary safety device can be an electromechanical safety switch or any other safety device with either relay outputs or solid state outputs (for safety reasons, reversed polarity on these two inputs is mandatory, therefore connection of a second FF-SYB light curtain is not possible through these two inputs). Connection is done through the main connector. An optional junction box is available to perform the electrical connections close to the light curtain.

Figure 5

a) Serial connection of an FF-SYB safety light curtain with a safety mat



b) Serial connection of an FF-SYB safety light curtain with a safety gate switch.

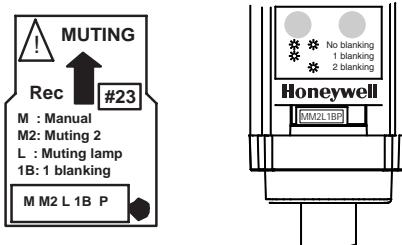


Note: This mode may be combined with the bi-directional muting mode. This combination of modes requires direct connection to the receiver internal terminal strip. A M20 cable gland is delivered with the package. Male M23 cordsets are available on option (see "Accessories" section).

□ Configuration cards

The FF-SYB emitter and receiver are set up by the use of configuration cards, similar to the SIM cards used on mobile phones (see figure below). This simple and elegant method eliminates the use of jumpers or dip switches. No computer is required: settings are done on site, using one of the small configuration cards. If the user needs to use a different configuration from the factory settings, he just needs to select the configuration card which corresponds to the desired settings and install it behind the bottom cap of the emitter or receiver. The selected settings are written on the configuration card and are visible through the transparent front window.

Figure 6

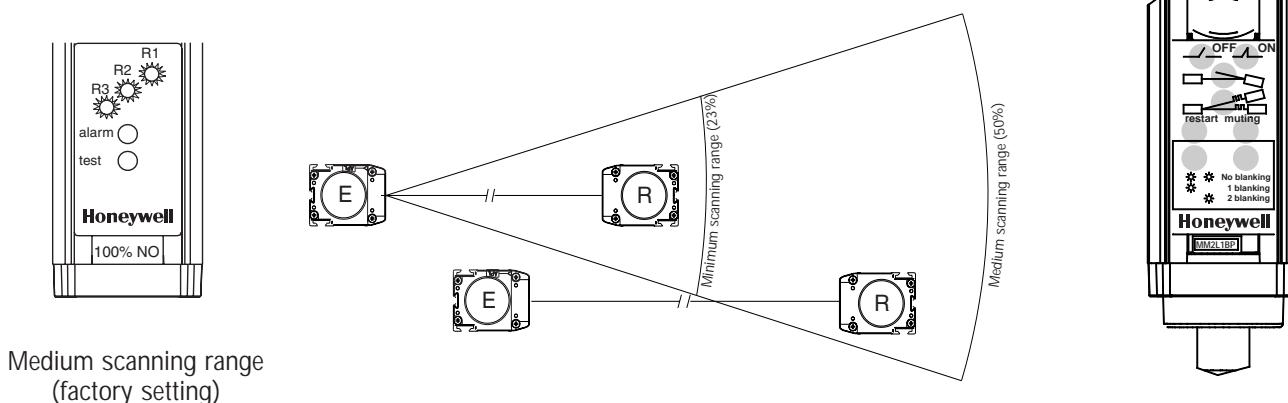


If the FF-SYB needs to be exchanged, the configuration card can be installed in another FF-SYB allowing transfer of settings in a few minutes.

□ Cross-talk reduction system

The FF-SYB light curtain is based upon an infrared transmission between an emitter unit and a receiver unit. It is a requirement of the IEC/EN 61496-2 standard that if a receiver R2 receives two signals transmitted by two different emitters E1 and E2, the receiver R2 must turn to the alarm state. This happens if the receiver R2 is within the beam aperture angle and within the nominal scanning range of the second emitter E1. The cross-talk detection indicator flickers on the receiver R2 to warn the installer.

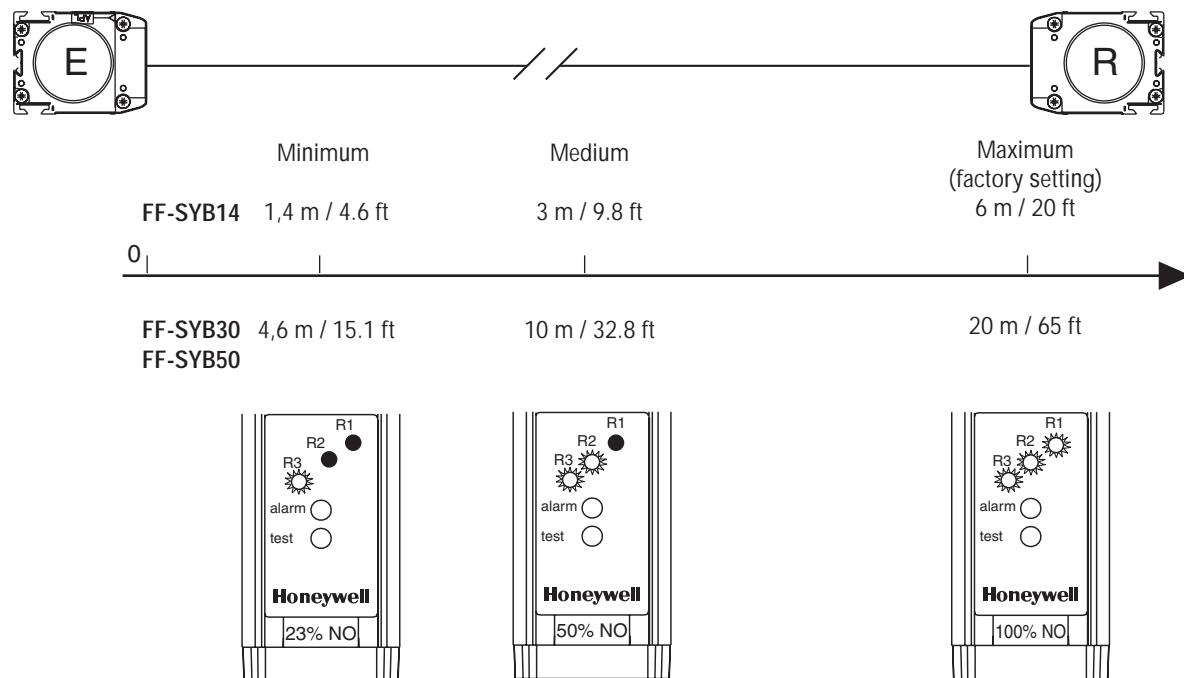
Figure 7



A configuration card is used on the emitter unit for the selection of the adequate emission power. This configuration card can be used to eliminate this cross-talk phenomenon by decreasing the scanning range. The end cap can be easily removed to select a different scanning range. Products are delivered with a medium scanning range (middle position) to minimize cross-talk upon installation.

