Safety light curtain

FF-SYA Series

Compact, Universal, Smart and Full-featured

FEATURES

- Active Optoelectronic Protective Device compliant with the requirements of the IEC/EN 61496 - parts 1 and 2 European norms for Type 4 electrosensitive protective equipment
- Meets applicable parts of North American standards and regulations OSHA 1910.212 and 217; ANSI B11.1, 2 and 19; RIA 15.06; CSA
- **Self-contained unit. No electrical connection necessary between emitter and receiver**
- **2 fail-safe static outputs with short-circuit and cross-fault detection**
- **Control of the infrared emission source for cross-talk reduction**
- **Enhanced diagnostic information includes: a signal strength indicator, a cross-talk indicator and a failure diagnostic indicator**
- Integrated DC to DC converter as requested by the IEC/EN 61496 Standard
- Test input
- Resolutions available:
  ø14 mm/0.6 in for finger detection
  ø30 mm/1.2 in for hand detection
  ø60 mm/2.4 in for body detection
- Protection height up to 1830 mm/72 in
- Scanning range up to 20 m/65 ft
- Electrical connection: quick-disconnect plugs
- Mounting brackets included
- Optional interface control module for more switching capability or additional features (see page 263).

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

NRTL/C

INRS

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

The new Honeywell FF-SYA light curtain is designed in compliance with IEC/EN 61496 - parts 1 and 2 standard and meets the requirements for a Type 4 Active Optoelectronic Protective Device, the safest possible 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, ANSI and RIA 15.06 for Control Reliability and has a CSAnrtl/c mark, making it a product usable in all parts of the world.

As soon as an object is detected inside the protection field, the FF-SYA opens its two fail-safe static outputs to remove hazardous situation from the machine it controls. The FF-SYA is a self-contained light curtain that does not require a separate control unit for operation. The optional FF-SRS5939 interface control module is available to provide higher current capability and additional functionality (see page 263). This light curtain has been designed to satisfy the requirements of worldwide machine manufacturers and users: its compact size combined with its universal and smart features makes it full-featured and easy to use.

⚠ 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.

The FF-SYA main features are:

- COMPACT SIZE

The cross section of 42 x 55 mm²/1.65 x 2.16 in² makes installation possible in tight spaces, especially with the help of the small brackets supplied with the light curtains. The optional FF-SRS59392 interface control module easily fits inside the machine control panel with its 45 mm/1.77 in width DIN rail mount housing.

- UNIVERSAL

The housing dimensions are the same for the 14 mm/0.6 in, 30 mm/1.2 in, 60 mm/2.4 in resolution light curtains. The extended protected heights range from 334 to 1830 mm/ 13.1 to 72.0 in, covering all industrial applications. The scanning range makes it possible to use mirrors in order to protect several sides of a machine with only one system.

- SMART

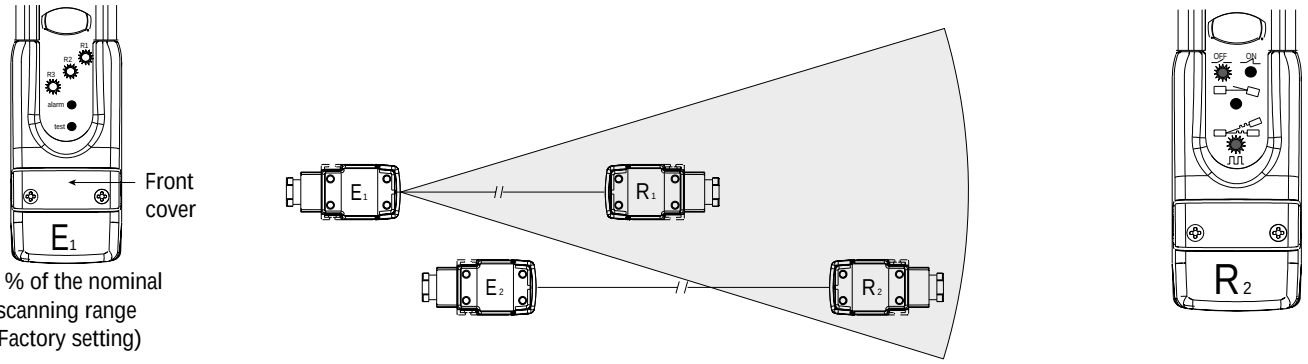
The FF-SYA is equipped with 2 fail-safe static outputs and an optional full-featured safety control module is available for a greater output current capability and manual restart functionality. An integrated cross talk reduction system allows the scanning range to be selected for the application distance. A cross talk indicator flickers when emission from other systems is detected, indicating that a different selection of the scanning range is needed. The light curtain also has a signal strength indicator which flickers if there is a slight misalignment of the beams or front window contamination. Additional indicators provide information on the outputs status, on the selected scanning range and on failure diagnostic. Standard brackets are delivered with the light curtain to ease the order process. The housing has a T-slot mounting system to adapt brackets anywhere along the housing. Quick disconnect connectors are also delivered with the FF-SYA❑❑❑❑❑C2 light curtains.

