Professionalism and experience to promote safety...

“We will make the industrial workplace a safer place”

Honeywell, a world leader in industrial machine safety, offers a range of global solutions backed up with products that comply with the highest standards of safety and reliability. Working from a global perspective, our engineers design safety products which scrupulously adhere to published standards for safety, especially in Europe and North America. Our safety specialists are active members of standards committees in Europe and contribute to the definition of standards and Directives in Europe and the USA.

As a result of our years of experience in industrial safety, we can offer global solutions that meet the constraints of your work environment. In fact, safety choices are not limited to the selection of a safety component. Safety must be integrated within the physical limitations of your machine design and, if necessary, additional forms of protection must be put in place.

This guide should facilitate your understanding of the broad questions relating to safety and show you all that Honeywell has to offer in this area. The information provided here is summary information only. Honeywell advises that you consult relevant legislation, regulations, standards, instruction manuals, technical brochures, etc. for a full understanding of industrial safety.
<table>
<thead>
<tr>
<th>TYPICAL APPLICATIONS</th>
<th>RESOLUTION</th>
<th>VOLTAGE RESPONSE TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compact Type 4 light curtain with fail-safe static outputs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy industry and material conversion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pressing, moulding and thermoforming machines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Conveyors, handling equipment and assembly lines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Copying lathes and machining centers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Door and gate, lift and hoist technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Stacking machines, transporting and conveyor technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Textile, packaging machines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Jigging sieves, sorters and milling machines</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Type 4 light curtain with separate control unit</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy industry and material conversion</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Harsh-duty Type 4 self-contained light curtain with relay outputs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy industry and material conversion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Presses and punches for metals, plastics and leather</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Deep-drawing presses, moulding presses and filter presses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Metal forming, milling and drilling machines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Spot-welding machines and fine-boring machines</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Compact Type 2 light curtain with separate control unit and relay outputs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Paper cutting machines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pick-and-place robots</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Light electronic assembly machines</td>
<td></td>
<td></td>
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<tr>
<td>• Goods lifts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Small carousels</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Light industry and material conversion, transportation and storage</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Packaging and wrapping machines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Automated warehouse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Machinery for merchandise handling such as palletising and self-organisers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Automated assembly lines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Wood and leather industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Compact Type 2 light curtain with separate control unit and relay outputs</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Voltage:**
- 24 Vdc
- 22 to 30 Vdc or 18 to 25 Vac
- 24 to 48 Vdc
- 120/240 Vac
- 24 to 22.5 ms
- 13.5 to 17.5 ms
- 25 to 29 ms
- 25 to 30 ms
- < 50 ms

**Response time:**
- 28 to 32 ms according to models
### Selection Guide

#### DIMENSIONS OF THE PROTECTED AREA

<table>
<thead>
<tr>
<th>Dimensions (m/ft)</th>
<th>FF-SYA14 / FF-SYA30</th>
<th>FF-SB12 / FF-SB14</th>
<th>FF-LS14 / FF-LS30</th>
<th>FF-SLC35</th>
</tr>
</thead>
<tbody>
<tr>
<td>10m/ 32.8 ft</td>
<td>320 to 1280 mm/ 13.1 to 44.6 in</td>
<td>200 to 600 mm/ 7.8 to 23.6 in</td>
<td>116 x 56 mm/ 4.57 x 2.20 in</td>
<td>12 m/ 39.4 ft</td>
</tr>
<tr>
<td>20m/ 65.6 ft</td>
<td>320 to 1760 mm/ 12.6 to 56.7 ft</td>
<td>200 to 1400 mm/ 78.7 to 55.1 in</td>
<td>23 x 35 mm/ 0.90 to 1.38 in</td>
<td>3.5 m/ 11.48 ft</td>
</tr>
<tr>
<td>30m/ 98.4 ft</td>
<td>24 m/ 78.7 ft</td>
<td>400 to 1400 mm/ 15.7 to 55.1 in</td>
<td>19 x 12 mm/ 0.74 to 0.47 in</td>
<td>1.5 m/ 5.91 ft</td>
</tr>
<tr>
<td>40m/ 131.2 ft</td>
<td>60 x 42 mm/ 2.36 to 1.65 in</td>
<td>500 mm/ 19.7 in</td>
<td>200 mm/ 7.88 in</td>
<td>12 m/ 39.4 ft</td>
</tr>
</tbody>
</table>

#### FUNCTIONS
- Automatic restart
- Start and restart interlock
- Test input
- RSD monitoring
- Cross-talk detection/reduction
- Beam status output
- Output contacts (static outputs)

#### APPROVALS
- NRTL/C
- UL Listed
- CSA Certified
- CE Marked

#### DIMENSIONS

<table>
<thead>
<tr>
<th>Dimensions (mm/in)</th>
<th>FF-SYA14 / FF-SYA30</th>
<th>FF-SB12 / FF-SB14</th>
<th>FF-LS14 / FF-LS30</th>
<th>FF-SLC35</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 mm/ 19.7 in</td>
<td>320 to 1280 mm/ 13.1 to 44.6 in</td>
<td>200 to 600 mm/ 7.8 to 23.6 in</td>
<td>116 x 56 mm/ 4.57 x 2.20 in</td>
<td>12 m/ 39.4 ft</td>
</tr>
<tr>
<td>1000 mm/ 39.4 in</td>
<td>320 to 1760 mm/ 12.6 to 56.7 ft</td>
<td>200 to 1400 mm/ 78.7 to 55.1 in</td>
<td>23 x 35 mm/ 0.90 to 1.38 in</td>
<td>3.5 m/ 11.48 ft</td>
</tr>
<tr>
<td>1500 mm/ 59.1 in</td>
<td>24 m/ 78.7 ft</td>
<td>400 to 1400 mm/ 15.7 to 55.1 in</td>
<td>19 x 12 mm/ 0.74 to 0.47 in</td>
<td>1.5 m/ 5.91 ft</td>
</tr>
<tr>
<td>2000 mm/ 78.8 in</td>
<td>60 x 42 mm/ 2.36 to 1.65 in</td>
<td>500 mm/ 19.7 in</td>
<td>200 mm/ 7.88 in</td>
<td>12 m/ 39.4 ft</td>
</tr>
</tbody>
</table>

#### Note 1:
- for FF-SB14E/R K-2 model only

---

**Automatic restart**

**Start and restart interlock**

**Test input**

**RSD monitoring**

**Cross-talk detection/reduction**

**Beam status output**

**Output contacts**

**Self-diagnostic LED**

**Note 1:** for FF-SB14E/R K-2 model only
### Multiple Light Beams for

#### TYPICAL APPLICATIONS

<table>
<thead>
<tr>
<th>Type</th>
<th>Resolution</th>
<th>Voltage</th>
<th>Response Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harsh-duty Type 4 self-contained light curtain with relay outputs</td>
<td>2, 3 or 4 beams per EN 999</td>
<td>Voltage: 120/240 Vac 24 to 48 Vdc</td>
<td>Response time: 25 to 29 ms according to models</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light industry and material conversion, transportation and storage</td>
<td>3 to 9 beams</td>
<td>Voltage: 24 Vdc</td>
<td>Response time: 28 to 30 ms according to models</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compact Type 2 light curtain with separate control unit and relay outputs</td>
<td>2 to 8 beams</td>
<td>Voltage: 120/240 Vac 24 to 48 Vdc</td>
<td>Response time: 30 ms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compact Type 4 self-contained single beam with relay outputs</td>
<td>1 beam</td>
<td>Voltage: 120 or 240 Vac 24 Vdc</td>
<td>Response time: 20 ms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harsh-duty Type 4 access control systems with relay outputs</td>
<td>2 or 3 beams</td>
<td>Voltage: 120 Vac 240 Vac 24 Vdc</td>
<td>Response time: 20 ms</td>
</tr>
</tbody>
</table>

#### RESOLUTION

- 2, 3 or 4 beams per EN 999
- 3 to 9 beams
- 2 to 8 beams
- 1 beam
- 2 or 3 beams

#### VOLTAGE RESPONSE TIME

- Voltage: 120/240 Vac 24 to 48 Vdc
- Voltage: 24 Vdc
- Voltage: 120 or 240 Vac 24 Vdc
- Voltage: 120 Vac 240 Vac 24 Vdc

#### BODY DETECTION

- Ø235 mm / 9.25 in
- Ø184 mm / 7.24 in
- According to EN 999

#### APPLICATIONS

- Heavy industry and material conversion
- Light industry and material conversion, transportation and storage
- Heavy industry and material conversion
- Heavy industry and material conversion
- Light industry and material conversion, transportation and storage
- Heavy industry and material conversion
- Heavy industry and material conversion
- Heavy industry and material conversion

#### EXAMPLES

- Access control for: Robotic and transfer areas, Machinery centers, Palletising areas, Storage and stacking areas
- Max. length of a U-shaped perimeter: 19 m/62.32 ft

#### TECHNICAL SPECIFICATIONS

- Voltage: 120/240 Vac 24 to 48 Vdc
- Response time: 25 to 29 ms according to models
- Voltage: 24 Vdc
- Voltage: 28 to 30 ms according to models
- Voltage: 120 or 240 Vac 24 Vdc
- Response time: 30 ms
- Voltage: 120 Vac 240 Vac 24 Vdc
- Response time: 20 ms

- Courtesy of Steven Engineering, Inc. ♦ 230 Ryan Way, South San Francisco, CA, 94080-6370 ♦ Main Office: (650) 588-9200 ♦ Outside Local Area: (800) 258-9200 ♦ www.stevenengineering.com
# Access Control to Dangerous Areas

## Dimensions of the Protected Area

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Scanning Range</th>
<th>Protection Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>(mm/ft)</td>
<td>(mm/in)</td>
<td>(m/ft)</td>
</tr>
<tr>
<td>500mm/19.7in</td>
<td>0 to 20m/65.6ft</td>
<td>0 to 70 in</td>
</tr>
<tr>
<td>1000mm/39.4in</td>
<td>20m/65.6ft</td>
<td>1000in/39.4in</td>
</tr>
<tr>
<td>1500mm/59.1in</td>
<td>30m/98.4ft</td>
<td>1500in/59.1in</td>
</tr>
<tr>
<td>2000mm/78.8in</td>
<td>40m/131.2ft</td>
<td>2000in/78.8in</td>
</tr>
</tbody>
</table>

## Functions

- Automatic restart
- Test input
- FSD monitoring
- Beam status output
- Output contacts

## Approvals

- Type 4 (per pr EN 50100 - 1/2)
- UL Listed
- Certified

## Example

<table>
<thead>
<tr>
<th>FF-SB15</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 m / 78.72 ft</td>
</tr>
<tr>
<td>600 to 1400 mm / 23.62 to 55.16 in</td>
</tr>
<tr>
<td>116 x 56 mm / 4.57 x 2.20 in</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FF-SLC18</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 m / 39.4 ft</td>
</tr>
<tr>
<td>400 to 1400 mm / 15.75 to 55.16 in</td>
</tr>
<tr>
<td>70 x 50 mm / 2.75 x 1.97 in</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FF-SCAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 m / 82 ft</td>
</tr>
<tr>
<td>33 m / 108 ft</td>
</tr>
<tr>
<td>99 x 316 mm / 3.90 x 12.40 in</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FF-SPS4</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 m / 131.2 ft</td>
</tr>
<tr>
<td>75 m / 246 ft</td>
</tr>
<tr>
<td>120 x 50 mm / 4.72 x 1.97 in</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FF-SPS4 systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-beam systems</td>
</tr>
<tr>
<td>5 to 75 m / 16.4 to 246 ft</td>
</tr>
<tr>
<td>5 to 75 m / 16.4 to 246 ft</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2-beam systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 25 m / 16.4 to 82 ft</td>
</tr>
<tr>
<td>5 to 25 m / 16.4 to 82 ft</td>
</tr>
</tbody>
</table>

## Optimal Interference Immunity

- Automatic restart
- Start and restart interlock
- Test input
- FSD monitoring
- Beam status output
- Optical interference immunity

- Output contacts

## Self-diagnostic output

- Automatic restart
- Start and restart interlock
- Test input
- FSD monitoring
- Beam status output
- Optical interference immunity

- Output contacts
## Electro-Sensitive Protective Equipment for

### TYPICAL APPLICATIONS

| Compact Type 4 light curtain with fail-safe static outputs | Heavy industry and material conversion  
- Presence control for:  
  - Robotic and transfer areas  
  - Machinery centers  
  - Palletizing areas  
  - Storage and stacking areas |  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage:</td>
<td>24 Vdc</td>
</tr>
<tr>
<td>Response time:</td>
<td>13.5 to 17.5 ms according to models</td>
</tr>
<tr>
<td>ø60 mm / 2.4 in</td>
<td>BODY DETECTION</td>
</tr>
</tbody>
</table>

| Compact Type 2 light curtain with separate control unit and relay outputs | Light industry and material conversion, transportation and storage  
- Presence control for robotic areas  
- Presence control for transfer areas |  
<table>
<thead>
<tr>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Voltage:</td>
<td>24 Vdc</td>
</tr>
<tr>
<td>Response time:</td>
<td>28 to 30 ms according to models</td>
</tr>
<tr>
<td>ø55 mm / 2.16 in</td>
<td>BODY DETECTION</td>
</tr>
</tbody>
</table>

| Type 4 modular light curtain with M18 sensors and separate control unit with relay outputs | Heavy industry and material conversion  
- Protection on palletising areas  
- Presence control of areas containing robots or automatic machines  
- Detection of automatic guided vehicles  
- Thermoforming, agglomerating and moulding presses |  
|-----------------|----------------------------------|  
| Voltage:        | 120/240 Vac  
24 to 48 Vdc |  
| Response time:  | 30 ms                          |  
| BODY DETECTION | According to EN 999             |  

| Category 3 Pressure sensitive mat and separate control unit with relay outputs | Heavy industry and material conversion  
- Presence sensing device for the control of dangerous areas such as robot areas, automotive transfer lines  
- Additional protection for optoelectronic trip devices  
- Suitable for cutting oils, welding splashes, shavings, etc. |  
|-----------------|----------------------------------|  
| Voltage:        | 120 Vac  
240 Vac  
24 Vdc |  
| Response time:  | 25 ms                          |  
| BODY DETECTION | Sensitivity ≥ 30 kg/66lbs       |  

| Category 3 laser scanner with relay outputs | Light industry  
- Ground level trip device as an alternative to the safety mat  
- Industrial robot areas  
- Automatically guided vehicles  
- For the control of large areas of any shape  
- Suitable for relatively clean environments |  
<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage:</td>
<td>24 Vdc</td>
</tr>
<tr>
<td>Response time:</td>
<td>280 ms (including relays)</td>
</tr>
<tr>
<td>ø70 mm / 2.75 in</td>
<td>BODY DETECTION</td>
</tr>
</tbody>
</table>
### Presence Control in Dangerous Zones

<table>
<thead>
<tr>
<th>FUNCTIONS</th>
<th>APPROVALS</th>
<th>DIMENSIONS OF THE PROTECTED AREA</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic restart</td>
<td>•</td>
<td>Scanning range (m/ft)</td>
<td></td>
</tr>
<tr>
<td>Start and restart interlock (*)</td>
<td>•</td>
<td>Protection height (mm/in)</td>
<td></td>
</tr>
<tr>
<td>Test input</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RSD monitoring (*)</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross-talk detection/reduction</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output contacts (static outputs)</td>
<td>2NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output contacts (*)</td>
<td>2NO+1NC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*through external relay module

### Functions

- Automatic restart
- Start and restart interlock (*)
- Test input
- RSD monitoring (*)
- Cross-talk detection/reduction
- Output contacts (static outputs)
- Output contacts (*)
- Self-diagnostic output

### Approvals

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

### Dimensions

- Automatic restart
- Start and restart interlock (*)
- Test input
- RSD monitoring
- Beam status output
- Output contacts
- Self-diagnostic output

### Control Unit Dimensions

- H 211 x W 211 x D 96 mm / H 8.31 x W 8.31 x D 3.78 in

### Device Dimensions

- W 172 x H 176 x D 107 mm³
- W 6.77 x H 6.93 x D 4.21 in

### Coverage

- 2NO
- 2NO+1NC

### Specifications

- Max. surface per control unit: 6 m²/64.5 ft²
- Thickness: ≤ 20 mm/0.78 in
- Control unit dimensions: H 211 x W 211 x D 96 mm³
- H 8.31 x W 8.31 x D 3.78 in

### Additional Features

- Device dimensions: W 172 x H 176 x D 107 mm³
- W 6.77 x H 6.93 x D 4.21 in

### Coordination with Other Equipment

- Standard dimensions available:
  - 1000x1000 mm / 39.4x39.4 in
  - 500x1500 mm / 19.7x59.1 in
  - 1000x1500 mm / 39.4x59.1 in
  - 1250x1500 mm / 49.2x59.1 in

### Further Information

- Courtesy of Steven Engineering, Inc.
  - 230 Ryan Way, South San Francisco, CA, 94080-6370
  - Main Office: (650) 588-9200
  - Outside Local Area: (800) 258-9200
  - www.stevenengineering.com
<table>
<thead>
<tr>
<th>TYPICAL APPLICATIONS</th>
<th>FUNCTIONS</th>
<th>CONTACTS</th>
</tr>
</thead>
</table>
| **Miniature Safety Key Interlock Switch** | • Door control for:  
  - Electronic assembly  
  - Packaging / wrapping  
  - Printing  
  • Key operated guard for door interlock | • Slow action  
  . 1NC + 1NO  
  . 2NC |
| **Dual Entry Key Operated Safety Interlock Switch** | • Key operated switch for:  
  - Sliding guard doors and screens  
  - Protective covers or enclosures with hinge, or removable  
  • Key operated guard for door interlock | • Slow action  
  . 1NC + 1NO (BBM)  
  . 2NC  
  . 2NC + 2NO  
  . 3NC + 1NO  
  . 4NC  
  • Snap action  
  . 1NC + 1NO |
| **Dual Entry Solenoid Key Operated Safety Interlock Switch** | • Locking key operated switch for:  
  - Very dangerous machines  
  - Presses  
  - Metal working  
  - Machine tools  
  - Automotive plant floor  
  • Key operated guard with solenoid locking capability | • Slow action  
  . 1NC + 1NO (BBM)  
  . 2NC  
  . 2NC + 2NO  
  . 3NC + 1NO |
| **Global Safety Switch** | • Door control for:  
  - Machine tools  
  - Wood machinery  
  - Automatic assembling machines  
  • Safety switch with forced disconnection | • Slow action  
  . 1NC + 1NO (MBB)  
  . 2NC  
  . 2NC + 2NO  
  . 2NC + 1NO (BBM)  
  . 3NC + 1NO (BBM)  
  . 4NC  
  • Snap action  
  . 1NC + 1NO  
  . 2NC + 2NO  
  . 2NC + 1NO sequential |
| **Miniature Safety Electromechanical Switch** | • Door control for:  
  - Material handling equipment  
  - Packaging machinery  
  - Textile machinery  
  - Small construction machinery  
  • Pre-wired switch with positive opening | • Slow action  
  . 1NC  
  . 1NC + 1NO (BBM)  
  . 1NC + 1NO (MBB)  

---

**Miniature Safety Electromechanical Switch**

**Dual Entry Key Operated Safety Interlock Switch**

**Dual Entry Solenoid Key Operated Safety Interlock Switch**

**Global Safety Switch**

**Miniature Safety Electromechanical Switch**

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**Selection Guide**
### Switches for Gate Monitoring

<table>
<thead>
<tr>
<th>APPROVALS</th>
<th>FEATURES</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>![UL]</td>
<td>Compact design</td>
<td>![GKM]</td>
</tr>
<tr>
<td>![CE]</td>
<td>Side or top key entry</td>
<td>34/1.33</td>
</tr>
<tr>
<td>![BG]</td>
<td>Prewired or connectorized</td>
<td>16/6.3</td>
</tr>
<tr>
<td>![EN 60947-5-1-3]</td>
<td>Daisy chain with pin to pin cross monitoring</td>
<td>29/1.15</td>
</tr>
<tr>
<td>![Positive opening]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>![EN50041 MOUNTING]</td>
<td>22/0.86 fixing centres</td>
</tr>
<tr>
<td></td>
<td>30 x 60 x 1.18 x 2.36 fixing centres (4-off)</td>
<td></td>
</tr>
<tr>
<td>![Harsh duty design]</td>
<td>Side or top key entry</td>
<td>![GKM]</td>
</tr>
<tr>
<td>![4 key styles]</td>
<td>42/1.65</td>
<td></td>
</tr>
<tr>
<td>![Single and dual LED indicator versions]</td>
<td>![42/1.65]</td>
<td></td>
</tr>
<tr>
<td>![IP 67 - NEMA 4 sealing]</td>
<td>![42/1.65]</td>
<td></td>
</tr>
<tr>
<td>![Daisy chain with pin to pin cross monitoring]</td>
<td>![41/1.25]</td>
<td></td>
</tr>
<tr>
<td>![Cylinderically isolated contacts]</td>
<td>![30 x 60 x 1.18 x 2.36 fixing centres (4-off)]</td>
<td></td>
</tr>
<tr>
<td>![Positive opening]</td>
<td>![110 x 4.33]</td>
<td></td>
</tr>
<tr>
<td>![EN 60947-5-1-3]</td>
<td>Side or top key entry</td>
<td>![EN 60947-5-1-3]</td>
</tr>
<tr>
<td>![Separate contact blocks control key entry and solenoid status]</td>
<td>![EN50041 MOUNTING]</td>
<td></td>
</tr>
<tr>
<td>![Solenoid power to lock or unlock key]</td>
<td>![EN50041 MOUNTING]</td>
<td></td>
</tr>
<tr>
<td>![IP 68 - NEMA 6 sealing]</td>
<td>![EN50041 MOUNTING]</td>
<td></td>
</tr>
<tr>
<td>![Dual indicator LED]</td>
<td>![EN50041 MOUNTING]</td>
<td></td>
</tr>
<tr>
<td>![Wide range of solenoid voltages available]</td>
<td>![EN50041 MOUNTING]</td>
<td></td>
</tr>
<tr>
<td>![Positive opening]</td>
<td>![EN50041 MOUNTING]</td>
<td></td>
</tr>
<tr>
<td>![Range of body sizes]</td>
<td>![EN50041 MOUNTING]</td>
<td></td>
</tr>
<tr>
<td>![Harsh duty design]</td>
<td>![EN50041 MOUNTING]</td>
<td></td>
</tr>
<tr>
<td>![Modular]</td>
<td>![EN50041 MOUNTING]</td>
<td></td>
</tr>
<tr>
<td>![Up to IP 67 sealing]</td>
<td>![EN50041 MOUNTING]</td>
<td></td>
</tr>
<tr>
<td>![25 to 85 °C / -13 to 185 °F operating temperature]</td>
<td>![EN50041 MOUNTING]</td>
<td></td>
</tr>
<tr>
<td>![Cylinderically isolated contacts]</td>
<td>![EN50041 MOUNTING]</td>
<td></td>
</tr>
<tr>
<td>![Sequential basic]</td>
<td>![EN50041 MOUNTING]</td>
<td></td>
</tr>
<tr>
<td>![Positive opening]</td>
<td>![EN50041 MOUNTING]</td>
<td></td>
</tr>
<tr>
<td>![Compact design]</td>
<td>![24CE/924CE]</td>
<td></td>
</tr>
<tr>
<td>![Prewired and miniature]</td>
<td>![Dimensions in mm/in]</td>
<td></td>
</tr>
<tr>
<td>![Stackable]</td>
<td>![25/0.98 mounting centres]</td>
<td></td>
</tr>
<tr>
<td>![IP 66 or 67 sealing]</td>
<td>![22/0.86 fixing centres]</td>
<td></td>
</tr>
<tr>
<td>![0 to 70 °C / 32 to 158 °F operating temperature]</td>
<td>![30 x 60 mm / 1.18 x 2.36 in fixing centres (4-off)]</td>
<td></td>
</tr>
<tr>
<td>![3 mm/0.11 in contact spacing]</td>
<td>![3 mm/0.11 in contact spacing]</td>
<td></td>
</tr>
<tr>
<td>![Positive opening]</td>
<td>![Positive opening]</td>
<td></td>
</tr>
</tbody>
</table>

**Selection Guide**

- **Industrial Safety Products**

---

**Courtesy of Steven Engineering, Inc.**

- 230 Ryan Way, South San Francisco, CA, 94080-6370
- Main Office: (650) 588-9200
- Outside Local Area: (800) 258-9200
- www.stevenengineering.com
# Safety Electromechanical Switches

<table>
<thead>
<tr>
<th>TYPICAL APPLICATIONS</th>
<th>FUNCTIONS</th>
<th>CONTACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cable Pull Safety Switch</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single Head</td>
<td>• Slow action</td>
<td>• Slow action</td>
</tr>
<tr>
<td></td>
<td>• Door control for:</td>
<td>. 1NC + 1NO (BBM)(^{(1)})</td>
</tr>
<tr>
<td></td>
<td>• Door interrupt system</td>
<td>. 2NO</td>
</tr>
<tr>
<td></td>
<td>• Do not use:</td>
<td>. 3NC + 1NO</td>
</tr>
<tr>
<td></td>
<td>• 4NC</td>
<td></td>
</tr>
<tr>
<td><strong>Cable Pull Safety Switch</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dual Head</td>
<td>• Slow action:</td>
<td>• Slow action:</td>
</tr>
<tr>
<td></td>
<td>. 1NC + 1NO (BBM)(^{(1)})</td>
<td>. 1NC + 1NO (BBM)(^{(1)})</td>
</tr>
<tr>
<td></td>
<td>. 2NC</td>
<td>. 2NC</td>
</tr>
<tr>
<td></td>
<td>. 2NC + 2NO</td>
<td></td>
</tr>
<tr>
<td></td>
<td>. 3NC + 1NO</td>
<td></td>
</tr>
<tr>
<td></td>
<td>. 4NC</td>
<td></td>
</tr>
</tbody>
</table>

\(^{(1)}\) BBM: Break before make

---

# Hall Effect Door Interrupt

<table>
<thead>
<tr>
<th>TYPICAL APPLICATIONS</th>
<th>FUNCTIONS</th>
<th>CONTACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hall Effect Door Interrupt System</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Door control for:</td>
<td>• Door control for:</td>
</tr>
<tr>
<td></td>
<td>• Do not use:</td>
<td>• Do not use:</td>
</tr>
<tr>
<td></td>
<td>• Solid state open collector outputs</td>
<td>. 2 NO contacts in series (2 safety relays with guided contacts)</td>
</tr>
<tr>
<td></td>
<td>(note: use of FF-SR Series recommended)</td>
<td></td>
</tr>
</tbody>
</table>

---

Courtesy of Steven Engineering, Inc.  ·  230 Ryan Way, South San Francisco, CA, 94080-6370  ·  Main Office: (650) 588-9200  ·  Outside Local Area: (800) 258-9200  ·  www.stevenengineering.com
### Systems for Gate/Door Monitoring

#### CLS/CLSX

<table>
<thead>
<tr>
<th>APPROVALS</th>
<th>FEATURES</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL</td>
<td>Tension indicator for easy adjustment</td>
<td>CLS X</td>
</tr>
<tr>
<td>CE BG</td>
<td>Broken/Slackened cable detection</td>
<td>(CLS only)</td>
</tr>
<tr>
<td>EN 60947-5-1-3 Pending</td>
<td>Snap action head</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Four conduit thread sizes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-1 to 70 °C / 30 to 158 °F operating temperature</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IP 67 - NEMA 1, 3, 4, 13 sealing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Indicator lights available</td>
<td></td>
</tr>
<tr>
<td></td>
<td>60 m / 200 ft maximum cable run</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Explosion-proof version available</td>
<td></td>
</tr>
</tbody>
</table>

#### 2CLS

<table>
<thead>
<tr>
<th>APPROVALS</th>
<th>FEATURES</th>
<th>DIMENSIONS</th>
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</thead>
<tbody>
<tr>
<td>UL</td>
<td>Tension indicator for easy adjustment</td>
<td>2CLS</td>
</tr>
<tr>
<td>CE BG</td>
<td>Broken/Slackened cable detection</td>
<td></td>
</tr>
<tr>
<td>EN 60947-5-1-3 Pending</td>
<td>Snap action head</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Four conduit thread sizes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-1 to 70 °C / 30 to 158 °F operating temperature</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IP 67 - NEMA 1, 3, 4, 13 sealing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Indicator lights available</td>
<td></td>
</tr>
<tr>
<td></td>
<td>120 m / 400 ft maximum cable run</td>
<td></td>
</tr>
</tbody>
</table>

#### 50FY

<table>
<thead>
<tr>
<th>APPROVALS</th>
<th>FEATURES</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL</td>
<td>Up to 6 sensors per amplifier</td>
<td>50FY</td>
</tr>
<tr>
<td>CE</td>
<td>LED indicators</td>
<td></td>
</tr>
<tr>
<td>EN 954-1</td>
<td>Tamper resistant</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Corrosion resistant plastic housing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IP 67 sealing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-40 to 85 °C / -40 to 153 °F operating temperature</td>
<td></td>
</tr>
</tbody>
</table>

#### 40FY

<table>
<thead>
<tr>
<th>APPROVALS</th>
<th>FEATURES</th>
<th>DIMENSIONS</th>
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</thead>
<tbody>
<tr>
<td>CE BG</td>
<td>Compact design</td>
<td>40FY</td>
</tr>
<tr>
<td>EN 60947-5-1-3</td>
<td>Alignment LED indicator</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tamper resistant</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Corrosion resistant plastic housing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pre-leaded or connectorized</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IP 67 sealing, washdown</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wide temperature rating</td>
<td></td>
</tr>
</tbody>
</table>

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For Perimeter Emergency Stop

<table>
<thead>
<tr>
<th>APPROVALS</th>
<th>FEATURES</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL</td>
<td>Tension indicator for easy adjustment</td>
<td>CLS X</td>
</tr>
<tr>
<td>CE BG</td>
<td>Broken/Slackened cable detection</td>
<td>(CLS only)</td>
</tr>
<tr>
<td>EN 60947-5-1-3 Pending</td>
<td>Snap action head</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Four conduit thread sizes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-1 to 70 °C / 30 to 158 °F operating temperature</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IP 67 - NEMA 1, 3, 4, 13 sealing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Indicator lights available</td>
<td></td>
</tr>
<tr>
<td></td>
<td>60 m / 200 ft maximum cable run</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Explosion-proof version available</td>
<td></td>
</tr>
</tbody>
</table>

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**Systems for Gate/Door Monitoring**

- **50FY**
  - Up to 6 sensors per amplifier
  - LED indicators
  - Tamper resistant
  - Corrosion resistant plastic housing
  - IP 67 sealing
  - -40 to 85 °C / -40 to 153 °F operating temperature

- **40FY**
  - Compact design
  - Alignment LED indicator
  - Tamper resistant
  - Corrosion resistant plastic housing
  - Pre-leaded or connectorized
  - IP 67 sealing, washdown
  - Wide temperature rating

---

**Selection Guide for Industrial Safety Products**

61
<table>
<thead>
<tr>
<th><strong>TYPICAL APPLICATIONS</strong></th>
<th><strong>FEATURES</strong></th>
<th><strong>VOLTAGES</strong></th>
<th><strong>APPROVAL</strong></th>
<th><strong>CONDITIONS OF USE</strong></th>
</tr>
</thead>
</table>
| **Single Channel Emergency Stop Module** | - Single channel input  
- Slim 22.5 mm/0.88 in housing  
- Automatic or manual restart  
- FSD monitoring  
- Power and outputs LED indicators  
- Removable terminal strips | - Voltage: 24 Vdc  
- Frequency: 50/60 Hz | | *Switching capacity: 10 mA - 10 A  
*Typical electrical lifespan: 10^6 operations  
*Response time: 35 ms  
*Overvoltage and short-circuit protection |

*According to the Machinery Directive: 98/37/EC and IEC/EN 60204*

| **Single Channel Emergency Stop Module** | - Single channel input  
- Automatic or manual restart  
- FSD monitoring  
- Power and outputs LED indicators | - Voltage: 24 Vdc  
- Frequency: 50/60 Hz | | *Switching capacity: 1 mA - 7 A  
*Typical electrical lifespan: 10^6 operations  
*Response time: 15 ms  
*Overvoltage and short-circuit protection |

*According to the Machinery Directive: 98/37/EC and IEC/EN 60204*

| **Dual Channel Emergency Stop Module** | - Dual channel input  
- Slim 22.5 mm/0.88 in housing  
- Short-circuit detection on start push-button  
- Automatic or manual restart  
- Cross-fault detection  
- FSD monitoring  
- Power and outputs LED indicators  
- Removable terminal strips | - Voltage: 24 Vac/Vdc | | *Switching capacity: 1 mA - 10 A  
*Typical electrical lifespan: 10^6 operations  
*Response time: 25 ms  
*Overvoltage and short-circuit protection |

*According to the Machinery Directive: 98/37/EC and IEC/EN 60204*

| **Dual Channel Emergency Stop Module** | - Dual channel input  
- Short-circuit detection on start push-button  
- Automatic or manual restart  
- Cross-fault detection  
- FSD monitoring  
- Power and outputs LED indicators  
- Removable terminal strips | - Voltage: 24 Vac/Vdc  
- Frequency: 50/60 Hz | | *Switching capacity: 1 mA - 10 A  
*Typical electrical lifespan: 10^6 operations  
*Response time: 30 ms  
*Overvoltage and short-circuit protection |

*According to the Machinery Directive: 98/37/EC and IEC/EN 60204*
## Emergency Stop Circuits

### Table: APPLICATION SCHEMATICS, OUTPUT, DIMENSIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>Outputs/Contacts</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SRS5924</td>
<td>3 NO, 1 NC</td>
<td>W 22.5 x D 121 x H 84 mm (0.89 x 4.77 x 3.31 in)</td>
</tr>
<tr>
<td>FF-SRS5934</td>
<td>2 NO, 1 NC</td>
<td>W 45 x D 121 x H 74 mm (1.77 x 4.76 x 2.91 in)</td>
</tr>
<tr>
<td>FF-SRS5925</td>
<td>2 NO, 1 NC</td>
<td>W 22.5 x D 118 x H 84 mm (0.89 x 4.76 x 3.31 in)</td>
</tr>
<tr>
<td>FF-SRS5935</td>
<td>3 NO, 1 NC</td>
<td>W 45 x D 121 x H 74 mm (1.77 x 4.76 x 2.91 in)</td>
</tr>
<tr>
<td>FF-SRS5988</td>
<td>6 NO, 1 NC</td>
<td>W 100 x D 121 x H 74 mm (3.93 x 4.76 x 2.91 in)</td>
</tr>
</tbody>
</table>

### Diagrams:

- **FF-SRS5924**: Emergency stop circuit with three normally open (NO) contacts and one normally closed (NC) contact. Dimensions: W 22.5 x D 121 x H 84 mm (0.89 x 4.77 x 3.31 in).
- **FF-SRS5934**: Emergency stop circuit with two NO contacts and one NC contact. Dimensions: W 45 x D 121 x H 74 mm (1.77 x 4.76 x 2.91 in).
- **FF-SRS5925**: Emergency stop circuit with two NO contacts and one NC contact. Dimensions: W 22.5 x D 118 x H 84 mm (0.89 x 4.76 x 3.31 in).
- **FF-SRS5935**: Emergency stop circuit with three NO contacts and one NC contact. Dimensions: W 45 x D 121 x H 74 mm (1.77 x 4.76 x 2.91 in).
- **FF-SRS5988**: Emergency stop circuit with six NO contacts and one NC contact. Dimensions: W 100 x D 121 x H 74 mm (3.93 x 4.76 x 2.91 in).
<table>
<thead>
<tr>
<th>TYPICAL APPLICATIONS</th>
<th>FEATURES</th>
<th>VOLTAGES</th>
<th>APPROVAL</th>
<th>CONDITIONS OF USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two hand control</td>
<td>• Interfaces up to Category 1 (EN 954-1)</td>
<td>• Voltages: 24 Vdc</td>
<td>• Switching capacity: 1 mA - 10 A</td>
<td>• According to the Machinery Directive: 98/37/EC and IEC / EN 60204</td>
</tr>
<tr>
<td></td>
<td>• Type IIIA (EN 574)</td>
<td>120 Vac 230 Vac</td>
<td>• Typical electrical lifespan: 10^6 operations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Hand injury protection e.g. due to dangerous machine movement</td>
<td>• Frequency: 50/60 Hz</td>
<td>• Simultaneity conditions between 2 inputs max. 0.5 s</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Robotics</td>
<td></td>
<td>• Response time: 30 ms</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Pick and place machines</td>
<td></td>
<td>• Voltage drop and short-circuit protection</td>
<td></td>
</tr>
<tr>
<td>Safety door monitor</td>
<td>• Interfaces up to Category 4 (EN 954-1)</td>
<td>• Voltages: 24 Vdc</td>
<td>• Switching capacity: 1 mA - 10 A</td>
<td>• According to the Machinery Directive: 98/37/EC and IEC / EN 60204</td>
</tr>
<tr>
<td></td>
<td>• Monitors the status of position switches on a safety door</td>
<td>120 Vac 230 Vac</td>
<td>• Typical electrical lifespan: 10^6 operations</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Frequency: 50/60 Hz</td>
<td>• Simultaneity conditions between 2 inputs max. 3 s</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Response time: 30 ms</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Voltage drop and short-circuit protection</td>
<td></td>
</tr>
<tr>
<td>Expansion module</td>
<td>• Interfaces up to Category 4 (EN 954-1)</td>
<td>• Voltages: 24 Vdc</td>
<td>• Switching capacity: 10mA - 10 A</td>
<td>• According to the Machinery Directive: 98/37/EC and IEC / EN 60204</td>
</tr>
<tr>
<td></td>
<td>• Contact multiplication for:</td>
<td>120 Vac 230 Vac</td>
<td>• Typical electrical lifespan: 10^6 operations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- safety control modules</td>
<td>• Frequency: 50/60 Hz</td>
<td>• Simultaneity conditions between 2 inputs max. 3 s</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- safety light curtains</td>
<td></td>
<td>• Response time: 15 ms</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- other safety devices</td>
<td></td>
<td>• Voltage drop and short-circuit protection</td>
<td></td>
</tr>
<tr>
<td>Time delay module</td>
<td>• Interfaces up to Category 4 (EN 954-1)</td>
<td>• Voltages: 24 Vdc</td>
<td>• Switching capacity: 10mA - 8 A</td>
<td>• According to the Machinery Directive: 98/37/EC and IEC / EN 60204</td>
</tr>
<tr>
<td></td>
<td>• Time delay before disconnection of safety interface circuits</td>
<td>120 Vac 230 Vac</td>
<td>• Typical electrical lifespan: 10^6 operations</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Frequency: 50/60 Hz</td>
<td>• Response time: 15 ms</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Voltage drop and short-circuit protection</td>
<td></td>
</tr>
<tr>
<td>Standstill monitor</td>
<td>• Interfaces up to Category 4 (EN 954-1)</td>
<td>• Voltages: 24 Vdc</td>
<td>• Switching capacity: 10mA - 8 A</td>
<td>• According to the Machinery Directive: 98/37/EC and IEC / EN 60204</td>
</tr>
<tr>
<td></td>
<td>• Standstill detection of asynchronous motors.</td>
<td>120 Vac 230 Vac</td>
<td>• Typical electrical lifespan: 10^6 operations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Example: Allows the opening of a protective door when movement</td>
<td>• Frequency: 50/60 Hz</td>
<td>• Response time: 15 ms</td>
<td></td>
</tr>
<tr>
<td></td>
<td>is stopped or applies a brake while movement exists</td>
<td></td>
<td>• Voltage drop and short-circuit protection</td>
<td></td>
</tr>
</tbody>
</table>

- Selection Guide for Industrial Safety Products -
### APPLICATION SCHEMATICS

<table>
<thead>
<tr>
<th>OUTPUT</th>
<th>DIMENSIONS</th>
</tr>
</thead>
</table>
| FF-SR25980 | ![Front view of FF-SR25980](image)  
W 45 x D 121 x H 74 mm  
W 1.77 x D 4.76 x H 2.91 in |
| FF-SRD5985 | ![Front view of FF-SRD5985](image)  
W 45 x D 121 x H 74 mm  
W 1.77 x D 4.76 x H 2.91 in |
| FF-SRE3081 | ![Front view of FF-SRE3081](image)  
W 100 x D 121 x H 74 mm  
W 3.94 x D 4.76 x H 2.91 in |
| FF-SRT | ![Front view of FF-SRT](image)  
W 45 x D 121 x H 74 mm  
W 1.77 x D 4.76 x H 2.91 in |
| FF-SR05936 | ![Front view of FF-SR05936](image)  
W 45 x D 121 x H 74 mm  
W 1.77 x D 4.76 x H 2.91 in |

- **2 NO contacts**
- **1 NO contact**
- **1 NC contact**
- **7 NO contacts**
- **1 NC contact**
- **2 NO contacts**
- **2 NC contacts**

### Output Details

- **FF-SR25980**
  - L1 (+)  
  - N (-)  
  - 2 NO contacts

- **FF-SRD5985**
  - L1 (+)  
  - N (-)  
  - 2 NO contacts

- **FF-SRE3081**
  - 7 NO contacts  
  - 1 NC contact

- **FF-SRT**
  - 1 NO contact  
  - 1 NC contact

- **FF-SR05936**
  - 2 NO contacts  
  - 2 NC contacts

---

*Courtesy of Steven Engineering, Inc.*

---

*Selection Guide for Industrial Safety Products*
## Safety Control Modules

<table>
<thead>
<tr>
<th>TYPICAL APPLICATIONS</th>
<th>FEATURES</th>
<th>VOLTAGE</th>
<th>APPROVAL</th>
<th>CONDITIONS OF USE</th>
</tr>
</thead>
</table>
| **Category 4 interface control module** | • Dual inputs compatible with failsafe solid state outputs of Honeywell electrosensitive protective equipment  
   • Selectable start and restart interlock  
   • Optional FSD monitoring loop  
   • LED indicators for inputs/outputs status and for restart condition  
   • Removable terminal strips | 24 Vdc | UL Listed Pending | • Switching capacity: 1 mA to 6A  
   • DIN rail mounting  
   • 15 ms response time |

**Compatible with the FF-SYA Series and the FF-SRM muting module ONLY**

| **Category 4 muting for conveyor or machine applications** | • Connection of 2 or 4 muting sensors with coincidence monitoring  
   • Variable timings  
   • Override facility  
   • Start & restart interlock facility  
   • FSD monitoring loop  
   • Optional test input for the control of the ESPE at power up  
   • Failure diagnostic output  
   • Removable terminal strips | 24 Vdc | CE  
   NRTL/C | • Switching capacity: 0.5A / 24 Vdc for connections to the machine control circuit including the muting lamp, 100 mA / 24 Vdc for status outputs  
   • Protection against overload, short-circuits and reversed polarity  
   • DIN rail mounting  
   • 5 ms response time |

**Compatible with any Honeywell Type 3 or 4 protective equipment**

| **Category 2 muting for conveyor or machine applications** | • Connection of 2 or 3 muting sensors with coincidence monitoring  
   • Override facility  
   • Test input for the control of the ESPE at power up and after each actuation  
   • FSD monitoring loop  
   • Failure diagnostic output  
   • Removable terminal strips | 24 Vdc | UL Listed  
   TUV | • Switching capacity: 2A / 125 Vac for connections to the machine control circuit, 0.5A / 60 Vdc for the self-diagnostic output, 200 mA / 24 Vdc for the muting lamp  
   • DIN rail mounting  
   • 15 ms response time |

**Compatible with the FF-SLC Series ONLY**
<table>
<thead>
<tr>
<th>APPLICATION SCHEMATICS</th>
<th>OUTPUT</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SRS59392</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Front view</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 45 x D 121 x H 74 mm</td>
<td></td>
<td>W 1.77 x D 4.76 x H 2.91 in</td>
</tr>
<tr>
<td>FF-SRM100P2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Front view</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 152 x D 118 x H 73 mm</td>
<td></td>
<td>W 5.98 x D 4.64 x H 2.87 in</td>
</tr>
<tr>
<td>FF-SLM200R2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Front view</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W 152 x D 118 x H 73 mm</td>
<td></td>
<td>W 5.98 x D 4.64 x H 2.87 in</td>
</tr>
</tbody>
</table>

- **FF-SRS59392**
- 2 NO and 1 NC contacts provided by two cross-monitored relays
- Connection to the machine control circuit: 2 NO failsafe static outputs and 1 NO failure alarm static output (tested at start up)
- Status indication: 1 static output for the muting lamp with permanent monitoring, 3 static outputs for remote indication on restart conditions and outputs status

- **FF-SRM100P2**
- Connection to the machine control circuit: 2 NO and 1 NC contacts, 1 NO contact for self-diagnostic
- Status indication: 1 output for the muting lamp with permanent monitoring

- **FF-SLM200R2**
- Connection to the machine control circuit: 2 NO and 1 NC contacts provided by two cross-monitored relays
- Status indication: 1 output for the muting lamp with permanent monitoring
Type 4 Safety light curtain
Compact, Universal, Smart and Full-featured

FEATURES
- 1- or 2-beam floating blanking
- Manual or automatic restart
- External Device Monitoring (EDM)
- 2 or 4 inputs for muting signals
- 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 indications: 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

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 actuated within a time period of 3 s 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 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.