□ Selectable scanning ranges

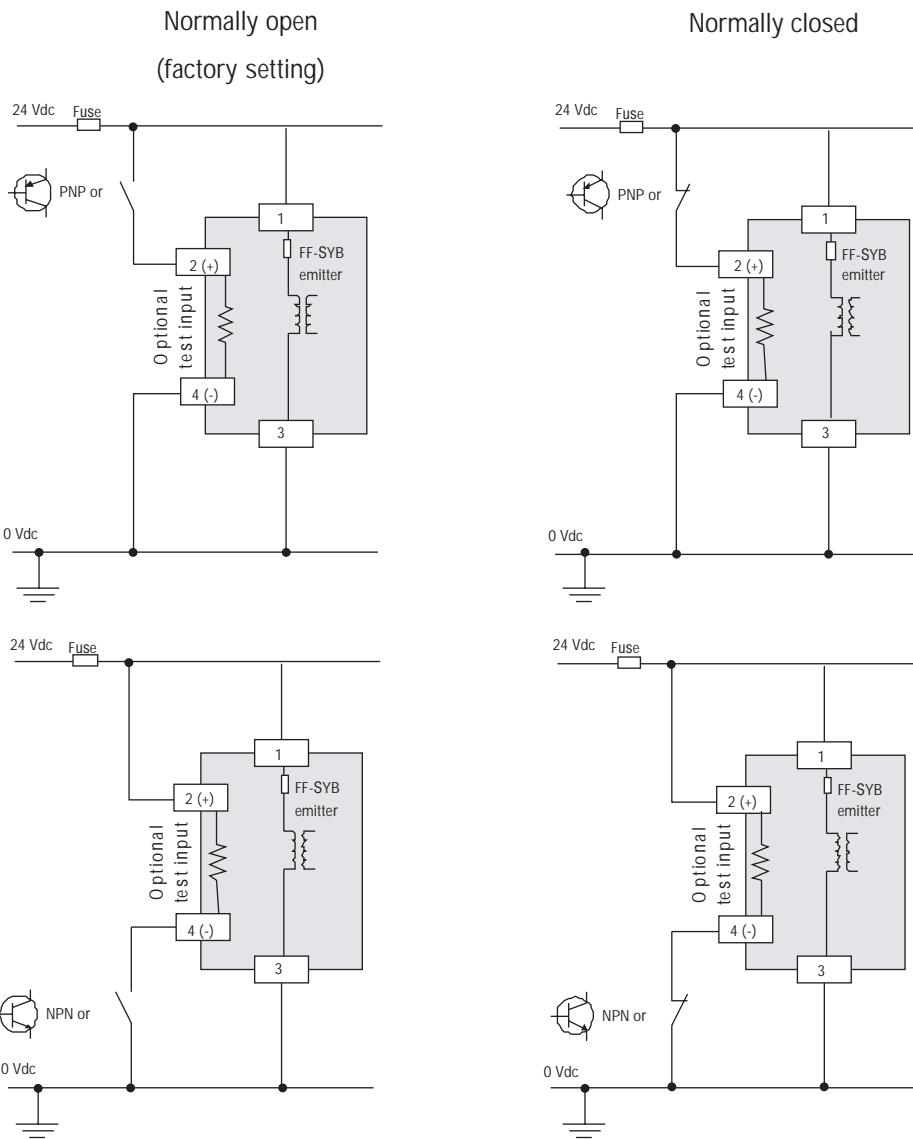
Figure 8



Test input type
Figure 9
FF-SYB

Voltage free contact

(PNP static (solid state) output and NPN static (solid state) output also connectable)



Type 4 safety light curtain

- Type 4 according to the IEC/EN 61496 - parts 1 and 2 standards
- Built-in muting, floating blanking, inputs for serial connection of an auxiliary device, manual restart and EDM
- Control of the infrared emission source for cross-talk reduction
- Enhanced diagnostic information

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



Approved as
Type 4
per IEC/EN 61496-1/2



FF-SYB

| Features | Type | FF-SYB14 | FF-SYB30 | FF-SYB50 |
|--|--|--|-----------------------------|-----------------------------|
| Nominal scanning range | | 0 m to 6 m / 0 ft to 20 ft | 0 m to 20 m / 0 ft to 65 ft | 0 m to 20 m / 0 ft to 65 ft |
| Object detection size (see chapter "Floating blanking function") | | 14 mm / 0.55 in | 30 mm / 1.18 in | 50 mm / 1.97 in |
| Angle of divergence | | | ±2°, ±25 % | |
| Emitting light source (immunity) | | Infrared, pulsed, 880 nm (Sunlight: 20 000 Lux • Lamplight: 15 000 Lux) | | |
| Supply voltage and power consumption | | 24 Vdc (±20 %); 5 W max. for the emitter, 5 W max. for the receiver | | |
| Safety outputs (OSSDs) | Output type | 2 safety static (solid state) outputs (PNP with NO characteristics) with permanent short-circuit and cross-fault detections | | |
| | Switching capability | 350 mA max. at 24 Vdc | | |
| | Response time (beam interruption) | 22 ms (28 ms for model numbers FF-SYB14128 to FF-SYB14176) | | |
| | Response time (Auxiliary Safety Device engaged) | 28 ms | | |
| | Maximum cable length | 100 m / 328 ft (100 nF capacitance) | | |
| Restart time after power up (after beam actuation) | | > 1 s (80 ms - without EDM, 150 ms - with EDM) | | |
| | Loads impedance | 70 Ω min. / 5 kΩ max. | | |
| | Voltage drop | < 2 Vdc | | |
| | Loads turn-on voltage | 5 V min. on resistive loads / 7 V min. on inductive loads | | |
| | Protections | Short-circuits and cross-faults, overloads, reversed polarity, micro-cut-off (10 ms, 100 % voltage drop, 10 Hz) | | |
| NC signalling or muting lamp/diagnosis output | | | | |
| | Output type | 1 PNP non safety output, NC (signalling contact) or NO (muting/diagnostic indication) | | |
| | Switching capability | 100 mA max. at 24 Vdc | | |
| | Protections | Overloads, reversed polarity, micro-cut-off (10 ms, 100 % voltage drop, 10 Hz) | | |
| Test input (emitter) (1) | Input type | Floating input with selectable NO/NC test logic | | |
| | External contact type | Relay contact, or static (solid state) PNP or static (solid state) NPN (must be activated for at least 20 ms) | | |
| | Test loop current (resistance) | 13 mA typical (750 Ω max.) | | |
| | Protections | 3000 Vdc galvanic insulation, reversed polarity, micro-cut-off (14 ms) | | |
| Restart / EDM input (1) | External contact type | Relay contact (must be activated for at least 150 ms and less than 3 s) | | |
| | Max. voltage | 29 Vdc | | |
| Muting or serial connection inputs (1) | | | | |
| | External contact type | Relay contact, or static (solid state) PNP or static (solid state) NPN (automatic recognition) | | |
| | Maximum cable length | 100 m / 328 ft (no limitation in capacitance) | | |
| Environmental/physical characteristics | | | | |
| | Temperature range | Operating: 0 °C to 55° C/32° F to 131 °F (95% relative humidity) • Storage: -20° C to 75 °C/-4° F to 167° F | | |
| | Sealing | NEMA 4, 13 and IP 65 | | |
| | Vibrations | IEC/EN 61496-1: 10 to 55 Hz frequency range, 1 octave/min. sweep rate, 0,35 mm ±0,05 amplitude, 20 sweeps per axis, for 3 axes | | |
| | Shocks | IEC/EN 61496-1: 15 G - 11 ms - 3 per axis, for 3 axes | | |
| | Bumps | IEC/EN 61496-1: 10 G - 16 ms - 1000 per axis, for 3 axes | | |
| | Product dimension | Width: 42 mm (1.65 in); depth: 55 mm (2.16 in); height (2) | | |
| | Connection | Emitter: M12/5 pole male receptacle • Receiver: M12/8 pole male receptacle or terminal strip with M20 cable gland | | |
| | | (see Figure 10 to determine possible modes of operation for each receiver termination type) | | |
| | Material | Housing: aluminium alloy and (conductive) polycarbonate (end caps) • Front plate: polymethylmethacrylate (PMMA) | | |
| Ordering information | | Notes: (1) Voltage switching (high/low): ≥ 11 Vdc min. (I > 6 mA) / ≤ 5 Vdc (I > 2 mA); Input current (high/low): 20 mA / 10 mA at 24 Vdc. In compliance with the IEC 61131-2 requirements for type 2 sensors. (2) Refer to emitter and receiver dimensions / weights. | | |
| FF-SYB□□□□□ M2 | Model (see Table 2 page 9) Resolutions 14: ø 14 mm / 0.6 in 30: ø 30 mm / 1.2 in 50: ø 50 mm / 1.97 in | | | |

Figure 10 - Possible modes of operation and corresponding receiver termination type and connection box