- FULL FEATURED

The FF-SYA does not need a galvanic insulated power supply since it includes its own means of galvanic insulation (DC/DC converter). Compliance with the installation requirements of the IEC/EN 61496-1 standard is therefore guaranted by design. The integrated test input can be used to test the entire safety chain. When connected to the FF-SRS59392 interface control module, the FF-SYA provides a wide variety of advanced functions: cross-monitored relays, final switching devices monitoring for the control of external contactors or relays, choice between automatic restart or start and restart interlock as well as relay status indicators.

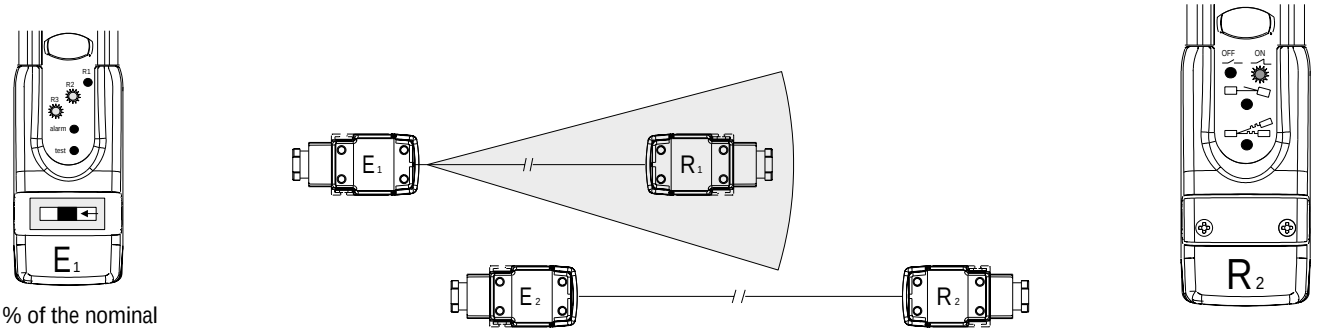
Cross-talk reduction system

The FF-SYA light curtain is based upon an infrared transmission between an emitter unit and a receiver unit. It is a requirement of the IEC/pr 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.



100 % of the nominal scanning range (Factory setting)

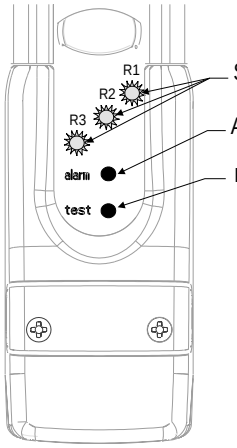
A selector switch is available on the emitter units for the selection of the adequate emission power. This switch can be used to eliminate this cross-talk phenomenon by decreasing the nominal scanning range down to 42 % or 54 % of its value. The front cover is accessible and there is no need to remove unit from the machinery to select a different scanning range.