Figure 3 - Uni-directional application with four optoelectronic sensors

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:

<table>
<thead>
<tr>
<th>Model</th>
<th>Resolution without floating/blanking</th>
<th>Resolution with 1-beam floating blanking</th>
<th>Resolution with 2-beam floating blanking</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYB14</td>
<td>14 mm / 0.55 in</td>
<td>24 mm / 0.94 in</td>
<td>34 mm / 1.33 in</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>30 mm / 1.18 in</td>
<td>50 mm / 1.97 in</td>
<td>70 mm / 2.75 in</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>50 mm / 1.97 in</td>
<td>90 mm / 3.54 in</td>
<td>130 mm / 5.12 in</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Model</th>
<th>Maximum size of undetected object with 1-beam floating blanking</th>
<th>Maximum size of undetected object with 2-beam floating blanking</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYB14</td>
<td>6 mm / 0.23 in</td>
<td>16 mm / 0.63 in</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>10 mm / 0.39 in</td>
<td>30 mm / 1.18 in</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>30 mm / 1.18 in</td>
<td>70 mm / 2.75 in</td>
</tr>
</tbody>
</table>

### 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.

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 7

![Medium scanning range (factory setting)]

<table>
<thead>
<tr>
<th>Minimum</th>
<th>Medium (factory setting)</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYB14</td>
<td>1.4 m / 4.6 ft</td>
<td>6 m / 20 ft</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>4.6 m / 15.1 ft</td>
<td></td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>10 m / 32.8 ft</td>
<td>20 m / 65 ft</td>
</tr>
</tbody>
</table>

Figure 8
Test input type

Figure 9

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

**Ordering information**
Each listing consists of an M12 emitter, an M12 receiver, 2 pairs of right-angle brackets, an end cover equipped with a cable gland, a test rod and a set of configuration cards.

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

<table>
<thead>
<tr>
<th>Features</th>
<th>Type</th>
<th>FF-SYB14</th>
<th>FF-SYB30</th>
<th>FF-SYB50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal scanning range</td>
<td>14 mm / 0.55 in</td>
<td>30 mm / 1.18 in</td>
<td>50 mm / 1.97 in</td>
<td></td>
</tr>
<tr>
<td>Object detection size</td>
<td>±2°, ±25 %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switching capability</td>
<td></td>
<td>350 mA max. at 24 Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time (beam interruption)</td>
<td>22 ms (28 ms for model numbers FF-SYB14128 to FF-SYB14176)</td>
<td>22 ms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time (Auxiliary Safety Device engaged)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum cable length</td>
<td>100 m / 328 ft (100 m capacitance)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restart time after power up</td>
<td>&gt; 1 s (80 ms - without EDM, 150 ms - with EDM)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loads impedance</td>
<td>70 Ω min. / 5 kΩ max.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage drop</td>
<td>&lt; 2 Vdc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loads turn-on voltage</td>
<td>5 V min. on resistive loads / 7 V min. on inductive loads</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-circuits and cross-faults, overloads, reversed polarity, micro-cut-off (10 ms, 100 % voltage drop, 10 Hz)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NC signalling or muting lamp/diagnosis output</td>
<td>1 PNP non safety output, NC (signalling contact) or NO (muting/diagnostic indication)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switching capability</td>
<td>100 mA max. at 24 Vdc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test input (emitter) (1)</td>
<td>Floating input with selectable NO/NC test logic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External contact type</td>
<td>Relay contact, or static (solid state) PNP or static (solid state) NPN (must be activated for at least 20 ms)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test loop current (resistance)</td>
<td>13 mA typical (750 Ω max.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protections</td>
<td>3000 Vdc galvanic insulation, reversed polarity, micro-cut-off (14 ms)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restart / EDM input (1)</td>
<td>Relay contact (must be activated for at least 150 ms and less than 3 s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. voltage</td>
<td>29 Vdc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muting or serial connection inputs (1)</td>
<td>Relay contact, or static (solid state) PNP or static (solid state) NPN (automatic recognition)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timing conditions</td>
<td>3 s between (pins 3 and 4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum cable length</td>
<td>100 m / 328 ft (no limitation in capacitance)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>Operating: 0 °C to 55 °C, 0% to 95% humidity; Storage: -20 °C to 75 °C, F to 167 °F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sealing</td>
<td>NEMA 4, 13 and IP 65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibrations</td>
<td>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</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shocks</td>
<td>IEC/EN 61496-1: 15 G - 11 ms - 3 per axis, for 3 axes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bumps</td>
<td>IEC/EN 61496-1: 10 G - 16 ms - 1000 per axis, for 3 axes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product dimensions</td>
<td>Width: 42 mm (1.65 in); depth: 55 mm (2.16 in); height: (2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection</td>
<td>Emitter: M12/5 pole male receptacle • Receiver: M12/8 pole male receptacle or terminal strip with M20 cable gland</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Housing: aluminium alloy and (conductive) polycarbonate (end caps) • Front plate: polymethylmethacrylate (PMMA)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1. Voltage switching (high/low): ≥ 11 Vdc min. (I > 6 mA) / ≤ 5 Vdc (I > 2 mA);
2. Input current (high/low): 20 mA / 10 mA at 24 Vdc.

In compliance with the IEC 61131-2 requirements for type 2 sensors.

Refer to emitter and receiver dimensions / weights.

(1) Frequency range: 0.5 to 550 Hz; 1 octave/min. sweep rate, ±0.5%.

(2) Voltage switching (high/low): 11 Vdc min. (I > 6 mA) / 5 Vdc (I > 2 mA).

(3) Input current (high/low): 20 mA / 10 mA at 24 Vdc.
**Figure 10 - Possible modes of operation and corresponding receiver termination type and connection box**

<table>
<thead>
<tr>
<th>Card (1)</th>
<th>Restart mode</th>
<th>Blanking (2)</th>
<th>Auxiliary Safety Device</th>
<th>Muting (3)</th>
<th>Auxiliary output (4)</th>
<th>Receiver termination (5)</th>
<th>Connection box (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>#01</td>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td>NC signal</td>
<td>M12 plug</td>
<td></td>
</tr>
<tr>
<td>#02</td>
<td>Manual</td>
<td>1-beam</td>
<td></td>
<td></td>
<td>NC signal</td>
<td>M12 plug</td>
<td></td>
</tr>
<tr>
<td>#03</td>
<td>Manual</td>
<td>2-beam</td>
<td></td>
<td></td>
<td>NC signal</td>
<td>M12 plug</td>
<td></td>
</tr>
<tr>
<td>#04</td>
<td>Automatic</td>
<td></td>
<td></td>
<td></td>
<td>NC signal</td>
<td>M12 plug</td>
<td></td>
</tr>
<tr>
<td>#05</td>
<td>Automatic</td>
<td>1-beam</td>
<td></td>
<td></td>
<td>NC signal</td>
<td>M12 plug</td>
<td></td>
</tr>
<tr>
<td>#06</td>
<td>Automatic</td>
<td>2-beam</td>
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<td>NC signal</td>
<td>M12 plug</td>
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<tr>
<td>#07</td>
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<td></td>
<td></td>
<td>yes</td>
<td>NC signal</td>
<td>M12 plug</td>
<td>FF-SXZBOKS</td>
</tr>
<tr>
<td>#08</td>
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<td>1-beam</td>
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<td>yes</td>
<td>NC signal</td>
<td>M12 plug</td>
<td>FF-SXZBOKS</td>
</tr>
<tr>
<td>#09</td>
<td>Automatic</td>
<td>2-beam</td>
<td></td>
<td>yes</td>
<td>NC signal</td>
<td>M12 plug</td>
<td>FF-SXZBOKS</td>
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<tr>
<td>#10</td>
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<td>yes</td>
<td>NC signal</td>
<td>M12 plug</td>
<td>FF-SXZBOKS</td>
</tr>
<tr>
<td>#11</td>
<td>Automatic</td>
<td></td>
<td></td>
<td>2 inputs</td>
<td>NC signal</td>
<td>M12 plug</td>
<td>FF-SXZBOM2</td>
</tr>
<tr>
<td>#12</td>
<td>Automatic</td>
<td></td>
<td></td>
<td>2 inputs</td>
<td>Muting lamp</td>
<td>M12 plug</td>
<td>FF-SXZBOM2</td>
</tr>
<tr>
<td>#13</td>
<td>Automatic</td>
<td></td>
<td></td>
<td>4 inputs</td>
<td>NC signal</td>
<td>Terminal strip</td>
<td>FF-SXZBOM4</td>
</tr>
<tr>
<td>#14</td>
<td>Automatic</td>
<td></td>
<td></td>
<td>4 inputs</td>
<td>Muting lamp</td>
<td>Terminal strip</td>
<td>FF-SXZBOM4</td>
</tr>
<tr>
<td>#15</td>
<td>Automatic</td>
<td></td>
<td></td>
<td>yes</td>
<td>2 inputs</td>
<td>NC signal</td>
<td>Terminal strip</td>
</tr>
<tr>
<td>#16</td>
<td>Automatic</td>
<td></td>
<td></td>
<td>yes</td>
<td>2 inputs</td>
<td>Muting lamp</td>
<td>Terminal strip</td>
</tr>
<tr>
<td>#17</td>
<td>Manual</td>
<td></td>
<td></td>
<td>2 inputs</td>
<td>NC signal</td>
<td>M12 plug</td>
<td>FF-SXZBOM2</td>
</tr>
<tr>
<td>#18</td>
<td>Manual</td>
<td></td>
<td></td>
<td>2 inputs</td>
<td>Muting lamp</td>
<td>M12 plug</td>
<td>FF-SXZBOM2</td>
</tr>
<tr>
<td>#19</td>
<td>Manual</td>
<td></td>
<td></td>
<td>4 inputs</td>
<td>NC signal</td>
<td>Terminal strip</td>
<td>FF-SXZBOM4</td>
</tr>
<tr>
<td>#20</td>
<td>Manual</td>
<td></td>
<td></td>
<td>4 inputs</td>
<td>Muting lamp</td>
<td>Terminal strip</td>
<td>FF-SXZBOM4</td>
</tr>
<tr>
<td>#21</td>
<td>Manual</td>
<td></td>
<td></td>
<td>yes</td>
<td>2 inputs</td>
<td>NC signal</td>
<td>Terminal strip</td>
</tr>
<tr>
<td>#22</td>
<td>Manual</td>
<td></td>
<td></td>
<td>yes</td>
<td>2 inputs</td>
<td>Muting lamp</td>
<td>Terminal strip</td>
</tr>
<tr>
<td>#23</td>
<td>Manual</td>
<td>1-beam</td>
<td></td>
<td>2 inputs</td>
<td>Muting lamp</td>
<td>M12 plug</td>
<td>FF-SXZBOM2</td>
</tr>
<tr>
<td>#24</td>
<td>Manual</td>
<td>2-beam</td>
<td></td>
<td>2 inputs</td>
<td>Muting lamp</td>
<td>M12 plug</td>
<td>FF-SXZBOM2</td>
</tr>
<tr>
<td>#25</td>
<td>Manual</td>
<td>1-beam</td>
<td></td>
<td>4 inputs</td>
<td>Muting lamp</td>
<td>Terminal strip</td>
<td>FF-SXZBOM4</td>
</tr>
<tr>
<td>#26</td>
<td>Manual</td>
<td>2-beam</td>
<td></td>
<td>4 inputs</td>
<td>Muting lamp</td>
<td>Terminal strip</td>
<td>FF-SXZBOM4</td>
</tr>
<tr>
<td>#27</td>
<td>Manual</td>
<td>1-beam</td>
<td></td>
<td>yes</td>
<td>2 inputs</td>
<td>Muting lamp</td>
<td>Terminal strip</td>
</tr>
<tr>
<td>#28</td>
<td>Manual</td>
<td>2-beam</td>
<td></td>
<td>yes</td>
<td>2 inputs</td>
<td>Muting lamp</td>
<td>Terminal strip</td>
</tr>
</tbody>
</table>

(1) Factory setting: card #01

(2) Floating blanking

<table>
<thead>
<tr>
<th>Model</th>
<th>Resolution</th>
<th>Undetected object size</th>
<th>Resolution</th>
<th>Undetected object size</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYB14</td>
<td>24 mm / 0.94 in</td>
<td>6 mm / 0.23 in</td>
<td>34 mm / 1.33 in</td>
<td>16 mm / 0.63 in</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>50 mm / 1.97 in</td>
<td>10 mm / 0.39 in</td>
<td>70 mm / 2.75 in</td>
<td>30 mm / 1.18 in</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>90 mm / 3.54 in</td>
<td>30 mm / 1.18 in</td>
<td>130 mm / 5.12 in</td>
<td>70 mm / 2.75 in</td>
</tr>
</tbody>
</table>

(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. A M20 cable gland is delivered with the package. Male M23 cordsets are available on option (see "Accessories" section).

(6) Connection boxes are available for the interconnection of all sensors and actuators (see "Accessories" section).
<table>
<thead>
<tr>
<th>Model</th>
<th>032</th>
<th>048</th>
<th>064</th>
<th>080</th>
<th>096</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Protection height (mm / in) (1)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SYB14</td>
<td>334 / 13.1</td>
<td>494 / 19.4</td>
<td>654 / 25.7</td>
<td>814 / 32.07</td>
<td>974 / 38.3</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>350 / 13.7</td>
<td>510 / 20.09</td>
<td>670 / 26.3</td>
<td>830 / 32.7</td>
<td>990 / 39</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>370 / 14.6</td>
<td>530 / 20.9</td>
<td>690 / 27.2</td>
<td>850 / 33.5</td>
<td>1010 / 39.8</td>
</tr>
<tr>
<td><strong>Sensing field height (mm / in) (2)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SYB14</td>
<td>314 / 12.3</td>
<td>474 / 18.6</td>
<td>634 / 24.9</td>
<td>794 / 31.2</td>
<td>954 / 37.5</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>310 / 12.2</td>
<td>470 / 18.5</td>
<td>630 / 24.8</td>
<td>790 / 31.1</td>
<td>950 / 37.4</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>290 / 11.4</td>
<td>450 / 17.7</td>
<td>610 / 24.03</td>
<td>770 / 30.3</td>
<td>930 / 36.6</td>
</tr>
<tr>
<td><strong>Total height (mm / in) (3)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M12 emitter or receiver</td>
<td>424 / 16.7</td>
<td>584 / 23</td>
<td>744 / 29.3</td>
<td>904 / 35.6</td>
<td>1064 / 41.9</td>
</tr>
<tr>
<td>Cable gland receiver only</td>
<td>438 / 12.2</td>
<td>598 / 23.5</td>
<td>758 / 29.8</td>
<td>918 / 36.1</td>
<td>1078 / 42.4</td>
</tr>
<tr>
<td><strong>Weight per device (kg / lbs)</strong></td>
<td>0.86 / 1.89</td>
<td>1.14 / 2.5</td>
<td>1.42 / 3.12</td>
<td>1.7 / 3.74</td>
<td>1.98 / 4.35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>112</th>
<th>128</th>
<th>144</th>
<th>160</th>
<th>176</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Protection height (mm / in) (1)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SYB14</td>
<td>1134 / 44.6</td>
<td>1294 / 50.9</td>
<td>1454 / 57.2</td>
<td>1614 / 63.5</td>
<td>1774 / 69.8</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>1150 / 45.3</td>
<td>1310 / 51.6</td>
<td>1470 / 57.9</td>
<td>1630 / 64.2</td>
<td>1790 / 70.5</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>1170 / 46.0</td>
<td>1330 / 52.4</td>
<td>1490 / 58.7</td>
<td>1650 / 65.0</td>
<td>1810 / 71.2</td>
</tr>
<tr>
<td><strong>Sensing field height (mm / in) (2)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SYB14</td>
<td>1114 / 43.8</td>
<td>1274 / 50.1</td>
<td>1434 / 56.5</td>
<td>1594 / 62.8</td>
<td>1754 / 69.1</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>1110 / 43.7</td>
<td>1270 / 50.03</td>
<td>1430 / 56.3</td>
<td>1590 / 62.6</td>
<td>1750 / 68.9</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>1090 / 42.9</td>
<td>1250 / 49.2</td>
<td>1410 / 55.1</td>
<td>1570 / 61.8</td>
<td>1730 / 68.1</td>
</tr>
<tr>
<td><strong>Total height (mm / in) (3)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M12 emitter or receiver</td>
<td>1224 / 48.2</td>
<td>1384 / 54.5</td>
<td>1544 / 60.8</td>
<td>1704 / 67.1</td>
<td>1864 / 73.4</td>
</tr>
<tr>
<td>Cable gland receiver only</td>
<td>1238 / 48.7</td>
<td>1398 / 55</td>
<td>1558 / 61.3</td>
<td>1718 / 67.6</td>
<td>1878 / 73.9</td>
</tr>
<tr>
<td><strong>Weight per device (kg / lbs)</strong></td>
<td>2.26 / 4.97</td>
<td>2.54 / 4.97</td>
<td>2.82 / 6.20</td>
<td>3.10 / 6.82</td>
<td>3.38 / 7.43</td>
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</tbody>
</table>
Figure 11 - Dimensions in mm / in

<table>
<thead>
<tr>
<th>(mm / in)</th>
<th>øR (resolution)</th>
<th>P (lens pitch)</th>
<th>D (lens diameter)</th>
<th>A (inactive zone)</th>
<th>B (inactive zone)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYB14</td>
<td>14 / 0.6</td>
<td>10 / 0.4</td>
<td>4 / 0.16</td>
<td>15.2 / 0.60</td>
<td>90.6 / 3.56</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>30 / 1.2</td>
<td>20 / 0.8</td>
<td>10 / 0.4</td>
<td>22.2 / 0.87</td>
<td>87.6 / 3.45</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>50 / 1.97</td>
<td>40 / 1.57</td>
<td>10 / 0.39</td>
<td>42.2 / 1.66</td>
<td>87.6 / 3.45</td>
</tr>
</tbody>
</table>

(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)
LED status indicators

Figure 12 - Emitter

- 3 scanning range indicators R1, R2, R3 (yellow)
- Alarm indicator (red)
- Test indicator (red)

Figure 13 - Receiver

- 2 operation indicators (red and green)
- Signal strength indicator (orange)
- Cross-talk indicator (red)
- Muting indicator (orange)
- 2 blanking indicators (yellow)

- Restart indicator (yellow)
- 1 blanking
- 2 blanking
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)

<table>
<thead>
<tr>
<th>LIGHT CURTAIN MODEL</th>
<th>FF-SYB14 FF-SYB30 without floating/blanking</th>
<th>FF-SYB30 with 1- or 2 beam floating blanking</th>
<th>FF-SYB50 with or without blanking</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normal approach</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$S \geq 2000 (t_1 + t_2) + 8 (R-14)$</td>
<td>$S \geq 1600 (t_1 + t_2) + 850$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with $S \geq 100$</td>
<td>with $Hu \geq 900$ mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>if $S \geq 500$, then use:</td>
<td>$H_l \leq 300$ mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$S \geq 1600 (t_1 + t_2) + 8 (R - 14)$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>with $S \geq 500$</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Parallel approach</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$S \geq 1600 (t_1 + t_2) + (1200 - 0.4H)$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>with $H \leq 875$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Or $S \geq 1600 (t_1 + t_2) + 850$, with $875 \leq H \leq 1000$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>with $H \geq 15$ (R-50):</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$H \geq 300$ mm for the FF-SYB30 with 2-beam floating blanking</td>
<td>$H \geq 600$ mm for the FF-SYB50 with 1-beam floating blanking</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$FF-SYB50$ with 2-beam floating blanking not allowed in parallel approach</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Angled approach</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$S \geq 1600 (t_1 + t_2)$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>with $Hu \geq 900$ mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>if $\alpha \geq 30^\circ$, then use the normal approach formula,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>with $H_l \leq 300$ mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>if $\alpha \leq 30^\circ$, then use the parallel approach formula,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>with $Hu \leq 1000$ mm and $H \geq 15$ (R-50) $R$ is the light curtain resolution</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$H \geq 300$ mm for the FF-SYB30 with 2-beam floating blanking</td>
<td>$H \geq 800$ mm for the FF-SYB50 with 1-beam floating blanking</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$FF-SYB50$ with 2-beam floating blanking not allowed in angled approach</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$t_1$: light curtain response time (s)

$t_2$: machine stopping time (s)

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)

<table>
<thead>
<tr>
<th>LIGHT CURTAIN MODEL</th>
<th>FF-SYB14, FF-SYB30, FF-SYB50 with or without floating blanking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal approach</td>
<td>$Ds \geq 63 \times (Ts + Tc + Tr) + Dpf$</td>
</tr>
<tr>
<td></td>
<td>If $R \leq 2.5$, $Dpf = 3.4 \times (R - 0.275)$, (see table below)</td>
</tr>
<tr>
<td></td>
<td>If $Hi \leq 12$ and $Hu \geq 48$ (Typical for Reach Thru), $Dpf = 36$</td>
</tr>
<tr>
<td></td>
<td>If $Hi \leq 12$ and $36 \leq Hu \leq 48$ (Typical for Reach Over), $Dpf = 48$</td>
</tr>
<tr>
<td></td>
<td>If $H &gt; 12$, supplemental safeguarding may be required to detect crawling underneath.</td>
</tr>
<tr>
<td>Parallel approach</td>
<td>$Ds \geq 63 \times (Ts + Tc + Tr) + 48$</td>
</tr>
<tr>
<td></td>
<td>$H \geq 15 \times (R-2)$</td>
</tr>
<tr>
<td></td>
<td>$\text{Table for } H^*$</td>
</tr>
<tr>
<td></td>
<td>No blanking</td>
</tr>
<tr>
<td>FF-SYB14</td>
<td>$0 &lt; H \leq 39$</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>$0 &lt; H \leq 39$</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>$0 &lt; H \leq 39$</td>
</tr>
<tr>
<td></td>
<td>*If $H &gt; 12$, supplemental safeguarding may be required to detect crawling underneath.</td>
</tr>
<tr>
<td>Angled approach</td>
<td>$Ds \geq 63 \times (Ts + Tc + Tr)$</td>
</tr>
<tr>
<td></td>
<td>$H \geq 15 \times (R-2)$</td>
</tr>
<tr>
<td></td>
<td>$\text{Table for } Dpf$</td>
</tr>
<tr>
<td></td>
<td>No blanking</td>
</tr>
<tr>
<td>FF-SYB14</td>
<td>0.935</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>3.077</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>5.763</td>
</tr>
</tbody>
</table>

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.)

For more information, refer to the ANSI/RIA 15.06 American standard.
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 ±10°).
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)
**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.

---

**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. ±45°)

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

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.

---

**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 ±11° 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-SYZMIR04, FF-SYZMIR06, FF-SYZMIR08, FF-SYZMIR10, FF-SYZMIR12, FF-SYZMIR14, FF-SYZMIR16, FF-SYZMIR18)
- Deflection mirror with 25% scanning range reduction (FF-SYZMIR10, FF-SYZMIR12, FF-SYZMIR14, FF-SYZMIR16, FF-SYZMIR18)
- Quick mounting and easy mirror adjustment
- Mounting brackets included (top / bottom mounting)
- Adjustment of mirror in azimuth direction of ±45°
- Material: Aluminium alloy housing
- Finish: Gold colour anodisation

### Ordering guide:
- FF-SYZMIR04: FF-SY032 and FF-SY048
- FF-SYZMIR06: FF-SY064
- FF-SYZMIR08: FF-SY080
- FF-SYZMIR10: FF-SY096
- FF-SYZMIR12: FF-SY112 and FF-SY128
- FF-SYZMIR14: FF-SY144
- FF-SYZMIR16: FF-SY160
- FF-SYZMIR18: FF-SY176

---

**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.
M12 connection boxes

**FF-SXZBOXM2**

Female M12 / 5 pole plug (x8) and removable spring-cage terminal block on each ends (M20 PGs)

Connection box for bi-directional muting applications (see Figure 1 and Figure 2). Allows the connection of a FF-SYB safety light curtain (emitter and receiver), two or four muting sensors, a muting/diagnostic lamp, a restart push-button and the TMM hold-to-run device via M12 connectors.

**FF-SXZBOXS**

Female M12 / 5 pole plug (x5) and removable spring-cage terminal block on each ends (M20 PGs)

Connection box for connection of an Auxiliary Safety Device (ASD). Allows the connection of a FF-SYB safety light curtain (emitter and receiver), the ASD, a diagnostic lamp and a restart push-button via M12 connectors.

**FF-SXZBOXM2S**

Female M12 / 5 pole plug (x7), female M23 / 19 poles (x1) and a removable spring-cage terminal block (M20 PG)

Connection box for bi-directional muting applications (see Figure 1 and Figure 2) with an auxiliary safety device (ASD). Allows the connection of a FF-SYB safety light curtain (emitter and receiver), two muting sensors, a muting lamp, the ASD, a restart push-button and the TMM hold-to-run device via M12 connectors and a M23 connector.

**FF-SXZBOXM4**

Female M12 / 5 pole plug (x8), female M23 / 19 poles (x1) and a removable spring-cage terminal block (M20 PG)

Connection box for uni-directional muting applications (see Figure 3). Allows the connection of a FF-SYB safety light curtain (emitter and receiver), four muting sensors, a muting lamp, a restart push-button and the TMM hold-to-run device via M12 connectors and a M23 connector.

Sealing: IP65
Approvals: cCSAus (pending)
Material: gold anodized aluminium alloy (housing), (conductive) polycarbonate (end caps), stainless steel (front plate)
Mounting: two right-angle brackets with mounting hardware (FF-SYZ634178 included with the connection box)

\( a = 367 \text{ mm} [14.45 \text{ in}] \) for cable gland versions or \( 364 \text{ mm} [14.33 \text{ in}] \) for M23 versions
Cordsets

M12/5 pole

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

Female keyway M12, straight, 5-pin for the 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)

Male keyway M12, 5-pin, straight - for connection boxes
FF-SXZCAM125UM02 2 m / 6.56 ft length
FF-SXZCAM125UM05 5 m / 16.40 ft length
FF-SXZCAM125UM10 10 m / 32.8 ft length
Equivalent to the 805006A09M... 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

Female keyway M12, straight, 8-pin for the 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)

Male keyway M12, 8-pin, straight - for connection boxes
FF-SXZCAM128UM02 2 m / 6.56 ft length
FF-SXZCAM128UM05 5 m / 16.40 ft length
FF-SXZCAM128UM10 10 m / 32.8 ft length
Equivalent to the 808006P02M... Micro-change® Series from Brad Harrison (see vendor catalog for color code)

M23/19 pole

1: purple
2: red
3: grey
4: red/blue
5: green
6: grey/pink
7: white/green
8: white/green
9: white/yellow
10: white/grey
11: black
12: green/yellow
13 to 19: unused

Male keyway M23, 19-pin, straight - for connection boxes
FF-SXZCOM2319UM02 2 m / 6.56 ft length
FF-SXZCOM2319UM05 5 m / 16.40 ft length
FF-SXZCOM2319UM10 10 m / 32.8 ft length

Cable connector

FF-SXZCOM128 Receiver plug, Binder single keyway M12 female screw type straight connector. 8 set screws M2.5. Gold plated contacts.

FF-SXZCOM125 Emitter plug, Binder single keyway M12 female screw type straight connector. 5 set screws M2.5. Gold plated contacts.

FF-SXZCOM128M For connection boxes, Single keyway M12, 8-pin, male, screw type, straight

FF-SXZCOM125M For connection boxes, Single keyway M12, 5-pin, male, screw type, straight
FF-SRE59292
Safety control modules
Slim line expansion module
- 24 Vdc
- Safety interface up to Category 4 per EN 954-1
- 4 NO/1 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).

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 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 ZBS Series type, fixing collar with screw clamp contact blocks, key # 455).
To be used as the TMM hold-to-run device.
Kit including two self-adhesive protections to be glued on the front windows of the FF-SYB light curtain. Order 1 kit per light curtain.

CAUTION
Make sure the transparent protection is placed on the emitter and the filtered protection is placed on the receiver. Protections cannot be removed once in place. Failure to comply with these instructions may result in product damage.

Features:
- Storage and operating temperatures: -20 °C to 55 °C / -4 °F to 131 °F, high resistance to the ejection of melting particles
- Material: Organic glass
- Prohibited liquids: Sulfuric acid, hydrofluoric acid, ammonia solution
- Scanning range attenuation: 36%
- Optical immunity improvement factor: 2.5

Ordering guide:
- FF-SYZFT032
- FF-SYZFT048
- FF-SYZFT064
- FF-SYZFT080
- FF-SYZFT096
- FF-SYZFT128
- FF-SYZFT144
- FF-SYZFT160
- FF-SYZFT176

(*) FF-SYB30 and FF-SYB50 only

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-SY2ZROD14: 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.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service

Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorised Distributor, contact a nearby sales office or:

INTERNET: www.honeywell.com/sensing
E-mail: info.sc@honeywell.com
GKM Series
MICRO SWITCH™ Safety Key
Interlock Switch

DESCRIPTION
Honeywell Sensing and Control (S&C) offers safety switches to meet your needs. Designed with OEMs in mind, we offer safety switches in every size. The MICRO SWITCH™ GKM Series is our miniature product line offering one of the smallest key-op switches available. GKM has daisy-chain capability to reduce installation and down time. Pre-ledged versions allow for rapid fit, easy cable routing and function testing, potentially cutting costs dramatically in OEM applications. Per safety code EN 954-1, components used alone comply as a Category 1. By using components in conjunction with other safety switches and modules, it is possible to construct a comprehensive protection schemes with Category 2, 3, or 4 compliance. Simple upgrade guarding solutions are available for end-user applications. Order switch and key separately.

FEATURES
- Red body color
- Integrated cable or connector(s)
- Bottom, side, and dual entry cable
- 90° or straight key
- Extremely compact enclosure
- Positive opening operation of Normally Closed contacts conforming to IEC/EN 609447-5-1-3
- IP67 enclosure rating
- Design allows side-by-side mounting and daisy-chaining from switch to switch
- Dust cap for unused key entry
- Robust stainless steel keys
- UL listed, CSA certified, CE compliant
- High current switching capabilities
- Small door swing radius allows use down to 160 mm [6.3 in]

POTENTIAL APPLICATIONS
- Small enclosures and compact spaces
- Multiple door modular machinery

BENEFITS
- Immediately identifiable as safety component
- Reduced installation time and costs
- Flexibility in mounting/actuation options
- Switch equipment directly and through safety control modules
- Fits into extremely compact spaces
- Often suitable for wet applications
- Simple mechanical and electrical redundancy
- Easy application to multiple door modular machinery—reduced difficulty in wiring small switch enclosures
- Durable and tough design
- Complies with global requirements
## GKM Series

### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected mechanical life</td>
<td>&gt; 1 million operations</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP66/67; EN 60529; NEMA 1, 12, 13</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-25 °C to 85 °C [-13 °F to 185 °F]</td>
</tr>
<tr>
<td>Approvals*</td>
<td>IEC 60947-5-1, EN 60947-5-1, EN 1088, EN 60504, UL508, CSA22.2-14, UL748C utilization category</td>
</tr>
<tr>
<td>Ratings</td>
<td>15 ac, B300; 13 dc, Q300&lt;br&gt;For low energy (gold versions): operating voltage Ue: 1 Vac to 50 Vac or 1 Vdc to 50 Vdc&lt;br&gt;Operating current Ie: 1 A to 100 mA&lt;br&gt;GKME: 30 Vdc and 2 A max.</td>
</tr>
<tr>
<td>Cable spec.</td>
<td>SJTP rated P.V.C. type</td>
</tr>
<tr>
<td>Vibration</td>
<td>IEC 68-2-6 (BS 2011, Part 2.1 Fc) 10 g</td>
</tr>
<tr>
<td>Shock</td>
<td>IEC 68-2-27 (BS 2011, Part 2.1 Ea) 50 g</td>
</tr>
<tr>
<td>Door radius</td>
<td>160 mm [6.3 in]</td>
</tr>
</tbody>
</table>

### NOTES:


### DIMENSIONS mm/in

![Image of dimensions diagram]

### PINOUT

**MALE CONNECTOR PIN-OUTS**

### WIRING DIAGRAMS

**Switch type 3 (Slow BBM 1NO/1NC) and Switch type 9 (Slow BBM 1NO/1NC gold contacts)**

![Image of wiring diagram 1]

**Switch type 6 (Slow 2NC) and Switch type 7 (Switch 2NC gold contacts)**

![Image of wiring diagram 2]
Global Miniature Safety Key Interlock Switch

PART NUMBER TREE

<table>
<thead>
<tr>
<th>Body style</th>
<th>Cable/connector</th>
<th>Switch type (Slow-action contacts)</th>
<th>Key style (sold separately)</th>
<th>Optional key positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1 METRE CABLE LENGTH</td>
<td>1 NORMALLY CLOSED/ 1 NORMALLY OPEN BREAK BEFORE MAKE</td>
<td>Details of straight key (stainless steel)</td>
<td>1 Key position</td>
</tr>
<tr>
<td>B</td>
<td>2 METRE CABLE LENGTH</td>
<td>2 NORMALLY CLOSED</td>
<td>Details of 90° key (stainless steel)</td>
<td>2 Key position</td>
</tr>
<tr>
<td>C</td>
<td>3 METRE CABLE LENGTH</td>
<td>2 NORMALLY CLOSED</td>
<td>Replacement part number GKZ52M</td>
<td>2 Key position</td>
</tr>
<tr>
<td>D</td>
<td>ZERO INDICATES NO CABLE BUT CONNECTOR</td>
<td>LOW ENERGY (GOLD) CONTACTS</td>
<td>Replacement part number GKZ52M</td>
<td>2 Key position</td>
</tr>
<tr>
<td>E</td>
<td>GOLD PLATE OVER SILVER</td>
<td>LOW ENERGY (GOLD) CONTACTS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example: GKMD03 + GKZ52M

Micro-change dc Style M12
4-pin with internal threads/nut

DAISY-CHAINING CAPABILITY

The GKME modules may be daisy-chained and terminated into either a GKMC or GKMD (as shown) for multi-door modular machinery.
**WARNING**

**RISK TO LIFE OR PROPERTY**

Never use this product for an application involving serious risk to life or property without ensuring that the system as a whole has been designed to address the risks, and that this product is properly rated and installed for the intended use within the overall system.

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

**WARNING**

**MISUSE OF DOCUMENTATION**

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- 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.

**WARRANTY/REMEDY**

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, 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. In no event shall Honeywell be liable for consequential, special, or indirect damages.

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.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

**SALES AND SERVICE**

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

**E-mail** info.sc@honeywell.com

**Internet**: www.honeywell.com/sensing

**Phone and Fax:**
- Asia Pacific +65 6355-2828
  +65 6445-3033 Fax
- Europe +44 (0) 1698 481481
  +44 (0) 1698 481676 Fax
- Latin America +1-305-805-8188
  +1-305-883-8257 Fax
- USA/Canada +1-800-537-6945
  +1-815-235-6847
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Golden Valley, Minnesota 55422
www.honeywell.com

June 2009

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GKM Series
(Global Miniature Safety Key Interlock Switch)

FEATURES
• Red body colour
• Integrated cable or connector(s)
• Bottom or side entry cable
• 90° and straight key
• Top or side key entry
• High switching current capabilities
• Extremely compact enclosure
• Positive opening operation of Normally Closed contacts conforming to IEC/EN 60947-5-1-3
• IP 67 Enclosure rating
• Stackable design allows one switch on top of the other
• Through wiring option (dual connector)
• Dust cap for unused key entry
• Robust stainless steel keys
• UL listed; CSA certified; CE approved

BENEFITS
• Immediately recognisable as safety component
• Reduced installation time and costs
• Flexibility in mounting/actuation options
• Switch equipment directly and through safety control modules
• Fits into extremely compact spaces
• Suitable for wet applications
• Extremely simple mechanical redundancy as well as electrical redundancy
• Very easy to apply to multiple door modular machinery - no difficulty in wiring small switch enclosures
• Durable and tough design

Used alone as Category 1 safety components or, in conjunction with other safety switches and our complete range of safety relays, it is possible to construct comprehensive protection schemes with Category 2, 3 or 4 compliance.

The preleaded versions allow rapid fit, easy cable routing and function testing which cut costs dramatically in OEM applications. Simple upgrade guarding solution for End User applications.

Low energy basic switches are rated as follows:
 Operating Voltage \( U_e \)  1 to 50Vdc or Vdc
 Operating Current \( I_e \)  1 microamp to 100mA

Example of catalog listing using a low energy basic switch - GKMA19W1

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.


### GKM Series

**Miniature Safety Key Interlock Switches**

#### Technical Data

- **Mechanical life**: >1 Million operations
- **Degree of protection**: IP 66/67, EN 60529, NEMA 1, 12, 13
- **Temperature range**: -25 to +85 °C (-13 to +185 °F)
- **Approvals**: IEC 60947-5-1, EN 60947-5-1, EN 1088, EN 60204, UL508, CSA22-2-14, UL748C
- **Utilization category**: AC15, B300, DC13, Q300
- **Vibration**: IEC 68-2-6 (BS 2011, Part 2.1 Fc) 10g
- **Shock**: IEC 68-2-27 (BS 2011, Part 2.1 Ea) 50g
- **Minimum Door Radius**: 160mm (6.3 in.)

* See Standards (page 161)

#### Ordering:

**Example**: GKMD03W2  

- **Cable/Connector**
  - **Cable lengths** in 1 Metre increments
  - **Cable spec.**: SJTORATED P.V.C. Type
  - **3 Metres is normal maximum cable length.**
  - **Zero indicates no cable but connector**
  - **Micro-change DC Style M12, 4 Pin with external threads/male**
  - **‘F’ version also has 4 Pin with internal threads/female**

---

**Note**: See page 167
### Switch Type

#### CONNECTOR PIN-OUTS

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Details of straight key (stainless steel)

**Replacement part number:** GKZ51M

#### Details of 90° key (stainless steel)

**Replacement part number:** GKZ52M

### Key Style

**SLOW-ACTION CONTACTS**

**Break Before Make**

1 Normally Closed / 1 Normally Open

**LOW ENERGY CONTACTS**

**SLOW-ACTION CONTACTS**

2 Normally Closed

**LOW ENERGY CONTACTS**

**New**

**SLOW-ACTION CONTACTS**

2 Normally Closed

Cost courtesy of Steven Engineering, Inc. · 230 Ryan Way, South San Francisco, CA, 94080-6370 · Main Office: (650) 588-9200 · Outside Local Area: (800) 258-9200 · www.stevenengineering.com
Optional Key Positions

- FACE 'A' DISCONNECT FORCE 20N (4.5 lbf) MAX
- FORCE DISCONNECT POSITION
- OF KEY SLOT
- FIT TO UNUSED ENTRY.
- SLOT DUST COVER
- RECOMMENDED KEY IN POSITION

Courtesy of Steven Engineering, Inc.
- 230 Ryan Way, South San Francisco, CA, 94080-6370
- Main Office: (650) 588-9200
- Outside Local Area: (800) 258-9200
- www.stevenengineering.com
GK Series
Dual Entry Key Operated Safety Interlock Switch

FEATURES
• Side or top key entry
• Unique friction feature for key retention
• LED Indicators for status available
• Choice of four heavy duty keys
• Standard mounting per EN 50041
• International conduit offering
• Positive opening operation of Normally Closed contacts conforming to IEC/EN 60947-5-1-3
• Available with 1 NC/1 NO, 2 NC, 3 NC/1 NO and low energy contacts positive opening contact options
• UL listed, CSA and CE compliant

BENEFITS
• Allows up to eight different key entry positions
• Door vibration does not trip the safety circuit
• Remote signalling can be achieved easily at the switch
• Key mounting flexibility and security
• Simple mounting
• Machinery can use local termination standards
• Welded contacts will separate - vital for safety applications
• Choice of wiring capabilities (switching inductive and safety relay loads)

The GK Series is designed specifically for use on machines where key removal brings the machine to an immediate safe condition. It provides enhanced operator safety when added to hinged or sliding guard doors, screens and protective covers on enclosures. The GK Series is especially well suited for large door applications, typically in the automotive plant floor environment. Its heavy duty construction withstands harsh industrial environments where rugged, long-term durability is required.

A safety lockout device is also available for use with the GK Series. The lockout device (GKZL2) is specifically designed to prevent a key from being inserted either manually, or by the access door being closed while maintenance personnel are working on the machine. When inserted, the lockout device can accommodate up to four padlocks to prevent unauthorised removal of the device.