FF-SYB

| Card (1) | Restart mode | Blanking (2) | Auxiliary Safety Device | Muting (3) | Auxiliary output (4) | Receiver termination (5) |
|----------|--------------|--------------|-------------------------|--------------|----------------------|--------------------------|
| #01 | Manual | | | | NC signal | M12 plug |
| #02 | Manual | 1-beam | | | NC signal | M12 plug |
| #03 | Manual | 2-beam | | | NC signal | M12 plug |
| #04 | Automatic | | | | NC signal | M12 plug |
| #05 | Automatic | 1-beam | | | NC signal | M12 plug |
| #06 | Automatic | 2-beam | | | NC signal | M12 plug |
| #07 | Automatic | | yes | | NC signal | M12 plug |
| #08 | Automatic | 1-beam | yes | | NC signal | M12 plug |
| #09 | Automatic | 2-beam | yes | | NC signal | M12 plug |
| #10 | Manual | | yes | | NC signal | M12 plug |
| #11 | Automatic | | | 2 inputs (6) | NC signal | M12 plug |
| #12 | Automatic | | | 2 inputs (6) | Muting lamp | M12 plug |
| #13 | Automatic | | | 4 inputs (6) | NC signal | Terminal strip |
| #14 | Automatic | | | 4 inputs (6) | Muting lamp | Terminal strip |
| #15 | Automatic | | yes | 2 inputs | NC signal | Terminal strip |
| #16 | Automatic | | yes | 2 inputs | Muting lamp | Terminal strip |
| #17 | Manual | | | 2 inputs (6) | NC signal | M12 plug |
| #18 | Manual | | | 2 inputs (6) | Muting lamp | M12 plug |
| #19 | Manual | | | 4 inputs (6) | NC signal | Terminal strip |
| #20 | Manual | | | 4 inputs (6) | Muting lamp | Terminal strip |
| #21 | Manual | | yes | 2 inputs | NC signal | Terminal strip |
| #22 | Manual | | yes | 2 inputs | Muting lamp | Terminal strip |
| #23 | Manual | 1-beam | | 2 inputs (6) | Muting lamp | M12 plug |
| #24 | Manual | 2-beam | | 2 inputs (6) | Muting lamp | M12 plug |
| #25 | Manual | 1-beam | | 4 inputs (6) | Muting lamp | Terminal strip |
| #26 | Manual | 2-beam | | 4 inputs (6) | Muting lamp | Terminal strip |
| #27 | Manual | 1-beam | yes | 2 inputs | Muting lamp | Terminal strip |
| #28 | Manual | 2-beam | yes | 2 inputs | Muting lamp | Terminal strip |

(1) Factory setting: card #04

(2) Floating blanking

| Model | 1-beam | | 2-beam | |
|----------|-----------------|------------------------|------------------|------------------------|
| | Resolution | Undetected object size | Resolution | Undetected object size |
| FF-SYB14 | 24 mm / 0.94 in | 6 mm / 0.23 in | 34 mm / 1.33 in | 16 mm / 0.63 in |
| FF-SYB30 | 50 mm / 1.97 in | 10 mm / 0.39 in | 70 mm / 2.75 in | 30 mm / 1.18 in |
| FF-SYB50 | 90 mm / 3.54 in | 30 mm / 1.18 in | 130 mm / 5.12 in | 70 mm / 2.75 in |

(3) Muting: either 2 inputs available for the connection of 2 or 4 muting sensors to perform a bi-directional muting function (see page 2 and 3), or 4 inputs available for the connection of 4 sensors to perform a uni-directional muting function (see page 3).

(4) Auxiliary output: either a normally closed signalling output of a muting and diagnosis lamp output (see page 2).

(5) Receiver termination: some modes require direct connections to the internal receiver terminal strip. The M20 cable gland (delivered with the package) allows the use of a male M23 cordset.

(6) Connection boxes are available for the interconnection of all sensors and actuators (see "Accessories" section).

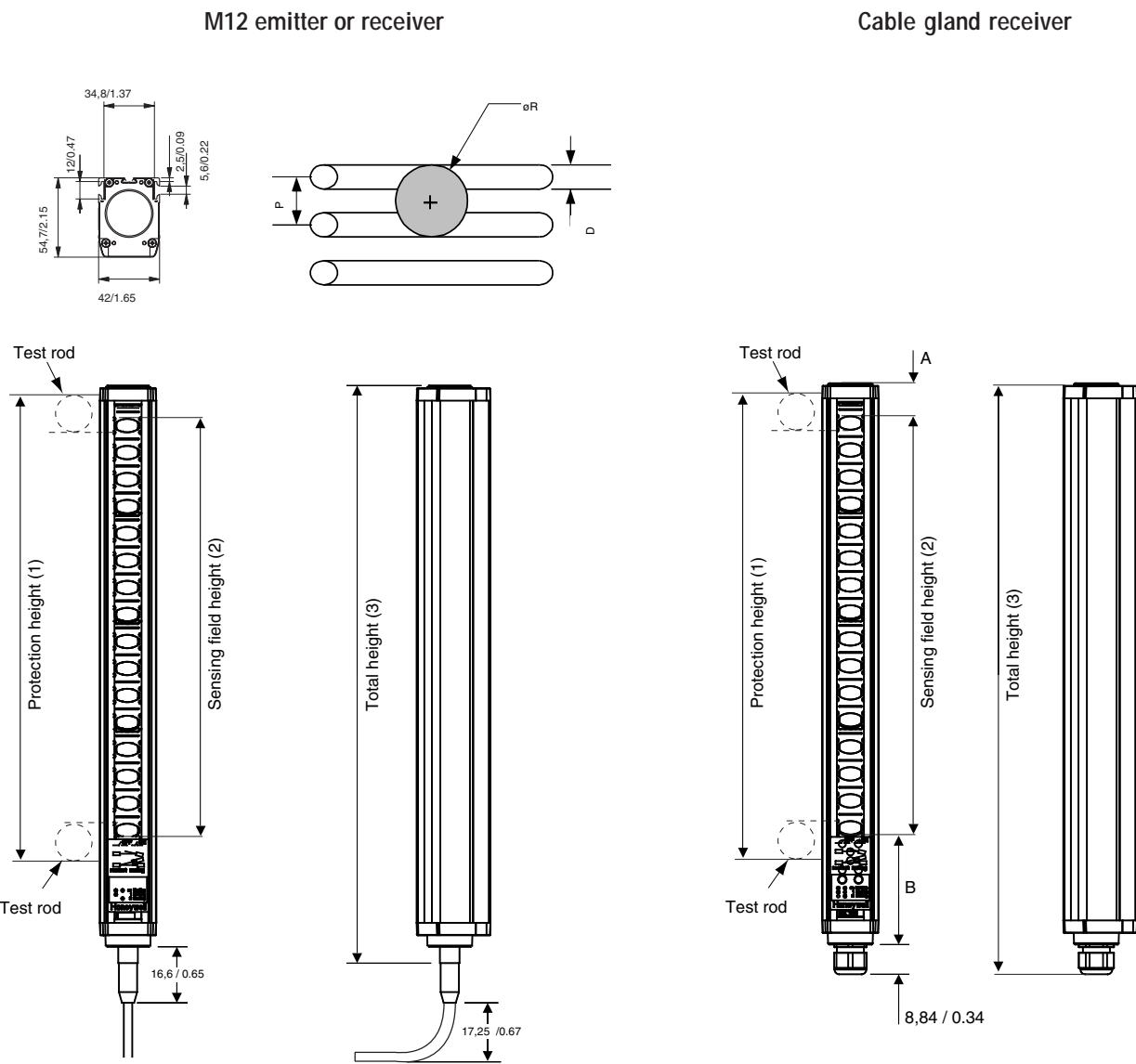
Table 2

| Model | 032 | 048 | 064 | 080 | 096 |
|--|-------------|-------------|-------------|-------------|-------------|
| Protection height (mm / in) (1) | | | | | |
| FF-SYB14 | 334 / 13.1 | 494 / 19.4 | 654 / 25.7 | 814 / 32.07 | 974 / 38.3 |
| FF-SYB30 | 350 / 13.7 | 510 / 20.09 | 670 / 26.3 | 830 / 32.7 | 990 / 39 |
| FF-SYB50 | 370 / 14.6 | 530 / 20.9 | 690 / 27.2 | 850 / 33.5 | 1010 / 39.8 |
| Sensing field height (mm / in)(2) | | | | | |
| FF-SYB14 | 314 / 12.3 | 474 / 18.6 | 634 / 24.9 | 794 / 31.2 | 954 / 37.5 |
| FF-SYB30 | 310 / 12.2 | 470 / 18.5 | 630 / 24.8 | 790 / 31.1 | 950 / 37.4 |
| FF-SYB50 | 290 / 11.4 | 450 / 17.7 | 610 / 24.03 | 770 / 30.3 | 930 / 36.6 |
| Total height (mm / in) (3) | | | | | |
| M12 emitter or receiver | 424 / 16.7 | 584 / 23 | 744 / 29.3 | 904 / 35.6 | 1064 / 41.9 |
| Cable gland receiver only | 438 / 12.2 | 598 / 23.5 | 758 / 29.8 | 918 / 36.1 | 1078 / 42.4 |
| Weight per device (kg / lbs) | 0,86 / 1.89 | 1,14 / 2.5 | 1,42 / 3.12 | 1,7 / 3.74 | 1,98 / 4.35 |