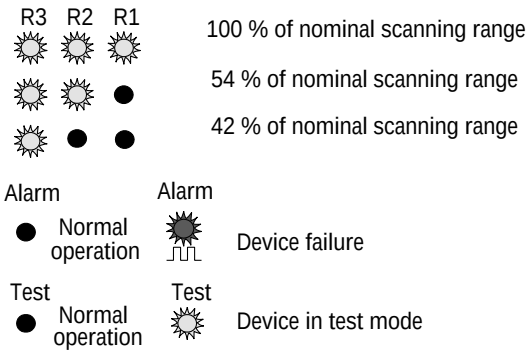


54 % of the nominal scanning range

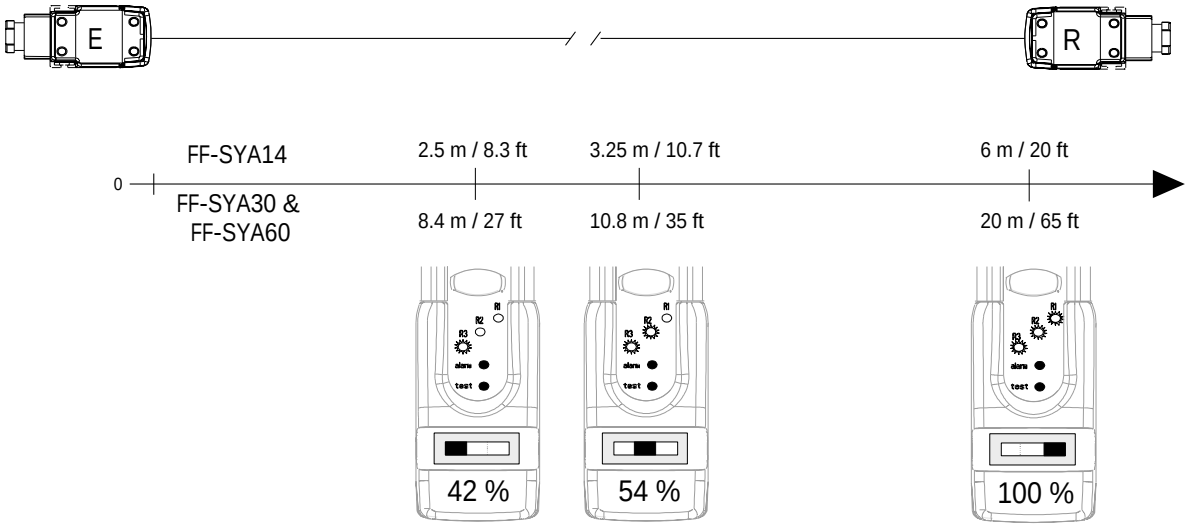
LED status indicators

Emitter

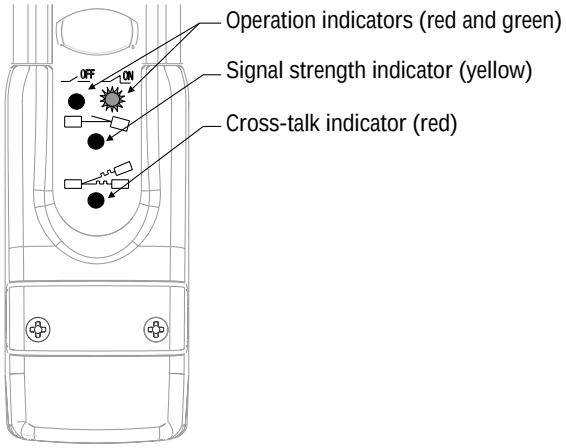


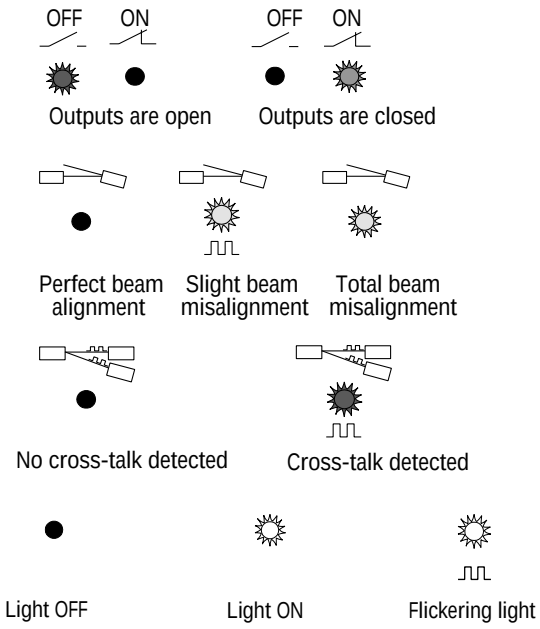


Scanning range selection:



Receiver





FF-SYA

- **Type 4 according to the IEC/EN 61496 - parts 1 and 2 standards**
- **Control of the infrared emission source for cross-talk reduction**
- **2 fail-safe static outputs with short-circuit and cross-fault detection**
- **Enhanced diagnostic information**

NRTL/C

INRS

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

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

Features / Type	SYA14	SYA30	SYA60
Resolutions (mm/in.)	ø 14 / 0.6	ø 30 / 1.2	ø 60 / 2.4
Protection heights (mm/in.)	See Table 2		
Nominal scanning ranges (m/ft)	0 to 6 / 0 to 20	0,6 to 20 / 2 to 65	0,6 to 20 / 2 to 65
Supply voltage	24 Vdc (± 15 %)		
Power consumption	Emitter: 7 W max. / Receiver: 5.5 W max. (see Table 2)		
Outputs	2 fail-safe static outputs (switching capacity: 0.5 A / 24 Vdc)		
Response time	13.5 to 22.5 ms (see Table 2)		
Function	Test input (external normally closed contact)		
LED status indicators	Emitter: test mode, failure alarm, selected scanning range		
	Receiver: outputs status, optical signal margin, cross-talk detection		
Cross sectional area	W 42 x D 55 mm²/W 1.65 x D 2.16 in.² (see Tables 1 and 2 for complete housing dimensions)		
Emission	Infrared modulated light source (880 nm)		
Effective aperture angle	± 2°, ± 25 % (in compliance with the IEC/EN 61496 - part 2)		
Light immunity	Sun: 20 000 lux / Lamp: 15 000 lux		
Electrical noise immunity	IEC 61000-4-4: level III / IEC 61000-4-3: level III		
Ambient temperature	Operating temperature: 0 to 55 °C/32 to 131 °F / Storage temperature: -20 to 75 °C/-4 to 167 °F		
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		
Sealing	IP 65, NEMA 4, 13		
Material	Housing: aluminium alloy, front plate: polymethyl metacrylate (PMMA), end caps: polycarbonate		
Electrical connection	FF-SYA❑❑❑❑❑C2: DIN 43651 plastic 7-pin right-angle plugs with crimping contacts		
	(Hirschmann N6RFF type) / FF-SYA❑❑❑❑❑Q2: 5 & 7 pole straight male receptacles		
	compatible with Brad Harrison mini-change plugs (not included) (4)		

Ordering information

Each listing consists of an emitter, a receiver, a pair of connectors, 2 pairs of right-angle brackets, 2 pairs of straight brackets and a test rod.