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.
**GKB- Metal Standard**

GKC - (w/1 LED)
12...250 Vac/dc

GKD - (w/2 LED)
18...30 Vdc - EN 50041

### Technical Data

**Mechanical**
- Up to 15 million life operations
- Degree of protection: IP 67, NEMA/UL type 1, 4, 12, 13

**Temperature range**
- Operating: -25 °C to +85 °C / -13 °F to +185 °F
- Storage: -40 °C to +85 °C / -40 °F to +185 °F

**Approvals**
- IEC 60947-5-1
- EN 60947-5-1
- ac15 A300/A600
- dc13 C300
- UL & CSA

**Operating forces**
- Insertion force: 35 N / 8 lb
- Extraction force: 28 N / 6 lb

**Vibration**
- 10 g conforming to IEC 68-2-6

**Shock**
- 50 g conforming to IEC 68-2-27

**Terminal marking**
- to EN 50013

*See Standards (page 179)*

### Dimensions in mm / in

- Example:
  - Standard = B
  - A = 1/2" NPT
  - with 1 LED = C
  - C = 20 mm

**Switch Ordering:**

- Example: GKB36LX + GKV56

---

*Industrial Safety Products*
<table>
<thead>
<tr>
<th>Head Orientation</th>
<th>Key Type (sold separately)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image of key orientation" /></td>
<td><img src="image2.png" alt="Image of key types" /></td>
</tr>
<tr>
<td><strong>Straight Key</strong></td>
<td><strong>90° Key</strong></td>
</tr>
<tr>
<td><img src="image3.png" alt="Diagram of straight key" /></td>
<td><img src="image4.png" alt="Diagram of 90° key" /></td>
</tr>
<tr>
<td>Door swing radius down to 250 mm / 9.84 in</td>
<td>Door swing radius down to 250 mm / 9.84 in</td>
</tr>
<tr>
<td><strong>Spring-loaded Key: Up/Down</strong></td>
<td><strong>Spring-loaded Key: Left/Right</strong></td>
</tr>
<tr>
<td><img src="image5.png" alt="Diagram of spring-loaded key up/down" /></td>
<td><img src="image6.png" alt="Diagram of spring-loaded key left/right" /></td>
</tr>
<tr>
<td>Door swing radius down to 150 mm / 5.9 in</td>
<td>Door swing radius down to 150 mm / 5.9 in</td>
</tr>
</tbody>
</table>

**Key Ordering:**

X X + GKZ5 X
The GKZL2 lockout device is for use with both the GK and GKR/GKL Series Dual Entry Head products. The lockout device does not activate the switch. It is designed to prevent a key from being inserted either manually, or by the access door being closed while maintenance personnel are working on the machine. When inserted, the lockout device accommodates up to four padlocks to prevent unauthorised removal of the device.

Mounting dimensional diagram (mm/in):

Ordering:

GKZL2
GKE Series
Dual Entry Safety Interlock Switches

DESCRIPTION
The GKE Series safety key-operated switch provides enhanced reliability for safety hard guarding applications in a compact, cost-effective package.

FEATURES
- Positive opening safety contacts
- Multiple contact configurations
- Rotating head allows actuator engagement from five orientations
- Double insulation per IEC 60947-5-1
- Choice of two standard actuators
- Small size
- Most global approvals: cULus, CE, (CCC applied for)

BENEFITS
- Designed to minimize intentional tampering or defeat
- Designed to meet application-specific needs
- Small-size provides a valuable solution where space is at a premium
- Designed for global acceptance

POTENTIAL APPLICATIONS
- Plastic molding equipment
- Packaging machinery
- Semiconductor manufacturing equipment
- Woodworking machinery
- Metal converting equipment
- Printing/paper finishing equipment
### GKE Series

#### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Designation and Utilization Category</th>
<th>Rated Operational Current Ie (A) at Rated Operational Voltage Ue (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 V</td>
</tr>
<tr>
<td>AC15 A500</td>
<td>—</td>
</tr>
<tr>
<td>AC15 A600</td>
<td>—</td>
</tr>
<tr>
<td>DC13 Q300</td>
<td>2,8 A</td>
</tr>
</tbody>
</table>

- **Rated thermal current (Ith)**: 10 A
- **Sealing**: IP66; NEMA 1, 12, 13
- **Rated impulse withstand (Uimp)**: 2500 V
- **Pollution degree**: 3
- **Rated insulation voltage (Ui)**: 500 V, 600 V
- **Operating temperature range**: -25 °C to 85 °C [-13 °F to 185 °F]
- **Short-circuit protective device (type/max. rating)**: Class J fuse (10 A/600 V)
- **Mechanical life**: 1,000,000 operations

Complies with:
- Low Voltage Directive 73/23/EEC, as amended by directive 93/68/EEC.
- Machinery Directive 98/37/EEC only as the directives relate to the components being used in a safety function.
- IEC/EN60947-5-1.

#### MOUNTING DIMENSIONS (For reference only mm [in])

![Mounting Dimensions Diagram]

- **Head Code L**: 13,50 [0.53]
- **Head Code M**: 12,50 [0.49]
- **Head Code N**: 11,50 [0.45]
- **Head Code P**: 12,50 [0.49]
Safety Door Interlock Switches

KEY MOUNTING DIMENSIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>6.4 MIN [0.25]</th>
<th>22.0 [0.87]</th>
<th>2X Ø5.0 [0.20]</th>
<th>12.8 [0.50]</th>
<th>15.8 [0.62]</th>
<th>13.9 [0.55]</th>
<th>24.0 MAX [0.94]</th>
<th>2.5 [0.10]</th>
</tr>
</thead>
<tbody>
<tr>
<td>GKZ51M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GKZ52M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Recommended key position.

CIRCUIT AND TRAVEL DIAGRAMS

Switch Code 01: 1NC/1NO

Switch Code 03: 1NC/1NO (BBM)

Switch Code 06: 2NC

1. Recommended key position.
SWITCH ORDER GUIDE (Not all combinations are active listings.)

<table>
<thead>
<tr>
<th>Series</th>
<th>GKE</th>
<th>X</th>
<th>X</th>
<th>Head Orientation*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual Entry Key Operated Safety Limit Switch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contacts</th>
<th>A = 1/2 in NPT</th>
<th>C = M20 x 1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>01 = 1NC/1NO</td>
<td></td>
</tr>
<tr>
<td></td>
<td>03 = 1NC/1NO (BBM)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>06 = 2NC</td>
<td></td>
</tr>
</tbody>
</table>

*Head orientation facing the right, left or back of the switch is available upon request. Minimum order quantities apply.

SWITCH ORDER GUIDE (active listings)

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GKEA01L</td>
<td>Dual Entry Key Operated Safety Limit Switch, ½ in NPT conduit, 1NC/1NO contacts, front head orientation</td>
</tr>
<tr>
<td>GKEA03L</td>
<td>Dual Entry Key Operated Safety Limit Switch, ½ in NPT conduit, 1NC/1NO (BBM) contacts, front head orientation</td>
</tr>
<tr>
<td>GKEA06L</td>
<td>Dual Entry Key Operated Safety Limit Switch, ½ in NPT conduit, 2NC contacts, front head orientation</td>
</tr>
<tr>
<td>GKEC01L</td>
<td>Dual Entry Key Operated Safety Limit Switch, M20 x 1.5 conduit, 1NC/1NO contacts, front head orientation</td>
</tr>
<tr>
<td>GKEC03L</td>
<td>Dual Entry Key Operated Safety Limit Switch, M20 x 1.5 conduit, 1NC/1NO (BBM) contacts, front head orientation</td>
</tr>
<tr>
<td>GKEC06L</td>
<td>Dual Entry Key Operated Safety Limit Switch, M20 x 1.5 conduit, 2NC contacts, front head orientation</td>
</tr>
</tbody>
</table>

KEY ORDER GUIDE

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GKZ51M</td>
<td>Straight Key</td>
</tr>
<tr>
<td>GKZ52M</td>
<td>90 Degree Key</td>
</tr>
</tbody>
</table>

WARNING
IMPROPER INSTALLATION
- Consult with local safety agencies and their requirements when designing a machine-control link, interface and all control elements that affect safety.
- Strictly adhere to all installation instructions.
Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY
Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell’s standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, 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. In no event shall Honeywell be liable for consequential, special, or indirect damages.

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.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

SALES AND SERVICE
Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com
Internet: www.honeywell.com/sensing

Phone and Fax:
Asia Pacific +65 6355-2828
+65 6445-3033 Fax
Europe +44 (0) 1698 481481
+44 (0) 1698 481676 Fax
Latin America +1-305-805-8188
+1-305-883-8257 Fax
USA/Canada +1-800-537-6945
+1-815-235-6847
+1-815-235-6545 Fax

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Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
GKR/GKL Series
Dual Entry Solenoid Key Operated Safety Interlock Switch

FEATURES
• Solenoid power to lock or power to unlock
• Side or top key entry
• Separate switches for key position and solenoid status
• Available with two 1 NC/1 NO snap action, two 3 NC/1 NO contact blocks
• 100 mm / 3.94 in x 100 mm / 3.94 in mounting
• Choice of four heavy duty keys
• Key retain force 1000 N max.
• IP 68 (NEMA 6P)
• Two solenoid voltages available
• Dual LEDs
• UL listed / CSA certified / CE compliant
• Red body colour
• Connectorised versions available upon request
• Fluorocarbon sealed enclosure available

BENEFITS
• Allows up to eight different key entry positions
• Flexibility of design
• Switch configuration exactly matches need
• Standard mounting centres
• Key mounting flexibility and security
• Suitable for harsh duty environments
• Operates at standard control voltage
• Use this product anywhere in the world
• Immediately recognisable in the application as a safety component

TYPICAL APPLICATIONS
• Automotive factory floor
• Machine tools sliding doors
• Metalworking machines sliding or hinged doors
• Special purpose machinery cage guarded sliding or hinged doors
• Robotics assembly cells cage guarded sliding or hinged doors
• Plastic moulding machines sliding doors

The GKR (head to the right) and GKL (head to the left) products offer the user an unrivalled range of standard options.

The GKR/GKL product is a key actuated device incorporating a key trapping mechanism. The switch is used on machinery where instant stop and access to the machinery is either impossible (due to the momentum of the machine) or impractical (due to tool or machine damage or scrapped product if the current machine cycle is interrupted).

The switch incorporates a manual override feature which allows removal of the key for emergency access.

A safety lockout device is also available for use with the GKR/GKL Series. The lockout device (GKZL2) is specifically designed to prevent a key from being inserted either manually, or by the access door being closed while maintenance personnel are working on the machine. When inserted, the lockout device can accommodate up to four padlocks to prevent unauthorised removal of the device.

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.
**GKR/GKL - Dual Entry Solenoid Key Operated Safety Interlock**

**Technical data**

Mechanical life: Up to 1 million operations

Degree of protection:
- IP 68
- NEMA/UL Type 1, 4, 6P, 12, 13

Temperature range:
- Operating: -25 °C to 40 °C / -13 °F to 104 °F

Approvals:
- IEC 60947-5-1, EN 60947-5-1
- ac15 A300/A600
- dc13 Q300
- UL Listed
- CSA Certified

Operating forces:
- Insertion force: 35 N / 8 lb
- Extraction force: 28 N / 6 lb
- Max. solenoid locking force: 1000 N / 224 lb

Directives: The forced disconnect mechanism on normally closed contacts conforms to IEC 60947-5-1-3.

Compliance: This product complies with the Machinery Directive 98/37/EC and complies with EN 60947-5-1.

* See Standards (page 179)

**Dimensions in mm / in**

**Switch Ordering:**

Example: GKL E36PXA2 + GKDZ56

**Switch Type**

Slow Acting,
1 Normally Closed/1 Normally Open
Gate and Solenoid Monitor

Slow Acting
3 Normally Closed/1 Normally Open
Gate and Solenoid Monitor

**Head Left or Right**

Head on Left = L
Head on Right = R

Conduit Thread

E = 1/2" NPT
G = 20 mm

XX OR X

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* Industrial Safety Products *
<table>
<thead>
<tr>
<th>Head Orientation</th>
<th>Latching Mechanism</th>
<th>Solenoid and LED Indicator Voltage</th>
<th>Key Type (sold separately)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="M diagram" /></td>
<td><img src="image" alt="A diagram" /></td>
<td><img src="image" alt="S diagram" /></td>
<td><img src="image" alt="Straight Key diagram" /></td>
</tr>
<tr>
<td>Only for right oriented head</td>
<td>Mechanical Latch</td>
<td>24 Vdc</td>
<td>Door swing radius down to 250 mm / 9.84 in</td>
</tr>
<tr>
<td><img src="image" alt="P diagram" /></td>
<td><img src="image" alt="S diagram" /></td>
<td>120 Vac</td>
<td>Door swing radius down to 250 mm / 9.84 in</td>
</tr>
<tr>
<td>Only for left oriented head</td>
<td>Solenoid Latch</td>
<td></td>
<td>Door swing radius down to 150 mm / 5.9 in</td>
</tr>
</tbody>
</table>

Key Ordering: X X X + GKZ5 X
The GKZL2 lockout device is for use with both the GK and GKR/GKL Series Dual Entry Head products. The lockout device does not activate the switch. It is designed to prevent a key from being inserted either manually, or by the access door being closed while maintenance personnel are working on the machine. When inserted, the lockout device accommodates up to four padlocks to prevent unauthorised removal of the device.

Mounting dimensional diagram (mm/in):

Ordering:
GKZL2
GKN Series
Safety Interlock Switch

DESCRIPTION
The MICRO SWITCH™ GKN Series safety interlock switches provide superior reliability in a compact, cost-effective package size. Six different types of actuator keys are available.

The GKN Series conforms to IEC 60947-5-1 and carries cULus, CE, and CCC approvals.

FEATURES
- Positive opening safety contacts
- Choice of six actuators
- Double insulated per IEC 60947-5-1
- Global approvals (cULus, CE, CCC)
- Three cable entries
- Large wiring cavity
- Large M20 cable entry
- Four-entry head

BENEFITS
- Meets global safety standards
- Wide application coverage
- No additional earthing requirements
- Final equipment may be sold worldwide
- Cable-to-switch orientation flexibility
- Wiring simplified
- No need to reconfigure head orientation

POTENTIAL APPLICATIONS
- Woodworking machinery
- Printing/paper finishing equipment
- Plastic molding equipment
- Packaging machinery
- Bailing and pumping equipment
- Semiconductor manufacturing equipment
- Packaging wrapping
- Specialty equipment
GKN Series

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Designation and Utilization Category</th>
<th>Rated Operational Current Ie (A) at Rated Operational Voltage Ue (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>120 Vac</td>
</tr>
<tr>
<td>AC15 A600</td>
<td>6 A</td>
</tr>
<tr>
<td>DC13 Q300</td>
<td>–</td>
</tr>
</tbody>
</table>

- Rated thermal current (Ith): 10 A
- Sealing: IP67; NEMA 1, 4, 12, 13
- Rated impulse withstand (Uimp): 2500 V
- Pollution degree: 2 (micro-environment, inside enclosure); 3 (macro-environment, installation environment)
- Rated insulation voltage (Ui): 600 V
- Operating temperature range: -25 °C to 70 °C [-13 °F to 158 °F]
- Storage temperature range: -40 °C to 85 °C [-40 °F to 185 °F]
- Short-circuit protective device (type/maximum rating): Class J fuse (10 A/690 V)
- Expected mechanical life: 500,000 cycles
- Conditional short-circuit current: 1000 A

Complies with:
Low Voltage Directive 73/23/EEC, as amended by directive 93/68/EEC.
Machinery Directive 98/37/EEC only as the directives relate to the components being used in a safety function.
IEC/EN60947-5-1.

MOUNTING DIMENSIONS

CIRCUIT AND TRAVEL DIAGRAMS

ORDER GUIDE

Series
3 Contacts Door Interlock Safety Limit Switch

Conduit
A = 1/2 in NPT
C = M20 X 1.5

Contact
21 = 2NC/1NO (BBM)
30 = 3NC

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## Safety Interlock Switch

### KEY DIMENSIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimensions</th>
<th>Min. R. [mm]</th>
<th>Max. Insertion Distance [mm]</th>
<th>Min. Insertion Distance [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>GKZ41 (M4 Screw)</td>
<td>2.0 [0.08]</td>
<td>15.0 [0.59]</td>
<td>8.1 [0.32]</td>
<td></td>
</tr>
<tr>
<td>GKZ42 (M5 Screw)</td>
<td>2.0 [0.08]</td>
<td>4.0 [0.16]</td>
<td>7.1 [0.28]</td>
<td></td>
</tr>
<tr>
<td>GKZ43 (M5 Screw)</td>
<td>2.0 [0.08]</td>
<td>4.0 [0.16]</td>
<td>7.1 [0.28]</td>
<td></td>
</tr>
<tr>
<td>GKZ44 (M5 Screw)</td>
<td>2.0 [0.08]</td>
<td>10.0 [0.39]</td>
<td>7.1 [0.28]</td>
<td></td>
</tr>
<tr>
<td>GKZ45 (M5 Screw)</td>
<td>2.0 [0.08]</td>
<td>10.0 [0.39]</td>
<td>7.1 [0.28]</td>
<td></td>
</tr>
<tr>
<td>GKZF1 (M5 Screw)</td>
<td>2.0 [0.08]</td>
<td>10.0 [0.39]</td>
<td>7.1 [0.28]</td>
<td></td>
</tr>
</tbody>
</table>

---

Honeywell Sensing and Control

3

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## ORDER GUIDE (ACTIVE LISTINGS)

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GKNA21</td>
<td>3 contact door interlock safety limit switch; 1/2 in NPT conduit; 2NC/1NO (BBM)</td>
</tr>
<tr>
<td>GKNA30</td>
<td>3 contact door interlock safety limit switch; 1/2 in NPT conduit; 3NC</td>
</tr>
<tr>
<td>GKNC21</td>
<td>3 contact door interlock safety limit switch; M20 x 1.5 conduit; 2NC/1NO (BBM)</td>
</tr>
<tr>
<td>GKNC30</td>
<td>3 contact door interlock safety limit switch; M20 x 1.5 conduit; 3NC</td>
</tr>
</tbody>
</table>

### WARNING

**PERSONAL INJURY**

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

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

### WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell’s standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, 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. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

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. Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

### SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

**E-mail:** info.sc@honeywell.com

**Internet:** www.honeywell.com/sensing

**Phone and Fax:**

- **Asia Pacific** +65 6355-2828 +65 6445-3033 Fax
- **Europe** +44 (0) 1698 481481 +44 (0) 1698 481676 Fax
- **Latin America** +1-305-805-8188 +1-305-883-8257 Fax
- **USA/Canada** +1-800-537-6945 +1-815-235-6847 +1-815-235-6545 Fax

---

**Sensing and Control**

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1985 Douglas Drive North
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www.honeywell.com

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GKS Series
Multi-Entry Trapped Key-Operated Safety Interlock Switch

DESCRIPTION
The introduction of the GKS product marks a significant new product class for Honeywell. Honeywell’s switching expertise has been applied to a cost-effective, trapped key safety interlock switch. This product allows OEMs to hold a door or gate closed while a hazard still exists. This is particularly important where there is momentum in the machine. In other words, when the machine is signaled to stop, the momentum in the machine can mean that parts of the machine are still moving and pose an injury risk if the access gate or door is not held closed. Global approvals and standards are important to Honeywell’s customers; therefore, the GKS product conform to the requirements of IEC60947-5-1 and carries cULus, CE and CCC approvals.

FEATURES
• Global approvals (CE, cULus, CE, and CCC)
• Glass-filled polyester body
• Power-to-lock and power-to-unlock schemes for key trap
• Flexible switching arrangement
• 24 Vdc, 110 Vac, and 230 Vac coil voltages
• Over-ride mechanism in cover
• Head may be rotated into 4 different positions
• Three conduit openings (knock-out style)
• Switch position provides status

BENEFITS
• Product may be applied to most applications worldwide
• Tough, cost-effective, double-insulated enclosure
• Choice of key trapping methodology
• Four contacts that can be arranged in any configuration¹
• Multiple voltages provide for every geography
• Has a method to open door (in case of power loss, etc.)
• One part number may be used for multiple applications
• Flexible wiring options
• Can diagnose status of gate/door (gate/door closed and locked, gate/door closed and unlocked, gate/door open)

¹ There will be minimum volume requirements for unreleased options.

POTENTIAL APPLICATIONS
• Woodworking machinery
• Printing/paper finishing equipment
• Plastic molding equipment
• Packaging machinery
• Bailing
• Pumping equipment
• Semiconductor manufacturing equipment
• Packaging wrapping
• Specialty equipment
• Machine tool
• Robot cell
GKS Series

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Designation and Utilization Category</th>
<th>Rated Operational Current Ie (A) at Rated Operational Voltage Ue (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC15 B300</td>
<td>120 Vac 125 Vdc 240 Vac/250 Vdc 3 A – 1.5 A</td>
</tr>
<tr>
<td>DC13 Q300</td>
<td>0.55 A 0.27 A</td>
</tr>
<tr>
<td>Rated thermal current (Ith)</td>
<td>5 A</td>
</tr>
<tr>
<td>Sealing</td>
<td>IP67; NEMA 1, 4, 12, 13</td>
</tr>
<tr>
<td>Rated impulse withstand (Uimp)</td>
<td>2500 V</td>
</tr>
<tr>
<td>Pollution degree</td>
<td>3 (macro-environment, installation environment)</td>
</tr>
<tr>
<td>Rated insulation voltage (Ui)</td>
<td>600 V</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-25 °C to 50 °C [-13 °F to 122 °F]</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-40 °C to 85 °C [-40 °F to 185 °F]</td>
</tr>
<tr>
<td>Short-circuit protective device (type/maximum rating)</td>
<td>Class J fuse (5 A/600 Vac)</td>
</tr>
<tr>
<td>Expected mechanical life</td>
<td>1,000,000 operations</td>
</tr>
<tr>
<td>Conditional short-circuit current</td>
<td>1000 A</td>
</tr>
<tr>
<td>Solenoid operating voltage and power</td>
<td>24 Vac: +10 %, -15 %, 4 W</td>
</tr>
<tr>
<td></td>
<td>110 Vac: +10 %, -15 %, 8 W</td>
</tr>
<tr>
<td></td>
<td>230 Vac: +10 %, -15 %, 9 W</td>
</tr>
<tr>
<td></td>
<td>24 Vdc: +10 %, -20 %, 7 W</td>
</tr>
</tbody>
</table>

Complies with:
Low Voltage Directive 73/23/EEC, as amended by directive 93/68/EEC.
Machinery Directive 98/37/EEC only as the directives relate to the components being used in a safety function.
IEC/EN60947-5-1.

PART NUMBER TREE

GKS X XX X X X

<table>
<thead>
<tr>
<th>Series</th>
<th>Conduit</th>
<th>Contacts</th>
<th>Head Orientation</th>
<th>Locking Principal</th>
<th>Solenoid Voltage</th>
<th>Additional Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door Interlock</td>
<td>A - 1/2 NPT</td>
<td>21 - 2NC/1NO/1NO</td>
<td>L - Front</td>
<td>A - Power to unlock</td>
<td>24 Vac/dc</td>
<td>L - LED</td>
</tr>
<tr>
<td>Safety Limit</td>
<td>C - M20</td>
<td>22 - 2NC/1NO/1NC</td>
<td>N - Back</td>
<td>N - Power to lock</td>
<td>110 Vac</td>
<td></td>
</tr>
<tr>
<td>Switch, Solenoid</td>
<td>46 - 3NC/1NO</td>
<td>47 - 4NC</td>
<td>P - Left</td>
<td>P -</td>
<td>230 Vac</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: The part number tree is provided to demonstrate the potential combinations of components. Actual availability of individual product combinations will depend on the popularity of that type. Please check with your local distributor or Honeywell representative for the available types in your region.

LED OPTION
The built-in LED is suitable for direct installation in the M20 x 1.5/0.5 in NPT thread, one of the three cable entries in the GKS safety switch. The built-in LED can indicate to the user whether the solenoid is unlocked/locked or whether the door is open/closed. The switching element can be wired individually.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED color</td>
<td>Red</td>
</tr>
<tr>
<td>Connection</td>
<td>2 connection cables</td>
</tr>
<tr>
<td>Screw-in thread</td>
<td>M20 x 1.5/0.5 in NPT</td>
</tr>
<tr>
<td>Operating voltage/current consumption</td>
<td>24 Vdc/45 Ma</td>
</tr>
<tr>
<td></td>
<td>115 Vac/15 mA</td>
</tr>
<tr>
<td></td>
<td>230 Vac/15 mA</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP67</td>
</tr>
</tbody>
</table>
Multi-Entry Trapped Key-Operated Safety Interlock Switch

MOUNTING DIMENSIONS (SWITCH AND OPTIONAL LED)

- 3 CONDUIT THREAD 
  M20 X 1.5mm 
  1/2" NPT

- 144.0 [5.67]

- 31.0 [1.22]
  41.0 [1.61]

- 106.0 [7.78]

- 19.0 [0.75]

- 30.2 [1.19]
  26.0 [1.02]

- WIRE LENGTH 100.0 [3.94]
GKS Series

SWITCH ORDER GUIDE (ACTIVE LISTINGS)

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GKSA46LA2</td>
<td>0.5 in conduit, 3NC/1NO, head to front, power to unlock, 24 Vdc solenoid</td>
</tr>
<tr>
<td>GKSA46LA5</td>
<td>0.5 in conduit, 3NC/1NO, head to front, power to unlock, 110 Vac solenoid</td>
</tr>
<tr>
<td>GKSC46LA2</td>
<td>20 mm conduit, 3NC/1NO, head to front, power to unlock, 24 Vdc solenoid</td>
</tr>
<tr>
<td>GKSC46LA6</td>
<td>20 mm conduit, 3NC/1NO, head to front, power to unlock, 230 Vac solenoid</td>
</tr>
</tbody>
</table>

KEY ORDER GUIDE (ACTIVE LISTINGS)

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
<th>Min. Actuating Radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>GKZS6</td>
<td>Straight key</td>
<td>min. R 160 [6.30]</td>
</tr>
<tr>
<td>GKZS7</td>
<td>90° key</td>
<td>min. R 160 [6.30]</td>
</tr>
<tr>
<td>GKZS8</td>
<td>Left-right adjustable key</td>
<td>min. R 32 [1.26]</td>
</tr>
<tr>
<td>GKZS4</td>
<td>Up-down adjustable key</td>
<td>min. R 45 [1.77]</td>
</tr>
<tr>
<td>GKZS9</td>
<td>Multidirectional key</td>
<td>Moveable max. 18 degrees</td>
</tr>
<tr>
<td>GKZSF</td>
<td>Funnel key</td>
<td>min. R 160 [6.30]</td>
</tr>
</tbody>
</table>

CIRCUIT AND TRAVEL DIAGRAMS

<table>
<thead>
<tr>
<th>Circuit Drawing</th>
<th>Inserted &amp; Locked</th>
<th>Inserted &amp; Unlocked</th>
<th>Removed &amp; Unlocked</th>
</tr>
</thead>
<tbody>
<tr>
<td>GKS..21..</td>
<td>13 ○ 0 14</td>
<td>13 ○ 0 14</td>
<td>13 ○ 0 14</td>
</tr>
<tr>
<td>21 ○ 22</td>
<td>21 ○ 22</td>
<td>21 ○ 22</td>
<td>21 ○ 22</td>
</tr>
<tr>
<td>33 ○ 34</td>
<td>33 ○ 34</td>
<td>33 ○ 34</td>
<td>33 ○ 34</td>
</tr>
<tr>
<td>41 ○ 42</td>
<td>41 ○ 42</td>
<td>41 ○ 42</td>
<td>41 ○ 42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GKS..22..</td>
<td>11 ○ 0 1 1/2</td>
<td>11 ○ 0 1/2</td>
<td>11 ○ 0 1/2</td>
</tr>
<tr>
<td>21 ○ 22</td>
<td>21 ○ 22</td>
<td>21 ○ 22</td>
<td>21 ○ 22</td>
</tr>
<tr>
<td>33 ○ 34</td>
<td>33 ○ 34</td>
<td>33 ○ 34</td>
<td>33 ○ 34</td>
</tr>
<tr>
<td>41 ○ 42</td>
<td>41 ○ 42</td>
<td>41 ○ 42</td>
<td>41 ○ 42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GKS..46..</td>
<td>13 ○ 0 14</td>
<td>13 ○ 0 14</td>
<td>13 ○ 0 14</td>
</tr>
<tr>
<td>21 ○ 22</td>
<td>21 ○ 22</td>
<td>21 ○ 22</td>
<td>21 ○ 22</td>
</tr>
<tr>
<td>31 ○ 32</td>
<td>31 ○ 32</td>
<td>31 ○ 32</td>
<td>31 ○ 32</td>
</tr>
<tr>
<td>41 ○ 42</td>
<td>41 ○ 42</td>
<td>41 ○ 42</td>
<td>41 ○ 42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GKS..47..</td>
<td>11 ○ 0 12</td>
<td>11 ○ 0 12</td>
<td>11 ○ 0 12</td>
</tr>
<tr>
<td>21 ○ 0 22</td>
<td>21 ○ 0 22</td>
<td>21 ○ 0 22</td>
<td>21 ○ 0 22</td>
</tr>
<tr>
<td>31 ○ 32</td>
<td>31 ○ 32</td>
<td>31 ○ 32</td>
<td>31 ○ 32</td>
</tr>
<tr>
<td>41 ○ 42</td>
<td>41 ○ 42</td>
<td>41 ○ 42</td>
<td>41 ○ 42</td>
</tr>
</tbody>
</table>

NOTE: This ‘truth table’ shows the switch status in various conditions. In each column, there is a change in switch contact position from the previous column. It is possible to determine the status of the switch by examining the combination against the table. This can be essential for operational reasons. For instance, the machine should not be started until the key is not only in the head, but is also trapped.

The first column depicts the key inserted and the key trapped in that position – this would be the typical run position for the machine – all doors closed. The second column illustrates the key inserted, but not trapped – this would be the safe-to-open the door position (as determined by the application’s safety scheme). The third column shows the key extracted or door-open position.
# Multi-Entry Trapped Key-Operated Safety Interlock Switch

## KEY DIMENSIONS

<table>
<thead>
<tr>
<th>GKZS6</th>
<th>GKZS7</th>
<th>GKZS8</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="GKZS6 Diagram" /></td>
<td><img src="image2" alt="GKZS7 Diagram" /></td>
<td><img src="image3" alt="GKZS8 Diagram" /></td>
</tr>
<tr>
<td><strong>MIN. R 190 [0.30]</strong></td>
<td><strong>MIN. R 190 [0.30]</strong></td>
<td><strong>MIN. R 32 [1.26]</strong></td>
</tr>
<tr>
<td><strong>23.0 [0.91]</strong> MAX. INSERTION DISTANCE 28.5 [1.12] MIN. INSERTION DISTANCE</td>
<td><strong>4.0 [0.16]</strong> MAX. INSERTION DISTANCE 6.0 [0.24] MIN. INSERTION DISTANCE</td>
<td><strong>21.0 [0.83]</strong> MAX. INSERTION DISTANCE 23.5 [0.93] MIN. INSERTION DISTANCE</td>
</tr>
<tr>
<td><strong>GKZS4</strong></td>
<td><strong>GKZS9</strong></td>
<td><strong>GKZSF</strong></td>
</tr>
<tr>
<td><img src="image4" alt="GKZS4 Diagram" /></td>
<td><img src="image5" alt="GKZS9 Diagram" /></td>
<td><img src="image6" alt="GKZSF Diagram" /></td>
</tr>
<tr>
<td><strong>MIN. R 45 [7.77]</strong></td>
<td><strong>MIN. R 160 [0.30]</strong></td>
<td><strong>MIN. R 160 [0.30]</strong></td>
</tr>
</tbody>
</table>

---

*Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com*
WARNING
IMPROPER INSTALLATION
• Consult with local safety agencies and their requirements when designing a machine-control link, interface, and all control elements that affect safety.
• Strictly adhere to all installation instructions
Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY
Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell’s standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, 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. In no event shall Honeywell be liable for consequential, special, or indirect damages.

SALES AND SERVICE
Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com
Internet: www.honeywell.com/sensing

Phone and Fax:
Asia Pacific  +65 6355-2828
            +65 6445-3033 Fax
Europe       +44 (0) 1698 481481
            +44 (0) 1698 481676 Fax
Latin America +1-305-805-8188
            +1-305-883-8257 Fax
USA/Canada   +1-800-537-6945
            +1-815-235-6847
            +1-815-235-6545 Fax

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.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.
GSS Series
Global Safety Switch

FEATURES
- EN 50041 and EN 50047 mounting and characteristics
- Designed to IEC electrical standard for world-wide use in guarding applications
- Positive opening operation of NC (Normally Closed) contacts conforming to IEC/EN 60947-5-1-3
- Available with a wide range of positive opening contacts
- Rugged housing (Zinc Die-cast)
- Tamper resistant design uses TORX® head security screw
- Full range of actuator heads and levers suitable for safety applications
- Sealing up to IP 67, NEMA 1, 4, 12 & 13
- Snap action and slow action basic switches
- International conduit sizes
- Galvanically isolated contacts
- UL listed; CSA and CE certified, BG approved
- Red body colour for easy safety recognition

BENEFITS
- Standard mounting and characteristics
- Globally available and accepted
- Welded NC contacts will separate – vital security in safety applications
- Range of actuation methods for detecting safety conditions in guarding and machine status applications
- Wiring and body flexibility
- Suitable for inductive switching and safety relay interfaces
- Signalling and power/safety circuits may be different polarities or voltages
- Immediately recognisable in the application as a safety component

GSS Series products may be used alone as Category 1 per EN954-1 safety component. In conjunction with other safety switches and our complete range of safety control modules, it is possible to construct comprehensive protection schemes with Category 2, 3 or 4 compliance per EN 954-1.

Honeywell’s design experience has resulted in a brand new patented concept in safety switching techniques. The sequential safety switch incorporates positive opening on the downward stroke of each NC sequence point. This allows the user to have both a warning signal and a stop signal. With this information a door can be closed before it stops a machine or settings adjusted to stop excessive movement thus avoiding down time.

LOW ENERGY SWITCHING
In today’s demanding age of low energy controls, electromechanical switches are frequently used to interface directly with safety relays, PLCs and other low energy devices. To accommodate this requirement GSS offers gold plated contact versions of the standard basic switch. This improves reliability of switching at low currents and voltages, by protecting the contact surfaces from contamination during operation or storage prior to use.

Standard silver contacts have a disadvantage in that the contact surface may tarnish under certain environmental conditions e.g. in the presence of moisture.

Low energy basic switches are rated as follows:
- Operating Voltage $U_e$ 1 to 50 Vac or Vdc
- Operating Current $I_e$ 1 µA to 100 mA

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.
GSA EN 50041
Safety Metal
Standard

Technical Data

Mechanical life: up to 15 million operations
Degree of protection: IP 67
Type 1, 4, 12, 13
Temperature range:
Operating: -25 °C to +85 °C / -13 °F to +185 °F
Storage: -40 °C to +85 °C / -40 °F to +185 °F

Approvals:
IEC 60947-5-1
EN 60947-5-1
ac15 A300/A600
dc13 Q300
UL & CSA

Vibration: 10 g conforming to IEC 68-2-6
Shock: 50 g conforming to IEC 68-2-27
Terminal marking: to EN 50013

* See Standards (page 179)

Dimensions in mm / in

Snap-Action Contacts
1 NORMALLY CLOSED/ 1 NORMALLY OPEN

Circuit closed
* Positive opening to IEC/EN 60947-5-1-3

Slow-Action Contacts
2 NORMALLY CLOSED

* Point from which the positive opening is assured
** Positive opening occurs at operating position. But to meet IEC/EN 60947-5-3 which requires a dielectric gap of 2.5 kV, positive opening is assured at*.

Ordering:
GSA X

Example: GSA C 01 B

Low Energy Contacts

Note: See page 197

Conduit Thread

A = 1/2" NPT

C = 20 mm

01

36°
Additional Lever Types

For use with all Side Rotary Head Styles.
Figure 1 illustrates standard lever types which conform to EN 50041.
All dimensions are in mm / in

---

**Actuator Types**

<table>
<thead>
<tr>
<th>GSS</th>
<th>XXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP</td>
<td>30˚</td>
</tr>
<tr>
<td>58 /</td>
<td>2.28</td>
</tr>
<tr>
<td>20 /</td>
<td>0.79</td>
</tr>
<tr>
<td>15 /</td>
<td>±2.5</td>
</tr>
<tr>
<td>0.59 ±0.1</td>
<td></td>
</tr>
</tbody>
</table>

| DP  | 44 / | 1.73 |
| ø12,4 / | 0.49 |

<table>
<thead>
<tr>
<th>FP</th>
<th>85 ˚</th>
<th>OP 30˚</th>
</tr>
</thead>
<tbody>
<tr>
<td>67 /</td>
<td>2.64</td>
<td></td>
</tr>
<tr>
<td>20 /</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>52 /</td>
<td>2.05</td>
<td></td>
</tr>
</tbody>
</table>

**Side Rotary, metal roller**

**Top pin plunger**

**Top roller plunger**

---

**GSA**

Figure 1

Side Rotary Roller Lever
A1B Metal Roller

---

47°

XXX
**Low Energy Contacts**

3 NORMALLY CLOSED/
1 NORMALLY OPEN
BREAK BEFORE MAKE

**Actuator Types**

A1B

Side Rotary, metal roller

B

Top pin plunger

C

Top roller plunger

Operator Types

47

Note: See page 197
GSC EN 50047

Safety Metal Standard

Technical Data

- **Mechanical life**: up to 15 million operations
- **Degree of protection**: IP 66, NEMA/UL type 1, 4, 12, 13
- **Temperature range**:
  - Operating: -25 °C to +85 °C / -13 °F to +185 °F
  - Storage: -40 °C to +85 °C / -40 °F to +185 °F
- **Approvals**:
  - IEC 60947-5-1
  - EN 60947-5-1
  - ac15 A300
  - dc13 Q300
  - BG, UL & CSA
- **Vibration**: 10 g conforming to IEC 68-2-6
- **Shock**: 50 g conforming to IEC 68-2-27
- **Terminal marking**: to EN 50013

*See Standards (page 179)

Dimensions in mm / in

- **Conduit Thread**
  - A = 1/2" NPT
  - C = 20 mm

**Ordering**:

Example: GSC C 01 B

- **Low Energy Contacts**
  - Note: See page 197

---

**Snap-Action Contacts**

1 NORMALLY CLOSED / 1 NORMALLY OPEN

**Slow-Action Contacts**

2 NORMALLY CLOSED

- Circuit closed
- Positive opening to IEC/EN 60947-5-3 which requires a dielectric gap of 2.5 kV, positive opening is assured at.

- Positive opening occurs at operating position. But to meet IEC/EN 60947-5-3 which requires a dielectric gap of 2.5 kV, positive opening is assured at.*

- See Standards (page 179)

---

* Point from which the positive opening is assured
** Positive opening occurs at operating position. But to meet IEC/EN 60947-5-3 which requires a dielectric gap of 2.5 kV, positive opening is assured at.*
**Actuator Types**

- **A1B**
  - Side Rotary, metal roller
  - Top pin plunger
  - Top roller plunger

**Additional Lever Types**

For use with all Side Rotary Head Styles.
All dimensions are in mm / in

Figure 2 illustrates standard lever types which conform to EN 50047.

**Figure 2**

- Side Rotary Roller Lever
- A1B Metal Roller
GSD EN 50047
Safety Double Insulated Standard

Technical Data

Mechanical
- up to 15 million life operations

Degree of protection
- IP66
- NEMA/UL type 1, 12, 13

Temperature range
- Operating: -25 °C to +85 °C / -13 °F to +185 °F
- Storage: -40 °C to +85 °C / -40 °F to +185 °F

Approvals
- IEC 60947-5-1
- EN 60947-5-1
- ac15 A600
- dc13 Q300
- BG, UL & CSA

Vibration
- 10 g conforming to IEC 68-2-6

Shock
- 50 g conforming to IEC 68-2-27

Terminal marking
- to EN 50013

* See Standards (page 179)

Dimensions in mm / in

Conduit Thread
- A = 1/2" NPT
- C = 20 mm

Ordering:

Example: GSD C 01 B

Honeywell

Note: Incorporates safety screws

Conduit Thread

Low Energy Contacts

Example: GSD C 01 B

* Positive opening at IEC/EN 60947-5-1-3

** Positive opening occurs at operating position. But to meet IEC/EN 60947-5-3 which requires a dielectric gap of 2.5 kV, positive opening is assured at*.

Note: See page 197
Additional Lever Types

For use with all Side Rotary Head Styles.

All dimensions are in mm / in

Figure 2 illustrates standard lever types which conform to EN 50047.
GSE EN 50047 Compatible
Safety 3 Conduit Metal Standard

Technical Data

Mechanical life: up to 15 million operations

Degree of protection: IP66

Temperature range:
- Operating: -25 °C to +85 °C / -13 °F to +185 °F
- Storage: -40 °C to +85 °C / -40 °F to +185 °F

Approvals:
- IEC 60947-5-1
- EN 60947-5-1
- ac15 A300
- dc13 Q300
- BG, UL & CSA

Vibration: 10 g conforming to IEC 68-2-6

Shock: 50 g conforming to IEC 68-2-27

Terminal marking: to EN 50013

* See Standards (page 179)

Dimensions in mm / in

Conduit Thread

A = 1/2” NPT

C = 20 mm

Ordering:

Example: GSE C 20 B

Slow-Action Contacts
3 NORMALLY CLOSED
1 NORMALLY OPEN
BREAK BEFORE MAKE

Actuator Types

Additional levers available (see page 208)

* Point from which the positive opening is assured

** Positive opening occurs at operating position. But to meet IEC/EN 60947-5-3 which requires a dielectric gap of 2.5 kV, positive opening is assured at*.
Additional Lever Types

For use with all Side Rotary Head Styles.

All dimensions are in mm / in.

Figure 2 illustrates standard lever types which conform to EN 50047.
MICRO SWITCH™
GSX Series
Explosion-Proof Safety Switch

DESCRIPTION
Honeywell Sensing and Control MICRO SWITCH™ GSX Series Explosion-Proof Safety Switches combines the world-class MICRO SWITCH™ global safety switch (GSS) with our superior explosion-proof housing from our LSX and BX product lines, offering our customers the best of our engineering expertise.

FEATURES
- Snap-action contacts with positive break
- Positive action push plunger breaks current upon opening of door or aperture
- Explosion-proof housing for hazardous locations
- NEMA 1, 3, 4, 12, 13 and IP67 sealing
- cULus, ATEX, IECEx
- Simple installation
- Positive break feature
- Extensive switching options and actuator styles

The positive break feature is designed to provide a safe failure mode, ensuring the machine will not start, and therefore supporting a safer working environment.

The GSX Series safety switch platform allows for over 10,000 actuator and switching option combinations, enabling our customers to source most of their safety and explosion-proof switch requirements from a single, global supplier.