Table 2 (continued)

| Model | 112 | 128 | 144 | 160 | 176 |
|--|-------------|--------------|-------------|-------------|-------------|
| Protection height (mm / in) (1) | | | | | |
| FF-SYB14 | 1134 / 44.6 | 1294 / 50.9 | 1454 / 57.2 | 1614 / 63.5 | 1774 / 69.8 |
| FF-SYB30 | 1150 / 45.3 | 1310 / 51.6 | 1470 / 57.9 | 1630 / 64.2 | 1790 / 70.5 |
| FF-SYB50 | 1170 / 46.0 | 1330 / 52.4 | 1490 / 58.7 | 1650 / 65.0 | 1810 / 71.2 |
| Sensing field height (mm / in)(2) | | | | | |
| FF-SYB14 | 1114 / 43.8 | 1274 / 50.1 | 1434 / 56.5 | 1594 / 62.8 | 1754 / 69.1 |
| FF-SYB30 | 1110 / 43.7 | 1270 / 50.03 | 1430 / 56.3 | 1590 / 62.6 | 1750 / 68.9 |
| FF-SYB50 | 1090 / 42.9 | 1250 / 49.2 | 1410 / 55.1 | 1570 / 61.8 | 1730 / 68.1 |
| Total height (mm / in) (3) | | | | | |
| M12 emitter or receiver | 1224 / 48.2 | 1384 / 54.5 | 1544 / 60.8 | 1704 / 67.1 | 1864 / 73.4 |
| Cable gland receiver only | 1238 / 48.7 | 1398 / 55 | 1558 / 61.3 | 1718 / 67.6 | 1878 / 73.9 |
| Weight per device (kg / lbs) | 2,26 / 4.97 | 2,54 / 4.97 | 2,82 / 6.20 | 3,10 / 6.82 | 3,38 / 7.43 |

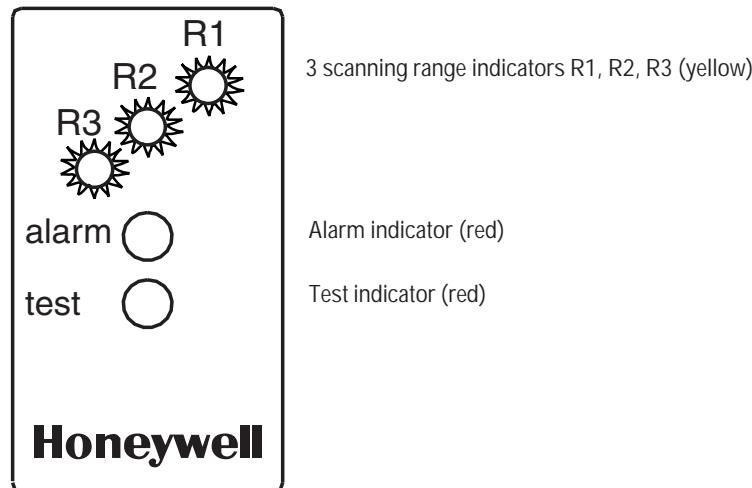
Figure 11 - Dimensions in mm / in

FF-SYB


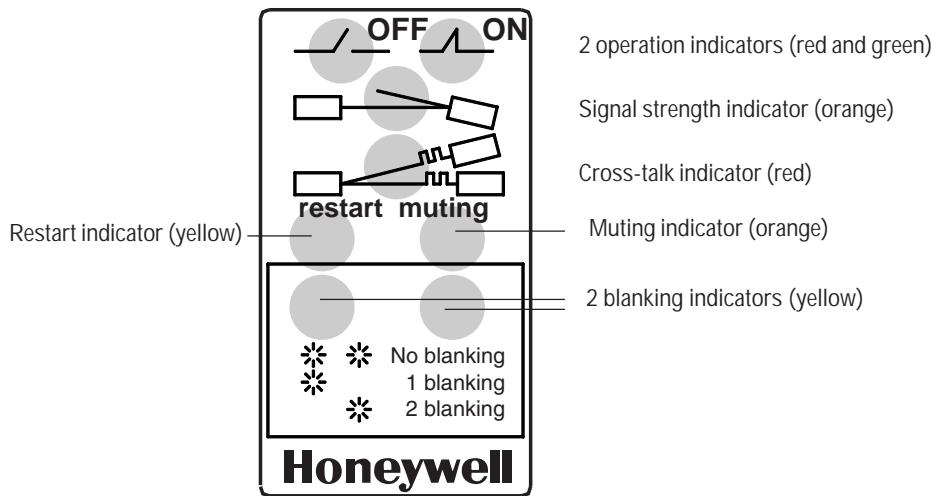
- (1) Protection Height for the minimum detected object size or resolution
- (2) Sensing Field Height (full screen height)
- (3) Total Height (including male receptacles or cable gland)

Table 1

| (mm / in) | øR (resolution) | P (lens pitch) | D (lens diameter) | A (inactive zone) | B (inactive zone) |
|-----------|-----------------|----------------|-------------------|-------------------|-------------------|
| FF-SYB14 | ø 14 / 0.6 | 10 / 0.4 | 4 / 0.16 | 15,2 / 0.60 | 90,6 / 3.56 |
| FF-SYB30 | ø 30 / 1.2 | 20 / 0.8 | 10 / 0.4 | 22,2 / 0.87 | 87,6 / 3.45 |
| FF-SYB50 | ø 50 / 1.97 | 40 / 1.57 | 10 / 0.39 | 42,2 / 1.66 | 87,6 / 3.45 |

LED status indicators*Figure 12 - Emitter*

FF-SYB

Figure 13 - Receiver

□ Wiring

Figure 14 - Recommended wiring diagram for a 2-sensor muting application with automatic restart and Temporary Manual Muting (TMM) (see Figure 1)