FF-SYA❑❑ ❑❑❑ ❑2

- **C**: DIN 43651 plastic plugs included
- **Q**: male receptacles compatible with Brad Harrison mini-change plugs (not included)(4)
- **Model** (see Table 2)
- **Resolutions**
  - 14: ø 14 mm / 0.6 in
  - 30: ø 30 mm / 1.2 in
  - 60: ø 60 mm / 2.4 in

(1) Protection Height for the minimum detected object size or resolution
(2) Sensing Field Height (full screen height)
(3) Total Height (including plugs for the FF-SYA❑❑❑❑❑C2 versions and male receptacles only for the FF-SYA❑❑❑❑❑Q2)
(4) See accessories

Dimensions (mm/in)

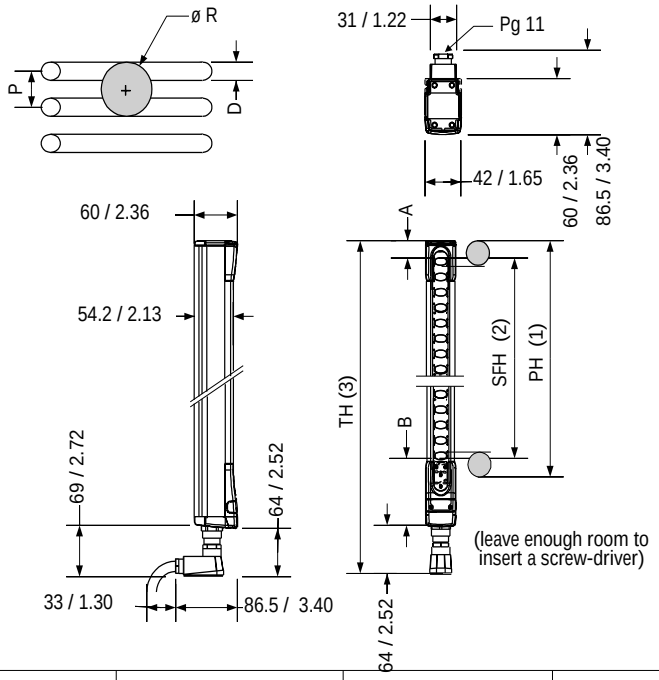


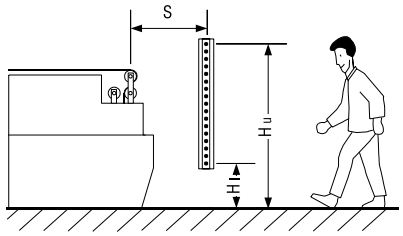
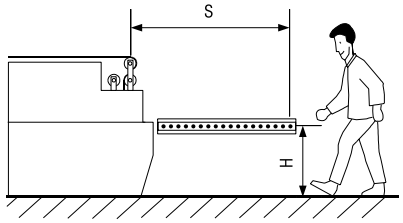
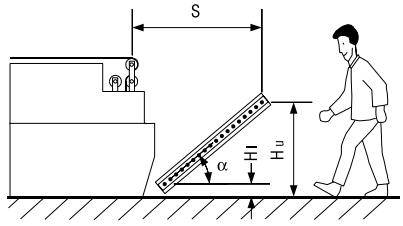
Table 1 (mm/in)	øR (resolution)	P (lens pitch)	D (lens diameter)	A (inactive zone)	B (inactive zone)
FF-SYA14	ø 14 / 0.6	10 / 0.4	4 / 0.16	15.2 / 0.60	90.6 / 3.56
FF-SYA30	ø 30 / 1.2	20 / 0.8	10 / 0.4	22.2 / 0.87	87.6 / 3.45
FF-SYA60	ø 60 / 2.4	40 / 1.6	10 / 0.4	42.2 / 1.66	87.6 / 3.45