POTENTIAL APPLICATIONS
Gates, doors, access panels or cages on machinery in:
- Hydrocarbon refining
- Chemical processing
- Agricultural equipment
- Food processing
- Grain elevators

BENEFITS
- Designed to ensure that even welded contacts will open and the machine will stop in an emergency
- Breaks current upon opening of door or aperture
- Reduces risk that hazardous gases or dusts could cause an explosion
- Meets IECEx standards
- Designed to provide a safe failure mode, ensuring the machine will not start
- Superior sealing for different applications
# MICRO SWITCH™ GSX Series

## Specifications

<table>
<thead>
<tr>
<th>Designation and Utilization Category</th>
<th>Rated Operational Current Ie (A) at Rated Operational Voltage Ue (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 V</td>
</tr>
<tr>
<td>AC15 A300</td>
<td>—</td>
</tr>
<tr>
<td>AC15 A500</td>
<td>—</td>
</tr>
<tr>
<td>AC15 A600</td>
<td>—</td>
</tr>
<tr>
<td>DC13 Q300</td>
<td>2,8 A</td>
</tr>
</tbody>
</table>

- **Rated thermal current (Ith)**: 10 A
- **Sealing**: IP67; NEMA 1, 3, 4, 12, 13
- **Rated impulse withstand (Uimp)**: 2500 V
- **Pollution degree**: 3
- **Rated insulation voltage (Ui)**: 300 V, 500 V, 600 V
- **Operating temperature range**: -40 °C to 70 °C [-40 °F to 158 °F]

### Short-circuit protective device (type/maximum rating)
- **Class J fuse (10 A/600 V)**
- **Expected mechanical life**: 1,000,000 operations

### Conditional short-circuit current
- **1000 A**
- **—**

Complies with:
- Low Voltage Directive 73/23/EEC, as amended by directive 93/68/EEC.
- Machinery Directive 98/37/EEC only as the directives relate to the components being used in a safety function.
- IEC/EN60947-1, IEC/EN60947-5-1.
Explosion-Proof Safety Switch

NOMENCLATURE TREE
MICRO SWITCH™ GSX Series Nomenclature

<table>
<thead>
<tr>
<th>GSX</th>
<th>A</th>
<th>16</th>
<th>A</th>
<th>1</th>
<th>B</th>
</tr>
</thead>
</table>
| Switch type | Housing (conduit) | Basic switch | Head | Actuator | Actuator options | Modifications/
| Explosion-proof | | | | | | Specials |
| positive break | A | Snap action, | A | 1 | 1 | 1 |
| series | | TNC/1NO | Side rotary | Std. fixed | Clockwise | Clockwise rotation |
| | B | Slow acting, | | fixed length | | 2 |
| | C | 20 mm | B | pin plunger | 1 | | 2 |
| | D | PE 1/2 | C | Top roller | 3 | | 3 |
| | | | | plunger | | | 4 |
| | | | | D | Top roller lever | | | 5 |
| | | | | E | 19 x 6.35 | Roller | | | 6 |
| | | | | | [1.47 x 0.25] nylon roller | | | 6 |
| | | | | | 19 x 6.35 | [0.75 x 0.25] nylon roller | | | 6 |
| | | | | | 19 x 6.35 | [0.75 x 0.25] bronze roller | | | 6 |
| | | | | | 19 x 6.35 | [0.75 x 0.25] rubber roller | | | 6 |
| | | | | | 19 x 6.35 | [0.75 x 0.25] rubber roller | | | 6 |

NOTES
(1) Not all possible combinations are available; these are only guidelines.
MICRO SWITCH™ GSX Series

Figure 1. Side rotary head with standard roller

Figure 2. Pin plunger  Figure 3. Top roller plunger  Figure 4. Top roller lever
## ORDER GUIDE

<table>
<thead>
<tr>
<th>Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSXA42A1E</td>
<td>0.5 in NPT housing 2NC/1NO side rotary Ø 0.75 in x 0.25 in bronze roller</td>
</tr>
<tr>
<td>GSXA42B</td>
<td>0.5 in NPT housing 2NC/1NO pin plunger</td>
</tr>
<tr>
<td>GSXA42C</td>
<td>0.5 in NPT housing 2NC/1NO top roller plunger</td>
</tr>
<tr>
<td>GSXA42D</td>
<td>0.5 in NPT housing 2NC/1NO top roller lever</td>
</tr>
<tr>
<td>GSXA46A1E</td>
<td>0.5 in NPT housing 3NC/1NO side rotary Ø 0.75 in x 0.25 in bronze roller</td>
</tr>
<tr>
<td>GSXA46B</td>
<td>0.5 in NPT housing 3NC/1NO pin plunger</td>
</tr>
<tr>
<td>GSXA46C</td>
<td>0.5 in NPT housing 3NC/1NO top roller plunger</td>
</tr>
<tr>
<td>GSXA46D</td>
<td>0.5 in NPT housing 3NC/1NO top roller lever</td>
</tr>
<tr>
<td>GSXC42A1E</td>
<td>20 mm housing 2NC/1NO side rotary Ø 0.75 in x 0.25 in bronze roller</td>
</tr>
<tr>
<td>GSXC42B</td>
<td>20 mm housing 2NC/1NO pin plunger</td>
</tr>
<tr>
<td>GSXC42C</td>
<td>20 mm housing 2NC/1NO top roller plunger</td>
</tr>
<tr>
<td>GSXC42D</td>
<td>20 mm housing 2NC/1NO top roller lever</td>
</tr>
<tr>
<td>GSXC46A1E</td>
<td>20 mm housing 3NC/1NO side rotary Ø 0.75 in x 0.25 in bronze roller</td>
</tr>
<tr>
<td>GSXC46B</td>
<td>20 mm housing 3NC/1NO pin plunger</td>
</tr>
<tr>
<td>GSXC46C</td>
<td>20 mm housing 3NC/1NO top roller plunger</td>
</tr>
<tr>
<td>GSXC46D</td>
<td>20 mm housing 3NC/1NO top roller lever</td>
</tr>
</tbody>
</table>

**WARNING**

### MISUSE OF DOCUMENTATION
- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- 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.

### RISK TO LIFE OR PROPERTY

Never use this product for an application involving serious risk to life or property without ensuring that the system as a whole has been designed to address the risks, and that this product is properly rated and installed for the intended use within the overall system.
- Failure to comply with these instructions could result in death or serious injury.

### WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell’s standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, 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. In no event shall Honeywell be liable for consequential, special, or indirect damages.

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.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

**SALES AND SERVICE**

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

- **E-mail:** info.sc@honeywell.com
- **Internet:** www.honeywell.com/sensing
- **Phone and Fax:**
  - **Asia Pacific:** +65 6355-2828
  - +65 6445-3033 Fax
  - **Europe:** +44 (0) 1698 481481
  - +44 (0) 1698 481676 Fax
  - **Latin America:** +1-305-805-8188
  - +1-305-883-6257 Fax
  - **USA/Canada:** +1-800-537-6945
  - +1-815-235-6847
  - +1-815-235-6545 Fax

**Sensing and Control**

Honeywell
1985 Douglas Drive North
Golden Valley, Minnesota 55422
www.honeywell.com
24CE/924CE
Miniature Safety Electromechanical Switch

FEATURES
- Positive opening operation of Normally Closed contacts conforming to IEC/EN 60947-5-1-3
- Compact construction
- Pre-wired
- Die-cast Zinc housing
- Wide selection of actuators
- Cable length variations
- Side and bottom exit cable
- Simple two-screw mounting
- IP 65/66/67
- UL recognised; CSA certified (924CE), CE compliant, BG approved (24CE)

BENEFITS
- Suitable for applications where space is at a premium
- Fast and easy to install
- Suitable for difficult operating environments
- Application flexibility
- Enhanced choice for application
- Multiple plunger capability

The ranges 24CE and 924CE have been tested and approved to meet the requirements of the Low Voltage directive and positive opening safety contacts per IEC/EN 60947-5-1-3. The devices are CE marked. The red colour clearly differentiates this safety component in the application. The 924CE range also has UL and CSA approval.

It is possible for the end user to enhance the safety level of these switches from Category 1 per EN 954-1 on their own to Categories 2, 3 or 4 per EN 954-1 when the switches are used in conjunction with our wide range of FF-SR safety control modules to form a safety system.

Typical applications for these switches would use the roller plunger 24CE18 style in conjunction with cams on doors with hinges. Also available are a range of panel mounting or top mounting versions to ensure that small space or difficult mounting can be simply achieved.

Several contact arrangements are available.
### 24CE Series

**Miniature Safety Electromechanical Switch**

#### Technical Data

**Mechanical life**
- 10 million operations.

**Degree of protection**
- Standard type: IP 66
- With boot seal type: IP 67

**Temperature range**
- Operating: 0 °C to +70 °C / 32 °F to +160 °F

**Approvals**
- IEC 60947-5-1
- EN 60947-5-1
- ac15 B300
- dc13 R300

**Electrical**
- According to IEC/EN 60947-5-1.
- Rated insulation voltage $U_i = 500$ V.
- Rated impulse withstand voltage $U_{imp} = 2.5$ kV.
- Not suitable for isolation.
- SCPD, Quick blow fuse to IEC 127 suitable for rated current.

* See Standards (page 179)

#### Dimensions in mm / in

**Free position**
- 2 Holes 5.1 dia
- Counter bored 10.2 dia x 6 deep (both sides - option 'A' only)

**Side-exit cable (Option 'A')**
- 3 or 5 x 0.75 mm² harmonised CENELEC cable.

### Actuator Types

<table>
<thead>
<tr>
<th>Pin Plunger (Boot Sealed)</th>
<th>Roller Plunger Parallel (Boot Sealed)</th>
<th>Roller Plunger Perpendicular (Boot Sealed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø7.1</td>
<td>Ø12.4</td>
<td>Ø12.4</td>
</tr>
<tr>
<td>24.3 max.</td>
<td>36.1 max.</td>
<td>36.1 max.</td>
</tr>
</tbody>
</table>

### Slow Action Contacts

1 Normally Closed

<table>
<thead>
<tr>
<th>Contact Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit closed</td>
</tr>
</tbody>
</table>

#### Example Order:

**Example:** 24CE18-Y1A

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*Industrial Safety Products*

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**24CE/924CE Series**

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(Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com)
**Slow Action Contacts**

**1 Normally Closed/1 Normally Open**

**Break before make**

- **17.1 +/- 0.4**
- **PT = 22 max.**
- **O.F (max.) = 22.5 Newtons / 2300 GMF**

**Slow Action Contacts**

**1 Normally Closed/1 Normally Open**

**Make before break**

- **17.1 +/- 0.4**
- **PT = 4 max.**
- **(O.P1 + 0.9 mm)**
- **O.F (max.) = 22.5 Newtons / 2300 GMF**

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**Cable Length**

*(in metres)*

Options:

- **A: Side Exit Cable.**

Specify cable length in 1 metre increments e.g.:

- 1 = 1 metre
- 2 = 2 metre etc.
## 924CE Series

**Miniature Safety Electromechanical Switch**

### Technical Data

**Mechanical life**
- 10 million operations.

**Degree of protection**
- 924CE
  - Standard type: IP 66
  - With boot seal type: IP 67

**Temperature range**
- Operating: 0 °C to +105 °C / 32 °F to +221 °F

**Approvals**
- IEC 60947-5-1
- EN 60947-5-1
- ac15 B300
dc13 R300
- UL, CSA

**Electrical**
- According to IEC/EN 60947-5-1.
- Rated insulation voltage $U_i = 500$ V.
- Rated impulse withstand voltage $U_{imp} = 2.5$ kV.
- Not suitable for isolation.
- SCPD, Quick blow fuse to IEC 127 suitable for rated current.

* See Standards (page 179)

### Dimensions in mm / in

<table>
<thead>
<tr>
<th>Cable Type</th>
<th>24CE/924CE Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 or 5 x 18 AWG SJTO CABLE</td>
<td></td>
</tr>
</tbody>
</table>

### Actuator Types

#### Slow Action Contacts

1 Normally Closed

<table>
<thead>
<tr>
<th>Actuator Types</th>
<th>Slow Action Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin Plunger (Boot Sealed)</td>
<td></td>
</tr>
<tr>
<td>Roller Plunger Parallel (Boot Sealed)</td>
<td></td>
</tr>
<tr>
<td>Roller Plunger Perpendicular (Boot Sealed)</td>
<td></td>
</tr>
</tbody>
</table>

#### Wiring Information

- 924CE Series
- Miniature Safety Electromechanical Switch

Example: 924CE18-Y3A

### Example Amp Ratings

<table>
<thead>
<tr>
<th>Example Amp</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>17.1 +/- 0.4</td>
<td>O.F (max.) = 22.5 Newtons / 2300 GMF</td>
<td></td>
</tr>
<tr>
<td>13.1 *</td>
<td>O.P</td>
<td></td>
</tr>
<tr>
<td>29.9 +/- 0.4</td>
<td>O.F (max.) = 22.5 Newtons / 2300 GMF</td>
<td></td>
</tr>
<tr>
<td>25.9 *</td>
<td>O.P</td>
<td></td>
</tr>
<tr>
<td>29.9 +/- 0.4</td>
<td>O.F (max.) = 22.5 Newtons / 2300 GMF</td>
<td></td>
</tr>
<tr>
<td>25.9 *</td>
<td>O.P</td>
<td></td>
</tr>
<tr>
<td>29.9 +/- 0.4</td>
<td>O.F (max.) = 22.5 Newtons / 2300 GMF</td>
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</tr>
<tr>
<td>25.9 *</td>
<td>O.P</td>
<td></td>
</tr>
</tbody>
</table>

### Ordering Information

- **Example:** 924CE18-Y3A
- **Cable Type:** 3 or 5 x 18 AWG SJTO CABLE

*Industrial Safety Products*
<table>
<thead>
<tr>
<th>Slow Action Contacts 1 Normally Closed/Break before make</th>
<th>Slow Action Contacts 1 Normally Closed/Make before break</th>
<th>Cable Length (in feet)</th>
<th>Option Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>black [ ] red [ ] white [ ]</td>
<td>black [ ] red [ ] green [ ] white [ ]</td>
<td>Specify cable length in 3 feet increments e.g. 3 = 3 feet 6 = 6 feet etc.</td>
<td>A: Side Exit Cable</td>
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<tr>
<td></td>
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<td></td>
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</tr>
<tr>
<td>17,1 +/- 0,4</td>
<td>17,1 +/- 0,4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q.P. -1</td>
<td>Q.P. -1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q.P. -2</td>
<td>Q.P. -2</td>
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<td></td>
</tr>
<tr>
<td>13,1 *</td>
<td>(Q.P1 + 0,9 mm) *</td>
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<td></td>
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<tr>
<td>O.F (max.) = 22,5 Newtons / 2300 GMF</td>
<td>O.F (max.) = 22,5 Newtons / 2300 GMF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29,9 +/- 0,4</td>
<td>29,9 +/- 0,4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q.P. -1</td>
<td>Q.P. -1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q.P. -2</td>
<td>Q.P. -2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2, +/- 0,5</td>
<td>2, +/- 0,5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O.F (max.) = 22,5 Newtons / 2300 GMF</td>
<td>O.F (max.) = 22,5 Newtons / 2300 GMF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29,9 +/- 0,4</td>
<td>29,9 +/- 0,4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q.P. -1</td>
<td>Q.P. -1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q.P. -2</td>
<td>Q.P. -2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2, +/- 0,5</td>
<td>2, +/- 0,5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O.F (max.) = 22,5 Newtons / 2300 GMF</td>
<td>O.F (max.) = 22,5 Newtons / 2300 GMF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29,9 +/- 0,4</td>
<td>29,9 +/- 0,4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q.P. -1</td>
<td>Q.P. -1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q.P. -2</td>
<td>Q.P. -2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2, +/- 0,5</td>
<td>2, +/- 0,5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O.F (max.) = 22,5 Newtons / 2300 GMF</td>
<td>O.F (max.) = 22,5 Newtons / 2300 GMF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 Degrees</td>
<td>0 Degrees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q.P. -1</td>
<td>Q.P. -1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q.P. -2</td>
<td>Q.P. -2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25,9</td>
<td>25,9</td>
<td></td>
<td></td>
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<tr>
<td>O.F (max.) = 22,5 Newtons / 2300 GMF</td>
<td>O.F (max.) = 7,85 Newtons / 800 GMF</td>
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<td>23,9 +/- 0,4</td>
<td>26 +/- 0,4</td>
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<tr>
<td>Q.P. -1</td>
<td>Q.P. -1</td>
<td></td>
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</tr>
<tr>
<td>Q.P. -2</td>
<td>Q.P. -2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2, +/- 0,5</td>
<td>2, +/- 0,5</td>
<td></td>
<td></td>
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<tr>
<td>O.F (max.) = 22,5 Newtons / 2300 GMF</td>
<td>O.F (max.) = 22,5 Newtons / 2300 GMF</td>
<td></td>
<td></td>
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<td>35,7 +/- 0,4</td>
<td>35,7 +/- 0,4</td>
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<td></td>
</tr>
<tr>
<td>Q.P. -1</td>
<td>Q.P. -1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q.P. -2</td>
<td>Q.P. -2</td>
<td></td>
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</tr>
<tr>
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<td>35,7 +/- 0,4</td>
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</tr>
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<td></td>
<td></td>
</tr>
<tr>
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<td>Q.P. -2</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
FFS Series
Electronic Standalone Non-Contact Safety Switch

DESCRIPTION
Honeywell FFS series are designed as tamper-proof, standalone safety switches that can often be used to switch relays, contacts, or safety relays directly. By removing the separate control unit, Honeywell has made it possible to use its electronic switching technology in smaller, simpler safety systems.

The FSS is often suitable for use on its own, for lower category safety systems, providing two volt-free outputs (2NC or 1NC/1NO). It can be used in conjunction with safety relays where a higher category of performance is required. For ease of operation, the fixed switch has a green LED, giving true indication of FFS safety switch contacts.

FEATURES
- Tamper-proof electronic switching
- IP67
- 7 mm to 10 mm [0.28 in to 0.4 in] operating distance
- Guard status indication
- CE, UL approvals

POTENTIAL APPLICATIONS
- Can forming and filling (aluminum, steel, and plastic)
- Pick and place packaging equipment
- Pick and place/assembly equipment
- Semicron equipment
- Plastic molding equipment
- Woodworking machinery
- Textile machinery
- Printing machinery
**FFS Series**

**TECHNICAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Type</th>
<th>FFS-11-03</th>
<th>FFS-20-03</th>
<th>FFS-11-QD</th>
<th>FFS-20-QD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact arrangement</td>
<td>Max: 1NC safety and 1NO auxiliary</td>
<td>Max: 2NC safety</td>
<td>Max: 1NC safety and 1NO auxiliary</td>
<td>Max: 2NC safety</td>
</tr>
<tr>
<td>Safety contact rating</td>
<td>230 Vac/2 A</td>
<td>230 Vac/2 A</td>
<td>230 Vac/2 A</td>
<td>230 Vac/2 A</td>
</tr>
<tr>
<td></td>
<td>30 Vdc/2 A</td>
<td>30 Vdc/2 A</td>
<td>30 Vdc/2 A</td>
<td>30 Vdc/2 A</td>
</tr>
<tr>
<td>Safety contact operating distance</td>
<td>7 mm [0.28 in] ON; 12 mm [0.47 in] OFF</td>
<td>7 mm [0.28 in] ON; 12 mm [0.47 in] OFF</td>
<td>7 mm [0.28 in] ON; 12 mm [0.47 in] OFF</td>
<td>7 mm [0.28 in] ON; 12 mm [0.47 in] OFF</td>
</tr>
<tr>
<td>Safety contact close/drop/bounce</td>
<td>3 ms/2.1 ms/0.7 ms</td>
<td>3 ms/2.1 ms/0.7 ms</td>
<td>3 ms/2.1 ms/0.7 ms</td>
<td>3 ms/2.1 ms/0.7 ms</td>
</tr>
<tr>
<td>Auxiliary contact rating</td>
<td>15 W/10 VA</td>
<td>15 W/10 VA</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Auxiliary contact operating distance</td>
<td>7 mm [0.28 in] OFF; 12 mm [0.47 in] ON</td>
<td>7 mm [0.28 in] OFF; 12 mm [0.47 in] ON</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Auxiliary contact close/drop/bounce</td>
<td>0.5 ms/0.3 ms/0.7 ms</td>
<td>0.5 ms/0.3 ms/0.7 ms</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Internal fuse</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
<tr>
<td>External fuse (customer supplied)</td>
<td>3 A/230 Vac, 1 A/30 Vdc</td>
<td>3 A/230 Vac, 1 A/30 Vdc</td>
<td>3 A/230 Vac, 1 A/30 Vdc</td>
<td>3 A/230 Vac, 1 A/30 Vdc</td>
</tr>
<tr>
<td>IP rating</td>
<td>IP67</td>
<td>IP67</td>
<td>IP67</td>
<td>IP67</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>24 Vdc</td>
<td>24 Vdc</td>
<td>24 Vdc</td>
<td>24 Vdc</td>
</tr>
<tr>
<td>Vibration/shock</td>
<td>50 Hz to 100 Hz/10 g</td>
<td>50 Hz to 100 Hz/10 g</td>
<td>50 Hz to 100 Hz/10 g</td>
<td>50 Hz to 100 Hz/10 g</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-10 °C to 55 °C [14 °F to 131 °F]</td>
<td>-10 °C to 55 °C [14 °F to 131 °F]</td>
<td>-10 °C to 55 °C [14 °F to 131 °F]</td>
<td>-10 °C to 55 °C [14 °F to 131 °F]</td>
</tr>
<tr>
<td>Mounting and fixture</td>
<td>Target to target</td>
<td>Target to target</td>
<td>Target to target</td>
<td>Target to target</td>
</tr>
<tr>
<td>Construction</td>
<td>Blue ABS resin filled</td>
<td>Blue ABS resin filled</td>
<td>Blue ABS resin filled</td>
<td>Blue ABS resin filled</td>
</tr>
</tbody>
</table>

**FFS CONTACTS**

Contact configurations show under closed condition for guard device.

**FFS CONNECTIONS**

**FFS PRE-WIRED CONNECTIONS**

![FFS-20-03 Connections](image)

**FFS QUICK CONNECT CONNECTIONS**

![FFS-20-QD Connections](image)

![FFS-11-03 Connections](image)

![FFS-11-QD Connections](image)
Electronic Standalone Non-Contact Safety Switch

DIMENSIONS

<table>
<thead>
<tr>
<th>FFS PRE-WIRED mm[in]</th>
<th>FFS QUICK CONNECT mm[in]</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Diagram of FFS PRE-WIRED mm[in]]</td>
<td>![Diagram of FFS QUICK CONNECT mm[in]]</td>
</tr>
</tbody>
</table>

ORDER GUIDE

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFS-20-03</td>
<td>Safety switch and actuator, 2NC, dc, 3 m pre-wired</td>
</tr>
<tr>
<td>FFS-11-03</td>
<td>Safety switch and actuator, 1NC/1NO, dc, 3 m pre-wired</td>
</tr>
<tr>
<td>FFS-20-QD</td>
<td>Safety switch and actuator, 2NC, dc, M12 Brad Harrison connector, no cable</td>
</tr>
<tr>
<td>FFS-11-QD</td>
<td>Safety switch and actuator, 1NC/1NO, dc, M12 Brad Harrison connector, no cable</td>
</tr>
<tr>
<td>FFS-20-QD05</td>
<td>Safety switch and actuator, 2NC, dc, 5 m cable, M12 Brad Harrison connector</td>
</tr>
<tr>
<td>FFS-11-QD05</td>
<td>Safety switch and actuator, 1NC/1NO, dc, 5 m cable, M12 Brad Harrison connector</td>
</tr>
<tr>
<td>FFS-20-10</td>
<td>Safety switch and actuator, 2NC, dc, 10 m pre-wired</td>
</tr>
<tr>
<td>FFS-11-10</td>
<td>Safety switch and actuator, 1NC/1NO, dc, 10 m pre-wired</td>
</tr>
</tbody>
</table>
WARNING

RISK TO LIFE OR PROPERTY
Never use this product for an application involving serious risk to life or property without ensuring that the system as a whole has been designed to address the risks, and that this product is properly rated and installed for the intended use within the overall system. Failure to comply with these instructions could result in death or serious injury.

WARNING

MISUSE OF DOCUMENTATION
• The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
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**CLS Series**

**(Cable Pull Safety Switch)**

**FEATURES**

- Red body colour
- Single and Dual Head
- Single Head explosion-proof version
- Conformance to IEC 60947-5-1, EN 60947-5-1 (low voltage), EN 418
- Multiple conduit entry/exit points
- Simple set-up
- Temperature stabiliser spring
- Cable pulled - latch - manual reset
- Broken/slackened cable detection
- Up to 4NC positive opening contacts
- Status indication
- Compact design
- Complete accessories packs
- Connectorised versions available upon request

**BENEFITS**

- Flexible range of options
- Easy wiring options
- Cost reduced set up time
- Minimal re-adjustment due to cable expansion or contraction
- All cable modes detected (under tension, pulled or broken/slackened)
- Wiring and indication flexibility
- Tripped switch visible from a distance
- Fits simply to available mounting locations on most conveyors

The CLS range of cable (rope) pull switches is designed to provide the conveyor OEM and end user with a cost effective yet robust and simple to set up emergency stop device to protect an exposed conveyor.

The design was developed in the USA in association with some of the world's leading conveyor OEMs. The product and design features of the CLS are the result of the close relationship with these OEMs.

The device is simple to install:
- bring the cable up to tension (using a simple line indicator on the switch)
- actuate and reset the cable (rope) firmly several times (to seat the cable)
- re-adjust tension
...and the switch is ready for use.

Large distribution warehouses are becoming common throughout the world. Conveyors are the connecting transport network through these warehouses. When a CLS is actuated it stops the protected conveyor, ensuring operator safety. This shutdown, however, stops the protected conveyor, causing congestion and delays throughout the rest of the network. The CLS reduces these delays by offering rapid diagnosis via a powerful 6W indicator which is visible from a distance. The tripped device can be quickly located and reset so that the conveyors may be restarted and costly down time minimised.

The CLSX explosion-proof cable pull limit switch is specifically designed to provide emergency stop protection in hazardous atmospheres. It withstands the pressure of an internal explosion and cools the exploding gases below the kindling temperature of the explosive atmosphere. Flame paths are provided by the cover housing threads and an extended plunger between the switch cavity and head. The CLSX satisfies NEMA 7, 9 standards and is UL listed and CSA certified for Class I, Div. 1, Groups B, C, and D; Class II, Div. 1, Groups E, F, and G. The CLSX is designed to meet the requirements of EN50014 and EN50018; certification is pending.

---

**CLS/CLSX/2CLS Series**

- Industrial Safety Products
CLS - Metal Body Single Head
Cable Pull Safety Switch

Technical Data

- Mechanical life: 25,000 operations maximum
- Degree of protection: IP67
- Temperature range: Operating: -1 to +70°C (30 to 158°F)
- Approvals and certifications: IEC/EN 60947-5-1 and EN 418

Operating rating:
- AC15: U = 600V, I = 1.2A
- U = 240V, I = 3A
- U = 120V, I = 6A
- DC13: U = 250V, I = 0.27A
- U = 24V, I = 2.8A

Directives and Compliance:
- The forced disconnect mechanism on normally closed contacts conforms to IEC 60947-5-1-3. This product complies with the Machinery Directive 98/37/EC and complies with EN 60947-5-1.

Switch Type

- Slow acting, break before make (BBM), 1 Normally Closed/1 Normally Open
- Slow acting, break before make (BBM), 1 Normally Closed/1 Normally Open
- Slow acting, break before make (BBM), 1 Normally Closed/1 Normally Open
- 240V Neon Indicator
- Slow acting, break before make (BBM), 1 Normally Closed/1 Normally Open
- 120V Neon Indicator
- Slow acting, break before make (BBM), 1 Normally Closed/1 Normally Open
- 24V LED Indicator
- Direct Acting, 2 Normally Closed
- 4 Circuit Slow Acting

Ordering:

Example: CLSA4T-3

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<table>
<thead>
<tr>
<th>Head Code</th>
<th>Modification Code for Contact Configuration When Using a 4 Circuit Slow Acting (Switch Type 9) Only</th>
<th>Modification Code for Indicator Type When Using a 4 Circuit Slow Acting (Switch Type 9) Only</th>
<th>Modification Code for Head Orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 Normally Closed</td>
<td>240 V neon</td>
<td>Head assembled with actuator to the left</td>
</tr>
<tr>
<td></td>
<td><img src="image1.png" alt="Diagram" /></td>
<td><img src="image2.png" alt="Diagram" /></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 Normally Closed/ 1 Normally Open</td>
<td>120 V neon</td>
<td>Head assembled with actuator to the front</td>
</tr>
<tr>
<td></td>
<td><img src="image3.png" alt="Diagram" /></td>
<td><img src="image4.png" alt="Diagram" /></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Normally Closed/ 2 Normally Open</td>
<td>24 V LED</td>
<td>Head assembled with actuator facing to the back</td>
</tr>
<tr>
<td></td>
<td><img src="image5.png" alt="Diagram" /></td>
<td><img src="image6.png" alt="Diagram" /></td>
<td></td>
</tr>
</tbody>
</table>

Note: Required for Switch Type 9. Leave the modification code blank for other switch types.

Note: Leave the modification code blank if no indicator is needed with Switch Type 9.

Note: Leave the modification code blank if not required. Standard head orientation is with actuator to the right. Unit may be field modified to adjust head orientation.

Note: Standard head orientation is with actuator to the right. Unit may be field modified to adjust head orientation.
# CLSX - Metal Body Explosion-proof Cable Pull Safety Switch

## Technical Data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mechanical life</strong></td>
<td>25,000 operations maximum</td>
</tr>
<tr>
<td><strong>Degree of protection</strong></td>
<td>NEMA/UL 1, 3, 4, 7, 9 and 13</td>
</tr>
<tr>
<td><strong>Temperature range</strong></td>
<td>Operating: -1 to +70°C (30 to 158°F)</td>
</tr>
<tr>
<td><strong>Approvals and</strong></td>
<td>IEC/EN 60947-5-1 and EN 418</td>
</tr>
<tr>
<td><strong>Operating rating</strong></td>
<td>AC15: U = 600V: I = 1.2A, U = 240V: I = 3A, U = 120V: I = 6A. DC13: U = 250V: I = 0.27A, U = 24V: I = 2.8A</td>
</tr>
<tr>
<td><strong>Directives</strong></td>
<td>The forced disconnect mechanism on normally closed contacts conforms to IEC 60947-5-1-3. This product complies with the Machinery Directive 98/37/EC and complies with EN 60947-5-1.</td>
</tr>
</tbody>
</table>

* See Standards (page 161)

## Switch Type

- Slow acting, break before make (BBM), 1 Normally Closed/1 Normally Open
- Direct Acting, 2 Normally Closed
- 4 Circuit Slow Acting

(Must include modification code A, B or E)

## Ordering

**Example:** CLSX99T-B

- **Conduit Thread**: A = PG 13.5, B = 1/2" NPT, C = 20 mm, D = PF 1/2"
<table>
<thead>
<tr>
<th>Head Code</th>
<th>Modification Code for Contact Configuration When Using a 4 Circuit Slow Acting (Switch Type 9) Only</th>
<th>Modification Code for Head Orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLS/CLSX/2CLS Series</td>
<td>Note: Leave the modification code blank if not required. Standard head orientation is with actuator to the right. Unit may be field modified to adjust head orientation.</td>
<td>Note: Leave the modification code blank if not required. Standard head orientation is with actuator to the right. Unit may be field modified to adjust head orientation.</td>
</tr>
</tbody>
</table>

- **Head Code A:** 4 Normally Closed
  - 11-12
  - 21-22
  - 31-32
  - 41-42
  - 4y
  - Head assembled with actuator to the left
- **Head Code B:** 3 Normally Closed/1 Normally Open
  - 11-12
  - 21-22
  - 31-32
  - 3y,1x
  - 43-44
  - Head assembled with actuator to the front
- **Head Code C:** 2 Normally Closed/2 Normally Open
  - 11-12
  - 21-22
  - 2y,2x
  - 13-14
  - 23-24
  - Head assembled with actuator facing to the back

**Note:** Required for Switch Type 9. Leave the modification code blank for other switch types.
2CLS - Metal Body Dual Head Cable Pull Safety Switch

Technical Data

Mechanical life 25,000 operations maximum
Degree of protection IP 67
NEMA/UL type 1, 3, 4 and 13
Temperature range Operating: -1 to +70 °C (30 to 158 °F)
Approvals and IEC/EN 60947-5-1 and EN 418
Emergency stop device, UL listed, CSA certified CE marked.
Operating rating AC15 U = 600V: I = 1.2A
U = 240V: I = 3A
U = 120V: I = 6A
DC13 U = 250V: I = 0.27A
U = 24V: I = 2.8A
Directives Compliance
The forced disconnect mechanism on normally closed contacts conforms to IEC 60947-5-1-3.
This product complies with the Machinery Directive 98/37/EC and complies with EN 60947-5-1.

* See Standards (page 161)

Conduit Thread
A = PG 13.5
B = 1/2” NPT
C = 20 mm
D = PF 1/2"

Ordering:
2CLS X

Example: 2CLSA1T1

Primary Switch Type
Located on left hand side of switch body

Slow Acting, 1 Normally Closed/1 Normally Open

Slow Acting, 2 Normally Closed

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<table>
<thead>
<tr>
<th>Head Code</th>
<th>Auxiliary Switch Type Located on right hand side of switch body</th>
<th>Indicator Code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Slow Acting 1 Normally Closed/1 Normally Open</td>
<td>120V – 6W incandescent Red Pilot Light</td>
</tr>
<tr>
<td></td>
<td>Slow Acting 2 Normally Closed</td>
<td>120V Neon Indicator</td>
</tr>
<tr>
<td></td>
<td>No switch</td>
<td>240V Neon Indicator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24V LED Indicator</td>
</tr>
</tbody>
</table>

Note: Leave the Indicator Code blank if indicator is not required.
Installation hardware

- Aircraft cable precut to 7.5 m (25 ft.), 15 m (50 ft.), 30 m (100 ft.), 45 m (150 ft.), 60 m (200 ft.).
- End springs for long cable spans to compensate for temperature variations
- Installation hardware kit CLSZ00 supports cable installations of up to 15 m (50 ft.)

Installation hardware order guide

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLSZC1</td>
<td>7.5 m Red Aircraft Cable, finished cable dia. 4.75 mm (0.187 in)</td>
</tr>
<tr>
<td>CLSZC2</td>
<td>15 m Red Aircraft Cable, finished cable dia. 4.75 mm (0.187 in)</td>
</tr>
<tr>
<td>CLSZC3</td>
<td>30 m Red Aircraft Cable, finished cable dia. 4.75 mm (0.187 in)</td>
</tr>
<tr>
<td>CLSZC4</td>
<td>45 m Red Aircraft Cable, finished cable dia. 4.75 mm (0.187 in)</td>
</tr>
<tr>
<td>CLSZC5</td>
<td>60 m Red Aircraft Cable, finished cable dia. 4.75 mm (0.187 in)</td>
</tr>
<tr>
<td>CLSZ1S</td>
<td>End Spring</td>
</tr>
<tr>
<td>CLSZ00</td>
<td>Installation Kit, includes: 4 - thimbles, 8 - wire rope clamps, 1 - turnbuckle (w/lock nuts), 9 - eyebolts (w/hardware), 1 - endspring, 1 conduit fitting</td>
</tr>
</tbody>
</table>

Notes:
1. CLS/CLSX includes 1 turnbuckle and 1 endspring.
2. CLS includes 2 turnbuckles and 2 endsprings.
CPS Series Cable Pull Safety Switch

FEATURES
• Direct opening action of NC (normally closed) contacts
• 2CPS: 2NO/2NC, 1NO/3NC or 4NC contact configurations
• 1CPS: 1NO/1NC, 2NO/2NC, 1NO/3NC or 4NC contact configurations
• Typical cable span of 76 m (250 ft) in an environment with a temperature change of ±17 °C (±30 °F). Longer spans are possible depending upon temperature change and installation (ref. note on page 6 for more details or Application note – Effect of Temperature on Cable Pull Switch Operation)
• Choice of three actuator configurations (2CPS)
• Removable contact block version available (2CPS)
• Large wiring cavity with straight-through wiring
• 24 Vdc or 120 Vac bright, multicluster LED status indicator light available on 2CPS. Single high intensity LED on 1CPS
• Gold-plated contacts are standard on 2CPS, available on 1CPS
• Die-cast zinc housing
• Optional hardware packs available

TYPICAL APPLICATIONS
• Long conveyor systems found in warehouses and distribution centers
• Conveyor systems having a high amount of vibration
• Conveyor systems that experience wide temperature swings
• Long conveyor systems where easy through wiring, or highly visible trip status is required
• Hose down conditions
• Packaging equipment
• Assembly lines

CPS Series Cable Pull Safety Switches provide a readily accessible emergency stop signal. This is a cost-effective means compared to using multiple emergency stop push-buttons. (Cable Pull Safety Switches are not, however, to be used as a means of personnel safeguarding. They may be used to prevent further injury or damage to equipment when used for emergency stop signaling.)

The CPS Series Cable Pull Safety switch is designed to provide emergency stop protection for exposed conveyor and assembly lines. The internal mechanism latches on both slackened cable (push) and pulled cable. This capability also enhances productivity by eliminating nuisance stops due to variations in temperature, stretch of cable over time, and other application variables.

The 1CPS is intended for use in applications where the cable span is 76 m (250 ft) or shorter. It is an economical solution for shorter runs or zone protection typical to automated systems. The 2CPS series is intended for use in very long cable runs of 152 m (500 ft) or shorter, such as long conveyor lines found in warehouses.

A line in the midpoint of the cable tension window indicates proper cable tension, providing easy set-up. The direct opening switch contacts are held closed when the actuating cable is under proper tension and the reset knob is set to RUN. When the actuating cable is pulled, slackened or broken, a cam positively opens the NC (Normally Closed) switch contacts. The snap action, trip operation causes the switch contacts to change state and mechanically latch almost simultaneously when the cable is pulled, slackened or broken. The NC switch contacts remain open until the CPS is reset by properly tensioning the cable and manually rotating the reset knob.

When the direct opening switch contacts open, the auxiliary contacts also actuate (open contacts close and closed contacts open). The auxiliary contacts are electrically isolated from the direct opening switch contacts. These NO (Normally Open) contacts may be used for monitoring or signaling.


⚠️ WARNING
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1CPS
Cable Pull Safety Switch

Technical Data

Mechanical life
1 000 000 operations

Degree of protection
IP 67

NEMA 1, 4, 12, 13

Temperature range
-25 °C to +80 °C / -13 °F to +176 °F

without condensation

Approvals
IEC/EN 60947-1
IEC/EN 60947-5-1
IEC/EN 60947-5-5
AC15 A300
DC13 Q300
UL & CSA
BG Applied for

Vibration
10 Hz - 500 Hz, 5 g

Shock
15 g

Contact material
Silver standard

Gold plated optional

Included accessories
None

Ordering:
1CPS

Example: 1CPSA1A
3 NORMALLY CLOSED/ 1 NORMALLY OPEN

4 NORMALLY CLOSED

Indicator-Pilot Light Code

A : 24 V LED

B : 120 V LED
2CPS
Cable Pull Safety Switch

Technical Data

Mechanical life: 1,000,000 operations

Degree of protection: IP 67, NEMA 1, 4, 12, 13

Temperature range: Operating: -40 °C to +80 °C / -40 °F to +176 °F without condensation

Approvals: IEC/EN 60947-1
IEC/EN 60947-5-1
IEC/EN 60947-5-5
AC15 A300
DC13 C300
UL & CSA
BG

Vibration: 10 Hz - 500 Hz, 5 g

Shock: 15 g

Contact material: Gold plate over silver

Included accessories: Turnbuckle(s)

Contact blocks mounted to housing

Example: 2CPSA1A2B
4 NORMALLY CLOSED

Actuation Code

Indicator Light Code

1: Maintained both sides
2: Maintained left side, no actuation right side
3: Maintained right side, no actuation left side

1: No letter: no indicator provided
2: A: 24 Vdc red multi-cluster LED
3: B: 120 Vac red multi-cluster LED

Removable contact blocks with heavy duty wiring receptacles

#6-32 UNC
Temperature-Span Distance Application Information

Cable Pull Switches featuring broken cable detection require pre-tensioning in order to enable the RUN condition.

The relative expansion or contraction of the steel actuating cable when the ambient temperature increases or decreases must be taken into account when pre-tensioning a cable pull switch.

The change in cable length with change in temperature can cause significant nuisance shut downs on longer runs.

Install the system when the temperature is at the mid point of the extremes. If a warehouse has a low temperature of 15,6 °C (60 °F) and a high of 32,2 °C (90 °F), set up the system at the midpoint 23,9 °C (75 °F).

Use an endspring or another CPS at the opposite end of the cable span to double the temperature tolerance and to meet the requirements of EN 418.

A = Total temperature variation
B = Setup point - Ideally at middle of temperature extremes
C = Cable Pull Switch usable temperature span without endspring or second CPS
D = Cable Pull Switch usable temperature span with endspring or second CPS
E = Cable span distance
Application information

1CPS

- A 0.46 m [18 in] maximum
- B 2.4 m [8 ft] maximum
- C 76 m [250 ft] typical
- D Reset knob
- E Tension indicator line is in center of indicator window - cable is properly tensioned
- F J-hook turnbuckle
- G Thimble
- H Cable clamp
- I Cable support (eyebolt)
- J Cable
- K Endspring

2CPS

- A 46 cm [18 in] maximum
- B 2.4 m [8 ft] maximum
- C 76 m [250 ft] typical
- D J-hook turnbuckle (included)
- E Thimble
- F Cable clamp
- G Cable support
- H Endspring
- I Tension indicator line is in center of indicator window - left cable is properly tensioned
- J Reset knob
- K Tension indicator line is in center of indicator window - right cable is properly tensioned
- L Thimble
- M Cable clamp
- N Cable
Hardware packets (available separately)

<table>
<thead>
<tr>
<th>Listing</th>
<th>Accessory</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLSZC1</td>
<td>Cable - 7.6 m (25 ft) length</td>
</tr>
<tr>
<td>CLSZC2</td>
<td>Cable - 15.2 m (50 ft) length</td>
</tr>
<tr>
<td>CLSZC3</td>
<td>Cable - 30.5 m (100 ft) length</td>
</tr>
<tr>
<td>CLSZC4</td>
<td>Cable - 45.7 m (150 ft) length</td>
</tr>
<tr>
<td>CLSZC5</td>
<td>Cable - 61 m (200 ft) length</td>
</tr>
<tr>
<td>CLSZC7</td>
<td>Cable - 76.2 m (250 ft) length</td>
</tr>
<tr>
<td>CLSZTC</td>
<td>(2) Thimbles</td>
</tr>
<tr>
<td></td>
<td>(2) Low-profile Duplex Cable Clamps</td>
</tr>
<tr>
<td>CPSZ1S</td>
<td>(1) Draw-bar Endspring</td>
</tr>
<tr>
<td>CPSZK1</td>
<td>(1) J-hook Turnbuckle with Lock Nuts</td>
</tr>
<tr>
<td></td>
<td>(2) Thimbles</td>
</tr>
<tr>
<td></td>
<td>(2) Low-profile Duplex Cable Clamps</td>
</tr>
<tr>
<td></td>
<td>(16) Sets of Cable Supports ((16) 1/4-20 Eye Bolts, (32) 1/4-20 Nuts,</td>
</tr>
<tr>
<td></td>
<td>(32) Flat Washers, (16) Lock Washers)</td>
</tr>
<tr>
<td>CPSLED24</td>
<td>Multicluster LED Accessory - 24 Vdc (conduit mount)</td>
</tr>
<tr>
<td>CPSLED120</td>
<td>Multicluster LED Accessory - 120 Vdc (conduit mount)</td>
</tr>
<tr>
<td>CPS-BRACKET</td>
<td>Mounting bracket (to be used with 1CPS or 2CPS)</td>
</tr>
<tr>
<td>CPSZTB</td>
<td>J-hook turnbuckle with lock nuts (included with 2CPS)</td>
</tr>
</tbody>
</table>

CPSLED

A Multi-LED red pilot light
B 1/2-14 NPom Thread
C 18 AWG red PVC insulation
D 18 AWG black PVC insulation

CPS-BRACKET
Mounting dimensions (mm/in)

1CPS

A Fully extended
B Optional indicator
C Conduit thread (3 total)
D Mounting pad (4 total)

2CPS

A Fully extended
B Optional indicator
C Conduit thread (3 total)
D Mounting pad (4 total)
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.