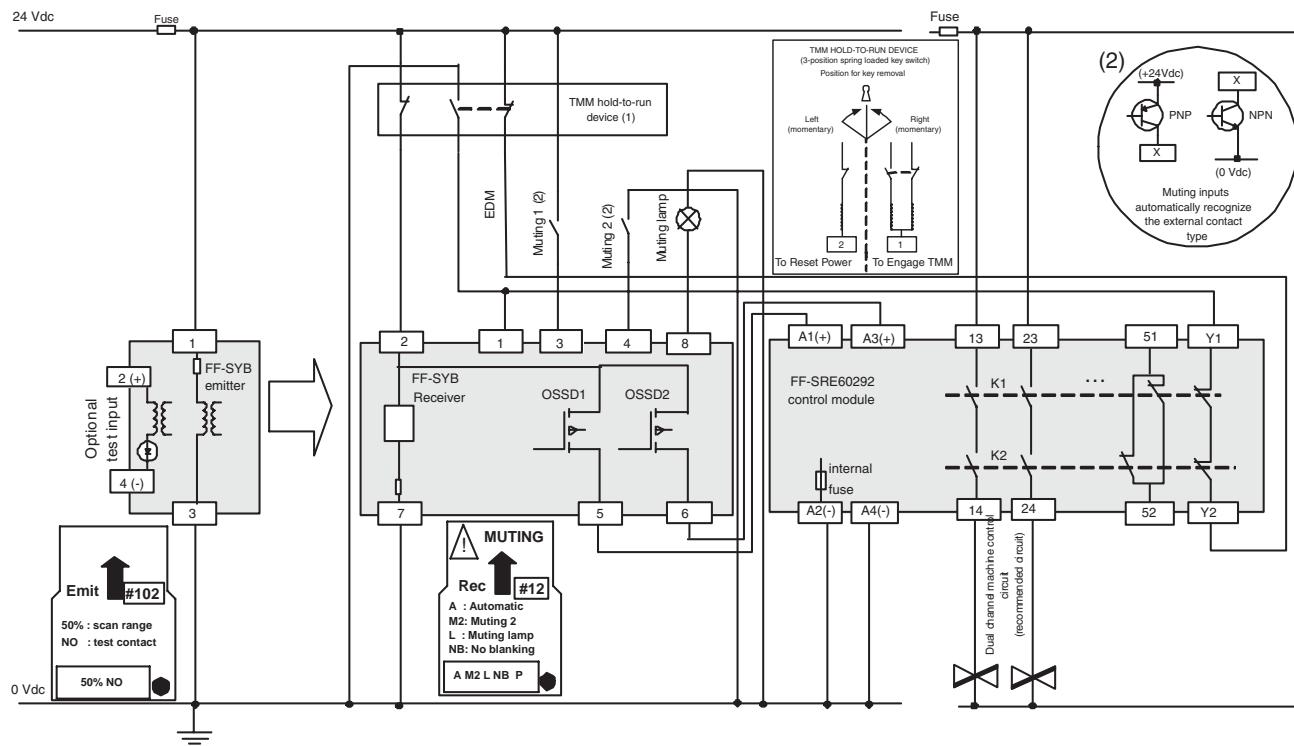
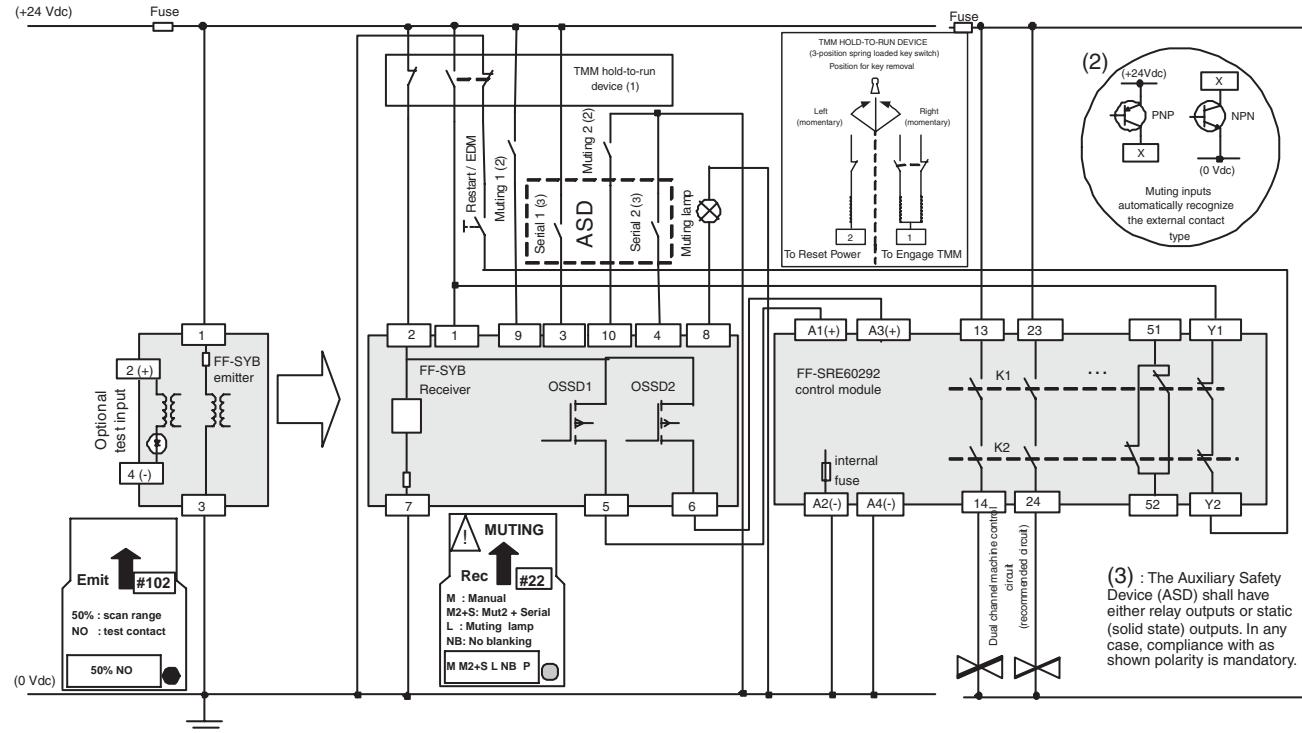
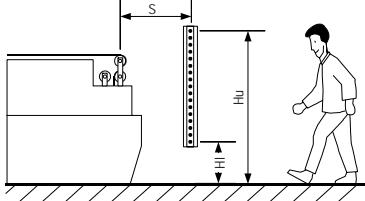
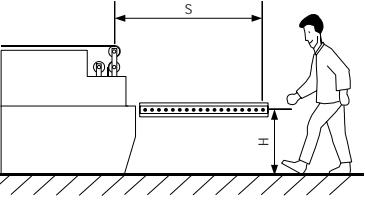
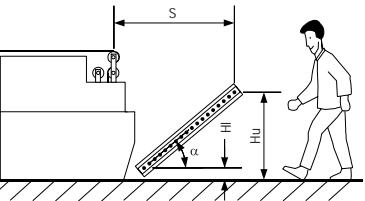


Figure 15 - Recommended wiring diagram for a 2-sensor muting application with an auxiliary safety device, manual restart and Temporary Manual Muting (TMM)



European EN 999 standard

All distances/heights in mm (100 mm = 3.9 in)

| LIGHT CURTAIN MODEL | FF-SYB14 FF-SYB30 without floating/blanking | FF-SYB30 with 1- or 2 beam floating blanking FF-SYB50 with or without blanking |
|---|--|--|
| Normal approach  | $S \geq 2000 (t_1+t_2) + 8 (R-14)$ with $S \geq 100$ if $S \geq 500$, then use: $S \geq 1600 (t_1+t_2) + 8 (R - 14)$ with $S \geq 500$ | $S \geq 1600 (t_1+t_2) + 850$ with $Hu \geq 900 \text{ mm}$ $HI \leq 300 \text{ mm}$ |
| Parallel approach  | $S \geq 1600 (t_1+t_2) + (1200 - 0.4H)$, with $H \leq 875$ Or $S \geq 1600 (t_1+t_2) + 850$, with $875 \leq H \leq 1000$ with $H \geq 15$ (R-50): $H \geq 300 \text{ mm}$ for the FF-SYB30 with 2-beam floating blanking. $H \geq 600 \text{ mm}$ for the FF-SYB50 with 1-beam floating blanking FF-SYB50 with 2-beam floating blanking not allowed in parallel approach. | |
| Angled approach  | if $\alpha \geq 30^\circ$, then use the normal approach formula, with $Hu \geq 900 \text{ mm}$ and $HI \leq 300 \text{ mm}$ if $\alpha \leq 30^\circ$, then use the parallel approach formula, with $Hu \leq 1000 \text{ mm}$ and $HI \geq 15$ (R-50) where R is the light curtain resolution $HI \geq 300 \text{ mm}$ for the FF-SYB30 with 2-beam floating blanking $HI \geq 600 \text{ mm}$ for the FF-SYB50 with 1-beam floating blanking FF-SYB50 with 2-beam floating blanking not allowed in angled approach. | |

t₁: light curtain response time (s)

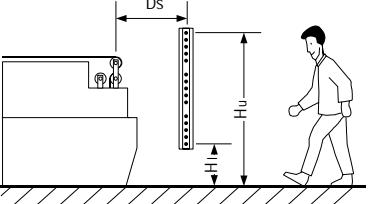
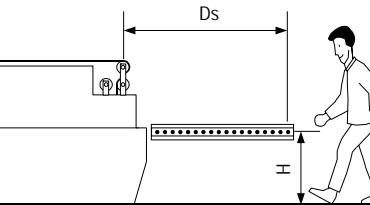
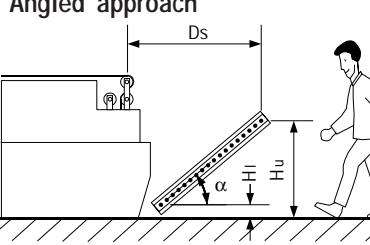
t₂: machine stopping time (s)

R: light curtain resolution

For more information, refer to the EN 999 European standard or comply with the requirements on safety distances given by the type C European standard if existing for the considered machine.