Table 2

Model	032	048	064	080	096	112	128	144	160	176
Protection height (mm/in) (1)										
SYA14	**334/13.1**	**494/19.4**	**654/25.7**	**814/32.07**	**974/38.3**	**1134/44.6**	1294/50.9	-	-	-
SYA30	**350/13.7**	**510/20.09**	**670/26.3**	**830/32.7**	**990/39**	**1150/45.3**	**1310/51.6**	**1470/57.9**	1630/64.2	1790/70.5
SYA60	390/15.3	**550/21.6**	**710/27.9**	**870/34.2**	**1030/40.5**	**1190/46.8**	**1350/53.1**	1510/59.4	**1670/65.7**	1830/72
Sensing field height (mm/in)										
(2) SYA14	**314/12.3**	**474/18.6**	**634/24.9**	**794/31.2**	**954/37.5**	**1114/43.8**	1274/50.1	-	-	-
SYA30	**310/12.2**	**470/18.5**	**630/24.8**	**790/31.1**	**950/37.4**	**1110/43.7**	**1270/50.03**	**1430/56.3**	1590/62.6	1750/68.9
SYA60	290/11.4	**450/17.7**	**610/24.03**	**770/30.3**	**930/36.6**	**1090/42.9**	**1250/49.2**	1410/55.1	**1570/61.8**	1730/68.1
Total height (mm/in) (3)										
FF-SYA❑❑❑❑❑C2	**483/19**	**643/25.3**	**803/31.6**	**963/37.9**	**1123/44.2**	**1283/50.5**	**1443/56.8**	**1603/63.1**	**1763/69.4**	1923/75.7
FF-SYA❑❑❑❑❑Q2	**443/17.4**	**603/23.7**	**763/30**	**923/36.3**	**1083/42.6**	**1243/48.9**	**1403/55.2**	**1563/61.5**	**1723/67.8**	1883/74.1
Response time (msec)										
SYA14	**14**	**15**	**15.5**	**17.5**	**19.5**	**20.5**	22.5	-	-	-
SYA30	**13.5**	**14**	**14**	**14.5**	**15**	**15**	**15.5**	**16**	17.5	17.5
SYA60	13.5	14	**14**	14.5	**15**	15	**15.5**	16	**17.5**	17.5
Weight per device (kg/lbs)	**1/2.2**	**1.38/3.04**	**1.76/3.88**	**2.14/4.71**	**2.52/5.55**	**2.90/6.39**	**3.28/7.23**	**3.66/8.07**	**4.04/8.9**	**4.42/9.74**
Power consumption (W) SYA14	**5/3.5**	**5/4**	**6/4**	**6/4.5**	**6/5**	**7/5**	7/5.5	-	-	
(Emitter/receiver) SYA30	**4/3.5**	**4/3.5**	**5/4**	**5/4**	**5/4**	**6/4**	**6/4.5**	**6/4.5**	6/4.5	6/4.5
SYA60	4/3.5	4/3.5	**5/3.5**	5/4	**5/4**	6/4	**6/4**	6/4.5	**6/4.5**	6/4.5

Preferred listings in bold

Safety distances (in mm, 100 mm = 3.9 in)

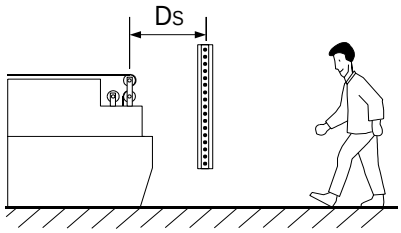
European EN 999 standard	**SYA14**	**SYA30**	**SYA60**
Normal approach			
	S ≥ 2000 (t1 + t2), with S ≥ 100 If S ≥ 500, then use: S ≥ 1600 (t1 + t2), with S ≥ 500	S ≥ 2000 (t1 + t2) + 128, with S ≥ 100 If S ≥ 500, then use: S ≥ 1600 (t1 + t2) + 128, with S ≥ 500	S ≥ 1600 (t1 + t2) + 850, with Hu ≥ 900 HI ≤ 300 m
Parallel approach			
	S ≥ 1600 (t1+ t2) + 1200 - 0.4 H), with H ≤ 875 or S ≥ 1600 (t1+ t2) + 850, with 875 ≤ H ≤ 1000 with H ≥ 15 (R-50) where R is the light curtain resolution (with H ≥ 150 for the FF-SYA60 light curtain)		
Angled approach			
	if α ≥ 30°, then use one of the formula given for a normal approach, with Hu ≥ 900 and Hl ≤ 300 for the FF-SYA60 light curtain if α ≤ 30°, then use one of the formula given for a parallel approach, with Hu ≤ 1000 and Hl ≥ 15 (R-50) where R is the light curtain resolution (with Hl ≥ 150 for the FF-SYA60 light curtain)		

With:

S minimum safety distance (in mm, 100 mm = 3.9 in)
t1 light curtain response time (in sec.)
t2 machine stopping time (in sec.)
H height of the detection plane above the reference floor (in mm, 100 mm = 3.9 in)
Hu height of the uppermost beam above the reference floor (in mm, 100 mm = 3.9 in)
Hl height of the lowest beam above the reference floor (in mm, 100 mm = 3.9 in)

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.

Safety distances (in inches, 1 in = 25,4 mm)

US ANSI / OSHA standard	SYA14	SYA30	SYA60
Normal approach			
	$D_S \geq 63 (t1 + t2) + 0.94$	$D_S \geq 63 (t1 + t2) + 3.08$	$D_S \geq 63 (t1 + t2) + 33.46$

With:

D_S minimum safety distance (in inches, 1 in. = 25.4 mm)