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INTERNET: www.honeywell.com/sensing
E-mail: info.sc@honeywell.com
RDI Series
Residential Door Interlock Switch

DESCRIPTION
The RDI Series electromechanical door interlock is designed specifically for swing door applications, which may include residential elevators, dumbwaiters, and platform lifts. The door interlock holds the door in place and prevents it from being opened when not desired (e.g., the elevator/lift car is not present at the door). A number of design features contribute to increase safety, reduce nuisance stoppages and call-backs, and contribute to simplified wiring and installation.

Featuring a custom internal solenoid control, the RDI may reduce complexity of the host controller, reduce power consumption for a “greener” product, extend solenoid life and reduce solenoid “time outs,” reducing customer aggravation. Two Honeywell MICRO SWITCH™ switches are used to indicate door closure, providing an extra level of reliability.

Reliability and smooth operations are also enhanced by use of a metal key, which is less susceptible to bending and breakage. The lack of open or exposed contacts minimizes the possibility of owners making manual adjustments. Finally, the engagement of the key initiates electrical contact.

The snap-action cam mechanism requires less adjustment set-up time and reduces door movement that can cause nuisance shutdown. A Cat 5 connection option is available, simplifying installation. This door interlock is configurable and available in left- and right-hand versions, allowing for simplified customization. It is designed to be easy for the OEM to retrofit into their current design.

FEATURES
- Compliant to ASME A17.1 and UL 104
- Manual override for easy actuation without user hazard
- Two separate mechanical actions to indicate door closure
- Metal key
- Internal solenoid control
- No open or exposed contacts
- Key engagement minimizes nuisance stoppage
- Door closure retention cam to hold door with minimal key-to-interlock play
- Cat 5 connection available
- Configurable product platform
- Universal voltage for ac and dc applications
- 51.44 mm W x 247.65 mm H x 49.23 mm D
  [2.025 in W x 9.75 in H x 1.938 in D]

POTENTIAL APPLICATIONS
- Residential elevators
- Residential dumbwaiters
- Platform/vertical lifts

BENEFITS
- Meets required safety codes
- Reduces potential for call-backs
- Reliable performance and multiple design features to minimize nuisance stoppage of applications
- Simplified wiring and installation
- Reduced OEM design and manufacturing costs
- Stronger OEM sales message: increased safety, reduced owner aggravation, reduced power consumption
- Honeywell brand quality
RDI Series

DESIGN FEATURES

- Product listings right or left hand installation
- Terminal strip interface to PCB for quick and easy connection
- Optional CAT 5 connector is available for customer electrical connection
- Custom solenoid design offers universal voltage for ac or dc applications
- Honeywell DM door switch used to monitor door position (open/closed)
- Die-cast metal enclosure using current Honeywell limit switch technology
- Two Honeywell SM basic switches controlling solenoid. Reduces complexity of host controller
- Manual override feature as required by certain approval agencies
- Honeywell reliable cam design provides positive snap action
- Metal key engagement ensures door is held securely closed to reduce alignment issues/nuisance stoppage

PRODUCT LISTING

<table>
<thead>
<tr>
<th>Catalog Listings</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDI-G-R</td>
<td>Right-hand door interlock</td>
</tr>
<tr>
<td>RDI-G-L</td>
<td>Left-hand door interlock</td>
</tr>
</tbody>
</table>
Door Interlock Switches

DIMENSIONS
**WARNING**

**RISK TO LIFE OR PROPERTY**
Never use this product for an application involving serious risk to life or property without ensuring that the system as a whole has been designed to address the risks, and that this product is properly rated and installed for the intended use within the overall system.

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

**WARNING**

**MISUSE OF DOCUMENTATION**
- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- 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.

---

**WARRANTY/REMEDY**
Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell’s standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, 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. In no event shall Honeywell be liable for consequential, special, or indirect damages.

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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- Europe +44 (0) 1698 481481
  +44 (0) 1698 481676 Fax
- Latin America +1-305-805-8188
  +1-305-883-8257 Fax
- USA/Canada +1-800-537-6945
  +1-815-235-6847
  +1-815-235-6545 Fax
Relialign™ RDI2 Series
Residential Door Interlock Switch

DESCRIPTION
The Relialign™ Series electromechanical door interlock is designed specifically for swing door applications that include residential elevators, dumbwaiters, and platform lifts. The door interlock holds the door in place and prevents it from being opened when not desired (e.g. the elevator/lift car is not present at the door). A number of design features contribute to its enhanced safety, reduction of nuisance stoppages and call-backs, as well as simplified wiring and installation.

The Relialign™ RDI2 Series interlock features a rugged plastic molded housing. Featuring a custom internal solenoid control, Relialign™ interlock can reduce complexity of the host controller, trim down power consumption for a “greener” product, extend solenoid life and reduce solenoid “time outs,” lessening customer aggravation.

A Honeywell MICRO SWITCH™ switch is used to indicate door closure, providing an extra level of reliability.

Reliability and smooth operations are also enhanced by use of a metal key that is less susceptible to bending and breakage than plastic. The lack of open or exposed contacts minimizes the possibility of owners making manual adjustments. Finally, the engagement of the key initiates electrical contact.

The snap-action cam mechanism requires less adjustment setup time and reduces door movement that could lead to a nuisance shutdown. Connection options include a 6-pin terminal strip or a Cat 5 connector, simplifying installation. The Relialign™ Series is designed to be easy for the OEM to retrofit into their current design.

FEATURES
- Compliant to ASME A17.1, UL standard 104, and CSA-B44.1
- Manual override for easy actuation without user hazard
- Two separate mechanical actions to indicate door closure
- Rugged plastic molded housing
- Metal key
- Internal solenoid control
- No open or exposed contacts
- Key engagement minimizes nuisance stoppage
- Door closure retention cam to hold door with minimal key-to-interlock play
- Series or parallel wiring option for the door closed and door locked switches
- 6 pin terminal strip or Cat 5 connection options
- Configurable product platform
- Universal voltage for ac and dc applications
- 51.44 mm W x 273.05 mm H x 49.23 mm D
  [2.025 in W x 10.75 in H x 1.938 in D]

POTENTIAL APPLICATIONS
- Residential elevators
- Residential dumbwaiters
- Platform/vertical lifts

BENEFITS
- Meets required safety codes
- Reduced potential for call-backs
- Reliable performance and multiple design features to minimize nuisance stoppage of applications
- Simplified wiring and installation
- Reduced OEM design and manufacturing costs
- Strong OEM sales message: enhanced safety, reduced owner aggravation, reduced power consumption
- Honeywell brand quality

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Relialign™ RDI2 Series

DESIGN FEATURES

- Thermoplastic cover offers durability as well as an aesthetically appealing design.
- 6-pin terminal block or one-piece Cat 5 connection for quick and easy connection.
- Custom solenoid design offers universal voltage for ac or dc applications.
- MICRO SWITCH™ ZM switch used to indicate door locked when key rotates cam.
- MICRO SWITCH™ ZM switch used to monitor door closure. New design location harder to tamper or defeat.
- Manual override feature as required by certain approvals agencies.
- New entry for wiring on backside of interlock helps keep wiring neat and out of sight.
- MICRO SWITCH™ ZM switch controlling solenoid, reduces power consumption and complexity of host controller.
- Honeywell's reliable cam design provides positive snap action. New material provides more pull force.
- Stainless steel key engagement holds the door securely closed to minimize alignment issues/huilsance stoppages.

PRODUCT LISTING

<table>
<thead>
<tr>
<th>Catalog Listings</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDI2RBS2</td>
<td>Relialign™ Series door interlock, right-hand swing, ac/dc voltage, series wiring, Cat 5 connector</td>
</tr>
<tr>
<td>RDI2LBS2</td>
<td>Relialign™ Series door interlock, left-hand swing, ac/dc voltage, series wiring, Cat 5 connector</td>
</tr>
<tr>
<td>RDI2RBS1</td>
<td>Relialign™ Series door interlock, right-hand swing, ac/dc voltage, series wiring, 6-pin terminal strip connection</td>
</tr>
<tr>
<td>RDI2LBS1</td>
<td>Relialign™ Series door interlock, left-hand swing, ac/dc voltage, series wiring, 6-pin terminal strip connection</td>
</tr>
</tbody>
</table>

ACCESSORIES

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GKZ91</td>
<td>Relialign™ Series replacement key</td>
</tr>
</tbody>
</table>
**PRODUCT NOMENCLATURE**

<table>
<thead>
<tr>
<th>RD12</th>
<th>R</th>
<th>B</th>
<th>S</th>
<th>2</th>
<th>---</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch type</td>
<td>Key-entry Position</td>
<td>Solenoid Type</td>
<td>Wiring Type</td>
<td>Connector Type</td>
<td>Specials</td>
</tr>
<tr>
<td>ReliaLign™ Series Residential Door Interlock</td>
<td>R: Right</td>
<td>A: ac,</td>
<td>P: Push-in</td>
<td>1: 4-pin terminal strip,</td>
<td>Two characters, letters or numbers to signify customer name or other unique features of the product not covered in the nomenclature; this field is not required.</td>
</tr>
<tr>
<td></td>
<td>L: Left</td>
<td>D: dc</td>
<td>S: Saddle</td>
<td>2: Cerbi</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B: bistable</td>
<td></td>
<td>3: Other</td>
<td></td>
</tr>
</tbody>
</table>

*Not all combinations are possible.*

**DIMENSIONS (inches)**
**WARNING**

**RISK TO LIFE OR PROPERTY**
Never use this product for an application involving serious risk to life or property without ensuring that the system as a whole has been designed to address the risks, and that this product is properly rated and installed for the intended use within the overall system.

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

---

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  +44 (0) 1698 481676 Fax
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  +1-305-883-8257 Fax
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  +1-815-235-6847
  +1-815-235-6545 Fax

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Sensing and Control
Honeywell
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www.honeywell.com

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Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Hall Effect Door Interrupt System
For the control of mechanical guards

FEATURES
• Equipment comprising a safety amplifier which can run up to 6 Hall Effect sensors triggered by coded magnet actuators
• Protective equipment in compliance with the essential requirements of the Machinery Directive 98/37/EC and with the technical requirements of the EN 954 standard for Type 3 safety related parts of control systems
• Solid state Hall Effect sensors and magnet actuators for reliability and long life.
• Tamper resistant coded sensors - Special magnet actuators
• Door misalignment monitoring and door chattering sensor (misalignment or vibration causes unit to lock off)
• Self-checking electronic processing with redundant output switching circuitries using two guided contact safety relays
• Sensors sealed to high pressure washdown

APPLICATIONS
Interlocking guard for non locked mechanical screens offering free access:
• Machine door or casing “open/closed” detection
• Guard-in-place detection, gate / access door detection
• Control of mechanical screens used in addition to a safety light curtain
• Food & Beverage, Packaging, Machine Tool, Automotive and Textile

The 50FY Series interlocking guard is a protective equipment comprising a safety amplifier accepting up to six Hall effect sensors operated by coded magnet actuators. This equipment allows to control up to 6 doors/casings of a machine or small production line. When all connected sensors are actuated, the logic circuit which controls the 2 output relays, closes the relay contacts to enable the machine operation. If any sensor is turned off (by opening a door), the logic circuit opens the contacts and the machine movement stops immediately.

Each sensor is equipped with 2 Hall effect integrated circuits. These Hall effect circuits are connected independently so that both must turn on simultaneously to produce an output. Each sensor is equipped with one N.O. output switching circuit and one N.C. output switching circuit in order to avoid common mode failure. An accurate positioning of the magnets is necessary to enable the machine operation, and the magnet actuators are coded. These two features make the 50FY series very difficult to defeat or to create a false closed door condition resulting in a more reliable system.

The Hall effect sensors and magnets are designed to be used in harsh duty. Sealed to IP 67, they meet washdown criteria for Food & Beverage Industry (high pressure 80 bars, high temperature 60 °C/140 °F and chemical washdown). Their corrosion resistant one-piece plastic housing survives exposure to metal cutting environments. Operating temperature is from -40 °C to 85 °C/-40 °F to 185 °F.

The 50FY series protective equipment is in compliance with the essential requirements of the Machinery Directive 98/37/EC and with the technical requirements of EN 954 standard for Type 3 safety related parts of control system.

The logic circuit is based on a permanent self-checking principle with redundancy. The N.O. contacts of the 2 output relays are internally connected in series. The two relays are cross monitored which guarantees a reliable connection to the machine control circuitry. The control unit must be installed in an IP 54 enclosure. Moreover, the access to the safety amplifier should be limited to the authorised personnel (the use of a special tool is recommended to secure the safety amplifier installation).
50FY

- Type 3 interlocking guard according to EN 954
- Monitor up to 6 doors
- Sensing distance up to 2.5 mm / 0.098 in. depending upon the offset adjustment

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

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Sensors and magnets</th>
<th>Amplifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply voltage</td>
<td>10-12 Vdc</td>
<td>100 to 128 Vac, 50/60 Hz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>20 mA</td>
<td>3 VA max.</td>
</tr>
<tr>
<td>Output switching capacity</td>
<td>-</td>
<td>2 safety relays with guided-contacts (5A/120 Vac, 2 NO in series)</td>
</tr>
<tr>
<td>Material</td>
<td>Corrosion resistant plastic</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Sensors &amp; magnets: 12.7x39.4x33/0.50x1.55x1.30</td>
<td>57.9x303.2x135.1/2.28x8x5.32</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 to 85°C / -40 to 185°F</td>
<td>-40 to 70°C / -40° to 158°F</td>
</tr>
<tr>
<td>Sealing</td>
<td>IP 67 / NEMA 3, 4, 4X, 12, 13 and washdown</td>
<td>To be installed in an IP 54 enclosure</td>
</tr>
<tr>
<td>Status indicators</td>
<td>LED indicators on the amplifier</td>
<td>-</td>
</tr>
<tr>
<td>Sensing distance</td>
<td>2.5 mm/0.09 in. (offset: 0 mm)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1.3 mm/0.05 in. (offset: 3.8 mm/0.14 in.)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>0 mm (offset: 7.5 mm/0.29 in.)</td>
<td>-</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>4-leads prewired (2, 4 or 15 m/6.56, 13.12 or 49.2 ft)</td>
<td>Terminal strip</td>
</tr>
</tbody>
</table>

Ordering information (1)

Hall effect sensors:
- 50FY41-6 (cable length 2 m / 6.56 ft)
- 50FY41-12 (cable length 4 m / 13.12 ft)
- 50FY41-50 (cable length 15 m / 49.2 ft)

Magnet actuators:
- 52FY31

Safety amplifier:
- FYQLA1-140R-3

(1) Order one set of sensor and magnet per door, and up to 6 sets per amplifier.

 Courtesy of Steven Engineering, Inc.
### Status indicators
![Status indicators diagram]

### Logic amplifier output status

<table>
<thead>
<tr>
<th>LED Status</th>
<th>Output Status</th>
<th>Machine operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal operation</td>
<td>ON</td>
<td>Enable</td>
</tr>
<tr>
<td>Failure detection (or sensor misalignment detected)</td>
<td>OFF</td>
<td>Disable</td>
</tr>
</tbody>
</table>

### Failure detection

<table>
<thead>
<tr>
<th>LED Status</th>
<th>System operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal operation</td>
<td>Red, Green light on</td>
</tr>
<tr>
<td>Failure detection (or sensor misalignment detected)</td>
<td>Red, Flickering light</td>
</tr>
</tbody>
</table>

### Sensor output status (red LEDs number 1 to 6)

<table>
<thead>
<tr>
<th>LED Status</th>
<th>Sensors operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal operation</td>
<td>Each Hall effect sensor produces a signal</td>
</tr>
<tr>
<td>Improper operation</td>
<td>Only one out of two Hall effect sensors produces a signal</td>
</tr>
</tbody>
</table>

### Wiring instructions
- **R (+) = Red positive**
- **B (-) = Black negative**
- **W (NO output) = White**
- **O (NC output) = Orange**

If less than six 50FY41 sensors are being used, install 22 kΩ resistors between W and R and a second between O and B for each terminal set unwired. The resistors are necessary for correct operation of the amplifier. Ten 22 kΩ resistors are supplied.

### Amplifier supply
- Connect nominal voltage leads to the amplifier terminals labeled L1 (neutral) and L2 (phase).
- The NO output contact R1/R2 must be connected directly to the machine stop command or if necessary to an emergency stop module.

* Reset push-button to use only after control unit lock off when sensor misalignment detected.

** Internal switches FF-SRS935:
- S1: Without cross-fault monitoring
- S2: Manual restart
 ledge Hall Effect Door Interrupt Proximity Sensors
2-Wire AC, 3-Wire DC types

FEATURES
• Sensors and actuators must be specifically aligned before sensors will produce outputs
• Special magnet actuators required to operate sensors, making unauthorized actuation difficult
• Solid state sensors for reliability and long life
• Sealed to IP 67, NEMA 4, 6, 6P, 13, meets washdown requirements
• LED output indicator
• Preleaded or connector style termination
• 10 to 30 Vdc supply voltage, PNP or NPN outputs
• 93 to 132 Vac supply voltage, N.O., SCR output
• -30 to +85 °C (-22 to +165 °F) temperature range (AC)
• -30 to +70 °C (-13 to +158 °F) (DC)
• Hard to defeat
• Standard and extended range magnetic actuators

The 40FY Series Hall Effect Door Interrupt Sensor is a non-contact, magnetic device consisting of two parts: a sensor and a magnetic actuator. The magnetic actuator has a keyed magnetic field that must match the sensor to operate correctly. When exposed to this keyed magnetic field, the sensor responds with an output. This product cannot be defeated by using an operator’s hand, non-magnetic metal, wire or tape and is hard to defeat with standard magnet/target actuator.

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.
Category 1 Hall Effect Door Interrupt Proximity Sensors
2-Wire AC, 3-Wire DC types

Specifications

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>3-wire DC</th>
<th>2-wire AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing Distance</td>
<td>41FY1</td>
<td>41FY2</td>
</tr>
<tr>
<td>Min. Operate</td>
<td>6.35 mm (0.25 in.)</td>
<td>7.6 mm (0.30 in.)</td>
</tr>
<tr>
<td>Max. Release</td>
<td>15.24 mm (0.60 in.)</td>
<td>19.05 mm (0.75 in.)</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>10 to 30 Vdc</td>
<td>93 to 132 Vac</td>
</tr>
<tr>
<td>Load Current</td>
<td>0 to 200 mA</td>
<td>0 to 500 mA</td>
</tr>
<tr>
<td>Leakage Current</td>
<td>30 µA</td>
<td>1.5 mA max.</td>
</tr>
<tr>
<td>Voltage Drop, max.</td>
<td>PNP: 2.5 V</td>
<td>NPN: 1.5 V</td>
</tr>
<tr>
<td>Current Consumption, max.</td>
<td>40 mA</td>
<td></td>
</tr>
<tr>
<td>Inrush Current, max.</td>
<td>-</td>
<td>1.2 A/20 msec</td>
</tr>
<tr>
<td>Repeatability*</td>
<td>± 3 %</td>
<td>± 3 %</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-30 to +85 °C</td>
<td>-25 to +70 °C</td>
</tr>
<tr>
<td>Protection Class</td>
<td>IP 67 (Dust tight, temporary immersion)</td>
<td></td>
</tr>
<tr>
<td>Materials</td>
<td>Housing: Polycarbonate; Cable: 22 gage PVC</td>
<td></td>
</tr>
<tr>
<td>Circuit Protection</td>
<td>Transients (power and output), incorrect wiring</td>
<td></td>
</tr>
</tbody>
</table>

* Repeatability is the ability of the sensor to trigger at the same point, plus or minus a given tolerance, after every operation (at constant voltage and temperature) over the entire range of the sensor's specifications.

** Application Note: Enclosures are based, in general, on the broad definitions outlined in NEMA standards. Therefore, it will be necessary for the user to determine that a particular enclosure is adequate when exposed to the specific condition that might exist in intended applications. Except as might otherwise be noted, all references to products relative to NEMA enclosure types are based on MICRO SWITCH evaluation only.

ELECTROMAGNETIC COMPATIBILITY

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Standard</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impulse Voltage Withstand</td>
<td>IEC 255-5</td>
<td>1 KV</td>
</tr>
<tr>
<td>Radiated Electromagnetic Field Immunity</td>
<td>IEC 801-3</td>
<td>3 V/m</td>
</tr>
<tr>
<td>Discharge (ESD) Immunity Electrostatic</td>
<td>IEC 1000-4-2</td>
<td>8 KV</td>
</tr>
<tr>
<td>Fast Transient Immunity</td>
<td>IEC 1000-4-4</td>
<td>1 KV</td>
</tr>
<tr>
<td>Radiated Emissions</td>
<td>CISPR 11 within specified limits</td>
<td></td>
</tr>
</tbody>
</table>

MOUNTING REQUIREMENTS

- SENSOR MUST FACE AND LINE UP PROPERLY IN BOTH AXES WITH ACTUATOR TO FUNCTION

- FACE (WRITING) OF DEVICES TOWARDS EACH OTHER

MOUNTING DIMENSIONS (for reference only)

Sensor Pre-leaded Termination (mm/in)

Sensor Connector Termination (mm/in)

Magnetic Actuator (mm/in)
LED WIRES COLOR CODE AND CONNECTOR PINOUT

3-wire DC NPN (Sinking)

3-wire DC PNP (Sourcing)

3-wire DC Pinout

2-wire AC Pinout

Wiring diagram:
The connection of two 40FY Hall effect sensors to the FF-SRS5935 emergency stop module increases the safety level of the whole installation.

NOTICE:
The cable resistance between terminals S11-S12 and S21-S22 must be less than 68 Ω for correct operation of the emergency stop module.
Sensor order guide

<table>
<thead>
<tr>
<th>Description</th>
<th>Catalog Listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-wire DC, PNP N.O. output, connector</td>
<td>40FY26-33</td>
</tr>
<tr>
<td>3-wire DC, PNP N.C. output, connector</td>
<td>40FY22-33</td>
</tr>
<tr>
<td>3-wire DC, PNP N.O. output, leadwires</td>
<td>40FY26-020</td>
</tr>
<tr>
<td>3-wire DC, PNP N.C. output, leadwires</td>
<td>40FY22-020</td>
</tr>
<tr>
<td>3-wire DC, NPN N.O. output, connector</td>
<td>40FY28-33</td>
</tr>
<tr>
<td>3-wire DC, NPN N.C. output, connector</td>
<td>40FY24-33</td>
</tr>
<tr>
<td>3-wire DC, NPN N.O. output, leadwires</td>
<td>40FY28-020</td>
</tr>
<tr>
<td>3-wire DC, NPN N.C. output, leadwires</td>
<td>40FY24-020</td>
</tr>
<tr>
<td>2-wire AC, N.O. output, connector</td>
<td>40FY36-33</td>
</tr>
<tr>
<td>2-wire AC, N.C. output, connector</td>
<td>40FY32-33</td>
</tr>
<tr>
<td>2-wire AC, N.O. output, leadwires</td>
<td>40FY36-020</td>
</tr>
<tr>
<td>2-wire AC, N.C. output, leadwires</td>
<td>40FY32-020</td>
</tr>
<tr>
<td>Magnet actuator</td>
<td>41FY1</td>
</tr>
<tr>
<td>Magnet actuator, extended range</td>
<td>41FY2</td>
</tr>
</tbody>
</table>

Cables for connector versions

<table>
<thead>
<tr>
<th>Style</th>
<th>Cable Length</th>
<th>Catalog Listings</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-Pin DC Standard Key (12 mm/0.47 in. Micro)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Straight</td>
<td>2m (6.56 ft)</td>
<td>803000A09M020</td>
</tr>
<tr>
<td></td>
<td>5m (16.4 ft)</td>
<td>803000A09M050</td>
</tr>
<tr>
<td>Right Angle</td>
<td>2m (6.56 ft)</td>
<td>803001A09M020</td>
</tr>
<tr>
<td></td>
<td>5m (16.4 ft)</td>
<td>803001A09M050</td>
</tr>
<tr>
<td>Right Angle w/LED, NPN</td>
<td>2m (6.56 ft)</td>
<td>8030NP1A09M020</td>
</tr>
<tr>
<td></td>
<td>5m (16.4 ft)</td>
<td>8030NP1A09M050</td>
</tr>
<tr>
<td>Right Angle w/LED, PNP</td>
<td>2m (6.56 ft)</td>
<td>8030P1A09M020</td>
</tr>
<tr>
<td></td>
<td>5m (16.4 ft)</td>
<td>8030P1A09M050</td>
</tr>
<tr>
<td>4-Pin AC Inverted Key (12 mm/0.47 in. Micro)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Straight</td>
<td>2m (6.56 ft)</td>
<td>B03000A11M020</td>
</tr>
<tr>
<td></td>
<td>5m (16.4 ft)</td>
<td>B03000A11M050</td>
</tr>
<tr>
<td>Right angle</td>
<td>2m (6.56 ft)</td>
<td>B03001A11M020</td>
</tr>
<tr>
<td></td>
<td>5m (16.4 ft)</td>
<td>B03001A11M050</td>
</tr>
</tbody>
</table>

Emergency stop module order guide

FF-SRSS935

Voltage:
- 2: 24 Vdc
- E: 120 Vac
- G: 230 vac

Refer to the Safety Control Modules section for product complete specifications
**FF2 and FF3 Series**

Magnetically Actuated Non-Contact Barrel Safety Switches

**DESCRIPTION**
The FF2 is an 18 mm barrel (thread) mounting magnetically actuated safety switch with one safety contact and an optional indicator contact, if required. The FF3 is a 30 mm barrel (thread) mounting magnetically actuated safety switch with up to two safety contacts and one indicator contact.

The barrel, thread, mount design is easy to install into the frame of a machine guard and allows for flush mounting, reducing potential switch damage and space constraint issues. Both the FF2 and FF3 series are sealed to IP67 requirements enabling use in most harsh environments.

**FEATURES**
- Options of one or two safety contacts
- Tested to over 1,000,000 operations, full load
- Simple M18 and M30 barrel (thread) mounting
- Guard status indication available
- ac and dc versions
- CE and UL approvals

**POTENTIAL APPLICATIONS**
- Can forming and filling (aluminum, steel, and plastic)
- Pick and place packaging equipment
- Pick and place/assembly equipment
- Semicon equipment
- Plastic molding equipment
- Woodworking machinery
- Textile machinery
- Printing machinery
**FF2 and FF3 Series**

**TECHNICAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Type</th>
<th>FF2-10-AC FF2-11-AC</th>
<th>FF2-10-DC FF2-11-DC</th>
<th>FF3-20-AC FF3-21-AC</th>
<th>FF3-20-DC FF3-21-DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact arrangement</td>
<td>1NC (FF2-10-AC) 1NC/1NO (FF2-11-AC)</td>
<td>1NC (FF2-10-DC) 1NC/1NO (FF2-11-DC)</td>
<td>2NC (FF3-20-AC) 2NC/1NO (FF3-21-AC)</td>
<td>2NC (FF3-20-DC) 2NC/1NO (FF3-21-DC)</td>
</tr>
<tr>
<td>Safety contact rating</td>
<td>230 Vac/2 A</td>
<td>30 Vdc/1 A inductive/ resistive</td>
<td>230 Vac/2A</td>
<td>30 Vdc/1 A inductive/ resistive</td>
</tr>
<tr>
<td>Safety contact operating distance</td>
<td>10 mm [0.4 in] ON; 30 mm [ 1.8 in] OFF</td>
<td>10 mm [0.4 in] ON; 30 mm [ 1.18 in] OFF</td>
<td>10 mm [0.4 in] ON; 35 mm [ 1.38 in] OFF</td>
<td>10 mm [0.4 in] ON; 35 mm [ 1.38 in] OFF</td>
</tr>
<tr>
<td>Safety contact close/drop/bounce</td>
<td>3 ms/2.1 ms/0.7 ms</td>
<td>3 ms/2.1 ms/0.7 ms</td>
<td>3 ms/2.1 ms/0.7 ms</td>
<td>3 ms/2.1 ms/0.7 ms</td>
</tr>
<tr>
<td>Auxiliary contact rating</td>
<td>15 W/10 VA</td>
<td>15 W/10 VA</td>
<td>15 W/10 VA</td>
<td>15 W/10 VA</td>
</tr>
<tr>
<td>Auxiliary contact operating distance</td>
<td>7 mm [0.28 in] OFF; 14 mm [0.55 in] ON</td>
<td>7 mm [0.28 in] OFF; 14 mm [0.55 in] ON</td>
<td>7 mm [0.28 in] OFF; 20 mm [0.79 in] ON</td>
<td>7 mm [0.28 in] OFF; 20 mm [0.79 in] ON</td>
</tr>
<tr>
<td>Auxiliary contact close/drop/bounce</td>
<td>0.5 ms/0.3 ms/0.7 ms</td>
<td>0.5 ms/0.3 ms/0.7 ms</td>
<td>0.5 ms/0.3 ms/0.7 ms</td>
<td>0.5 ms/0.3 ms/0.7 ms</td>
</tr>
<tr>
<td>Internal fuse</td>
<td>ac: 2 A fast acting</td>
<td>dc: 1 A fast acting</td>
<td>ac: 2 A fast acting</td>
<td>dc: 1 A fast acting</td>
</tr>
<tr>
<td>External fuse (customer supplied)</td>
<td>ac: 1.6 A fast acting</td>
<td>dc: 0.8 A fast acting</td>
<td>ac: 1.6 A fast acting</td>
<td>dc: 0.8 A fast acting</td>
</tr>
<tr>
<td>IP rating</td>
<td>IP67</td>
<td>IP67</td>
<td>IP67</td>
<td>IP67</td>
</tr>
<tr>
<td>Vibration/shock</td>
<td>50 Hz to 100 Hz/10 g</td>
<td>50 Hz to 100 Hz/10 g</td>
<td>50 Hz to 100 Hz/10 g</td>
<td>50 Hz to 100 Hz/10 g</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-10 °C to 55 °C</td>
<td>-10 °C to 55 °C</td>
<td>-10 °C to 55 °C</td>
<td>-10 °C to 55 °C</td>
</tr>
<tr>
<td>Mounting and fixture</td>
<td>Target to target</td>
<td>Target to target</td>
<td>Target to target</td>
<td>Target to target</td>
</tr>
<tr>
<td>Construction</td>
<td>Red ABS resin filled</td>
<td>Red ABS resin filled</td>
<td>Red ABS resin filled</td>
<td>Red ABS resin filled</td>
</tr>
</tbody>
</table>

**DIMENSIONS**

<table>
<thead>
<tr>
<th>FF2 mm[in]</th>
<th>FF3 mm[in]</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Diagram]</td>
<td>[Diagram]</td>
</tr>
</tbody>
</table>

[www.honeywell.com/sensing](http://www.honeywell.com/sensing)

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
# Magnetically Actuated Non-Contact Barrel Safety Switches

## CONNECTIONS

<table>
<thead>
<tr>
<th>FF2-10</th>
<th>FF3-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF2-10-AC &amp; FF2-10-DC</td>
<td>FF3-20-AC &amp; FF3-20-DC</td>
</tr>
<tr>
<td>Brown</td>
<td>Safety Contact 1 NC</td>
</tr>
<tr>
<td>Blue</td>
<td>Safety Contact 1 NC</td>
</tr>
<tr>
<td>Green</td>
<td>Safety Contact 2 NC</td>
</tr>
<tr>
<td>Yellow</td>
<td>Safety Contact 2 NC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FF2-11</th>
<th>FF3-21</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF2-11-AC &amp; FF2-11-DC</td>
<td>FF3-21-AC &amp; FF3-21-DC</td>
</tr>
<tr>
<td>Red</td>
<td>Safety Contact 1 NC</td>
</tr>
<tr>
<td>Blue</td>
<td>Safety Contact 1 NO</td>
</tr>
<tr>
<td>Green</td>
<td>Auxiliary Contact 1 NO</td>
</tr>
<tr>
<td>Yellow</td>
<td>Auxiliary Contact 1 NO</td>
</tr>
</tbody>
</table>

## CONTACTS

### FF2

- FF2-11-AC-03
- FF2-11-DC-03
- Red
- Blue
- Green
- Yellow

- FF2-10-AC-03
- FF2-10-DC-03
- Brown
- Blue

### FF3

- FF3-21-AC-03
- FF3-21-DC-03
- Red
- Blue
- Black
- White
- Green
- Yellow

- FF3-20-AC-03
- FF3-20-DC-03
- Brown
- Blue
- Black
- White

---

NOTE: Contact configurations show under closed condition for guard device.
<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF2-10-AC-03</td>
<td>Barrel safety switch, 18 mm [0.70 in], 1NC, ac, 3 m pre-wired</td>
</tr>
<tr>
<td>FF2-11-AC-03</td>
<td>Barrel safety switch, 18 mm [0.70 in], 1NC/1NO, ac, 3 m pre-wired</td>
</tr>
<tr>
<td>FF2-10-DC-03</td>
<td>Barrel safety switch, 18 mm [0.70 in], 1NC dc, 3 m pre-wired</td>
</tr>
<tr>
<td>FF2-11-DC-03</td>
<td>Barrel safety switch, 18 mm [0.70 in], 1NC/1NO dc, 3 m pre-wired</td>
</tr>
<tr>
<td>FF3-20-AC-03</td>
<td>Barrel safety switch, 30 mm [1.18 in], 2NC, ac, 3 m pre-wired</td>
</tr>
<tr>
<td>FF3-21-AC-03</td>
<td>Barrel safety switch, 30 mm [1.18 in], 2NC/1NO ac, 3 m pre-wired</td>
</tr>
<tr>
<td>FF3-20-DC-03</td>
<td>Barrel safety switch, 30 mm [1.18 in], 2NC dc, 3 m pre-wired</td>
</tr>
<tr>
<td>FF3-21-DC-03</td>
<td>Barrel safety switch, 30 mm [1.18 in], 2NC/1NO dc, 3 m pre-wired</td>
</tr>
</tbody>
</table>

**WARNING**

**RISK TO LIFE OR PROPERTY**

Never use this product for an application involving serious risk to life or property without ensuring that the system as a whole has been designed to address the risks, and that this product is properly rated and installed for the intended use within the overall system.

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

**WARNING**

**MISUSE OF DOCUMENTATION**

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- 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.

**WARRANTY/REMEDY**

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell’s standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, 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. In no event shall Honeywell be liable for consequential, special, or indirect damages.

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.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

**SALES AND SERVICE**

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

- **E-mail:** info.sc@honeywell.com
- **Internet:** www.honeywell.com/sensing

**Phone and Fax:**

- **Asia Pacific** +65 6355-2828
  +65 6445-3033 Fax
- **Europe** +44 (0) 1698 481481
  +44 (0) 1698 481676 Fax
- **Latin America** +1-305-805-8188
  +1-305-883-8257 Fax
- **USA/Canada** +1-800-537-6945
  +1-815-235-6847
  +1-815-235-6545 Fax

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**FF5 Series**

Magnetically Actuated Non-Contact Safety Switches

**DESCRIPTION**

Honeywell FF5 switches are magnetically operated, non-contact safety switches designed for use in many machine-guarding applications. The FF5 is available in both ABS and 316 grade stainless steel and is capable of switching up to 300 mA at 24 Vdc as per features below. The switch and actuator are fully sealed to IP67 and can often be used in wet or dusty environments. With correct installation, the FF5 safety switches comply with the guidelines given in EN1088.

**FEATURES**

- Non-contact safety switches
- Switches can be magnetically actuated from almost any angle
- Compact, rugged design
- Tested to over 1,000,000 operations, full-load
- 6 mm [0.24 in] operating distance
- Up to 300 mA at 24 Vdc switching capability
- IP67
- Stainless steel option
- CE, UL approvals

**POTENTIAL APPLICATIONS**

- Can forming and filling (aluminum, steel, and plastic)
- Pick and place packaging equipment
- Pick and place/assembly equipment
- Semicon equipment
- Plastic molding equipment
- Woodworking machinery
- Textile machinery
- Printing machinery
FF5 Series

TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Type</th>
<th>FF5</th>
<th>FF5-SS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact arrangement</td>
<td>Max: 2NC safety and 1NO auxiliary</td>
<td>Max: 2NC safety and 1NO auxiliary</td>
</tr>
<tr>
<td>Safety contact rating</td>
<td>24 Vdc/0.3 A inductive/resistive</td>
<td>24 Vdc/0.3 A inductive/resistive</td>
</tr>
<tr>
<td>Safety contact operating distance</td>
<td>6 mm [0.24 in] ON; 17 mm [0.67 in] OFF</td>
<td>6 mm [0.24 in] ON; 17 mm [0.67 in] OFF</td>
</tr>
<tr>
<td>Safety contact close/drop/bounce</td>
<td>3 ms/2.1 ms/0.7 ms</td>
<td>3 ms/2.1 ms/0.7 ms</td>
</tr>
<tr>
<td>Auxiliary contact rating</td>
<td>24 Vdc/0.3 A inductive/resistive</td>
<td>24 Vdc/0.3 A inductive/resistive</td>
</tr>
<tr>
<td>Auxiliary contact operating distance</td>
<td>6 mm [0.24 in] OFF; 17 mm [0.67 in] ON</td>
<td>6 mm [0.24 in] OFF; 17 mm [0.67 in] ON</td>
</tr>
<tr>
<td>Auxiliary contact close/drop/bounce</td>
<td>0.5 ms/0.3 ms/0.7 ms</td>
<td>0.5 ms/0.3 ms/0.7 ms</td>
</tr>
<tr>
<td>Internal fuse</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
<tr>
<td>External fuse (customer supplied)</td>
<td>dc: 0.2 A fast acting</td>
<td>dc: 0.2 A fast acting</td>
</tr>
<tr>
<td>IP rating</td>
<td>IP67</td>
<td>IP67</td>
</tr>
<tr>
<td>Vibration/shock</td>
<td>50 Hz to 100 Hz/10 g</td>
<td>50 Hz to 100 Hz/10 g</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-10 °C to 55 °C [14 °F to 131 °F]</td>
<td>-10 °C to 55 °C [14 °F to 131 °F]</td>
</tr>
<tr>
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<td>Target to target</td>
</tr>
<tr>
<td>Construction</td>
<td>Red ABS resin filled</td>
<td>316 grade stainless steel resin filled</td>
</tr>
</tbody>
</table>

**FF5 CONTACTS**

![FF5-21-DC-03](image)

**FF5 CONNECTIONS**

*The safety contact must be fused externally. dc switch – external fuse= 0.2 A fast acting*

![FF5 Connections](image)

![FF5 High Temperature Connections](image)
Magnetically Actuated Non-Contact Safety Switches

**FF5 DIMENSIONS mm[in]**

![Diagram of FF5 ABS and SS dimensions](Image)
# ORDER GUIDE

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF5-21-DC-03</td>
<td>Safety switch and actuator, red ABS, 2NC/1NO, dc, 3 m pre-wired</td>
</tr>
<tr>
<td>FF5-21-DC-03-SS</td>
<td>Safety switch and actuator, stainless steel, 2NC/1NO, dc, 3 m pre-wired</td>
</tr>
<tr>
<td>FF5-21-DC-10</td>
<td>Safety switch and actuator, red ABS, 2NC/1NO, dc, 10 m pre-wired</td>
</tr>
<tr>
<td>FF5-21-DC-10-SS</td>
<td>Safety switch and actuator, stainless steel, 2NC/1NO, dc, 10 m pre-wired</td>
</tr>
</tbody>
</table>

## WARNING

### RISK TO LIFE OR PROPERTY

Never use this product for an application involving serious risk to life or property without ensuring that the system as a whole has been designed to address the risks, and that this product is properly rated and installed for the intended use within the overall system.

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

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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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  +44 (0) 1698 481676 Fax
- **Latin America:** +1-305-805-8188
  +1-305-883-8257 Fax
- **USA/Canada:** +1-800-537-6945
  +1-815-235-6847
  +1-815-235-6545 Fax

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Sensing and Control
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Golden Valley, MN 55422
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Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
FF6 Series
Magnetically Actuated Non-Contact Safety Switches

DESCRIPTION
Honeywell FF6 switches are magnetically operated, non-contact safety switches designed for use in many machine-guarding applications. The FF6 is available in both ABS and 316 grade stainless steel. The switch and actuator are fully sealed to IP67 and can often be used in wet or dusty environments. With correct installation, the FF6 safety switches comply with the guidelines given in EN1088.