□ USA's OSHA/ANSI/RIA standards

All distances/heights in inches (1 in = 25,4 mm)

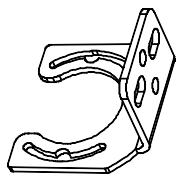
| LIGHT CURTAIN MODEL | FF-SYB14, FF-SYB30, FF-SYB50 with or without floating blanking | | | | | | | | | | | | | | | | |
|---|---|--------------------|--------------------|--------|--------|----------|-----------------|-----------------|-----------------|----------|-----------------|-----------------|--------------------|----------|-----------------|--------------------|-------------|
| Normal approach  | $Ds \geq 63 (Ts + Tc + Tr) + Dpf$ <p>If $R \leq 2,5$, $Dpf = 3.4 \times (R - 0.275)$, (see table below)</p> <p>If $Hi \leq 12$ and $Hu \geq 48$ (Typical for Reach Thru), $Dpf = 36$</p> <p>If $Hi \leq 12$ and $36 \leq Hu \leq 48$ (Typical for Reach Over), $Dpf = 48$</p> <p>If $Hi > 12$, supplemental safeguarding may be required to detect crawling underneath.</p> | | | | | | | | | | | | | | | | |
| Parallel approach  | $Ds \geq 63 \times (Ts + Tc + Tr) + 48$ $H \geq 15 \times (R-2)$ <table border="1" data-bbox="573 677 1414 868"> <thead> <tr> <th data-bbox="605 699 747 730">Table for H^*</th> <th data-bbox="811 699 954 730">No blanking</th> <th data-bbox="1065 699 1176 730">1-beam</th> <th data-bbox="1271 699 1367 730">2-beam</th> </tr> </thead> <tbody> <tr> <td data-bbox="605 741 747 772">FF-SYB14</td> <td data-bbox="811 741 954 772">$0 < H \leq 39$</td> <td data-bbox="1065 741 1176 772">$0 < H \leq 39$</td> <td data-bbox="1271 741 1367 772">$0 < H \leq 39$</td> </tr> <tr> <td data-bbox="605 783 747 815">FF-SYB30</td> <td data-bbox="811 783 954 815">$0 < H \leq 39$</td> <td data-bbox="1065 783 1176 815">$0 < H \leq 39$</td> <td data-bbox="1271 783 1399 815">$11.3 < H \leq 39$</td> </tr> <tr> <td data-bbox="605 825 747 857">FF-SYB50</td> <td data-bbox="811 825 954 857">$0 < H \leq 39$</td> <td data-bbox="1017 825 1192 857">$23.1 < H \leq 39$</td> <td data-bbox="1271 825 1383 857">Not allowed</td> </tr> </tbody> </table> | Table for H^* | No blanking | 1-beam | 2-beam | FF-SYB14 | $0 < H \leq 39$ | $0 < H \leq 39$ | $0 < H \leq 39$ | FF-SYB30 | $0 < H \leq 39$ | $0 < H \leq 39$ | $11.3 < H \leq 39$ | FF-SYB50 | $0 < H \leq 39$ | $23.1 < H \leq 39$ | Not allowed |
| Table for H^* | No blanking | 1-beam | 2-beam | | | | | | | | | | | | | | |
| FF-SYB14 | $0 < H \leq 39$ | $0 < H \leq 39$ | $0 < H \leq 39$ | | | | | | | | | | | | | | |
| FF-SYB30 | $0 < H \leq 39$ | $0 < H \leq 39$ | $11.3 < H \leq 39$ | | | | | | | | | | | | | | |
| FF-SYB50 | $0 < H \leq 39$ | $23.1 < H \leq 39$ | Not allowed | | | | | | | | | | | | | | |
| Angled approach  | If $\alpha < 30^\circ$, then use the normal approach formula If $\alpha < 30^\circ$, then use the parallel approach formula | | | | | | | | | | | | | | | | |

Ts: worst case stopping time of the machine (s)
 Tc: worst case response time of the machine controls (s)
 Tr: response time of the safety devices (s)
 Dpf: Depth penetration factor (in.)
 R: light curtain resolution

| Table for Dpf | No blanking | 1-beam | 2-beam |
|---------------|-------------|--------|--------|
| FF-SYB14 | 0.935 | 2.261 | 3.587 |
| FF-SYB30 | 3.077 | 5.763 | - |
| FF-SYB50 | 5.763 | - | - |

For more information, refer to the ANSI/RIA 15.06 American standard.

Accessories



FF-SYZ634178

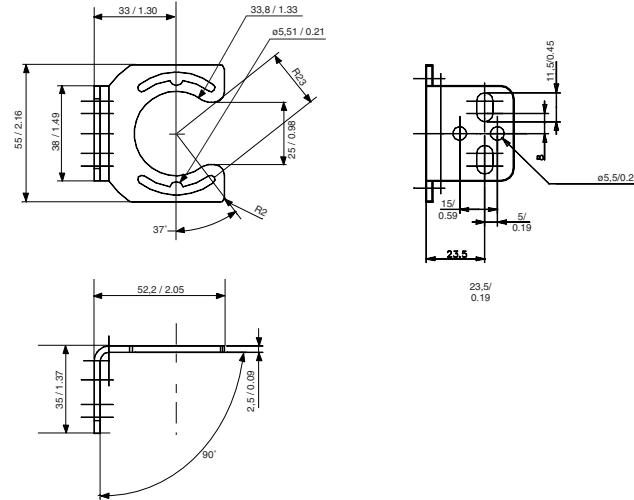
Kit of 2 right angle mounting brackets with screws, bolts, nuts and washers to mount one emitter or one receiver unit.

Possible mounting positions:

1. At the top and the bottom of the FF-SYB (allowing adjustments in azimuth directions of $\pm 10^\circ$).
2. At one of the two lateral dovetail slots (allowing adjustments in vertical directions along the slot)
3. At the rear dovetail slot (allowing adjustments in vertical directions along the slot)

Order 2 kits for a complete set of emitter and receiver.

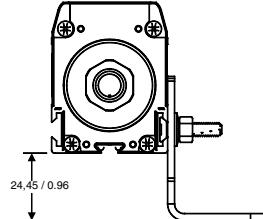
(already included in the FF-SYB package)



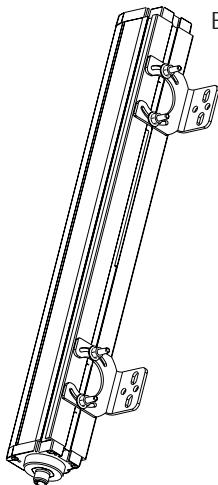
Bracket mounting at the top and the bottom



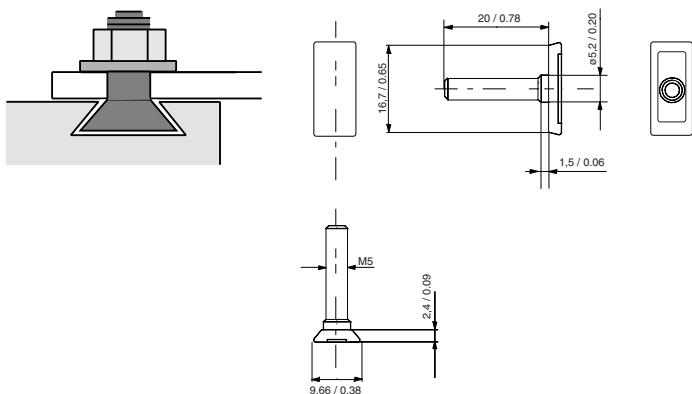
Bracket mounting at the lateral dovetail slots

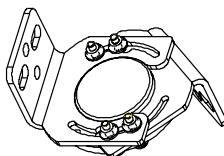


Bracket mounting at the rear dovetail slots



M5 dovetail shape bolt



FF-SYB**FF-SYZ634179**

Kit of 2 adjustable mounting brackets with rotating plate, screws, bolts, nuts, and washers to mount one emitter or one receiver unit.