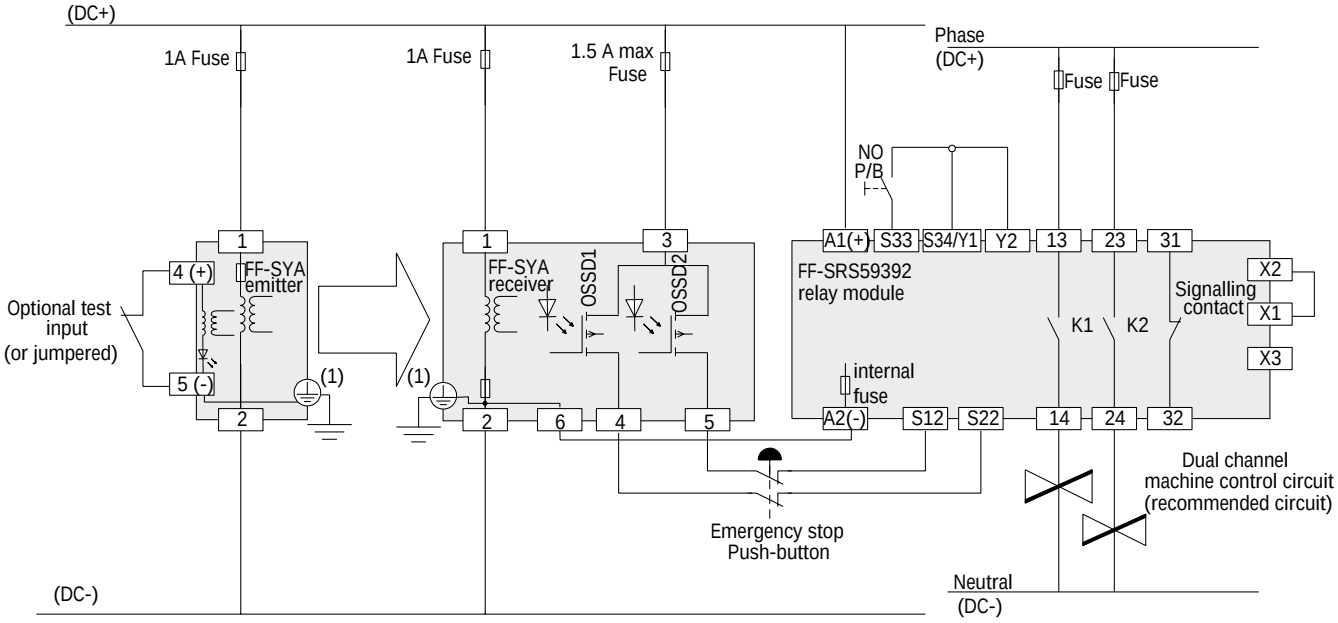
t1 light curtain response time (in sec.)

t2 machine stopping time (in sec.)

For more information, refer to the US regulations and standards (OSHA 29 CFR 1910.212 and 1910.217, ANSI B11.1, B11.2, B11.19 and ANSI/ RIA R15.06).

Wiring diagram (using the FF-SRS59392 safety control module)

The FF-SRS5939 interface control module is set in the Manual restart mode without FSD monitoring:



(1) Use pin 3 for the FF-SYA❑❑❑❑❑Q2E emitter and pin 7 for the FF-SYA❑❑❑❑❑Q2R receiver

OSSD1 and OSSD2: Output Signal Switching Devices (light curtain safety contacts)

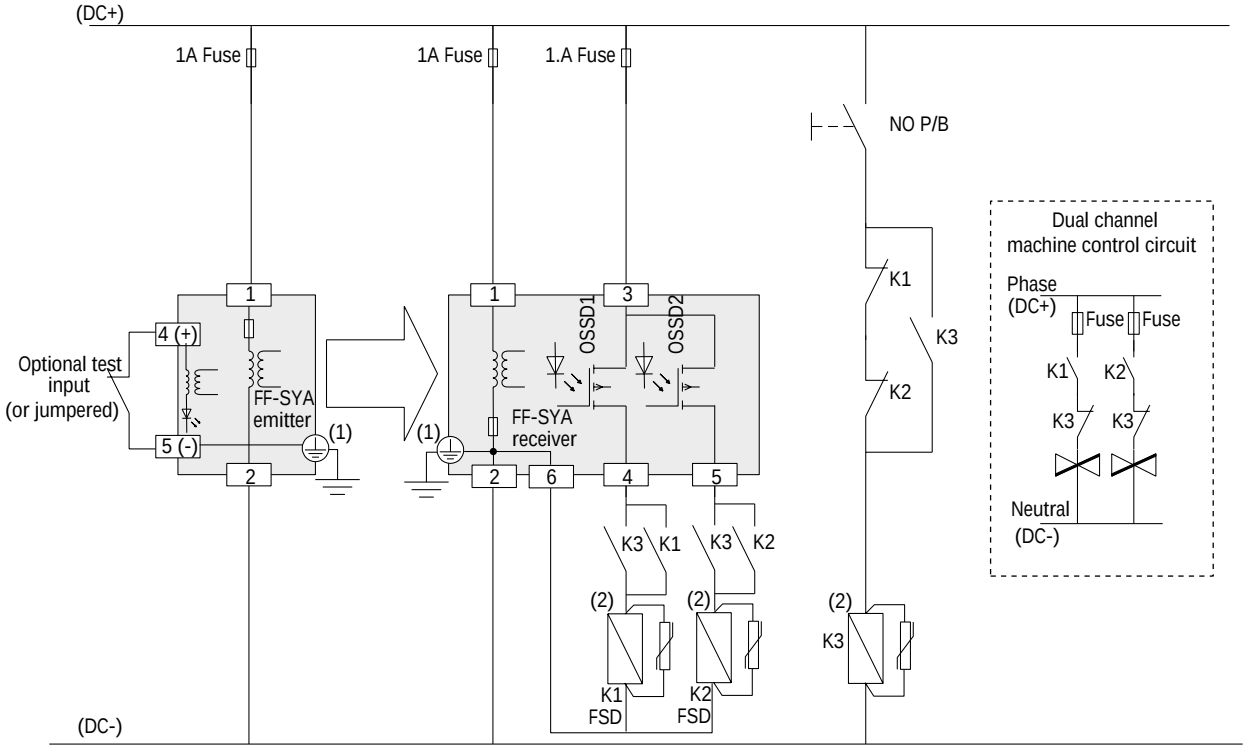
N.O. P/B: normally open contact of a push-button