FEATURES
- Non-contact safety switches
- Up to three contacts
- 10 mm [0.4 in] operating distance
- Up to 2 A switching
- IP67
- Stainless steel option
- CE and UL approvals

POTENTIAL APPLICATIONS
- Can forming and filling (aluminum, steel, and plastic)
- Pick and place packaging equipment
- Pick and place/assembly equipment
- Semiconductor equipment
- Plastic molding equipment
- Woodworking machinery
- Textile machinery
- Printing machinery
# FF6 Series

## TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Type</th>
<th>FF6 ac</th>
<th>FF6 dc</th>
<th>FF6-SS ac</th>
<th>FF6-SS dc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact arrangement</td>
<td>Max: 2NC safety and 1NO auxiliary</td>
<td>Max: 2NC safety and 1NO auxiliary</td>
<td>1NC safety</td>
<td>Max: 2NC safety and 1NO auxiliary</td>
</tr>
<tr>
<td>Safety contact rating</td>
<td>230 Vac/2 A</td>
<td>30 Vac/1 A inductive/resistive</td>
<td>230 Vac/2A</td>
<td>30 Vdc/1 A inductive/resistive</td>
</tr>
<tr>
<td>Safety contact operating distance</td>
<td>10 mm [0.4 in] ON; 30 mm [1.18 in] OFF</td>
<td>10 mm [0.4 in] ON; 30 mm [1.18 in] OFF</td>
<td>10 mm [0.4 in] ON; 30 mm [1.18 in] OFF</td>
<td>10 mm [0.4 in] ON; 30 mm [1.18 in] OFF</td>
</tr>
<tr>
<td>Safety contact close/drop/bounce</td>
<td>3 ms/2.1 ms/0.7 ms</td>
<td>3 ms/2.1 ms/0.7 ms</td>
<td>3 ms/2.1 ms/0.7 ms</td>
<td>3 ms/2.1 ms/0.7 ms</td>
</tr>
<tr>
<td>Auxiliary contact rating</td>
<td>15 W/10 VA</td>
<td>15 W/10 VA</td>
<td>15 W/10 VA</td>
<td>15 W/10 VA</td>
</tr>
<tr>
<td>Auxiliary contact operating distance</td>
<td>7 mm [0.28 in] OFF; 20 mm [0.79 in] ON</td>
<td>7 mm [0.28 in] OFF; 20 mm [0.79 in] ON</td>
<td>7 mm [0.28 in] OFF; 20 mm [0.79 in] ON</td>
<td>7 mm [0.28 in] OFF; 20 mm [0.79 in] ON</td>
</tr>
<tr>
<td>Auxiliary contact close/drop/bounce</td>
<td>0.5 ms/0.3 ms/0.7 ms</td>
<td>0.5 ms/0.3 ms/0.7 ms</td>
<td>0.5 ms/0.3 ms/0.7 ms</td>
<td>0.5 ms/0.3 ms/0.7 ms</td>
</tr>
<tr>
<td>Internal fuse</td>
<td>ac: 2 A fast acting</td>
<td>dc: 1 A fast acting</td>
<td>ac: 2 A fast acting</td>
<td>dc: 1 A fast acting</td>
</tr>
<tr>
<td>External fuse (customer supplied)</td>
<td>ac: 1.6 A fast acting</td>
<td>dc: 0.8 A fast acting</td>
<td>ac: 1.6 A fast acting</td>
<td>dc: 0.8 A fast acting</td>
</tr>
<tr>
<td>IP rating</td>
<td>IP67</td>
<td>IP67</td>
<td>IP67</td>
<td>IP67</td>
</tr>
<tr>
<td>Vibration/shock</td>
<td>50 Hz to 100 Hz/10 g</td>
<td>50 Hz to 100 Hz/10 g</td>
<td>50 Hz to 100 Hz/10 g</td>
<td>50 Hz to 100 Hz/10 g</td>
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<tr>
<td>Operating temperature</td>
<td>-10 °C to 55 °C</td>
<td>-10 °C to 55 °C</td>
<td>-10 °C to 55 °C</td>
<td>-10 °C to 55 °C</td>
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<tr>
<td></td>
<td>[14 °F to 131 °F]</td>
<td>[14 °F to 131 °F]</td>
<td>[14 °F to 131 °F]</td>
<td>[14 °F to 131 °F]</td>
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<tr>
<td>Construction</td>
<td>Red ABS resin filled</td>
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</tr>
</tbody>
</table>
Magnetically Actuated Non-Contact Safety Switches

CONTACTS AND CONNECTIONS: PRE-WIRED SWITCHES

<table>
<thead>
<tr>
<th>FF6-21-ABS (ac &amp; dc)</th>
<th>FF6-20 ABS (ac &amp; dc)</th>
<th>FF6-11 ABS (ac &amp; dc)</th>
<th>FF6-10 ABS (ac &amp; dc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF6-21-SS (dc only)</td>
<td>FF6-20 SS (dc only)</td>
<td>FF6-11 (dc only)</td>
<td>FF6-10 SS (ac &amp; dc)</td>
</tr>
<tr>
<td>Red</td>
<td>Blue</td>
<td>Red</td>
<td>Blue</td>
</tr>
<tr>
<td>White</td>
<td></td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td>Yellow</td>
<td>Yellow</td>
<td></td>
</tr>
</tbody>
</table>

FF6-10-03-SS

Brown  Blue

Green/Yellow

NOTE: Contact configurations show under closed condition for guard device.

CONTACTS AND CONNECTIONS: QUICK DISCONNECT CONNECTIONS

<table>
<thead>
<tr>
<th>FF6-21-AC-QD05</th>
<th>FF6-20-AC-QD05</th>
<th>FF6-11-AC-QD05</th>
<th>FF6-10-AC-QD05</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF6-21-DC-QD05</td>
<td>FF6-20-DC-QD05</td>
<td>FF6-11-DC-QD05</td>
<td>FF6-10-DC-QD05</td>
</tr>
<tr>
<td>White  Brown  Safety  N/C</td>
<td>Blue  Brown  Safety  N/C</td>
<td>Blue  Brown  Safety  N/C</td>
<td>Brown  Blue  Safety  N/C</td>
</tr>
<tr>
<td>Green/Yellow  Aux  N/O</td>
<td>Yellow  Black  Safety  N/C</td>
<td>White  Black  Safety  N/C</td>
<td>White  Black  Safety  N/C</td>
</tr>
</tbody>
</table>

FF6-10-AC-QD05-SS

Brown  Blue  Safety  N/C
FF6 Series

DIMENSIONS

<table>
<thead>
<tr>
<th>FF6 STAINLESS STEEL PRE-WIRED mm/in</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Diagram of FF6 STAINLESS STEEL PRE-WIRED mm/in" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FF6 PRE-WIRED mm/in</th>
<th>FF6 QUICK CONNECT mm/in</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image2" alt="Diagram of FF6 PRE-WIRED mm/in" /></td>
<td><img src="image3" alt="Diagram of FF6 QUICK CONNECT mm/in" /></td>
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<tr>
<td>FF6-11-DC-03-SS</td>
<td>Safety switch and actuator, stainless steel, 1NC safety and 1 NO auxiliary, dc, 3 m pre-wired</td>
</tr>
<tr>
<td>FF6-20-DC-03-SS</td>
<td>Safety switch and actuator, stainless steel, 2NC safety, dc, 3 m pre-wired</td>
</tr>
<tr>
<td>FF6-10-AC-03-SS</td>
<td>Safety switch and actuator, stainless steel, 1NC safety, ac, 3 m pre-wired</td>
</tr>
<tr>
<td>FF6-10-AC-QD-SS</td>
<td>Safety switch and actuator, stainless steel, 1NC safety, ac, M12 quick disconnect, no cable</td>
</tr>
<tr>
<td>FF6-10-AC-QD05-SS</td>
<td>Safety switch and actuator complete, stainless steel, 1NC safety, ac, M12 quick disconnect, 5 m cable</td>
</tr>
<tr>
<td>FF6-10-DC-03</td>
<td>Safety switch and actuator, red ABS, 1NC safety, dc, 3 m pre-wired</td>
</tr>
<tr>
<td>FF6-11-DC-03</td>
<td>Safety switch and actuator, red ABS, 1NC safety and 1NO auxiliary, dc, 3 m pre-wired</td>
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</tr>
<tr>
<td>FF6-10-AC-03</td>
<td>Safety switch and actuator, red ABS, 1NC safety, ac, 3 m pre-wired</td>
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**Failure to comply with these instructions could result in death or serious injury.**

---

**WARNING**

**MISUSE OF DOCUMENTATION**

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- 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.**

---

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+1-815-235-6545 Fax

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### Typical Applications

<table>
<thead>
<tr>
<th>Application</th>
<th>Resolution</th>
<th>Approvals</th>
<th>Connection</th>
<th>Protection Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact Type 4 light curtain with static safety outputs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy industry and material conversion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pressing, moulding and thermoforming machines</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>• Conveyors, handling equipment and assembly lines</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• Copying lathes and machining centers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Door and gates, lift and host technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Stacking machines, transporting and conveyer technology</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>• Textile, packaging machines</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Vibrating sieves, sorters and milling machines</td>
<td></td>
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</tr>
</tbody>
</table>

| Compact Type 4 light curtain with static safety outputs                    |            |           |            |                   |
| Heavy industry and material conversion                                      |            |           |            |                   |
|  • Pressing, moulding and thermoforming machines                            |            |           |            |                   |
|  • Electronic assembly                                                      |            |           |            |                   |
|  • Copying lathes and machining centers                                     |            |           |            |                   |
|  • Textile, packaging machines                                              |            |           |            |                   |

| Harsh-duty Type 4 self-contained light curtain with relay outputs           |            |           |            |                   |
| Heavy industry and material conversion                                      |            |           |            |                   |
|  • Presses and punches for metals, plastics and leather                     |            |           |            |                   |
|  • Deep-drawing presses, moulding presses and filter presses               |            |           |            |                   |
|  • Metal forming, milling and drilling machines                             |            |           |            |                   |
|  • Spot-welding machines and fine-boring machines                          |            |           |            |                   |

| Type 4 light curtain with separate control unit and blanking capability     |            |           |            |                   |
| Heavy industry and material conversion                                      |            |           |            |                   |
|  • Presses, metalforming, moulding, milling, thermoforming, and assembly machines |            |           |            |                   |
|  • Stacking, transporting and handling equipment, conveyors and assembly lines |            |           |            |                   |
|  • Copying lathes and machining centers                                     |            |           |            |                   |
|  • Door and gates, lift and host technology                                 |            |           |            |                   |
|  • Robotic, welding, cutting, and sealing                                  |            |           |            |                   |
|  • Textile, packaging machines                                              |            |           |            |                   |
|  • Juggling sieves, sorters and special machines                           |            |           |            |                   |

### Dimensions of the Protected Area

<table>
<thead>
<tr>
<th>Type 4 / Type 4</th>
<th>Scanning Range (mm/ft)</th>
<th>Protection Height (mm/in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYA14 / FF-SYA20</td>
<td></td>
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</tr>
<tr>
<td>FF-SYAFF-SYA30</td>
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<td></td>
</tr>
<tr>
<td>FF-SG18 / FF-SG30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SB12 / FF-SB14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SB12FF-SB14</td>
<td></td>
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<tr>
<td>FF-SB12FF-SB14</td>
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<tr>
<td>DETECTOR™ 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Safety Light Curtains for point-of-operation protection

### Slim line Type 4 light curtain with separate control unit and relay outputs

- **Applications:**

- **Resolution:**
  - Finger detection: \(\varnothing 14 \text{ mm} / 0.55 \text{ in}\)
  - Hand detection: \(\varnothing 30 \text{ mm} / 1.18 \text{ in}\)

- **Approvals:**
  - CE Marking
  - Type 4 (en 50100-1/2)

- **Connection:**
  - M8 connectors

- **Dimensions of the Protected Area:**
  - \(200 \text{ mm} \text{ to } 3000 \text{ mm} / 7.88 \text{ in} \text{ to } 118.11 \text{ in}\)

- **Electrical connection:**
  - M8 connectors

- **Output status indicator:**
  - Blank
  - Reduced resolution
  - Cascading

- **Additional features:**
  - Weld splash protection
  - Sealing
  - Voltage
  - Relay outputs

- **Connection options:**
  - G6F/G20

- **Electrical connections:**
  - NEMA 4
  - NEMA 13

- **Connections:**
  - Single/double stroke
  - Muting
  - Cross-talk detection reduction
  - Self-diagnostic indicator

- **Additional features:**
  - Static outputs
  - Test input

- **Response time:**
  - \(50 \text{ ms}\)

- **Protein ESD monitoring:**
  - \(1 \text{ NC}\)

- **Start & Restart interlock:**
  - \(2 \text{ NO}\)

- **Automatic restart:**
  - \(2 \text{ NO}\)

- **Through-the-door accessory:**
  - \(50 \text{ mm} / 2\)

### Compact Type 2 light curtain with static safety outputs

- **Applications:**
  - Heavy industry and material conversion: Moulding and thermoforming machines, Electronic assembly, Assembly lines, Textile, packaging machines

- **Resolution:**
  - Finger detection: \(\varnothing 18 \text{ mm} / 0.70 \text{ in}\)
  - Hand detection: \(\varnothing 30 \text{ mm} / 1.18 \text{ in}\)

- **Approvals:**
  - CE Marking
  - Type 2 (en 61496-1/2)

- **Connection:**
  - M12 (8 pin) connectors

- **Dimensions of the Protected Area:**
  - \(100 \text{ mm} \text{ to } 750 \text{ mm} / 3.94 \text{ in} \text{ to } 29.53 \text{ in}\)

- **Electrical connection:**
  - M8 connectors

- **Output status indicator:**
  - Blank
  - Reduced resolution

- **Additional features:**
  - Cross-talk detection reduction
  - Self-diagnostic indicator

- **Connection options:**
  - G6F/G20

- **Electrical connections:**
  - NEMA 4
  - NEMA 13

- **Connections:**
  - Single/double stroke
  - Muting

- **Additional features:**
  - Static outputs
  - Test input

- **Response time:**
  - \(60 \text{ ms}\)

- **Protein ESD monitoring:**
  - \(1 \text{ NC}\)

- **Start & Restart interlock:**
  - \(2 \text{ NO}\)

- **Automatic restart:**
  - \(2 \text{ NO}\)

- **Through-the-door accessory:**
  - \(50 \text{ mm} / 2\)
## Multiple Light Beams for Access Detection to Hazardous Areas

### TYPICAL APPLICATIONS

<table>
<thead>
<tr>
<th>Type 4 Multibeam System with Static Safety Outputs</th>
<th>Heavy Industry and Material Conversion</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Access detection for:</td>
<td>- Robotic and transfer area</td>
</tr>
<tr>
<td>• Machinery centers</td>
<td>- Palletising areas</td>
</tr>
<tr>
<td>• Storage and stacking areas</td>
<td>- Access to hazardous areas</td>
</tr>
<tr>
<td>• Max. length of a U-shaped perimeter: 64 m / 210 ft</td>
<td></td>
</tr>
</tbody>
</table>

| Body Detection according to EN 999 |

<table>
<thead>
<tr>
<th>Type 4 Modular Light Curtain with M18 Sensors and Separate Control Unit with Relay Outputs</th>
<th>Heavy Industry and Material Conversion</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Access protection on palletising areas</td>
<td>- Access to hazardous areas</td>
</tr>
<tr>
<td>• Access detection of areas containing robots or automatic machines</td>
<td>- Detection of automatic-guided vehicles</td>
</tr>
<tr>
<td>• Thermoforming, agglomerating and moulding press</td>
<td>- Access at the rear of a press brake</td>
</tr>
<tr>
<td>• Max. length of a U-shaped perimeter: 27 m / 88.56 ft</td>
<td>- Max. length of a U-shaped perimeter: 19 m / 62.32 ft</td>
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| Body Detection according to EN 999 |

<table>
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<tr>
<th>Compact Type 4 Self-contained Single Beam with Relay Outputs</th>
<th>Heavy Industry and Material Conversion</th>
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<tbody>
<tr>
<td>• Access detection of perimeter protection around a robot zone, trip device at the entrance and the exit of a paint shop, etc.</td>
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<td>• Max. length of a U-shaped perimeter: 19 m / 62.32 ft</td>
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<th>Harsh-duty Type 4 Access Detection Systems with Relay Outputs</th>
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<td>• Access detection for perimeter protection around a robot zone, trip device at the entrance and the exit of a paint shop, etc.</td>
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</tr>
<tr>
<td>• Max. length of a U-shaped perimeter: 60 m / 196.81 ft</td>
<td>- Max. length of a U-shaped perimeter: 27 m / 88.56 ft</td>
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| Body Detection according to EN 999 |

### ELECTRICAL CONNECTIONS

<table>
<thead>
<tr>
<th>Dimensions of the Protected Area</th>
<th>Scanning Range (m/ft)</th>
<th>Protection Height (m/ft)</th>
</tr>
</thead>
</table>

### DIMENSIONS

<table>
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| Body Detection according to EN 999 |

### SAFETY FEATURES

<table>
<thead>
<tr>
<th>Type 4 Multibeam System with Static Safety Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Automatic restart</td>
</tr>
<tr>
<td>• Cross-talk detection reduction</td>
</tr>
<tr>
<td>• Output status indicator</td>
</tr>
<tr>
<td>• Start &amp; Restart interlock</td>
</tr>
<tr>
<td>• FF-SPS4 systems</td>
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</tbody>
</table>

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<th>Type 4 Modular Light Curtain with M18 Sensors and Separate Control Unit with Relay Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Static outputs</td>
</tr>
<tr>
<td>• FF-SB15 systems</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Compact Type 4 Self-contained Single Beam with Relay Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Self-diagnostic indicator</td>
</tr>
<tr>
<td>• Cross-talk detection reduction</td>
</tr>
<tr>
<td>• Output status indicator</td>
</tr>
<tr>
<td>• FF-SPS4 systems</td>
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</tbody>
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<th>Harsh-duty Type 4 Access Detection Systems with Relay Outputs</th>
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<tr>
<td>• FF-SPS4 systems</td>
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</table>

### CONNECTORS

<table>
<thead>
<tr>
<th>Compact Type 4 Self-contained Single Beam with Relay Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Metal connector</td>
</tr>
<tr>
<td>• Terminal strips</td>
</tr>
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### CONNECTIONS

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### PROTECTION HEIGHTS

<table>
<thead>
<tr>
<th>Compact Type 4 Self-contained Single Beam with Relay Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 beam - 19.7 in to 23.64 in</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Harsh-duty Type 4 Access Detection Systems with Relay Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 or 3 beams - 18 in to 19 in</td>
</tr>
</tbody>
</table>

| Body Detection according to EN 999 |

<table>
<thead>
<tr>
<th>Compact Type 4 Self-contained Single Beam with Relay Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 beam - 55.16 in to 60 in</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Harsh-duty Type 4 Access Detection Systems with Relay Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 or 3 beams - 54 in to 60 in</td>
</tr>
</tbody>
</table>

| Body Detection according to EN 999 |

### SAFETY PRODUCTS

<table>
<thead>
<tr>
<th>Compact Type 4 Self-contained Single Beam with Relay Outputs</th>
</tr>
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<tbody>
<tr>
<td>• Safety Products for Machine Safeguarding - Safety Products for Machine Safeguarding</td>
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### TYPE 4 MULTIBEAM SYSTEM WITH STATIC SAFETY OUTPUTS

<table>
<thead>
<tr>
<th>Heavy Industry and Material Conversion</th>
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<tbody>
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<td>• Access detection for:</td>
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<td>• Max. length of a U-shaped perimeter: 64 m / 210 ft</td>
</tr>
</tbody>
</table>

| Body Detection according to EN 999 |

### TYPE 4 MODULAR LIGHT CURTAIN WITH M18 SENSORS AND SEPARATE CONTROL UNIT WITH RELAY OUTPUTS

<table>
<thead>
<tr>
<th>Heavy Industry and Material Conversion</th>
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<tbody>
<tr>
<td>• Access protection on palletising areas</td>
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<td>• Detection of automatic-guided vehicles</td>
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<td>• Thermoforming, agglomerating and moulding press</td>
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<td>• Max. length of a U-shaped perimeter: 27 m / 88.56 ft</td>
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| Body Detection according to EN 999 |

### TYPE 4 COMPACT LIGHT CURTAIN WITH RELAY OUTPUTS

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<tr>
<td>• Access detection for:</td>
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<td>• Max. length of a U-shaped perimeter: 19 m / 62.32 ft</td>
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| Body Detection according to EN 999 |

### TYPE 4 HARSH-DUTY LIGHT CURTAIN WITH RELAY OUTPUTS

<table>
<thead>
<tr>
<th>Heavy Industry and Material Conversion</th>
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<tbody>
<tr>
<td>• Access detection for perimeter protection around a robot zone, trip device at the entrance and the exit of a paint shop, etc.</td>
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### PROTECTION HEIGHTS

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<tr>
<th>Compact Type 4 Self-contained Single Beam with Relay Outputs</th>
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<tr>
<td>1 beam - 19.7 in to 23.64 in</td>
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<table>
<thead>
<tr>
<th>Harsh-duty Type 4 Access Detection Systems with Relay Outputs</th>
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<tbody>
<tr>
<td>2 or 3 beams - 18 in to 19 in</td>
</tr>
</tbody>
</table>
## Multiple Light Beams for Access Detection into Low Risk Areas

### Typical Applications
- **Type 2 light curtain with integrated muting**
  - Light industry and material conversion, transportation and storage:
    - Palletisers
    - Access detection for robotic areas
    - Access detection in transfer areas
  - Perimetric protection
  - Max. length of a U-shaped perimeter: 36.45 m / 119.58 ft

- **Type 2 single beam with separate control unit and relay outputs**
  - Light industry and material conversion, transportation and storage:
    - Access detection for robotic areas:
      - Packaging OEMs
      - Textile Machinery Industries
      - Automated industrial warehousing systems
    - Handling, palletising/de-palletising systems
    - Assembly lines

### Resolution
- **2, 3, 4 beams**
- **1 to 4 beams**

### Approvals
- **Type 2 light curtain with integrated muting**
  - FF-SYA234
  - FF-SLG234
  - FF-SLB

### Electrical Connection
- **Type 2**
  - Approved as FF-SLB

### Dimensions of the Protected Area
- **Dimensions of the Scanning Range (m/ft)**
  - Protection Height (mm/in):
    - **FF-SYA234**
      - 0.5 m to 45 m / 1.64 ft to 147.64 ft
    - **FF-SLG234**
      - 0.8 m to 6 m / 2.6 ft to 16.7 ft

### Electrical Connection
- **M8 connector**
- **M12 (5 pin, 8 pin)**

### Dimensions of the Protected Area
- **Body Detection**
  - Ø184 mm / 7.24 in
  - 2, 3, 4 beams
  - Type 2 per EN 50100-1/2
  - Approved as FF-SLB

### Design Notes
- **Type 2 light curtain with integrated muting**
  - FF-SYA234
  - FF-SLG234
  - FF-SLB

### Accessories
- **Cascading**
- **Through external accessory**

### Additional Information
- **PRODUCT SERVICE**
  - Type 2 according to IEC/EN 61496-1/2
  - Approved as FF-SLB

### Dimensions
- **Sensors**
  - IP 65 24 Vdc
  - NEMA 4

### Specifications
- **Type 2 light curtain with integrated muting**
  - Sensing distance: 28 to 30 ms
  - M12 (5 pin, 8 pin)
  - IP 65 24 Vdc
  - NEMA 4

### Type 2 single beam with separate control unit and relay outputs
- **Sensors**
  - IP 65 24 Vdc
  - NEMA 4

### Technical Details
- **Type 2 light curtain with integrated muting**
  - FF-SYA234
  - FF-SLG234
  - FF-SLB
Electro-Sensitive Protective Equipment for Presence Detection in Hazardous Areas

**TYPICAL APPLICATIONS**

| Type 4 modular light curtain with M18 sensors | Heavy industry and material conversion |
| Compact Type 4 light curtain with static safety outputs | - Presence detection for: |
| | - Robotic and transfer areas |
| | - Machinery centers |
| | - Palletizing areas |
| | - Storage and stacking areas |

| Compact Type 4 light curtain and separate control unit with relay outputs | Heavy industry and material conversion |
| | - Protection on palletising areas |
| | - Presence detection of areas containing robots or automatic machines |
| | - Detection of automatic-guided vehicles |
| | - Thermoforming, agglomerating and moulding presses |

| Category 3 Pressure sensitive mat and separate control unit with relay outputs | Heavy industry and material conversion |
| | - Protection on palletising areas |
| | - Presence detection of areas containing robots or automatic machines |
| | - Detection of automatic-guided vehicles |
| | - Suitable for cutting oils, welding splashes, shavings, etc. |

| Category 3 laser scanner with relay outputs | Light industry |
| | - Ground level trip device |
| | - Industrial robot areas |
| | - Automatically guided vehicles |
| | - For the control of large areas of any shape |
| | - Suitable for relatively clean environments |

**ELECTRICAL CONNECTION**

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Approvals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 4</td>
<td>EN 60204-1/2</td>
</tr>
<tr>
<td>Type 4</td>
<td>EN 61496-1/2</td>
</tr>
</tbody>
</table>

**DIMENSIONS OF THE PROTECTED AREA**

<table>
<thead>
<tr>
<th>Scanning Range (m/f)</th>
<th>Protection Height (mm/e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 m / 82 ft</td>
<td>330 mm / 13 in</td>
</tr>
<tr>
<td>2 to 8 beams</td>
<td>30 mm</td>
</tr>
</tbody>
</table>

**RESOLUTION APPROVALS**

- **CU S T E D LI** | 1998

**BODY DETECTION**

| ø60 mm / 2.36 in |
| 30 kg / 66 lbs |

**CU S T E D LI** | 1998

**CONNECTION**

- Terminal strips
- Fiber optic cables for safety mat
- Binder RS232 cordset (5 m/16.4 ft) for power and signal connection
- Control unit: 6 m²/64.5 ft²
- Change plugs

**DIMENSIONS**

| Width: 6.77 x 6.93 x 4.21 in |
| Depth: 172 x 176 x 107 mm |
| Height: 19.7 x 29.55 in |

**ELECTRICAL**

- Voltage: 120 Vac, 230 Vac, 480 Vac
- Connection: FF-SY60, FF-SCAN, FF-SM, FF-SE

**Sensors**

- EN 1760

**CU S T E D LI** | 1998

**Automatic restart**

- Start & Restart interlock
- Test input
- FSD monitoring
- Response time
- Sealing

**Self-diagnostic indicator**

- Muting
- Static outputs
- Relay outputs
- Cross-talk detection reduction
- Output status indicator
- Cascading

**Weld splash protection**

- FF-SE
- FF-SA60
- FF-SCAN
- FF-SM
- FF-SE

**Sensors:**

- NEMA 4
- NEMA 6
- NEMA 12

**Control unit:**

- IP 65
- IP 67
- IP 69

**Voltage:**

- DC 120 Vac
- 24 Vdc
- 24 to 48 Vdc
- 48 Vdc
- 240 Vdc

**Through external accessory**

- FF-SE
- FF-SA60
- FF-SCAN
- FF-SM
- FF-SE
### Safety Sensitive Edges

**Typical Applications**
- Industrial doors (sectional doors, sliding doors, etc.)
- Machine guards and doors
- Auto-Guided vehicle
- Automatic handling systems or manipulators (robots, material feeding systems, etc.)

**Detection Capability**
- Finger detection
- Hand detection
- Body detection

**Approvals**
- Electrical connection: 3 wires

**Electrical Connection**
- Sensors: 27 mm x 11.5 mm / 1.06 in x 0.45 in
- Control unit: 100 mm x 70 mm x 40 mm / 3.94 in x 2.76 in x 1.57 in

**Dimensions of the Protected Zone**

**Scanning Range (m/ft)**
- FF-SD

**Applications**
- Industrial doors (sectional doors, sliding doors, etc.)
- Machine guards and doors
- Auto-Guided vehicle
- Automatic handling systems or manipulators (robots, material feeding systems, etc.)

### Non Contact Safety Switches

**Typical Applications**
- Interlocking guards for non-locked mechanical screens offering free access
- Machine door or casing position detection
- Guard-in-place detection, gate or access door detection
- Control of mechanical screens used in addition to a safety light curtain
- Meet the requirements of the following industries: Food & Beverage

**Detection Capability**
- Operating range: 5 mm - 7 mm / 0.20 in - 0.27 in ON, 8 mm - 12 mm / 0.32 in - 0.47 in OFF

**Approvals**
- Electrical connection: 2 wires

**Electrical Connection**
- Sensors: 24 Vdc / IP 68
- Control unit: IP 40

**Function**
- Tamper resistant keyed magnetic field actuated sensors
- Multi-sensor safety control module

**Applications**
- Safety magnetic multi-sensor system

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**Safety Products for Machine Safeguarding**

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14 - Safety Products for Machine Safeguarding - 15
**FF-ST2 Series**

**Type 2 Safety Light Curtains**

**DESCRIPTION**

The FF-ST2 Series is designed for hazardous point-of-operation or access detection industrial machine safeguarding applications. Its enhanced output stage design provides longer cable length through M12 plugs. The Honeywell patented push-pull type OSSD outputs allow for low impedance at any time, while regular open collector type OSSD outputs have high impedance when OFF. As a result, the M12 limited wire section is no longer a constraint.

ASIC technology provides fast response times compared to the micro-processor technology commonly used for safety light curtains. The FF-ST2 light curtain response times are worst-case response times including the sensor and the output stage, and possible OSSD outputs failure modes. Fast response times contribute to shortened safety distances and reduced overall machine size.

The sturdy metal housing (including zamak end caps), and a small window that reduces exposure to the environment, allow the FF-ST2 to operate in most harsh duty applications.

Accessories include mounting kits, connectors, power supply, and relay modules.

**FEATURES**

- Type 2 per IEC61496-1/2, SIL2 per IEC61508
- Resolutions: 18 mm, 30 mm, 80 mm
- Protection heights: 200 mm to 1400 mm (18 mm resolution) or 200 mm to 1800 mm (30 mm and 80 mm resolutions)
- Scanning range: 0.25 m to 10 m
- Patented, unique solid state safety OSSD outputs allow longer cable length
- M12, 5 pole plugs
- ASIC technology provides fast response times
- Metal housing and reduced window size provide sturdy design
- Optimized overall size with reduced inactive zones
- Different function packages available

**POTENTIAL APPLICATIONS**

- Automotive plant floor industry
- Food and beverage industry
- Handling industry
- Machine tool industry
- Packaging industry
- Paper industry
- Special machines

---

**DANGER**

**IMPROPER SAFETY PRODUCT USE IN THE US**

- Type 2 safety light curtains as defined by IEC/EN 61496-1 and IEC/EN 61496-2 do not meet US OSHA 1910.217, US ANSI B11.1, B11.2, B11.19 and B11.20 requirements. Although Type 2 safety products are acceptable for certain applications outside the US, they are not generally acceptable in the US due to current US regulations and standards.
- In the US, Type 2 safety light curtains may be used under limited circumstances as defined by the ANSI/R15.06-1999 standard. In Canada, IEC/EN 61496-1 and IEC/EN 61496-2 are recognised as product standards, however application standards do not typically allow Type 2 light curtain use.
- Do not use Type 2 safety products in the US if the applicable standard requires a control reliable solution.
- For Risk Assessment, refer to ANSI TR3 and ANSI/R15.06-1999 for the USA and refer to the Ministry of Labour for Canada.
- Consult with local safety agencies before installing a Type 2 safety light curtain product.

Failure to comply with these instructions will result in death or serious injury.
## FF-ST2 Series

### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution (min. object detection size)</td>
<td>18 mm, 30 mm, 80 mm</td>
</tr>
<tr>
<td>Nominal scanning range</td>
<td>0.25 m to 10 m</td>
</tr>
<tr>
<td>Angle of divergence</td>
<td>max. ±5° above 3 m (as per IEC/EN 61496-2)</td>
</tr>
<tr>
<td>Emitting light source</td>
<td>infrared, pulsed, 880 nm</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>24 Vdc (±20%) for the emitter and the receiver</td>
</tr>
<tr>
<td>Power consumption</td>
<td>5 W max. for the emitter, 5 W max. for the receiver</td>
</tr>
<tr>
<td>Output type</td>
<td>2 safety solid state outputs, push-pull/PNP type with Normally Open characteristics</td>
</tr>
<tr>
<td>Response time</td>
<td>see mounting dimension drawing</td>
</tr>
<tr>
<td>Switching capability</td>
<td>350 mA max. at 24 Vdc</td>
</tr>
<tr>
<td>Restart time after power up</td>
<td>&gt;1 s (automatic mode)</td>
</tr>
<tr>
<td>Restart time after beam release</td>
<td>80 ms (without EDM), 150 ms (with EDM)</td>
</tr>
<tr>
<td>Leakage current</td>
<td>0.25 mA</td>
</tr>
<tr>
<td>Load impedance</td>
<td>70 Ohm min., 5 kOhm max.</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>&lt;2.3 Vdc</td>
</tr>
<tr>
<td>Load turn-on voltage</td>
<td>5 V min. on resistive loads, 7 V min. on inductive loads</td>
</tr>
<tr>
<td>Test pulse width/recurrence</td>
<td>2 pulses (width 200 us and 75 us), separated by 300 us, frequency from 3.3 ms to 8 ms (depending on height)</td>
</tr>
<tr>
<td>Protections</td>
<td>short-circuits and cross-faults, overloads (0.4 A max./0 Vdc; 0.9 A max./24 Vdc), reversed polarity, micro-cut-off 10 ms (100% voltage breakdown, 10 Hz)</td>
</tr>
<tr>
<td>Max. cable length</td>
<td>100 m [328.08 ft] (capacitance: 10 nF)</td>
</tr>
<tr>
<td>External contact type</td>
<td>relay contact, or static (solid state) PNP or static (solid state) NPN</td>
</tr>
<tr>
<td>Filtering time</td>
<td>20 ms by default, 150 ms on the EDM input</td>
</tr>
<tr>
<td>Voltage switching thresholds (high/low)</td>
<td>14.5 Vdc min., 4.5 Vdc (complies with IEC 61131-2, for type 2 sensors)</td>
</tr>
<tr>
<td>Input current (high/low)</td>
<td>20 mA; 10 mA at 24 Vdc</td>
</tr>
<tr>
<td>Max. voltage</td>
<td>29 Vdc</td>
</tr>
<tr>
<td>Housing material</td>
<td>aluminum alloy</td>
</tr>
<tr>
<td>End cap material</td>
<td>zamak</td>
</tr>
<tr>
<td>Window material</td>
<td>PMMA (Polymethylmethacrylate)</td>
</tr>
</tbody>
</table>

### FUNCTION PACKAGES

<table>
<thead>
<tr>
<th>Models</th>
<th>External Device Monitoring (EDM)</th>
<th>Automatic Restart (AUTO)</th>
<th>Restart Interlock (RES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-ST2 Standard A</td>
<td>X</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>FF-ST2 Standard M</td>
<td>X</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>
MOUNTING DIMENSIONS (For reference only: mm/[in])
**ORDERING INFORMATION**

**Function package**  
Automatic restart with external device monitoring  
**Connection types**  
M12, 5 pole on emitter and receiver

These on/off sensors are designed to be directly interfaced to the machine final switching devices (e.g. contactors), negating the need for a dedicated interface module.

**RECEIVER WIRING DIAGRAM**

**FINGER DETECTION**

<table>
<thead>
<tr>
<th>Resolution 18 mm, Scanning Range 0.25 m to 10 m</th>
<th>Catalog Listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protective Height (mm)</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>FF-ST2B02CM2</td>
</tr>
<tr>
<td>300</td>
<td>FF-ST2B03CM2</td>
</tr>
<tr>
<td>400</td>
<td>FF-ST2B04CM2</td>
</tr>
<tr>
<td>500</td>
<td>FF-ST2B05CM2</td>
</tr>
<tr>
<td>600</td>
<td>FF-ST2B06CM2</td>
</tr>
<tr>
<td>700</td>
<td>FF-ST2B07CM2</td>
</tr>
<tr>
<td>800</td>
<td>FF-ST2B08CM2</td>
</tr>
<tr>
<td>1000</td>
<td>FF-ST2B10CM2</td>
</tr>
<tr>
<td>1200</td>
<td>FF-ST2B12CM2</td>
</tr>
<tr>
<td>1400</td>
<td>FF-ST2B14CM2</td>
</tr>
</tbody>
</table>

**HAND, LIMB OR BODY DETECTION**

<table>
<thead>
<tr>
<th>Resolution 30 mm, Scanning Range 0.25 m to 10 m</th>
<th>Catalog Listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protective Height (mm)</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>FF-ST2C02CM2</td>
</tr>
<tr>
<td>300</td>
<td>FF-ST2C03CM2</td>
</tr>
<tr>
<td>400</td>
<td>FF-ST2C04CM2</td>
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<tr>
<td>500</td>
<td>FF-ST2C05CM2</td>
</tr>
<tr>
<td>600</td>
<td>FF-ST2C06CM2</td>
</tr>
<tr>
<td>700</td>
<td>FF-ST2C07CM2</td>
</tr>
<tr>
<td>800</td>
<td>FF-ST2C08CM2</td>
</tr>
<tr>
<td>900</td>
<td>FF-ST2C09CM2</td>
</tr>
<tr>
<td>1000</td>
<td>FF-ST2C10CM2</td>
</tr>
<tr>
<td>1200</td>
<td>FF-ST2C12CM2</td>
</tr>
<tr>
<td>1400</td>
<td>FF-ST2C14CM2</td>
</tr>
<tr>
<td>1600</td>
<td>FF-ST2C16CM2</td>
</tr>
<tr>
<td>1800</td>
<td>FF-ST2C18CM2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resolution 80 mm, Scanning Range 0.25 m to 10 m</th>
<th>Catalog Listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protective Height (mm)</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>FF-ST2C02LM2</td>
</tr>
<tr>
<td>300</td>
<td>FF-ST2C03LM2</td>
</tr>
<tr>
<td>400</td>
<td>FF-ST2C04LM2</td>
</tr>
<tr>
<td>500</td>
<td>FF-ST2C05LM2</td>
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<tr>
<td>600</td>
<td>FF-ST2C06LM2</td>
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<tr>
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<td>FF-ST2C09LM2</td>
</tr>
<tr>
<td>1000</td>
<td>FF-ST2C10LM2</td>
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<tr>
<td>1200</td>
<td>FF-ST2C12LM2</td>
</tr>
<tr>
<td>1400</td>
<td>FF-ST2C14LM2</td>
</tr>
<tr>
<td>1600</td>
<td>FF-ST2C16LM2</td>
</tr>
<tr>
<td>1800</td>
<td>FF-ST2C18LM2</td>
</tr>
</tbody>
</table>
Type 2 Safety Light Curtains

ORDERING INFORMATION

Function package: Manual restart interlock with external device monitoring
Connection types: M12, 5 pole on emitter and receiver

These on/off sensors are designed to be directly interfaced to the machine final switching devices (e.g. contactors), eliminating the need for a dedicated interface module.

FINGER DETECTION

<table>
<thead>
<tr>
<th>Protective Height (mm)</th>
<th>Catalog Listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>FF-ST2B02BM2</td>
</tr>
<tr>
<td>300</td>
<td>FF-ST2B03BM2</td>
</tr>
<tr>
<td>400</td>
<td>FF-ST2B04BM2</td>
</tr>
<tr>
<td>500</td>
<td>FF-ST2B05BM2</td>
</tr>
<tr>
<td>600</td>
<td>FF-ST2B06BM2</td>
</tr>
<tr>
<td>700</td>
<td>FF-ST2B07BM2</td>
</tr>
<tr>
<td>800</td>
<td>FF-ST2B08BM2</td>
</tr>
<tr>
<td>1000</td>
<td>FF-ST2B10BM2</td>
</tr>
<tr>
<td>1200</td>
<td>FF-ST2B12BM2</td>
</tr>
<tr>
<td>1400</td>
<td>FF-ST2B14BM2</td>
</tr>
</tbody>
</table>

HAND, LIMB OR BODY DETECTION

<table>
<thead>
<tr>
<th>Protective Height (mm)</th>
<th>Catalog Listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>FF-ST2C02BM2</td>
</tr>
<tr>
<td>300</td>
<td>FF-ST2C03BM2</td>
</tr>
<tr>
<td>400</td>
<td>FF-ST2C04BM2</td>
</tr>
<tr>
<td>500</td>
<td>FF-ST2C05BM2</td>
</tr>
<tr>
<td>600</td>
<td>FF-ST2C06BM2</td>
</tr>
<tr>
<td>700</td>
<td>FF-ST2C07BM2</td>
</tr>
<tr>
<td>800</td>
<td>FF-ST2C08BM2</td>
</tr>
<tr>
<td>900</td>
<td>FF-ST2C09BM2</td>
</tr>
<tr>
<td>1000</td>
<td>FF-ST2C10BM2</td>
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<tr>
<td>1200</td>
<td>FF-ST2C12BM2</td>
</tr>
<tr>
<td>1400</td>
<td>FF-ST2C14BM2</td>
</tr>
<tr>
<td>1600</td>
<td>FF-ST2C16BM2</td>
</tr>
<tr>
<td>1800</td>
<td>FF-ST2C18BM2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Protective Height (mm)</th>
<th>Catalog Listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>800</td>
<td>FF-ST2C08KM2</td>
</tr>
<tr>
<td>900</td>
<td>FF-ST2C09KM2</td>
</tr>
<tr>
<td>1000</td>
<td>FF-ST2C10KM2</td>
</tr>
<tr>
<td>1200</td>
<td>FF-ST2C12KM2</td>
</tr>
<tr>
<td>1400</td>
<td>FF-ST2C14KM2</td>
</tr>
<tr>
<td>1600</td>
<td>FF-ST2C16KM2</td>
</tr>
<tr>
<td>1800</td>
<td>FF-ST2C18KM2</td>
</tr>
</tbody>
</table>
# FF-ST2 Series

## ACCESSORIES

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Picture</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SGZ001001</td>
<td>![Picture]</td>
<td>Basic mounting kit includes two M5 dovetail shape bolts, two M5 nuts and two rip-lock washers. (These are already included in the FF-ST package.) Order two kits for a complete set to use with emitter and receiver.</td>
</tr>
<tr>
<td>FF-SXZ634189</td>
<td>![Picture]</td>
<td>Adjustable bracket kit includes two right angle brackets with four sets of M5 bolts, nuts and washers. Allows adjustments in azimuth directions of ±4° with front access of the adjusting screws. Order two kits for a complete set to use with emitter and receiver.</td>
</tr>
<tr>
<td>FF-SXZ634190</td>
<td>![Picture]</td>
<td>Kit includes two top/bottom, right angle, rotating brackets and four anti-vibration dampers (mounting hardware included). Allows adjustments in azimuth directions of ±5°. Order two kits for a complete set to use with emitter and receiver.</td>
</tr>
</tbody>
</table>
| FF-SXZ634190-1  | ![Picture] | • FF-SXZ634190: with anti-vibration dampers  
• FF-SXZ634190-1: without anti-vibration dampers |
| FF-SYZPF        | ![Picture] | Floor standing posts. |
| FF-SYZPFM11     | ![Picture] | • 1300 mm high beam post. (Order two pieces for a complete light curtain set and two FF-SYZ634178 bracket kits.)  
• 1170 mm high plain mirror post (25% scanning range reduction). Recommended for light curtains with a protection height of up to 1000 mm. |
| FF-SYZMIR102    | ![Picture] | Wall mount plain mirrors (25% scanning range reduction). Top and bottom brackets included (±45° angle adjustment). Suitable for:  
• FF-ST_ _ _ _ _02_ _ _ M2  
• FF-ST_ _ _ _ _03_ _ _ M2 and FF-ST_ _ _ _ _04_ _ _ M2  
• FF-ST_ _ _ _ _05_ _ _ M2 and FF-ST_ _ _ _ _06_ _ _ M2  
• FF-ST_ _ _ _ _07_ _ _ M2 and FF-ST_ _ _ _ _08_ _ _ M2  
• FF-ST_ _ _ _ _09_ _ _ M2 and FF-ST_ _ _ _ _10_ _ _ M2  
• FF-ST_ _ _ _ _12_ _ _ M2  
• FF-ST_ _ _ _ _14_ _ _ M2  
• FF-ST_ _ _ _ _16_ _ _ M2  
• FF-ST_ _ _ _ _18_ _ _ M2 |
| FF-SYZMIR104    | ![Picture] | M12 single-ended cordsets, female, 5 pin. |
| FF-SYZMIR106    | ![Picture] | • 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
| FF-SYZMIR108    | ![Picture] | M12 single-ended cordsets, female, 8 pin. |
| FF-SYZMIR110    | ![Picture] | • 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
| FF-SYZMIR112    | ![Picture] | • 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
| FF-SYZMIR114    | ![Picture] | • 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
| FF-SYZMIR116    | ![Picture] | • 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
| FF-SYZMIR118    | ![Picture] | • 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
| FF-SXZCAM125U02-S | ![Picture] | • 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
| FF-SXZCAM125U05-S | ![Picture] | • 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
| FF-SXZCAM125U05-90S | ![Picture] | • 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
| FF-SXZCAM125U10-S | ![Picture] | • 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
| FF-SXZCAM125U10-90S | ![Picture] | • 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
| FF-SXZCAM128U02-S | ![Picture] | • 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
| FF-SXZCAM128U05-S | ![Picture] | • 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
| FF-SXZCAM128U05-90S | ![Picture] | • 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
| FF-SXZCAM128U10-S | ![Picture] | • 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
| FF-SXZCAM128U10-90S | ![Picture] | • 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
ACCESSORIES (continued)

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Picture</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SXZCOM125</td>
<td><img src="image1.png" alt="Image" /></td>
<td>M12 screw connector, female, straight, 5 pin</td>
</tr>
</tbody>
</table>
| FF-SXZPWR050     | ![Image](image2.png) | ac to dc power supply (to be ordered separately as an option)  
   - 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 Vac to 264 Vac (43 Hz to 67 Hz)  
   - Output voltage: 24 Vdc to 28 Vdc adjustable  
   - Rated continuous load (at 60 °C [140 °F] max.): 2.1 A at 24 Vdc/1.8 A at 28 Vdc  
   - Power: 50 W  
   - Dimensions: 75 mm x 45 mm x 97 mm  
   - DIN rail mounting  
   - Weight: 240 g |
| FF-SRE60292      | ![Image](image3.png) | Expansion relay modules for the FF-ST2 Standard A and Standard M models  
   - 22.5 mm width, 4 NO/2 NC safety relay outputs  
   - 90 mm width, 7 NO/1 NC safety relay outputs  
(See separate product data sheet for detailed information.) |
| FF-SRE30812      | ![Image](image4.png) |  
| FF-SRM200P2      | ![Image](image5.png) | Muting module  
   - Connection of one or two safety devices  
   - Modes of operation: unidirectional or bidirectional muting, mutual exclusion  
   - Connection of two or four auxiliary muting sensors  
   - 24 Vdc  
   - Category 4 per EN 954-1  
   - Programmable max. muting time  
   - Crossfault monitoring of inputs  
   - Self-monitored muting lamp output  
   - 3 NO safety relay outputs  
   - Static outputs for output status and diagnostic information  
   - 45 mm [1.77 in] |
WARRANTY
MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- 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.