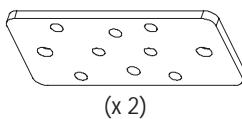
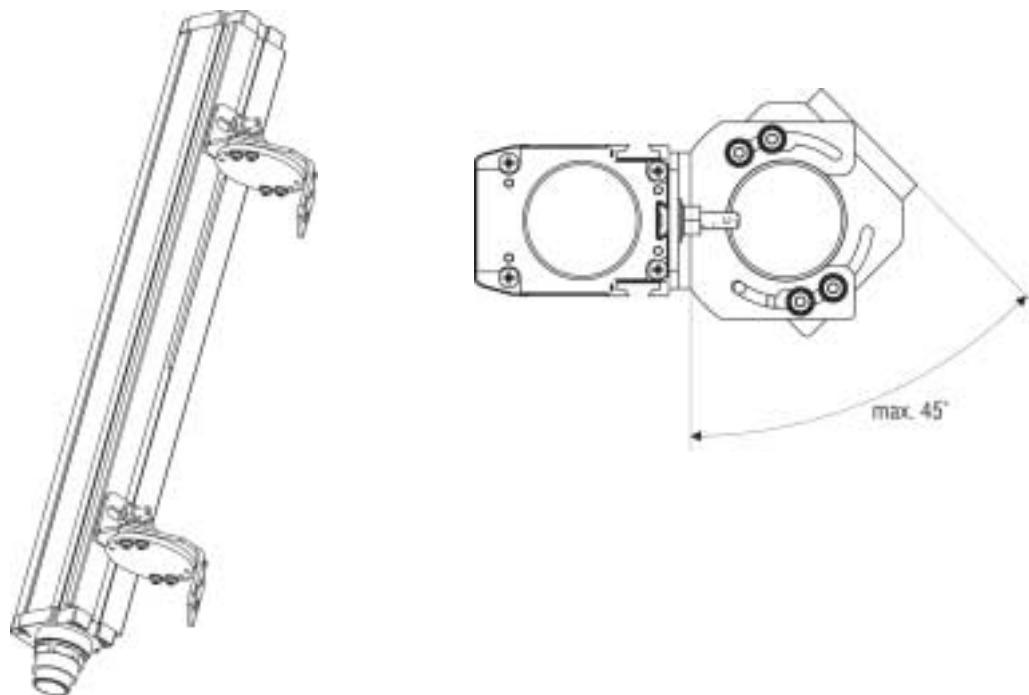
Possible mounting position is:

- at the rear dovetail slot
(allowing adjustments in vertical directions along the slot and in azimuth directions of max. $\pm 45^\circ$)

Order 2 kits for a complete set of emitter and receiver.

Refer to the section FF-SYZ634178 for the detailed dimensions of the brackets.

(to be ordered separately as an option, to be mounted together with the FF-SYZ634178 brackets delivered with the FF-SYB package)



(x 2)



(x 4)

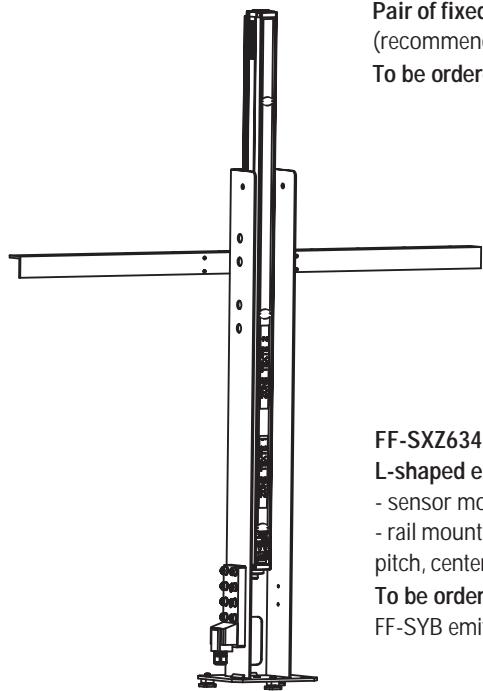
FF-SYZAD**Anti-vibration kit**

Kit of 2 straight brackets and 4 anti-vibration dampers (mounting hardware included) - to substitute for the FF-SYZ634178 brackets delivered with the FF-SYB package.

NOTICE**PROTECTION AGAINST HIGH VIBRATION**

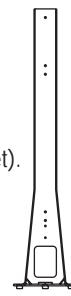
In case of high vibrations, order:

- 2 sets of FF-SYZAD kit for light curtain systems with protection height below 1000 mm/ 39.4 in.
- 3 sets of FF-SYZAD kit for light curtain systems with protection height greater or equal to 1000 mm/39.4 in, but less than 1850 mm/72.8 in.
- 4 sets of FF-SYZAD kit for light curtain systems with protection height greater than 1850 mm/72.8 in.

Mechanical fixture for muting application**FF-SXZ630170****Pair of fixed posts for FF-SYB light curtain**

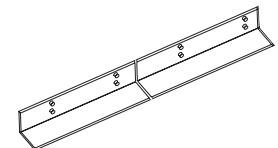
(recommended when mechanical protection of the light curtain is NOT required)

To be ordered separately as an option (order 1 piece for a complete FF-SYB emitter/receiver set).

**FF-SXZ634186****L-shaped extrusion 40 mm x 40 mm / 1.57 in x 1.57 in, 1 m / 3.28 ft long**

- sensor mounting: ø5.5 mm / ø1/4 in fixing holes, 100 mm / 3.94 in pitch

- rail mounting: 3 pairs of ø5.5 mm / ø1/4 in fixing holes, 100 mm / 3.94 in pitch, centered

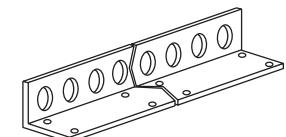


To be ordered separately as an option (order 2 pieces for a complete FF-SYB emitter/receiver set).

FF-MPZS6018**Muting sensor mounting rails**

- sensor mounting: ø18 mm / ø0.71 in mounting holes, 30 mm / 1.18 in distance between centers

- rail mounting: ø5 mm / ø1/5 in fixing holes, 100 mm / 3.94 in pitch



To be ordered separately as an option (order 2 pieces for a complete FF-SYB emitter/receiver set).

**FF-SYZPF****Fixed post for FF-SYB light curtain**

(recommended when the mechanical protection of the light curtain is required)

Floorstanding post for the installation of the following FF-SYB light curtains:

Light curtain models: FF-SYB032□□, FF-SYB048□□, FF-SYB080□□, FF-SYB096□□

Multibeam models: FF-SYB02500, FF-SYB03400, FF-SYB04300

To be ordered separately as an option (order 2 pieces for a complete FF-SYB emitter/receiver set).

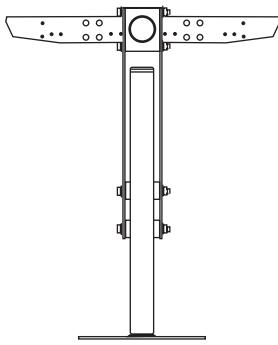
Front covers are available for additional protection of the FF-SYB234 beam access detection systems:

FF-SYZ630184-2: Front cover for 2 beams

FF-SYZ630184-3: Front cover for 3 beams

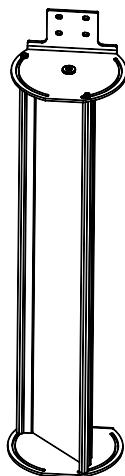
FF-SYZ630184-4: Front cover for 4 beams

To be ordered separately as an option.

**FF-SYZPA****Adjustable floor standing post**

- Compatible with all protection heights
- Horizontal, diagonal and vertical adjustment of light curtains possible
- Quick mounting and easy light curtain adjustment
- 360° rotation of light curtain possible
- Fine adjustment of light curtains in azimuth direction of $\pm 11^\circ$ ensures an easy alignment
- 700 mm / 27.58 in corner protection for light curtain included
- Base plate can be mounted independently
- Finish: RAL 1021 yellow paint

To be ordered separately as an option.