Notice

Improper use of the FF-SYA light curtain

The cross-monitoring of the FF-SYA static outputs is based upon a self-checking principle which guarantees the detection of an output short-circuit and the detection of a short-circuit between the outputs (cross-fault detection). The FF-SRS5939 interface control module is primarily designed to be interfaced with Honeywell fail-safe static outputs devices.

Compatibility of the FF-SYA with any other emergency stop safety control module is not guaranteed.



Wiring diagram (using external safety relays with guided contacts)

This interface provides the manual restart and the FSD monitoring:

(1) Use pin 3 for the FF-SYA❑❑❑❑❑Q2E emitter and pin 7 for the FF-SYA❑❑❑❑❑Q2R receiver

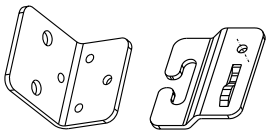
(2) 31 Vdc varistors (customer supplied)

OSSD1 and OSSD2: Output Signal Switching Devices (light curtain safety contacts)

FSD: Final Switching Devices (safety relays with guided contacts)

N.O. P/B: normally open contact of a push-button

Accessories



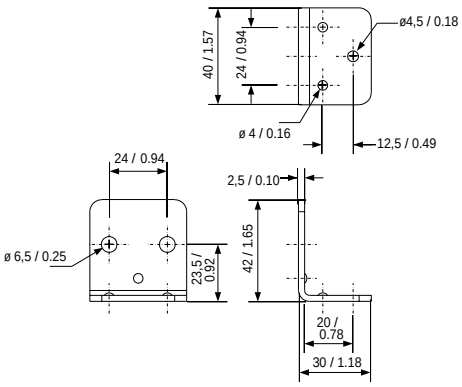
FF-SYZ001001

Kit of 2 right-angle brackets and 2 straight brackets with screws, nuts and bolts. Order 2 kits for a complete set emitter and receiver **(already included in the FF-SYA package)**.

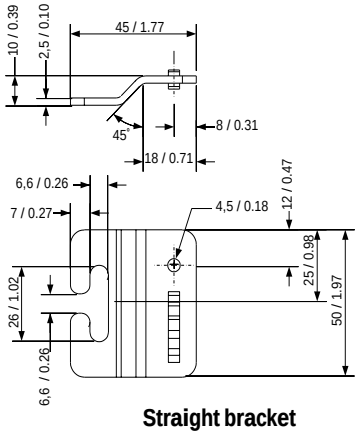
NOTICE

PROTECTION AGAINST HIGH VIBRATIONS

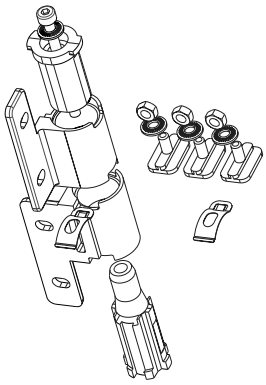
In case of high vibrations, 3 pairs of brackets must be used for light curtain systems with protection heights greater or equal to 1000 mm/39.4 in (An additional bracket kit must be ordered).



Right-angle bracket



Straight bracket



Available in January 2000

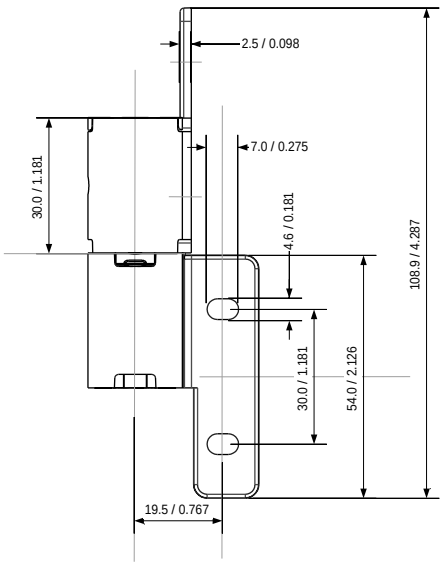
FF-SYZ003001

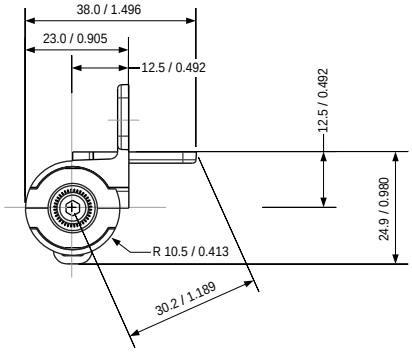
Kit of 2 adjustable brackets with screws, nuts and bolts. Order 2 kits for a complete set for emitter and receiver**.**
To be ordered separately as an option.