Warranty/Remedy
Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell’s standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details.
Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. The foregoing is buyer’s sole remedy and is in lieu of all warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.

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.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service
Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com
Internet: www.honeywell.com/sensing

Phone and Fax:
Asia Pacific  +65 6355-2828
           +65 6445-3033 Fax
Europe     +44 (0) 1698 481481
           +44 (0) 1698 481676 Fax
Latin America  +1-305-805-8188
              +1-305-883-8257 Fax
USA/Canada +1-800-537-6945
           +1-815-235-6847
           +1-815-235-6545 Fax

Sensing and Control
Honeywell
1985 Douglas Drive North
Minneapolis, Minnesota  55422
www.honeywell.com
FF-ST4 Series
Type 4 Safety Light Curtains

DESCRIPTION
The FF-ST4 Series is designed for hazardous point-of-operation or access detection in industrial machine safeguarding applications. Its enhanced output stage design provides longer cable length through M12 plugs. The Honeywell patented push-pull type OSSD outputs allow for low impedance at any time, while regular open collector type OSSD outputs have high impedance when OFF. As a result, the M12 limited wire section is no longer a constraint.

ASIC technology provides fast response times compared to the micro-processor technology commonly used for safety light curtains. The FF-ST4 light curtain response times are worst-case response times including the sensor and the output stage, the embedded functions processing such as blanking or muting, and possible OSSD output failure modes. Fast response times contribute to shortened safety distances and reduced overall machine size.

FEATURES
- Type 4 per IEC61496-1/2, SIL2 per IEC61508
- Resolutions: 14 mm, 30 mm, 80 mm
- Protection heights: 200 mm to 1400 mm (14 mm and 18 mm resolution) or 200 mm to 1800 mm (30 mm and 80 mm resolution)
- Scanning ranges: 0 m to 3.5 m (14 mm resolution) or 0.25 mm to 10 m (other resolutions)
- Patented, unique solid state safety OSSD outputs allow longer cable lengths
- Patented, automatic polarity recognition inputs provide easy, last minute configuration
- M12, 5 and 8 pole plugs
- ASIC technology provides fast response times
- Metal housing and reduced window size provide sturdy design
- Optimized overall size with reduced inactive zones
- Different function packages available
- Optional AS-i Safe field module

POTENTIAL APPLICATIONS
- Automotive plant floor industry
- Food and beverage industry
- Handling industry
- Machine tool industry
- Packaging industry
- Paper industry
- Special machines

Some models offer flexible configuration of different mode of operations through the M12, 8 pole plug. The Honeywell patented inputs with automatic polarity recognition reduce the amount of wiring and increase the number of configurations while keeping the advantages of the pre-wired, off-the shelf M12 cord sets.

The sturdy metal housing (including zamak end caps), and a small window that reduces exposure to the environment, allow the FF-ST4 to operate in most harsh duty applications.

Accessories include mounting kits, connectors, power supply, and relay modules.
**FF-ST4 Series**

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution (min. object detection size)</td>
<td>14 mm, 18 mm, 30 mm, 80 mm</td>
</tr>
<tr>
<td>Nominal scanning range</td>
<td>0 m to 3.5 m (for 14 mm resolution); 0.25 m to 10 m (for 18 mm, 30 mm, 80 mm resolutions)</td>
</tr>
<tr>
<td>Angle of divergence</td>
<td>max. ±5° above 3 m (as per IEC/EN 61496-2)</td>
</tr>
<tr>
<td>Emitting light source</td>
<td>infrared, pulsed, 880 nm</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>24 Vdc (±20%) for the emitter and the receiver</td>
</tr>
<tr>
<td>Power consumption</td>
<td>5 W max. for the emitter, 5 W max. for the receiver</td>
</tr>
<tr>
<td>Output type</td>
<td>2 safety solid state outputs, push-pull/PNP type with Normally Open characteristics</td>
</tr>
<tr>
<td>Response time</td>
<td>see mounting dimensions drawing</td>
</tr>
<tr>
<td>Switching capability</td>
<td>350 mA max. at 24 Vdc</td>
</tr>
<tr>
<td>Restart time after power up</td>
<td>&gt;1 s (automatic mode)</td>
</tr>
<tr>
<td>Restart time after beam release</td>
<td>80 ms (without EDM), 150 ms (with EDM)</td>
</tr>
<tr>
<td>Leakage current</td>
<td>0.25 mA</td>
</tr>
<tr>
<td>Load impedance</td>
<td>70 Ohm min., 5 kOhm max.</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>&lt;2.3 Vdc</td>
</tr>
<tr>
<td>Load turn-on voltage</td>
<td>5 V min. on resistive loads, 7 V min. on inductive loads</td>
</tr>
<tr>
<td>Test pulse width/recurrence</td>
<td>2 pulses (width 200 us and 75 us), separated by 300 us, frequency from 3.3 ms to 8 ms (depending on height)</td>
</tr>
<tr>
<td>Protections</td>
<td>short-circuits and cross-faults, overloads (0.4 A max./0 Vdc; 0.9 A max./24 Vdc), reversed polarity, micro-cut-off 10 ms (100% voltage breakdown, 10 Hz)</td>
</tr>
<tr>
<td>Max. cable length</td>
<td>100 m [328.08 ft] (capacitance: 10 nF)</td>
</tr>
<tr>
<td>External contact type</td>
<td>relay contact, or static (solid state) PNP or static (solid state) NPN</td>
</tr>
<tr>
<td>(automatic recognition - no push-pull output allowed)</td>
<td></td>
</tr>
<tr>
<td>Filtering time</td>
<td>20 ms by default, 150 ms on the EDM input</td>
</tr>
<tr>
<td>Voltage switching thresholds (high/low)</td>
<td>14.5 Vdc min., 4.5 Vdc (complies with IEC 61131-2, for type 2 sensors)</td>
</tr>
<tr>
<td>Input current (high/low)</td>
<td>20 mA; 10 mA at 24 Vdc</td>
</tr>
<tr>
<td>Max. voltage</td>
<td>29 Vdc</td>
</tr>
<tr>
<td>Housing material</td>
<td>aluminum alloy</td>
</tr>
<tr>
<td>End cap material</td>
<td>zamak</td>
</tr>
<tr>
<td>Window material</td>
<td>PMMA (Polymethyllethacrylate)</td>
</tr>
</tbody>
</table>

**FUNCTION PACKAGES**

<table>
<thead>
<tr>
<th>Model</th>
<th>External Device Monitoring (EDM)</th>
<th>Automatic Restart (AUTO)</th>
<th>Restart Interlock (RES)</th>
<th>Muting (or Bypass)</th>
<th>One or Two Beam Floating Blanking</th>
<th>AS-i Safe</th>
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<tbody>
<tr>
<td>FF-ST4 Basic</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
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<tr>
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<td>X</td>
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<tr>
<td>FF-ST4 Advanced M</td>
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<td>X</td>
<td>X</td>
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</tr>
</tbody>
</table>
Type 4 Safety Light Curtains

MOUNTING DIMENSIONS (For reference only: mm/[in])

Protection Height PH (mm)
- 14 mm resolution
  - 206
  - 302
  - 398
  - 494
  - 590
  - 686
  - 782
  - 974
  - 1166
  - 1358
  - NA
  - NA
- 18 mm resolution
  - 210
  - 306
  - 402
  - 498
  - 594
  - 690
  - 786
  - 978
  - 1170
  - 1362
  - NA
  - NA
- 30 mm, 80 mm resolution
  - 222
  - 318
  - 414
  - 510
  - 606
  - 702
  - 798
  - 894
  - 990
  - 1182
  - 1374
  - 1566
  - 1758

Total Height TH (mm)
- 242
- 338
- 434
- 530
- 626
- 722
- 818
- 914
- 1010
- 1202
- 1394
- 1586
- 1778

Response Time (ms) *
- 14 mm, 18 mm resolution
  - 11
  - 12
  - 12.5
  - 13
  - 14
  - 14.5
  - 15.5
  - -
  - 16.5
  - 18
  - 19.5
  - NA
  - NA
- 30 mm resolution
  - 11
  - 12
  - 12.5
  - 13
  - 14
  - 14.5
  - 15.5
  - 16
  - 16.5
  - 18
  - 19.5
  - 21
  - 22
- 80 mm resolution
  - 13.5
  - 14.5
  - 15.5
  - 16
  - 17
  - 18
  - 19
  - 20
  - 21
  - 23
  - 24.5
  - 26.5
  - 28.5

NA: not available
(*) without blanking
## FF-ST4 Series

**ORDERING INFORMATION**

**FF-ST4 Basic**

Function package: Automatic restart without external device monitoring
Connection types: M12/5 pole on emitter and receiver

These on/off sensors are designed for the Honeywell FF-SRL60252 relay module or for the Honeywell FF-SRAC007S AS-i Safe field module.

### RECEIVER WIRING DIAGRAM

![Receiver Wiring Diagram](image)

### FINGER DETECTION

<table>
<thead>
<tr>
<th>Protective Height (mm)</th>
<th>Catalog Listing</th>
<th>Protective Height (mm)</th>
<th>Catalog Listing</th>
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<tbody>
<tr>
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<td>FF-ST4A02AM2</td>
<td>200</td>
<td>FF-ST4B02AM2</td>
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<tr>
<td>300</td>
<td>FF-ST4A03AM2</td>
<td>300</td>
<td>FF-ST4B03AM2</td>
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<td>400</td>
<td>FF-ST4A04AM2</td>
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<td>FF-ST4A05AM2</td>
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<td>FF-ST4B05AM2</td>
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<td>600</td>
<td>FF-ST4A06AM2</td>
<td>600</td>
<td>FF-ST4B06AM2</td>
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<tr>
<td>700</td>
<td>FF-ST4A07AM2</td>
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<td>FF-ST4B07AM2</td>
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<tr>
<td>800</td>
<td>FF-ST4A08AM2</td>
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<td>FF-ST4B08AM2</td>
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<tr>
<td>1000</td>
<td>FF-ST4A10AM2</td>
<td>1000</td>
<td>FF-ST4B10AM2</td>
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<tr>
<td>1200</td>
<td>FF-ST4A12AM2</td>
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<td>FF-ST4B12AM2</td>
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<tr>
<td>1400</td>
<td>FF-ST4A14AM2</td>
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### HAND, LIMB OR BODY DETECTION

<table>
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<tr>
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<th>Catalog Listing</th>
<th>Protective Height (mm)</th>
<th>Catalog Listing</th>
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<tbody>
<tr>
<td>200</td>
<td>FF-ST4C02AM2</td>
<td>200</td>
<td>FF-ST4C02JM2</td>
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<tr>
<td>300</td>
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<td>FF-ST4C04JM2</td>
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<tr>
<td>500</td>
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<td>FF-ST4C05JM2</td>
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<td>FF-ST4C10JM2</td>
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<td>1800</td>
<td>FF-ST4C18AM2</td>
<td>1800</td>
<td>FF-ST4C18JM2</td>
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</tbody>
</table>
Type 4 Safety Light Curtains

ORDERING INFORMATION
Function package
Selectable automatic or manual restart interlock with external device monitoring
Connection types
M12, 5 pole on emitter and M12, 8 pole on receiver

These on/off sensors are designed to be directly interfaced to the machine final switching devices (e.g. contactors), eliminating the need for a dedicated interface module.

RECEIVER WIRING DIAGRAM

FINGER DETECTION
Resolution 14 mm, Scanning Range 0 m to 3.5 m

<table>
<thead>
<tr>
<th>Protective Height (mm)</th>
<th>Catalog Listing</th>
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<tbody>
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<tr>
<td>600</td>
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<tr>
<td>1400</td>
<td>FF-ST4A14DM2</td>
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</table>

Resolution 18 mm, Scanning Range 0.25 m to 10 m

<table>
<thead>
<tr>
<th>Protective Height (mm)</th>
<th>Catalog Listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>FF-ST4B02DM2</td>
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<tr>
<td>300</td>
<td>FF-ST4B03DM2</td>
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<tr>
<td>400</td>
<td>FF-ST4B04DM2</td>
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<td>500</td>
<td>FF-ST4B05DM2</td>
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<tr>
<td>600</td>
<td>FF-ST4B06DM2</td>
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<td>700</td>
<td>FF-ST4B07DM2</td>
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<tr>
<td>800</td>
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<tr>
<td>1000</td>
<td>FF-ST4B10DM2</td>
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<td>1200</td>
<td>FF-ST4B12DM2</td>
</tr>
<tr>
<td>1400</td>
<td>FF-ST4B14DM2</td>
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</tbody>
</table>

HAND, LIMB OR BODY DETECTION
Resolution 30 mm, Scanning Range 0.25 m to 10 m

<table>
<thead>
<tr>
<th>Protective Height (mm)</th>
<th>Catalog Listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>FF-ST4C02DM2</td>
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<tr>
<td>300</td>
<td>FF-ST4C03DM2</td>
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<td>400</td>
<td>FF-ST4C04DM2</td>
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<tr>
<td>500</td>
<td>FF-ST4C05DM2</td>
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<tr>
<td>600</td>
<td>FF-ST4C06DM2</td>
</tr>
<tr>
<td>700</td>
<td>FF-ST4C07DM2</td>
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<tr>
<td>800</td>
<td>FF-ST4C08DM2</td>
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<tr>
<td>900</td>
<td>FF-ST4C09DM2</td>
</tr>
<tr>
<td>1000</td>
<td>FF-ST4C10DM2</td>
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<tr>
<td>1200</td>
<td>FF-ST4C12DM2</td>
</tr>
<tr>
<td>1400</td>
<td>FF-ST4C14DM2</td>
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<tr>
<td>1600</td>
<td>FF-ST4C16DM2</td>
</tr>
<tr>
<td>1800</td>
<td>FF-ST4C18DM2</td>
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</tbody>
</table>

Resolution 80 mm, Scanning Range 0.25 m to 10 m

<table>
<thead>
<tr>
<th>Protective Height (mm)</th>
<th>Catalog Listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>FF-ST4C02MM2</td>
</tr>
<tr>
<td>300</td>
<td>FF-ST4C03MM2</td>
</tr>
<tr>
<td>400</td>
<td>FF-ST4C04MM2</td>
</tr>
<tr>
<td>500</td>
<td>FF-ST4C05MM2</td>
</tr>
<tr>
<td>600</td>
<td>FF-ST4C06MM2</td>
</tr>
<tr>
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<td>FF-ST4C07MM2</td>
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<td>FF-ST4C16MM2</td>
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<tr>
<td>1800</td>
<td>FF-ST4C18MM2</td>
</tr>
</tbody>
</table>
**FF-ST4 Series**

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>Function package</th>
<th>FF-ST4 Advanced M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selectable automatic or manual restart interlock with external device monitoring and muting</td>
<td>M12, 5 pole on emitter and M12, 8 pole on receiver</td>
</tr>
</tbody>
</table>

Muting (or bypass) allows objects to pass through the protection field without stopping the machine. Muting is permitted when personnel are not exposed to the hazard (e.g., manual loading/unloading) or when the hazard cannot be accessed without a stop (e.g., conveyor).

**NOTICE**

**MUTING SENSOR OUTPUT TYPE**

The muting sensors can be any device with either relay outputs or solid state output. Devices with solid state push-pull outputs cannot be used.

**RECEIVER WIRING DIAGRAM**

---

**FINGER DETECTION**

<table>
<thead>
<tr>
<th>Resolution 14 mm, Scanning Range 0 m to 3.5 m</th>
<th>Resolution 18 mm, Scanning Range 0.25 m to 10 m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protective Height (mm) Catalog Listing</td>
<td>Protective Height (mm) Catalog Listing</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>200 FF-ST4A02VM2</td>
<td>200 FF-ST4B02VM2</td>
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<td>300 FF-ST4A03VM2</td>
<td>300 FF-ST4B03VM2</td>
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<tr>
<td>400 FF-ST4A04VM2</td>
<td>400 FF-ST4B04VM2</td>
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<tr>
<td>500 FF-ST4A05VM2</td>
<td>500 FF-ST4B05VM2</td>
</tr>
<tr>
<td>600 FF-ST4A06VM2</td>
<td>600 FF-ST4B06VM2</td>
</tr>
<tr>
<td>700 FF-ST4A07VM2</td>
<td>700 FF-ST4B07VM2</td>
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<tr>
<td>800 FF-ST4A08VM2</td>
<td>800 FF-ST4B08VM2</td>
</tr>
<tr>
<td>1000 FF-ST4A10VM2</td>
<td>1000 FF-ST4B10VM2</td>
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<tr>
<td>1200 FF-ST4A12VM2</td>
<td>1200 FF-ST4B12VM2</td>
</tr>
<tr>
<td>1400 FF-ST4A14VM2</td>
<td>1400 FF-ST4B14VM2</td>
</tr>
</tbody>
</table>

**HAND, LIMB OR BODY DETECTION**

<table>
<thead>
<tr>
<th>Resolution 30 mm, Scanning Range 0.25 m to 10 m</th>
<th>Resolution 80 mm, Scanning Range 0.25 m to 10 m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protective Height (mm) Catalog Listing</td>
<td>Protective Height (mm) Catalog Listing</td>
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<tr>
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<td>200 FF-ST4C02VM2</td>
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<tr>
<td>1800 FF-ST4C18VM2</td>
<td>1800 FF-ST4C18D1M2</td>
</tr>
</tbody>
</table>
Type 4 Safety Light Curtains

ORDERING INFORMATION

Function package: Selectable automatic or manual restart interlock with external device monitoring and selectable one or two-beam floating blanking

Connection types: M12, 5 pole on emitter and M12, 8 pole on receiver

The built-in floating blanking feature provides a means for the random inhibition of one or two light curtain beams. It is useful in applications where material or air-ejected parts randomly travel through or within the sensing field. Light beams may be disabled in an area where a fixture penetrates the light field, and stationary objects may not be allowed to protrude into the light curtain’s sensing field. Any beam within the light curtain detection field may be blanked.

WARNING

INCORRECT SAFETY DISTANCE WHEN USING FLOATING BLANKING

• Floating blanking increases the light curtain resolution and the response time. Therefore, the safety distance between the light curtain and the hazardous area shall be increased.

• Refer to the installation manual for detailed information on resolution and calculating the safety distance. Failure to comply with these instructions could result in death or serious injury.

RECEIVER WIRING DIAGRAM

FINGER DETECTION

<table>
<thead>
<tr>
<th>Resolution 14 mm, Scanning Range 0 m to 3.5 m</th>
<th>Catalog Listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protective Height (mm)</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>FF-ST4A02RM2</td>
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<tr>
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<td>FF-ST4A03RM2</td>
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<tr>
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<table>
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<th>Catalog Listing</th>
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<tbody>
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</tr>
<tr>
<td>1200</td>
<td>FF-ST4B12RM2</td>
</tr>
<tr>
<td>1400</td>
<td>FF-ST4B14RM2</td>
</tr>
</tbody>
</table>

HAND, LIMB OR BODY DETECTION

<table>
<thead>
<tr>
<th>Resolution 30 mm, Scanning Range 0.25 m to 10 m</th>
<th>Catalog Listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protective Height (mm)</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>FF-ST4C02RM2</td>
</tr>
<tr>
<td>300</td>
<td>FF-ST4C03RM2</td>
</tr>
<tr>
<td>400</td>
<td>FF-ST4C04RM2</td>
</tr>
<tr>
<td>500</td>
<td>FF-ST4C05RM2</td>
</tr>
<tr>
<td>600</td>
<td>FF-ST4C06RM2</td>
</tr>
<tr>
<td>700</td>
<td>FF-ST4C07RM2</td>
</tr>
<tr>
<td>800</td>
<td>FF-ST4C08RM2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resolution 30 mm, Scanning Range 0.25 m to 10 m</th>
<th>Catalog Listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protective Height (mm)</td>
<td></td>
</tr>
<tr>
<td>900</td>
<td>FF-ST4C09RM2</td>
</tr>
<tr>
<td>1000</td>
<td>FF-ST4C10RM2</td>
</tr>
<tr>
<td>1200</td>
<td>FF-ST4C12RM2</td>
</tr>
<tr>
<td>1400</td>
<td>FF-ST4C14RM2</td>
</tr>
<tr>
<td>1600</td>
<td>FF-ST4C16RM2</td>
</tr>
<tr>
<td>1800</td>
<td>FF-ST4C18RM2</td>
</tr>
</tbody>
</table>
## FF-ST4 Series

### ACCESSORIES

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Picture</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SGZ001001</td>
<td><img src="image1" alt="Picture of FF-SGZ001001" /></td>
<td>Basic mounting kit includes two M5 dovetail shape bolts, two M5 nuts and two rip-lock washers. (These are already included in the FF-ST package.) Order two kits for a complete set to use with emitter and receiver.</td>
</tr>
<tr>
<td>FF-SXZ634189</td>
<td><img src="image2" alt="Picture of FF-SXZ634189" /></td>
<td>Adjustable bracket kit includes two right angle brackets with four sets of M5 bolts, nuts and washers. Allows adjustments in azimuth directions of ±4° with front access of the adjusting screws. Order two kits for a complete set to use with emitter and receiver.</td>
</tr>
<tr>
<td>FF-SXZ634190</td>
<td><img src="image3" alt="Picture of FF-SXZ634190" /></td>
<td>Kit includes two top/bottom, right angle, rotating brackets and four anti-vibration dampers (mounting hardware included). Allows adjustments in azimuth directions of ±5°. Order two kits for a complete set to use with emitter and receiver.</td>
</tr>
</tbody>
</table>
| FF-SXZ634190-1  | ![Picture of FF-SXZ634190-1](image4) | • FF-SXZ634190: with anti-vibration dampers  
• FF-SXZ634190-1: without anti-vibration dampers |
| FF-SYZPF        | ![Picture of FF-SYZPF](image5) | Floor standing posts.  
• 1300 mm high beam post. (Order two pieces for a complete light curtain set and two FF-SYZ634178 bracket kits.)  
• 1170 mm high plain mirror post (25% scanning range reduction). Recommended for light curtains with a protection height of up to 1000 mm. |
| FF-SYZPFM11     | ![Picture of FF-SYZPFM11](image6) | Wall mount plain mirrors (25% scanning range reduction). Top and bottom brackets included (±45° angle adjustment). Suitable for:  
• FF-ST_ _ 02 _ M2  
• FF-ST_ _ 03 _ M2 and FF-ST_ _ 04 _ M2  
• FF-ST_ _ 05 _ M2 and FF-ST_ _ 06 _ M2  
• FF-ST_ _ 07 _ M2 and FF-ST_ _ 08 _ M2  
• FF-ST_ _ 09 _ M2 and FF-ST_ _ 10 _ M2  
• FF-ST_ _ 12 _ M2  
• FF-ST_ _ 14 _ M2  
• FF-ST_ _ 16 _ M2  
• FF-ST_ _ 18 _ M2 |
| FF-SXZCAM125U02-S | ![Picture of FF-SXZCAM125U02-S](image7) | M12 single-ended cordsets, female, 5 pin.  
• 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
| FF-SXZCAM125U05-S | ![Picture of FF-SXZCAM125U05-S](image8) | M12 single-ended cordsets, female, 8 pin.  
• 2 m, straight  
• 5 m, straight  
• 5 m, right angle  
• 10 m, straight  
• 10 m, right angle |
### ACCESSORIES (continued)

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Picture</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SXZCOM125</td>
<td><img src="image1" alt="M12 screw connector, female, straight, 5 pin" /></td>
<td>M12 screw connector, female, straight, 5 pin</td>
</tr>
<tr>
<td>FF-SXZCOM128</td>
<td><img src="image2" alt="M12 screw connector, female, straight, 8 pin" /></td>
<td>M12 screw connector, female, straight, 8 pin</td>
</tr>
</tbody>
</table>
| FF-SXZPWR050     | ![ac to dc power supply](image3) | ac to dc power supply (ordered separately as an option).  
- 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 Vac to 264 Vac (43 Hz to 67 Hz)  
- Output voltage: 24 Vdc to 28 Vdc adjustable  
- Rated continuous load (at 60 °C [140 °F] max.): 2.1 A at 24 Vdc/ 1.8 A at 28 Vdc  
- Power: 50 W  
- Dimensions: 75 mm x 45 mm x 97 mm  
- DIN rail mounting  
- Weight: 240 g |
| FF-SRL60252      | ![Dual channel module for the FF-ST4 Basic models.](image4) | Dual channel module for the FF-ST4 Basic models.  
- 22.5 mm width, 3 NO/1 NC internally redundant safety relay outputs  
(See separate product data sheet for detailed information.) |
| FF-SRAC007S      | ![AS-i Safe input module for the FF-ST4 basic models.](image5) | AS-i Safe input module for the FF-ST4 basic models.  
- Category 4 per EN954-1 and SIL3 per IEC61508  
- Connection of the FF-ST4 emitter and receiver via a pair of M12 sockets  
- An external power supply is required to power the light curtain through the black flat cable. Order the DIN rail and panel quick mount base for AS-i flat cables: FF-SRAC5003  
- Maximum cable length between light curtain and module is 10 m  
- 31 modules per master module  
- IP 67 protection rating  
- Dimensions: 110 mm x 45 mm x 70 mm (with the base)  
- Material: PA 6 (module), PBT (base)  
- CE approved, UL/CSA (application approval pending)  
- AS-i details: versions 2.11 and 3.0, profile S-0.B.E |
| FF-SRAC5003      | ![AS-i Safe input module for the FF-ST4 basic models.](image6) | AS-i Safe input module for the FF-ST4 basic models.  
- Category 4 per EN954-1 and SIL3 per IEC61508  
- Connection of the FF-ST4 emitter and receiver via a pair of M12 sockets  
- An external power supply is required to power the light curtain through the black flat cable. Order the DIN rail and panel quick mount base for AS-i flat cables: FF-SRAC5003  
- Maximum cable length between light curtain and module is 10 m  
- 31 modules per master module  
- IP 67 protection rating  
- Dimensions: 110 mm x 45 mm x 70 mm (with the base)  
- Material: PA 6 (module), PBT (base)  
- CE approved, UL/CSA (application approval pending)  
- AS-i details: versions 2.11 and 3.0, profile S-0.B.E |
- 22.5 mm width, 4 NO/2 NC safety relay outputs  
- 90 mm width, 7 NO/1 NC safety relay outputs  
(See separate product data sheet for detailed information.) |
- 22.5 mm width, 4 NO/2 NC safety relay outputs  
- 90 mm width, 7 NO/1 NC safety relay outputs  
(See separate product data sheet for detailed information.) |
| FF-SRL59022      | ![Presence sensing device initiation module (PSDI) for the automatic machine cycle start to be used with light curtains with a resolution less than or equal to 30 m.](image9) | Presence sensing device initiation module (PSDI) for the automatic machine cycle start to be used with light curtains with a resolution less than or equal to 30 m.  
(See separate product data sheet for detailed information.) |
WARNING
MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- 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.

Warranty/Remedy
Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell’s standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details.

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. The foregoing is buyer’s sole remedy and is in lieu of all warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.

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.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service
Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

Phone and Fax:
Asia Pacific  +65 6355-2828
+65 6445-3033 Fax
Europe  +44 (0) 1698 481481
+44 (0) 1698 481676 Fax
Latin America  +1-305-805-8188
+1-305-883-8257 Fax
USA/Canada  +1-800-537-6945
+1-815-235-6847
+1-815-235-6545 Fax
Type 4 Safety light curtain
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; ANSI RIA 15.06 for Control Reliability; CSA standards
- Self-contained with optical synchronisation
- 2 static safety outputs with short-circuit and cross-fault detection
- Selection of the infrared emission power allows cross-talk reduction
- Enhanced diagnostic information includes: a signal strength indicator, a cross-talk indicator and a failure diagnostic indicator
- 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
  - ø60 mm / 2.4 in for leg detection
- Protection height up to 1830 mm / 72 in
- Scanning range up to 20 m / 65 ft
- Electrical connection:
  - Hirschmann N6RFF type connectors,
  - Brad Harrison Mini-Change® connectors
  - Terminal strips
- Mounting brackets included allowing multiple mounting positions
- Safety relay modules for more switching capability or additional features (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

The Honeywell FF-SYA 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). Its CSA mark makes it a product usable in most parts of the world.

As soon as an object is detected inside the protection field, the FF-SYA de-energizes its two static safety outputs to signal the dangerous motion to stop. The FF-SYA is a self-contained light curtain that does not require a separate control unit for operation. Safety relay modules are available to provide higher current capability and additional functionality. 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 mm² x 55 mm² makes installation possible in tight spaces, especially with the help of the small brackets supplied with the light curtains. The available safety relay modules easily fit inside the machine control panel with its small 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 mm to 1830 mm / 13.1 in to 72 in, covering 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 static safety outputs. Compatible safety relay modules are 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 lateral sides, the rear sides or at the top and the bottom of the light curtain. Hirschmann connectors are delivered with the FF-SYA C2 light curtains.

- **FULL FEATURED**
  The integrated test input can be used to test the entire safety chain. The test contact type (NO or NC characteristics) can be selected by internal configuration cards. When connected to the compatible safety relay modules, 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/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.

An internal configuration card is available on the emitter units for the selection of the adequate emission power. This configuration card can be used to eliminate this cross-talk phenomenon by decreasing the maximum scanning range down to minimum. The end cap can be easily removed, and there is no need to remove the unit from the machinery to select a different scanning range. Products are delivered with a maximum scanning range to ease the alignment process.
Scanning range selection
Test input type selection

<table>
<thead>
<tr>
<th>FF-SYA14</th>
<th>Minimum: 23 %</th>
<th>Medium: 50 %</th>
<th>Maximum: 100 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYA30 / FF-SYA60</td>
<td>0 m to 1.4 m / 0 ft to 4.6 ft</td>
<td>1 m to 3 m / 3.3 ft to 9.8 ft</td>
<td>2 m to 6 m / 6.6 ft to 19.7 ft</td>
</tr>
</tbody>
</table>

Remove the end cap, in order to access to the internal configuration cards.

Emitter configuration card selection

<table>
<thead>
<tr>
<th>Card number (1)</th>
<th>Card code (1)</th>
<th>Scanning range</th>
<th>Test contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>#101</td>
<td>23 % NO</td>
<td>Minimum</td>
<td>Normally Open</td>
</tr>
<tr>
<td>#102</td>
<td>50 % NO</td>
<td>Medium</td>
<td>Normally Open</td>
</tr>
<tr>
<td>#103</td>
<td>100 % NO</td>
<td>Maximum</td>
<td>Normally Open</td>
</tr>
<tr>
<td>#104</td>
<td>23 % NC</td>
<td>Minimum</td>
<td>Normally Closed</td>
</tr>
<tr>
<td>#105</td>
<td>50 % NC</td>
<td>Medium</td>
<td>Normally Closed</td>
</tr>
<tr>
<td>#106</td>
<td>100 % NC</td>
<td>Maximum</td>
<td>Normally Closed</td>
</tr>
</tbody>
</table>

(1) Factory setting: card #106 (code «100 % NC»)
**LED status indicators**

**Emitter**

- 3 scanning range indicators (yellow)
- Alarm indicator (red)
- Test indicator (red)

**Receiver**

- 2 operation indicators (red and green)
- Signal strength indicator (yellow)
- Cross-talk indicator (red)
Table 1

<table>
<thead>
<tr>
<th></th>
<th>øR (resolution)</th>
<th>P (lens pitch)</th>
<th>D (lens diameter)</th>
<th>A (inactive zone)</th>
<th>B (inactive zone)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYA14</td>
<td>14 / 0.6</td>
<td>10 / 0.4</td>
<td>4 / 0.16</td>
<td>15.2 / 0.6</td>
<td>90.6 / 3.56</td>
</tr>
<tr>
<td>FF-SYA30</td>
<td>30 / 1.2</td>
<td>20 / 0.8</td>
<td>10 / 0.4</td>
<td>22.2 / 0.87</td>
<td>87.6 / 3.45</td>
</tr>
<tr>
<td>FF-SYA60</td>
<td>50 / 1.97</td>
<td>40 / 1.6</td>
<td>10 / 0.4</td>
<td>42.2 / 1.66</td>
<td>87.6 / 3.45</td>
</tr>
</tbody>
</table>

(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/G89/G89/G89/G89, male receptacles for the FF-SYA/G89/G89/G89/G89Q2 and cable glands for the FF-SYA/G89/G89/G89/G89T2 versions)
Type 4 safety light curtain

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

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

<table>
<thead>
<tr>
<th>Features</th>
<th>Type</th>
<th>FF-SYA14 (ø 14 mm / 0.6 in)</th>
<th>FF-SYA30 (ø 30 mm / 1.2 in)</th>
<th>FF-SYA60 (ø 50 mm / 1.97 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection heights</td>
<td></td>
<td>See Table 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal scanning ranges</td>
<td></td>
<td>0 m to 6 m / 0 ft to 20 ft</td>
<td>0 m to 20 m / 0 ft to 65 ft</td>
<td>0 m to 20 m / 0 ft to 65 ft</td>
</tr>
<tr>
<td>Supply voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td></td>
<td></td>
<td>24 Vdc (± 15 %)</td>
<td></td>
</tr>
<tr>
<td>Outputs</td>
<td></td>
<td></td>
<td>2 PNP safety static outputs</td>
<td></td>
</tr>
<tr>
<td>Test input</td>
<td></td>
<td></td>
<td>Normal open or Normally closed (Factory setting)</td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td></td>
<td></td>
<td>13,5 to 22.5 ms (see Table 2)</td>
<td></td>
</tr>
<tr>
<td>Restart time after beam release</td>
<td></td>
<td></td>
<td>&gt; 1 s</td>
<td></td>
</tr>
<tr>
<td>LED status indicators</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test input type</td>
<td></td>
<td>Emitter: test mode, failure alarm, selected scanning range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross sectional area</td>
<td></td>
<td>W 42 mm² x D 55 mm² / W 1.65 in² x D 2.16 in²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emission</td>
<td></td>
<td>Infrared modulated light source (880 nm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective aperture angle</td>
<td></td>
<td>± 2°, ± 25 % (in compliance with the IEC/EN 61496 - Part 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical noise immunity</td>
<td></td>
<td>IEC 61000-4-4: level III, IEC 61000-4-3: level III</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
<td>Operating temperature: 0 °C to 55 °C / 32 °F to 131 °F</td>
<td>Storage temperature: -20 °C to 75 °C / -4 °F to 167 °F</td>
<td></td>
</tr>
<tr>
<td>Vibration</td>
<td></td>
<td>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</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sealing</td>
<td></td>
<td>IP 65, NEMA 4, 13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td></td>
<td>Housing: aluminium alloy</td>
<td>Front plate: polymethyl metacrylate (PMMA)</td>
<td>End caps: polycarbonate</td>
</tr>
<tr>
<td>Electrical connection</td>
<td></td>
<td>FF-SYA14/14/14/14/14/14/J2: EN 60423 plastic 7-pin right-angle plugs with crimping contacts (Hirschmann NBRFF-type)</td>
<td>FF-SYA14/14/14/14/14/J2: 5 and 7 pole straight male receptacles compatible with Brad Harrison Mini-Change® plugs (not included)</td>
<td>FF-SYA14/14/14/14/14/T2: terminal strip version with M16 cable glands</td>
</tr>
</tbody>
</table>

Ordering information
Each listing consists of an emitter, a receiver, 2 pairs of right-angle brackets, a test rod and a pair of Hirschmann NBRFF connector (FF-SYA14/14/14/14/14/14/T2 version only)

- FF-SYA14/14/14/14/14/14
  - C: EN 60423 plastic plugs included
  - Q: male receptacles compatible with Brad Harrison Mini-Change® plugs (not included)
  - T: terminal strips (cable glands included)

Model (see Table 2)

Resolutions
- 14: ø 14 mm / 0.6 in
- 30: ø 30 mm / 1.2 in
- 60: ø 50 mm / 1.97 in
### Table 2

<table>
<thead>
<tr>
<th>Model</th>
<th>032</th>
<th>048</th>
<th>064</th>
<th>080</th>
<th>096</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection height (mm / in) (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SYA14</td>
<td>334 / 13.1</td>
<td>494 / 19.4</td>
<td>654 / 25.7</td>
<td>814 / 32.07</td>
<td>974 / 38.3</td>
</tr>
<tr>
<td>FF-SYA30</td>
<td>350 / 13.7</td>
<td>510 / 20.09</td>
<td>670 / 26.3</td>
<td>830 / 32.7</td>
<td>990 / 39</td>
</tr>
<tr>
<td>FF-SYA60</td>
<td>390 / 15.3</td>
<td>550 / 21.6</td>
<td>710 / 27.9</td>
<td>870 / 34.2</td>
<td>1030 / 40.5</td>
</tr>
<tr>
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<td>950 / 37.4</td>
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<td>450 / 17.7</td>
<td>610 / 24.03</td>
<td>770 / 30.3</td>
<td>930 / 36.6</td>
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### Table 2 (continued)

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<td>1774 / 69.8</td>
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<td>1470 / 57.9</td>
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<td>1274 / 50.1</td>
<td>1434 / 56.5</td>
<td>1594 / 62.8</td>
<td>1754 / 69.1</td>
</tr>
<tr>
<td>FF-SYA30</td>
<td>1110 / 43.7</td>
<td>1270 / 50.03</td>
<td>1430 / 56.3</td>
<td>1590 / 62.6</td>
<td>1750 / 68.9</td>
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<tr>
<td>FF-SYA60</td>
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<td>1250 / 49.2</td>
<td>1410 / 55.1</td>
<td>1570 / 61.8</td>
<td>1730 / 68.1</td>
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<tr>
<td>Total height (mm / in) (3)</td>
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<td></td>
</tr>
<tr>
<td>FF-SYA14</td>
<td>1283 / 50.5</td>
<td>1443 / 56.8</td>
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<td>1923 / 75.7</td>
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<td>1723 / 67.8</td>
<td>1883 / 74.1</td>
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<td>FF-SYA60</td>
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<td>1558 / 61.3</td>
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<td>1878 / 73.9</td>
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<td>Response time (ms)</td>
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<td>15.5</td>
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<td>17.5</td>
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<tr>
<td>Weight per device (kg / lbs)</td>
<td>2.26 / 4.97</td>
<td>2.54 / 4.97</td>
<td>2.82 / 6.20</td>
<td>3.10 / 6.82</td>
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<td>7 / 7</td>
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## Safety distances (in mm, 100 mm = 3.9 in)

### European EN 999 standard

<table>
<thead>
<tr>
<th>FF-SYA14</th>
<th>FF-SYA30</th>
<th>FF-SYA60</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normal approach</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( S \geq 2000 , (t_1 + t_2) ), ( S \geq 100 ), with ( S \geq 100 )</td>
<td>( S \geq 2000 , (t_1 + t_2) + 128, ) with ( S \geq 100 )</td>
<td>( S \geq 1600 , (t_1 + t_2) + 850, ) with ( Hu \geq 900 ) ( Hl \leq 300 , m )</td>
</tr>
<tr>
<td>If ( S \geq 500 ), then use: ( S \geq 1600 , (t_1 + t_2), ) with ( S \geq 500 )</td>
<td>If ( S \geq 500 ), then use: ( S \geq 1600 , (t_1 + t_2) + 128, ) with ( S \geq 500 )</td>
<td></td>
</tr>
</tbody>
</table>

### Parallel approach

\( S \geq 1600 \, (t_1 + t_2) + (1200 - 0.4 \, H), \) with \( H \leq 875 \) or
\( S \geq 1600 \, (t_1 + t_2) + 850, \) with \( 875 \leq H \leq 1000 \)
with \( H \geq 15 \, (R-50), \) where \( R \) is the light curtain resolution
with \( H \geq 150 \) for the FF-SYA60 light curtain

### Angled approach

If \( \alpha \geq 30^\circ \), then use one of the formula given for a normal approach,
with \( Hu \geq 900 \) and \( Hl \leq 300 \) for the FF-SYA60 light curtain

If \( \alpha \leq 30^\circ \), then use one of the formula given for a parallel approach,
with \( Hu \leq 1000 \) and \( Hl \geq 15 \, (R-50), \) where \( R \) is the light curtain resolution (with \( Hl \geq 150 \) for the FF-SYA60 light curtain)

With:
- \( S \): Minimum safety distance (in mm, 100 mm = 3.9 in)
- \( t_1 \): Light curtain response time (s)
- \( t_2 \): Machine stopping time (s)
- \( H \): Height of the detection plane above the reference floor (in mm)
- \( Hu \): Height of the uppermost beam above the reference floor (in mm)
- \( Hl \): Height of the lowest beam above the reference floor (in mm)

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**

### Normal approach

\[ Ds \geq 63 (Ts + Tc + Tr) + 0.94 \]
\[ Ds \geq 63 (Ts + Tc + Tr) + 3.08 \]
\[ Ds \geq 63 (Ts + Tc + Tr) + 7.10 \]

- If \( Hi \leq 12 \) and \( Hu > 48 \) (Typical for Reach Thru).

\[ Ds \geq 63 (Ts + Tc + Tr) + 48 \]
\[ Ds \geq 63 (Ts + Tc + Tr) + 48 \]
\[ Ds \geq 63 (Ts + Tc + Tr) + 48 \]

- If \( Hi \leq 12 \) and \( 36 \leq Hu \leq 48 \) (Typical for Reach Over).