**FF-SYZMIR□□□ Deflection mirror**

To be ordered separately as an option

Features:

- Deflection mirror with 10 % scanning range reduction (FF-SYZMIR004 through 18)
- Deflection mirror with 25 % scanning range reduction (FF-SYZMIR104 through 18)
- Food and Beverage industry: stainless steel deflection mirrors with 45 % scanning range reduction (FF-SYZMIR204 through 14)

Quick mounting and easy mirror adjustment

Mounting brackets included (top / bottom mounting)

Adjustment of mirror in azimuth direction of $\pm 45^\circ$

| | |
|----------|-------------------------|
| Material | Aluminium alloy housing |
| Finish | Gold colour anodisation |

Ordering guide:

| | |
|--------------|---------------------------|
| FF-SYZMIR□04 | FF-SY□□032 and FF-SY□□048 |
| FF-SYZMIR□06 | FF-SY□□064 |
| FF-SYZMIR□08 | FF-SY□□080 |
| FF-SYZMIR□10 | FF-SY□□096 |
| FF-SYZMIR□12 | FF-SY□□112 and FF-SY□□128 |
| FF-SYZMIR□14 | FF-SY□□144 |
| FF-SYZMIR□16 | FF-SY□□160 |
| FF-SYZMIR□18 | FF-SY□□176 |

**FF-SYZPFM****Fixed post with plain mirror (10 % or 25 % reduction of scanning range)**

Floorstanding post with 1 plain mirror (FF-SYZPFM01, 10 % of loss)

Floorstanding post with 1 plain mirror (FF-SYZPFM11, 25 % of loss)

Suitable for light curtain models: FF-SYB032□□, FF-SYB048□□, FF-SYB080□□, FF-SYB096□□

To be ordered separately as an option.

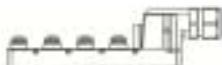
**FF-SXZSHL****IP67 enclosure for FF-SYB light curtains**

| Enclosures | Light curtains |
|---------------|--|
| FF-SXZSHL048□ | FF-SYB□□032 and 048 |
| FF-SXZSHL096□ | FF-SYB□□064 through 096 |
| FF-SXZSHL128□ | FF-SYB□□112 and 128 |
| FF-SXZSHLKIT | Brackets and cable gland kit (order one kit per enclosure) |

□: "P" for polycarbonate, "G" for glass

M12 connection boxes

For the connection of muting sensors, restart and TMM switches and muting lamp to the light curtain

**FF-SXZBOX8M12T**

IP67 junction box, field-attachable home run cable, M12 8-port configuration.

**FF-SXZBOX8M12L02**

IP67 junction box, field-attachable home run cable, M12 8-port configuration, prewired with a 2 m/6.56 ft M12 8-pin cordset.

**Cordsets
M12/5 pole**

- 1: brown
- 2: white
- 3: blue
- 4: black
- 5: green/yellow

**M12 single-ended cordset, female / 5-pin straight for the FF-SYB emitter**

FF-SXZCAM125U02 2 m / 6.56 ft length

FF-SXZCAM125U05 5 m / 16.40 ft length

FF-SXZCAM125U10 10 m / 32.8 ft length

Equivalent to the 805000A09M... Micro-change® Series from Brad Harrison
(see vendor catalog for color code)

M12/8 pole

- 1: white
- 2: brown
- 3: green
- 4: yellow
- 5: grey
- 6: pink
- 7: blue
- 8: red

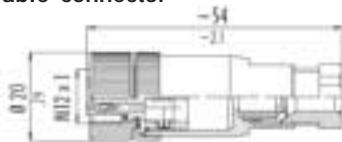
**M12 single-ended cordset, female / 8-pin straight for the FF-SYB receiver**

FF-SXZCAM128U02 2 m / 6.56 ft length

FF-SXZCAM128U05 5 m / 16.40 ft length

FF-SXZCAM128U10 10 m / 32.8 ft length

Equivalent to the 808000P02M... Micro-change® Series from Brad Harrison
(see vendor catalog for color code)

Cable connector

FF-SXZCOM125 - M12 screw connector, female / 5 pin straight for the FF-SYB emitter
FF-SXZCOM128 - M12 screw connector, female / 8 pin straight for the FF-SYB receiver

Safety control modules**FF-SRE60292**

Slim line expansion module

- 24 Vdc
- Safety interface up to Category 4 per EN 954-1
- 4 NO/2 NC safety relay outputs
- 22,5 mm / 0.88 in width
- (to be ordered separately as an option).

**FF-SRE30812**

Expansion module

- 24 Vdc, 115 Vac or 230 Vac
- Safety interface up to Category 4 per EN 954-1
- 7 NO/1 NC internally redundant safety relay outputs
- 90 mm / 3.54 in width
- (to be ordered separately as an option).

Safety control modules

FF-SYB



FF-SRM200P2

Mutual exclusion module

(to be ordered separately as an option)

- typical applications: loading/unloading chamber on machining centers or conveyors, crossing of conveyor lines, moving conveyors or AGVs
- connection of 2 safety devices
- 24 Vdc
- Category 4 per EN 954-1
- manual start mode, FSD monitoring
- crossfault monitoring of inputs
- 3 NO safety relay outputs
- static outputs for output status and diagnostic information
- 45 mm / 1.77 in



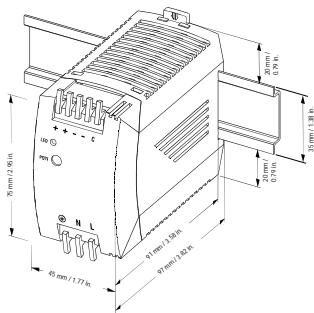
FF-SRL59022

Presence Sensing Device Initiation (PSDI)

(to be ordered separately as an option)

- to be used with FF-SYB14 or FF-SYB30 only
- accept a single safety light curtain working in a single stroke/dual stroke mode
- 24 Vdc
- Category 4 per EN 954-1
- manual start mode and FSD monitoring
- cross-fault monitoring of inputs
- 3 NO safety relay outputs
- static outputs for relay output status and diagnostic information
- 45 mm / 1.77 in

ac to dc power supply



FF-SXZPWR050

ac to dc power supply

(to be ordered separately as an option)

- Approvals: UL508 listed, UL1950, cUL/CSA-C22.2 No.950-M90, EN/IEC 60950, EN 50178 (Class 2 Rated for low power installations)
- Input voltage: 85-264 Vac (43-67 Hz)
- Output voltage: 24-28 Vdc adjustable
- Rated continuous load (at 60 °C/140 °F max.): 2,1 A @ 24 Vdc / 1,8A @ 28 Vdc
- Power: 50 W
- Dimensions 75 mm x 45 mm x 97 mm / 2.95 in x 1.77 in x 3.82 in
- DIN rail mounting
- Weight: 240 g / 0.52 lbs

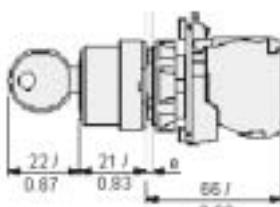
Muting lamp



FF-SXZMLED

Beacon supplied with fixing plate for vertical surface and a LEDs bulb (Telemecanique XVB Series type). To be used as the muting/diagnostic lamp.

3 position spring loaded key switch



(not contractual)

FF-SXZTMM

ø 22 mm 3-position spring loaded key switch with a Normally Closed contact on the left position and two complementary (Normally Closed and Normally Open) contacts on the right position (Telemecanique ZB5 Series type, fixing collar with screw clamp contact blocks, key # 455).

To be used as the TMM hold-to-run device.

Configuration cards

FF-SYZ101085R
Set of 28 configuration cards for FF-SYB receiver

FF-SYZ101092E
Set of 6 configuration cards for FF-SYB emitter

Installation manuals

FF-PK107120-EN One FF-SYB English installation manual
FF-PK107120-DE One FF-SYB German installation manual
FF-PK107120-FR One FF-SYB French installation manual
FF-PK107120-IT One FF-SYB Italian installation manual
FF-PK107120-SP One FF-SYB Spanish installation manual

NOTICE

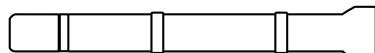
By default, products will be shipped with the installation manual in the language of the country of delivery when available or in English. If any other language is required, it must be ordered separately.

Test rods**FF-SYZROD14**

Test rod for ø14 mm / 0.6 in resolution safety light curtains
(already included in the FF-SYB package).

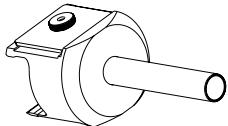
FF-SBZROD30

Test rod for ø30 mm / 1.2 in resolution safety light curtains
(already included in the FF-SYB package).

**FF-SPZLASER**

The laser pen FF-SPZLASER is a self-contained and compact laser device designed to ease infrared beam alignments. Its class II conforms to the EN 60825 European standard and the US 21 CFR 1040 American standard.

To be ordered separately as an option.

**FF-SYZ604795**

Mechanical adapter for the FF-SPZLASER laser pen to be used with the FF-SYB Series light curtain.
To be ordered separately as an option.

Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. **The foregoing is Buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

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