NOTICE

PROTECTION AGAINST HIGH VIBRATIONS

In case of high vibrations, 3 pairs of brackets must be used for light curtain systems with protection heights greater or equal to 1000 mm/39.4 in (An additional bracket kit must be ordered).

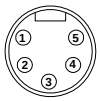




Plugs kits

FF-SYZ172113 (for FF-SYA❑❑❑❑❑C2 light curtains)
Kit of 2 DIN 43651 plastic 7-pin right-angle plugs with crimping contacts (Hirschmann, N6RFF type). Order 1 kit for a complete set emitter and receiver.
Already included in the FF-SYA package.

FF-SYZ172159 (for FF-SYA❑❑❑❑❑C2 light curtains)
Kit of 2 DIN 43651 plastic 7-pin straight plugs with crimping contacts (Hirschmann, N6REF type). Order 1 kit for a complete set emitter and receiver.
To be ordered separately as an option.

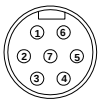


Face view male

1-White
2-Red
3-Green
4-Orange
5-Black

41308 (for FF-SYA❑❑❑❑❑Q2E emitters)
5-pole female straight Brad Harrison Mini-change plug 3.66 m (12 ft) cable length. Order one plug for the emitter.
To be ordered separately when using the FF-SYA❑❑❑❑Q2 light curtains.

41322 (for FF-SYA❑❑❑❑❑Q2E emitters)
5-pole female straight Brad Harrison Mini-change plug, 6.10 m (20 ft) cable length. Order one plug for the emitter.
To be ordered separately when using the FF-SYA❑❑❑❑Q2 light curtains.



Face view male

1-White/Black
2-Black
3-White
4-Red
5-Orange
6-Blue
7-Green

42803 (for FF-SYA❑❑❑❑❑Q2R receivers)
7-pole female straight Brad Harrison Mini-change plug, 3.66 m (12 ft) cable length. Order one plug for the receiver.
To be ordered separately when using the FF-SYA❑❑❑❑Q2 light curtains.

42821 (for FF-SYA❑❑❑❑❑Q2R receivers)
7-pole female straight Brad Harrison Mini-change plug, 6.10 m (20 ft)cable length. Order one plug for the receiver.
To be ordered separately when using the FF-SYA❑❑❑❑Q2 light curtains.

Test rods

FF-SYZROD14
Test rod for ø14 mm/0.6 in. resolution safety light curtains
Already included in the FF-SYA package.

FF-SBZROD30
Test rod for ø30 mm/1.2 in. resolution safety light curtains
Already included in the FF-SYA package.

Safety control module

FF-SRS59392
Interface control module designed for failsafe static outputs safety light curtains (24 Vdc)
To be ordered separately as an option.

AC to DC power supply

FF-SYZ880246
Lambda Coutant JWS50 - 24 A type AC/DC power supply
Input voltage: 85 to 265 Vac
Output voltage: 24 Vdc / 2.2 A (50 W)
Dimensions: 159 x 85 x 37 mm/6.26 x 3.34 x 1.45 in.
Mounting: three M3 screws or DIN RAIL adapter (see below)
Approvals: UL 1950, CSA 950, EN 60950
To be ordered separately as an option.

FF-SYZ736048
DIN RAIL adapter for Lambda Coutant JWS50 power supply
To be ordered separately as an option.

FF-SYZFL❑❑❑ (for FF-SYA30❑❑❑❑2 and FF-SYA60❑❑❑❑2 only)

Welding protection kit including two adhesive tapes to be glued on the front windows of the FF-SYA30or FF-SYA60 light curtain.

CAUTION

Make sure the transparent protection tape is on the emitter and the filtered protection is glued on the receiver. Protections cannot be removed without damaging the device.

Features:	
Storage and operating temperatures:	-20° to 55°C / -4° to 131°F, high resistance to the ejection of melting particules
Material:	Organic glass
Prohibited liquids:	Sulfuric acid, hydrofluoric acid, ammonia solution
Scanning range attenuation:	36%
Optical immunity improvement factor:	2,5
Ordering guide:	Protection heights of FF-SYA30 or FF-SYA60:
FF-SYZFL048	Model 048
FF-SYZFL064	Model 064
FF-SYZFL080	Model 080
FF-SYZFL096	Model 096