If \( Hi > 12 \), supplemental safeguarding may be required to detect crawling underneath.

### Parallel approach

\[ Ds \geq 63 (Ts + Tc + Tr) + 48 \]

Allowable field heights
- (for FF-SYA14 and FF-SYA30): \[ 0 \leq H \leq 39 \]
- (for FF-SYA60): \[ 5.5 \leq H \leq 39 \]

If \( H > 12 \), supplemental safeguarding may be required to detect crawling underneath.

### Angled approach

- If \( \alpha \geq 30^\circ \), then use the normal approach formula.
- If \( \alpha < 30^\circ \), then use the parallel approach formula.

\[ Ds = K (Ts + Tc + Tr) + Dpf \]

Where:
- \( Ds \): Minimum safety distance (in inches, 1 in = 25.4 mm)
- \( K \): Approach speed (in/s)
- \( Ts \): Worst case stopping time of the machine (s)
- \( Tc \): Worst case response of the machine’s control (s)
- \( Tr \): Response time of the safety devices (light curtain plus its interface - meaning the response time including the mechanical relay outputs in s)
- \( Dpf \): Depth penetration factor (in)
- \( Hu \): Height of the uppermost beam above the reference floor (in)
- \( Hl \): Height of the lowest beam above the reference floor (in). For normal approach, assumption is that \( Hl \) is not greater than 12 in unless the application prevents access even with \( Hl \) at a distance greater than 12 in).

Wiring diagram using external safety relays with guided contacts

Option (1) Use pin 3 for the FF-SYA emitter and pin 7 for the FF-SYA receiver
(2) Optional test input jumpered when unused
(3) Install arc suppressors (31Vdc varistors, customer supplied)

OSSD1 and OSSD2: Output Signal Switching Devices (static safety outputs)
FSD: Final Switching Devices (external safety relays with guided contacts)
Start P/B: normally open contact of a start push-button (customer supplied)

NOTICE
IMPROPER USE OF FF-SYA 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-SRL60252 interface control module is primarily designed to be interfaced with Honeywell static safety outputs devices.
Compatibility of the FF-SYA with any other emergency stop safety control module is not guaranteed.

(1) Use pin 3 for the FF-SYA emitter and pin 7 for the FF-SYA receiver
(2) Optional test input jumpered when unused
(3) Install arc suppressors (31Vdc varistors, customer supplied)
OSSD1 and OSSD2: Output Signal Switching Devices (static safety outputs)
FSD: Final Switching Devices (external safety relays with guided contacts)
Start P/B: normally open contact of a start push-button (customer supplied)
FF-SY634178
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-SYA (allowing adjustments in azimuth directions of ±10°).
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-SYA package).
FF-SYZ34179
Kit of 2 adjustable mounting brackets (FF-SYZ34178 type) with rotating plate, screws, bolts, nuts, and washers to mount one emitter or one receiver unit. To be mounted together with the FF-SYZ34178 brackets delivered with the FF-SYA package.
Possible mounting position is:
• at the rear dovetail slot
  (allowing adjustments in vertical directions along the slot and in azimuth directions of max. ± 45°)
Order 2 kits for a complete set of emitter and receiver.
Refer to the section FF-SYZ34178 for the detailed dimensions of the brackets.
(to be ordered separately as an option)

FF-SYZAD
Kit of 4 antivibration dampers. To be mounted together with the existing mounting brackets. Order 2 kits for a complete set of emitter and receiver.

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. You may also use our antivibration damper kit FF-SYZAD.
(The additional bracket kit and the antivibration damper kit must be ordered separately).
Plugs kits

**FF-SYZ172113** (for FF-SYAQ2 light curtains)
Kit of 2 EN 60423 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-SYAQ2 light curtains)
Kit of 2 EN 60423 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.

**FF-SBZ1721136** (for FF-SYAQ2 light curtains)
Kit of 1 EN 60423 plastic 7-pin right-angle connector with screw contact terminals (Hirschmann, N6RFFS11 type). Order 2 kits for a complete set of emitter and receiver.
To be ordered separately as an option.

**FF-41308** (for FF-SYAQ2 Emitters)
One 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-SYAQ2 light curtains.

**FF-41322** (for FF-SYAQ2 Emitters)
One 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-SYAQ2 light curtains.

**FF-42803** (for FF-SYAQ2 Receivers)
One 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-SYAQ2 light curtains.

**FF-42821** (for FF-SYAQ2 Receivers)
One 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-SYAQ2 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 modules

**FF-SRL60252**
Dual channel relay module for safety light curtains with static safety outputs
(to be ordered separately as an option).
- Compatible with safety light curtains with static outputs only
- 24 Vdc
- Category 4 per EN 954-1
- Selectable start mode and FSD monitoring
- 3 NO, 1 NC internally redundant safety relay outputs
- 22.5 mm / 0.89 in width

**FF-SRL59022**
Multi-safety device control module with Presence Sensing Device Initiation (PSDI)
(to be ordered separately as an option)
- Accept up to three safety devices working in a guard-only mode or 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

**FF-SRM200P2**
Muting module
(to be ordered separately as an option)
- Connection of 1 or 2 safety devices
- Modes of operation: unidirectional or bidirectional muting, mutual exclusion
- Connection of 2 or 4 auxiliary muting sensors
- 24 Vdc
- Category 4 per EN 954-1
- Manual start mode, FSD monitoring
- Programmable max. muting time
- Cross-fault monitoring of inputs
- Self monitored muting lamp output
- 3 NO safety relay outputs
- Static outputs for output status and diagnostic information
- 45 mm / 1.77 in

**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

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Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
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.

FF-SYZ604795
Mechanical adapter for the FF-SPZLASER laser pen to be used with the FF-SYA Series light curtain.

FF-SXZSHL
IP67 enclosure for FF-SYA light curtains

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<thead>
<tr>
<th>Enclosures</th>
<th>Light curtains</th>
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<tr>
<td>FF-SXZSHL048</td>
<td>FF-SYA032 and 048</td>
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<tr>
<td>FF-SXZSHL096</td>
<td>FF-SYA064 through 096</td>
</tr>
<tr>
<td>FF-SXZSHL128</td>
<td>FF-SYA112 and 128</td>
</tr>
<tr>
<td>FF-SXZSHLKIT</td>
<td>Brackets and cable gland kit (order one kit per enclosure)</td>
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</tbody>
</table>

□: “P” for polycarbonate, “G” for glass

FF-SYZMIR
Deflection mirror
To be ordered separately as an option
Deflection mirror for light curtain models

Features:
- Deflection mirror with 10% scanning range reduction (FF-SYZMIR004)
- Deflection mirror with 25% scanning range reduction (FF-SYZMIR006)
- Quick mounting and easy mirror adjustment
- Mounting brackets included (top / bottom mounting)
- Adjustment of mirror in azimuth direction of +/-45°
- Housing compatible with FF-SBSMIR Series

Material: Aluminium alloy housing
Finish: Gold colour anodisation

Ordering guide:
- FF-SYZMIR004: FF-SY032 and FF-SY048
- FF-SYZMIR006: FF-SY064
- FF-SYZMIR008: FF-SY080
- FF-SYZMIR010: FF-SY096
- FF-SYZMIR012: FF-SY112 and FF-SY128
- FF-SYZMIR014: FF-SY144
- FF-SYZMIR016: FF-SY160
FF-SYZPF
Fixed post for FF-SYA light curtain
Floorstanding post for the installation of the following FF-SYA light curtains:
Light curtain models: FF-SYA032, FF-SYA048, FF-SYA080, FF-SYA096
Multibeam models: FF-SYA02500, FF-SYA03400, FF-SYA04300
To be ordered separately as an option.

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-SYA032, FF-SYA048, FF-SYA080, FF-SYA096
To be ordered separately as an option.

FF-SYZPA
Adjustable floor standing post
- Mounting of FF-SYA, FF-SB14 and FF-SLC light curtains
- 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 ±11° 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.
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.

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INTERNET: www.honeywell.com/sensing

E-mail: info.sc@honeywell.com

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Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Safety multibeam system for access detection
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; ANSI RIA 15.06 for Control Reliability; CSA standards
- Self-contained with optical synchronisation
- 2 static safety outputs with short-circuit and cross-fault detection
- Selection of the infrared emission power allows cross-talk reduction
- Enhanced diagnostic information includes: a signal strength indicator, a cross-talk indicator and a failure diagnostic indicator
- Test input with selectable test input type
- Two, three and four beam versions for access and beam detection
- Scanning range up to 80 m / 262.4 ft
- Electrical connection:
  - Hirschmann N6RFF type connectors,
  - Brad Harrison Mini-Change® connectors
  - Terminal strips
- Mounting brackets included allowing multiple mounting positions
- Safety relay modules for more switching capability or additional features (to be ordered separately).

**TYPICAL APPLICATIONS**
- Access detection to robot areas
- Stacking machines, transporting and conveyor technology
- Handling equipment and assembly lines

The Honeywell FF-SYA234 multibeam system 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). Its CSA mark makes it a product usable in most parts of the world.

As soon as a person is detected inside the protection field, the FF-SYA de-energizes its two static safety outputs to signal the dangerous motion to stop. The FF-SYA is a self-contained light curtain that does not require a separate control unit for operation. Safety relay modules are available to provide higher current capability and additional functionality. 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.

The long scanning distance ensures that most perimeter guarding applications are covered. The optional FF-SYZPF floor mounting posts with individual mirrors can be used to protect several sides of a machine with only one system.

![New design](image)
The FF-SYA main features are:

- **COMPACT SIZE**

The cross section of \(42 \text{ mm}^2 \times 55 \text{ mm}^2\) makes installation possible in tight spaces, especially with the help of the small brackets supplied with the light curtains. The available safety relay modules easily fit inside the machine control panel with its small width DIN rail mount housing.

- **UNIVERSAL**

The housing dimensions are the same for the whole FF-SYA series. 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 static safety outputs. Compatible safety relay modules are 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 lateral sides, the rear sides or at the top and the bottom of the light curtain. Hirschmann connectors are delivered with the FF-SYA C2 light curtains.

- **FULL FEATURED**

The integrated test input can be used to test the entire safety chain. The test contact type (NO or NC characteristics) can be selected by internal configuration cards. When connected to the compatible safety relay modules, 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/EN 61496-2 standard that if a receiver \(R_2\) receives two signals transmitted by two different emitters \(E_1\) and \(E_2\), the receiver \(R_2\) must turn to the alarm state. This happens if the receiver \(R_2\) is within the beam aperture angle and within the nominal scanning range of the second emitter \(E_1\). The cross-talk detection indicator flickers on the receiver \(R_2\) to warn the installer.

An internal configuration card is available on the emitter units for the selection of the adequate emission power. This configuration card can be used to eliminate this cross-talk phenomenon by decreasing the maximum scanning range down to minimum. The end cap can be easily removed, and there is no need to remove the unit from the machinery to select a different scanning range. Products are delivered with a maximum scanning range to ease the alignment process.

**LED status indicators**

- **Maximum scanning range**

- **(factory setting)**

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Scanning range selection
Test input type selection

<table>
<thead>
<tr>
<th>FF-SYA02 / FF-SYA03 / FF-SYA04 - standard range (-3)</th>
<th>Minimum: 23 %</th>
<th>Medium: 50 %</th>
<th>Maximum: 100 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYA02 / FF-SYA03 / FF-SYA04 - long range (-8)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remove the end cap, in order to access to the internal configuration cards.

Emitter configuration card selection

<table>
<thead>
<tr>
<th>Card number</th>
<th>Card code</th>
<th>Scanning range</th>
<th>Test contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>#101</td>
<td>23 % NO</td>
<td>Minimum</td>
<td>Normally Open</td>
</tr>
<tr>
<td>#102</td>
<td>50 % NO</td>
<td>Medium</td>
<td>Normally Open</td>
</tr>
<tr>
<td>#103</td>
<td>100 % NO</td>
<td>Maximum</td>
<td>Normally Open</td>
</tr>
<tr>
<td>#104</td>
<td>23 % NC</td>
<td>Minimum</td>
<td>Normally Closed</td>
</tr>
<tr>
<td>#105</td>
<td>50 % NC</td>
<td>Medium</td>
<td>Normally Closed</td>
</tr>
<tr>
<td>#106</td>
<td>100 % NC</td>
<td>Maximum</td>
<td>Normally Closed</td>
</tr>
</tbody>
</table>

(1) Factory setting: card #106 (code «100 % NC»)
LED status indicators

Emitter

- 3 scanning range indicators (yellow)
- Alarm indicator (red)
- Test indicator (red)

Receiver

- 2 operation indicators (red and green)
- Signal strength indicator (yellow)
- Cross-talk indicator (red)

Test input type

Normally open

- Normally open (factory setting)

Normally closed

- Outputs are open
- Outputs are closed

- Perfect beam alignment
- Sight beam misalignment
- Total beam misalignment

- No cross-talk detected
- Cross-talk detected

- Light OFF
- Light ON
- Flickering light

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### Dimensions (mm / in)

<table>
<thead>
<tr>
<th>Reference</th>
<th>Number of beams N</th>
<th>Beam Spacing BS</th>
<th>Total Height TH</th>
<th>A</th>
<th>B</th>
<th>Weight per device</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYA02500C2-3 (-8)</td>
<td>2</td>
<td>500 / 19.70</td>
<td>803 / 31.63</td>
<td>149 / 5.87</td>
<td>87 / 3.42</td>
<td>1.42 / 3.12</td>
</tr>
<tr>
<td>FF-SYA02500Q2-3 (-8)</td>
<td>2</td>
<td>500 / 19.70</td>
<td>763 / 30.06</td>
<td>149 / 5.87</td>
<td>87 / 3.42</td>
<td>1.42 / 3.12</td>
</tr>
<tr>
<td>FF-SYA02500T2-3 (-8)</td>
<td>2</td>
<td>500 / 19.70</td>
<td>758 / 29.8</td>
<td>149 / 5.87</td>
<td>87 / 3.42</td>
<td>1.42 / 3.12</td>
</tr>
<tr>
<td>FF-SYA03400C2-3 (-8)</td>
<td>3</td>
<td>400 / 15.76</td>
<td>1123 / 44.24</td>
<td>169 / 6.65</td>
<td>87 / 3.42</td>
<td>1.98 / 4.35</td>
</tr>
<tr>
<td>FF-SYA03400Q2-3 (-8)</td>
<td>3</td>
<td>400 / 15.76</td>
<td>1083 / 42.67</td>
<td>169 / 6.65</td>
<td>87 / 3.42</td>
<td>1.98 / 4.35</td>
</tr>
<tr>
<td>FF-SYA03400T2-3 (-8)</td>
<td>3</td>
<td>400 / 15.76</td>
<td>1078 / 42.4</td>
<td>169 / 6.65</td>
<td>87 / 3.42</td>
<td>1.98 / 4.35</td>
</tr>
<tr>
<td>FF-SYA04300C2-3 (-8)</td>
<td>4</td>
<td>300 / 11.82</td>
<td>1123 / 44.24</td>
<td>69 / 2.72</td>
<td>87 / 3.42</td>
<td>1.98 / 4.35</td>
</tr>
<tr>
<td>FF-SYA04300Q2-3 (-8)</td>
<td>4</td>
<td>300 / 11.82</td>
<td>1083 / 42.67</td>
<td>69 / 2.72</td>
<td>87 / 3.42</td>
<td>1.98 / 4.35</td>
</tr>
<tr>
<td>FF-SYA04300T2-3 (-8)</td>
<td>4</td>
<td>300 / 11.82</td>
<td>1078 / 42.4</td>
<td>69 / 2.72</td>
<td>87 / 3.42</td>
<td>1.98 / 4.35</td>
</tr>
</tbody>
</table>

TH: Total Height (including plugs for the FF-SYA02500C2, male receptacles only for the FF-SYA03400C2 and cable glands for the FF-SYA04300T2 versions)

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Safety multibeam system for access detection

- Type 4 according to the IEC/EN 61496 - parts 1 and 2 standards
- Two, three and four beam systems for access and body detection
- Beam spacing per EN 999 and ANSI/RIA/R15.06-1999 (see notice below)
- Enhanced diagnostic information

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

<table>
<thead>
<tr>
<th>Features</th>
<th>Type</th>
<th>FF-SYA02500</th>
<th>FF-SYA03400</th>
<th>FF-SYA04300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of beams</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Beam spacing</td>
<td>500 mm / 19.7 in</td>
<td>400 mm / 15.76 in</td>
<td>300 mm / 11.82 in</td>
<td></td>
</tr>
<tr>
<td>Nominal scanning ranges</td>
<td>Standard range (-3): 0 m to 30 m / 0 ft to 98.42 ft</td>
<td>Long range (-8): 5 m to 80 m / 16.4 ft to 262.4 ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply voltage</td>
<td>24 Vdc (± 15 %)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>Emitter: 5 W max. • Receiver: 7 W max.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outputs</td>
<td>2 PNP safety static outputs (switching capacity: 0.35 A / 24 Vdc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test input</td>
<td>Normally open or Normally closed (Factory setting)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>22 ms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LED status indicators</td>
<td>Emitter: test mode, failure alarm, selected scanning range • Receiver: outputs status, optical signal margin, cross-talk detection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross sectional area</td>
<td>W 42 mm² x D 55 mm² / W 1.65 in² x D 2.16 in²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emission</td>
<td>Infrared modulated light source (880 nm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective aperture angle</td>
<td>± 2°, ± 25 % (in compliance with the IEC/EN 61496 - Part 2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light immunity</td>
<td>Sun: 20 000 lux • Lamp: 15 000 lux</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical noise immunity</td>
<td>IEC 61000-4-2: level III / IEC 61000-4-3: level III</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Operating temperature: 0 °C to 55 °C / 32 °F to 131 °F • Storage temperature: -20 °C to 75 °C / -4 °F to 167 °F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration</td>
<td>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</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sealing</td>
<td>IP 65, NEMA 4, 13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Housing: aluminium alloy • Front plate: polymethyl metacrylate (PMMA) • End caps: polycarbonate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical connection</td>
<td>FF-SYA02500 5: EN 60423 plastic 7-pin right-angle plugs with crimping contacts (Hirschmann N6RFF type)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FF-SYA03400 Q2: 5 and 7 pole straight male receptacles compatible with Brad Harrison Mini-Change® plugs (not included)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FF-SYA04300 T2: terminal strip version with M16 cable glands</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ordering information
Each listing consists of an emitter, a receiver, 2 pairs of right-angle brackets, a test rod and a pair of Hirschmann N6RFF connector (FF-SYA02500 version only)

**Example:**

- **FF-SYA02500**: 2 beams, beam spacing 500 mm / 19.7 in
- **FF-SYA03400**: 3 beams, beam spacing 400 mm / 15.76 in
- **FF-SYA04300**: 4 beams, beam spacing 300 mm / 11.82 in

**NOTICE**

NON COMPLIANCE TO ANSI/RIA 15.6-1999 WITH FF-SYA02500

Only the three beam (FF-SYA03400 Series) and the four beam versions (FF-SYA04300 series) are in compliance with the beam heights, specified in the US Standard ANSI/RIA R15.06-1999 (Industrial Robots and Robot Systems - Safety Requirements). The two beam version (FF-SYA02500 Series) does NOT comply with ANSI/RIA R15.06 and may require additional protection.

Refer to applicable standards. In the absence of an applicable standard, ANSI B11.19 and ANSI R15.06 may be used as reference for the USA, as well as EN 999 (or the relevant Type C machine standard) for Europe.
### Safety distances

#### European EN 999 standard (in mm, 100 mm = 3.9 in)

**Normal approach**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Number of beams (N)</th>
<th>Beam heights above the reference floor (mm)</th>
<th>Dpf</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYA02500</td>
<td>2</td>
<td>400 / 900</td>
<td>15.7 / 35.4</td>
</tr>
<tr>
<td>FF-SYA03400</td>
<td>3</td>
<td>300 / 700 / 1100</td>
<td>11.8 / 27.6 / 43.3</td>
</tr>
<tr>
<td>FF-SYA04300</td>
<td>4</td>
<td>300 / 600 / 900 / 1200</td>
<td>11.8 / 23.6 / 35.4 / 47.2</td>
</tr>
</tbody>
</table>

Where:
- **S**: Minimum safety distance (in mm, 100 mm = 3.9 in)
- **K**: Approach speed
- **Ts**: Worst case stopping time of the machine (s)
- **Tc**: Worst case response of the machine's control (s)
- **Tr**: Response time of the safety devices (light curtain plus its interface – meaning the response time including the mechanical relay outputs in s)
- **Dpf**: Depth penetration factor (in)
- **Hu**: Height of the uppermost beam above the reference floor (in)
- **Hl**: Height of the lowest beam above the reference floor (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.

#### USA ANSI/RIA 15.06 requirements (in inches, 1 in = 25.4 mm)

**Normal approach**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Number of beams (N)</th>
<th>Beam heights above the reference floor (in)</th>
<th>Dpf</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYA02500</td>
<td>2</td>
<td>12 in max. (Hl) / Top beam at 900 min. (Hl)</td>
<td>1.2 m / 48 in (Reach over)</td>
</tr>
<tr>
<td>FF-SYA03400</td>
<td>3</td>
<td>12 in max. (Hl) / Top beam at 900 min. (Hl)</td>
<td>1.2 m / 48 in (Reach over)</td>
</tr>
<tr>
<td>FF-SYA04300</td>
<td>4</td>
<td>12 in max. (Hl) / Top beam at 1200 min. (Hl)</td>
<td>0.9 m / 36 in (Reach thru)</td>
</tr>
</tbody>
</table>

1) Additional safeguard(s) is (are) required, when using the FF-SYA02500 two beam systems, as beam heights do not fully comply to ANSI/RIA 15.06 requirements.

\[ Ds = K (Ts + Tc + Tr) + Dpf \]

Where:
- **Ds**: Minimum safety distance (in inches, 1 in = 25.4 mm)
- **K**: Approach speed
- **Ts**: Worst case stopping time of the machine (s)
- **Tc**: Worst case response of the machine's control (s)
- **Tr**: Response time of the safety devices (light curtain plus its interface – meaning the response time including the mechanical relay outputs in s)
- **Dpf**: Depth penetration factor (in)
- **Hu**: Height of the uppermost beam above the reference floor (in)
- **Hl**: Height of the lowest beam above the reference floor (in)

Wiring diagram using the FF-SRL60252
Example: the FF-SRL60252 safety control module is set in the manual mode, without cross-fault monitoring by the module, with FSD monitoring.

NOTICE
IMPROPER USE OF FF-SYA 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-SRL60252 interface control module is primarily designed to be interfaced with Honeywell static safety outputs devices. Compatibility of the FF-SYA with any other emergency stop safety control module is not guaranteed.

(1) Use pin 3 for the FF-SYA emitter and pin 7 for the FF-SYA receiver
(2) Optional test input jumpered when unused
(3) Install arc suppressors (31 Vdc varistors, customer supplied)
OSSD1 and OSSD2: Output Signal Switching Devices (static safety outputs)
FSD: Final Switching Devices (external safety relays with guided contacts)
Start P/B: normally open contact of a start push-button (customer supplied)
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-SYA (allowing adjustments in azimuth directions of ±10°).
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-SYA package).
FF-SYZ634179

Kit of 2 adjustable mounting brackets (FF-SYZ634178 type) with rotating plate, screws, bolts, nuts, and washers to mount one emitter or one receiver unit. To be mounted together with the FF-SYZ634178 brackets delivered with the FF-SYA package.

Possible mounting position is:
- at the rear dovetail slot
  (allowing adjustments in vertical directions along the slot and in azimuth directions of max. ± 45°)

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)

FF-SYZAD

Kit of 4 antivibration dampers. To be mounted together with the existing mounting brackets. Order 2 kits for a complete set of emitter and receiver.

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. You may also use our antivibration damper kit FF-SYZAD.
(The additional bracket kit and the antivibration damper kit must be ordered separately.)
Plugs kits

**FF-SYZ172113** (for FF-SYA Q2 light curtains)
Kit of 2 EN 60423 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 Q2 light curtains)
Kit of 2 EN 60423 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.

**FF-SBZ1721136** (for FF-SYA Q2 light curtains)
Kit of 1 EN 60423 plastic 7-pin right-angle connector with screw contact terminals (Hirschmann, N6RFFS11 type). Order 2 kits for a complete set of emitter and receiver.
To be ordered separately as an option.

**FF-41308** (for FF-SYA Q2 emitters)
One 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.

**FF-41322** (for FF-SYA Q2 emitters)
One 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.

**FF-42803** (for FF-SYA Q2 receivers)
One 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.

**FF-42821** (for FF-SYA Q2 receivers)
One 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.

**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 modules

**FF-SRL60252**
Dual channel relay module for safety light curtains with static safety outputs
*(to be ordered separately as an option).*
- Compatible with safety light curtains with static outputs only
- 24 Vdc
- Category 4 per EN 954-1
- Selectable start mode and FSD monitoring
- 3 NO, 1 NC internally redundant safety relay outputs
- 22.5 mm / 0.89 in width

**FF-SRL59022**
Multi-safety device control module with Presence Sensing Device Initiation (PSDI)
*(to be ordered separately as an option)*
- Accept up to three safety devices working in a guard-only mode or 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

**FF-SRM200P2**
Muting module
*(to be ordered separately as an option)*
- Connection of 1 or 2 safety devices
- Modes of operation: unidirectional or bidirectional muting, mutual exclusion
- Connection of 2 or 4 auxiliary muting sensors
- 24 Vdc
- Category 4 per EN 954-1
- Manual start mode, FSD monitoring
- Programmable max. muting time
- Cross-fault monitoring of inputs
- Self monitored muting lamp output
- 3 NO safety relay outputs
- Static outputs for output status and diagnostic information
- 45 mm / 1.77 in

**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
**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.

**FF-SYZ604795**
Mechanical adapter for the FF-SPZLASER laser pen to be used with the FF-SYA Series light curtain.

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

<table>
<thead>
<tr>
<th>Enclosures</th>
<th>Light curtains</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SXZSHL048</td>
<td>FF-SYA032 and 048</td>
</tr>
<tr>
<td>FF-SXZSHL096</td>
<td>FF-SYA064 through 096</td>
</tr>
<tr>
<td>FF-SXZSHL128</td>
<td>FF-SYA112 and 128</td>
</tr>
<tr>
<td>FF-SXZSHL14T</td>
<td>Brackets and cable gland kit (order one kit per enclosure)</td>
</tr>
</tbody>
</table>

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

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

Roosterstanding post for the installation of the following FF-SYA light curtains:

- Light curtain models: FF-SYA0032, FF-SYA0048, FF-SYA0080, FF-SYA0096
- Multibeam models: FF-SYA002500, FF-SYA003400, FF-SYA004300

(To be ordered separately as an option).

Front covers are available for additional protection of the FF-SYA234 beam access detection systems:

- FF-SY230184-2: Front cover for 2 beams
- FF-SY230184-3: Front cover for 3 beams
- FF-SY230184-4: Front cover for 4 beams

(To be ordered separately as an option).

**FF-SYZPF□□**
Fixed post with 2, 3 or 4 individual mirrors (10 % or 25 % reduction of scanning range) (to be ordered separately as an option)

- Roosterstanding post with 2 individual mirrors
  - FF-SY2P02 with 10 % of loss
  - FF-SY2P12 with 25 % of loss
    - Suitable for FF-SYA02500 multibeam system
- Roosterstanding post with 3 individual mirrors
  - FF-SY2P03 with 10 % of loss
  - FF-SY2P13 with 25 % of loss
    - Suitable for FF-SYA03400 multibeam system
- Roosterstanding post with 4 individual mirrors
  - FF-SY2P04 with 10 % of loss
  - FF-SY2P14 with 25 % of loss
    - Suitable for FF-SYA04300 multibeam system

Note: The FF-SYZPF□□ fixed posts with individual mirrors are already delivered with the FF-SY230184□ front covers.

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

<table>
<thead>
<tr>
<th>Enclosures</th>
<th>Light curtains</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SXZSHL048</td>
<td>FF-SYA032 and 048</td>
</tr>
<tr>
<td>FF-SXZSHL096</td>
<td>FF-SYA064 through 096</td>
</tr>
<tr>
<td>FF-SXZSHL128</td>
<td>FF-SYA112 and 128</td>
</tr>
<tr>
<td>FF-SXZSHL14T</td>
<td>Brackets and cable gland kit (order one kit per enclosure)</td>
</tr>
</tbody>
</table>

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

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service

Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact a nearby sales office:

INTERNET: www.honeywell.com/sensing
E-mail: info.so@honeywell.com
Type 4 Safety light curtain
Compact, Universal, Smart and Full-featured

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 synchronization
- 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

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

<table>
<thead>
<tr>
<th>Model</th>
<th>Resolution without floating/blanking</th>
<th>Resolution with 1-beam floating blanking</th>
<th>Resolution with 2-beam floating blanking</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYB14</td>
<td>14 mm / 0.55 in</td>
<td>24 mm / 0.94 in</td>
<td>34 mm / 1.33 in</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>30 mm / 1.18 in</td>
<td>50 mm / 1.97 in</td>
<td>70 mm / 2.75 in</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>50 mm / 1.97 in</td>
<td>90 mm / 3.54 in</td>
<td>130 mm / 5.12 in</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Model</th>
<th>Maximum size of undetected object with 1-beam floating blanking</th>
<th>Maximum size of undetected object with 2-beam floating blanking</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYB14</td>
<td>6 mm / 0.23 in</td>
<td>16 mm / 0.63 in</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>10 mm / 0.39 in</td>
<td>30 mm / 1.18 in</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>30 mm / 1.18 in</td>
<td>70 mm / 2.75 in</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Emitter/Receiver</th>
<th>Minimal</th>
<th>Medium</th>
<th>Maximum (factory setting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYB14</td>
<td>1.4 m / 4.6 ft</td>
<td>3 m / 9.8 ft</td>
<td>6 m / 20 ft</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>4.6 m / 15.1 ft</td>
<td>10 m / 32.8 ft</td>
<td>20 m / 65 ft</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emitter/Receiver</th>
<th>Minimal</th>
<th>Medium</th>
<th>Maximum (factory setting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYB50</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emitter/Receiver</th>
<th>Minimal</th>
<th>Medium</th>
<th>Maximum (factory setting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-MI50</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emitter/Receiver</th>
<th>Minimal</th>
<th>Medium</th>
<th>Maximum (factory setting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-MI70</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emitter/Receiver</th>
<th>Minimal</th>
<th>Medium</th>
<th>Maximum (factory setting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-MI100</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emitter/Receiver</th>
<th>Minimal</th>
<th>Medium</th>
<th>Maximum (factory setting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-MI200</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emitter/Receiver</th>
<th>Minimal</th>
<th>Medium</th>
<th>Maximum (factory setting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-MI500</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emitter/Receiver</th>
<th>Minimal</th>
<th>Medium</th>
<th>Maximum (factory setting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-MI1000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emitter/Receiver</th>
<th>Minimal</th>
<th>Medium</th>
<th>Maximum (factory setting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-MI2000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emitter/Receiver</th>
<th>Minimal</th>
<th>Medium</th>
<th>Maximum (factory setting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-MI5000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emitter/Receiver</th>
<th>Minimal</th>
<th>Medium</th>
<th>Maximum (factory setting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-MI10000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Test input type

**Figure 9**

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

<table>
<thead>
<tr>
<th>Features</th>
<th>FF-SYB14</th>
<th>FF-SYB30</th>
<th>FF-SYB50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal scanning range</td>
<td>0 m to 6 m / 0 ft to 20 ft</td>
<td>0 m to 20 m / 0 ft to 65 ft</td>
<td>0 m to 20 m / 0 ft to 65 ft</td>
</tr>
<tr>
<td>Object detection size (see chapter “Floating blanking function”)</td>
<td>14 mm / 0.55 in</td>
<td>30 mm / 1.18 in</td>
<td>50 mm / 1.97 in</td>
</tr>
<tr>
<td>Angle of divergence</td>
<td>±2°, ±25 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emitted light source (immunity)</td>
<td>Infrared, pulsed, 880 nm (Sunlight: 20 000 Lux • Lamplight: 15 000 Lux)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply voltage and power consumption</td>
<td>24 Vdc (±20 %); 5 W max. for the emitter, 5 W max. for the receiver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety outputs (OSSDs)</td>
<td>2 safety static (solid state) outputs (PNP with NO characteristics) with permanent short-circuit and cross-fault detections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switching capability</td>
<td>22 ms (28 ms for model numbers FF-SYB14128 to FF-SYB14176)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time (beam interruption)</td>
<td>28 ms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time (Auxiliary Safety Device engaged)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum cable length</td>
<td>100 m / 328 ft (100 nF capacitance)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restart time after power up (after beam actuation)</td>
<td>&gt; 1 s (80 ms - without EDM, 150 ms - with EDM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loads impedance</td>
<td>70 Ω min. / 5 kΩ max.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage drop</td>
<td>&lt; 2 Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loads turn-on voltage</td>
<td>5 V min. on resistive loads / 7 V min. on inductive loads</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NC signalling or muting lamp/diagnosis output</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output type</td>
<td>1 PNP non safety output, NC (signalling contact) or NO (muting/diagnostic indication)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switching capability</td>
<td>100 mA max. at 24 Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test input (emitter) (1)</td>
<td>Overloads, reversed polarity, micro-cut-off (10 ms, 100 % voltage drop, 10 Hz)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input type</td>
<td>Floating input with selectable NO/NC test logic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External contact type</td>
<td>Relay contact, or static (solid state) PNP or static (solid state) NPN (must be activated for at least 20 ms)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test loop current (resistance)</td>
<td>13 mA typical (750 Ω max.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protections</td>
<td>3000 Vdc galvanic insulation, reversed polarity, micro-cut-off (14 ms)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restart / EDM input (1)</td>
<td>Relay contact (must be activated for at least 150 ms and less than 3 s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External contact type</td>
<td>29 Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. voltage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutating or serial connection inputs (1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External contact type</td>
<td>Relay contact, or static (solid state) PNP or static (solid state) NPN (automatic recognition)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum cable length</td>
<td>100 m / 328 ft (no limitation in capacitance)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental/physical characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>Operating: 0 °C to 55° C32 F to 131 °F (95% relative humidity) • Storage: 20 °C to 75 °C 0-4 °F to 167 °F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sealing</td>
<td>NEMA 4, 13 and IP 65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibrations</td>
<td>IEC/EN 61496: 10 to 55 Hz frequency range, 1 octave/min. sweep rate, 0.35 mm ±0.05 amplitude, 20 sweeps per axis, for 3 axes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shocks</td>
<td>IEC/EN 61496: 15 G - 11 ms - 3 per axis, for 3 axes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bumps</td>
<td>IEC/EN 61496: 10 G - 16 ms - 1000 per axis, for 3 axes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product dimension</td>
<td>Width: 42 mm (1.65 in); depth: 55 mm (2.16 in); height (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection</td>
<td>Emitter: M12/5 pole male receptacle • Receiver: M12/8 pole male receptacle or terminal strip with M20 cable gland</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>(see Figure 10 to determine possible modes of operation for each receiver termination type)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing: aluminium alloy and (conductive) polycarbonate (end caps) • Front plate: polymethylmethacrylate (PMMA)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ordering information

Each listing consists of an M12 emitter, an M12 receiver, 2 pairs of right-angle brackets, an end cover equipped with a cable gland, a test rod and a set of configuration cards.

FF-SYB M2

Model (see Table 2 page 9)

<table>
<thead>
<tr>
<th>Resolutions</th>
<th>FF-SYB14</th>
<th>FF-SYB30</th>
<th>FF-SYB50</th>
</tr>
</thead>
<tbody>
<tr>
<td>14: ø 14 mm / 0.6 in</td>
<td>14 mm / 0.55 in</td>
<td>30 mm / 1.18 in</td>
<td>50 mm / 1.97 in</td>
</tr>
<tr>
<td>30: ø 30 mm / 1.2 in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50: ø 50 mm / 1.97 in</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 IEC61131-2 requirements for type 2 sensors.
(2) Refer to emitter and receiver dimensions / weights.
### Figure 10 - Possible modes of operation and corresponding receiver termination type and connection box

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

(1) Factory setting: card #04

(2) Floating blanking

<table>
<thead>
<tr>
<th>Model</th>
<th>Resolution</th>
<th>Undetected object size</th>
<th>Resolution</th>
<th>Undetected object size</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYB14</td>
<td>24 mm / 0.94 in</td>
<td>6 mm / 0.23 in</td>
<td>34 mm / 1.33 in</td>
<td>16 mm / 0.63 in</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>50 mm / 1.97 in</td>
<td>10 mm / 0.39 in</td>
<td>70 mm / 2.75 in</td>
<td>30 mm / 1.18 in</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>90 mm / 3.54 in</td>
<td>30 mm / 1.18 in</td>
<td>130 mm / 5.12 in</td>
<td>70 mm / 2.75 in</td>
</tr>
</tbody>
</table>

(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

<table>
<thead>
<tr>
<th>Model</th>
<th>032</th>
<th>048</th>
<th>064</th>
<th>080</th>
<th>096</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Protection height (mm / in) (1)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SYB14</td>
<td>334 / 13.1</td>
<td>494 / 19.4</td>
<td>654 / 25.7</td>
<td>814 / 32.07</td>
<td>974 / 38.3</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>350 / 13.7</td>
<td>510 / 20.09</td>
<td>670 / 26.3</td>
<td>830 / 32.7</td>
<td>990 / 39</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>370 / 14.6</td>
<td>530 / 20.9</td>
<td>690 / 27.2</td>
<td>850 / 33.5</td>
<td>1010 / 39.8</td>
</tr>
<tr>
<td><strong>Sensing field height (mm / in) (2)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SYB14</td>
<td>314 / 12.3</td>
<td>474 / 18.6</td>
<td>634 / 24.9</td>
<td>794 / 31.2</td>
<td>954 / 37.5</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>310 / 12.2</td>
<td>470 / 18.5</td>
<td>630 / 24.8</td>
<td>790 / 31.1</td>
<td>950 / 37.4</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>290 / 11.4</td>
<td>450 / 17.7</td>
<td>610 / 24.03</td>
<td>770 / 30.3</td>
<td>930 / 36.6</td>
</tr>
<tr>
<td><strong>Total height (mm / in) (3)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M12 emitter or receiver</td>
<td>424 / 16.7</td>
<td>584 / 23</td>
<td>744 / 29.3</td>
<td>904 / 35.6</td>
<td>1064 / 41.9</td>
</tr>
<tr>
<td>Cable gland receiver only</td>
<td>438 / 12.2</td>
<td>598 / 23.5</td>
<td>758 / 29.8</td>
<td>918 / 36.1</td>
<td>1078 / 42.4</td>
</tr>
<tr>
<td><strong>Weight per device (kg / lbs)</strong></td>
<td>0.86 / 1.89</td>
<td>1.14 / 2.5</td>
<td>1.42 / 3.12</td>
<td>1.7 / 3.74</td>
<td>1.98 / 4.35</td>
</tr>
</tbody>
</table>

Table 2 (continued)

<table>
<thead>
<tr>
<th>Model</th>
<th>112</th>
<th>128</th>
<th>144</th>
<th>160</th>
<th>176</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Protection height (mm / in) (1)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SYB14</td>
<td>1134 / 44.6</td>
<td>1294 / 50.9</td>
<td>1454 / 57.2</td>
<td>1614 / 63.5</td>
<td>1774 / 69.8</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>1150 / 45.3</td>
<td>1310 / 51.6</td>
<td>1470 / 57.9</td>
<td>1630 / 64.2</td>
<td>1790 / 70.5</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>1170 / 46.0</td>
<td>1330 / 52.4</td>
<td>1490 / 58.7</td>
<td>1650 / 65.0</td>
<td>1810 / 71.2</td>
</tr>
<tr>
<td><strong>Sensing field height (mm / in) (2)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SYB14</td>
<td>1114 / 43.8</td>
<td>1274 / 50.1</td>
<td>1434 / 56.5</td>
<td>1594 / 62.8</td>
<td>1754 / 69.1</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>1110 / 43.7</td>
<td>1270 / 50.03</td>
<td>1430 / 56.3</td>
<td>1590 / 62.6</td>
<td>1750 / 68.9</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>1090 / 42.9</td>
<td>1250 / 49.2</td>
<td>1410 / 55.1</td>
<td>1570 / 61.8</td>
<td>1730 / 68.1</td>
</tr>
<tr>
<td><strong>Total height (mm / in) (3)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M12 emitter or receiver</td>
<td>1224 / 48.2</td>
<td>1384 / 54.5</td>
<td>1544 / 60.8</td>
<td>1704 / 67.1</td>
<td>1864 / 73.4</td>
</tr>
<tr>
<td>Cable gland receiver only</td>
<td>1238 / 48.7</td>
<td>1398 / 55</td>
<td>1558 / 61.3</td>
<td>1718 / 67.6</td>
<td>1878 / 73.9</td>
</tr>
<tr>
<td><strong>Weight per device (kg / lbs)</strong></td>
<td>2.26 / 4.97</td>
<td>2.54 / 4.97</td>
<td>2.82 / 6.20</td>
<td>3.10 / 6.82</td>
<td>3.38 / 7.43</td>
</tr>
</tbody>
</table>

| Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 588-9200-www.stevenengineering.com |
Figure 11 - Dimensions in mm / in

(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

<table>
<thead>
<tr>
<th>Model</th>
<th>øR (resolution)</th>
<th>P (lens pitch)</th>
<th>D (lens diameter)</th>
<th>A (inactive zone)</th>
<th>B (inactive zone)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYB14</td>
<td>ø 14 / 0.6</td>
<td>10 / 0.4</td>
<td>4 / 0.16</td>
<td>15.2 / 0.60</td>
<td>90.6 / 3.56</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>ø 30 / 1.2</td>
<td>20 / 0.8</td>
<td>10 / 0.4</td>
<td>22.2 / 0.87</td>
<td>87.6 / 3.45</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>ø 50 / 1.97</td>
<td>40 / 1.57</td>
<td>10 / 0.39</td>
<td>42.2 / 1.66</td>
<td>87.6 / 3.45</td>
</tr>
</tbody>
</table>
LED status indicators

Figure 12 - Emitter

- 3 scanning range indicators R1, R2, R3 (yellow)
- Alarm indicator (red)
- Test indicator (red)

Figure 13 - Receiver

- 2 operation indicators (red and green)
- Signal strength indicator (orange)
- Cross-talk indicator (red)
- Muting indicator (orange)
- 2 blanking indicators (yellow)
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)

<table>
<thead>
<tr>
<th>LIGHT CURTAIN MODEL</th>
<th>FF-SYB14 without floating/blanking</th>
<th>FF-SYB30 with 1- or 2 beam floating blanking</th>
<th>FF-SYB50 with or without blanking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal approach</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Diagram" /></td>
<td>$S \geq 2000 \ (t_1+t_2) + 8 \ (R-14)$ with $S \geq 100$</td>
<td>$S \geq 1600 \ (t_1+t_2) + 8 \ (R-14)$ with $S \geq 500$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>if $S \geq 500$, then use:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$S \geq 1600 \ (t_1+t_2) + 8 \ (R-14)$ with $S \geq 500$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parallel approach</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Diagram" /></td>
<td>$S \geq 1600 \ (t_1+t_2)+(1200 - 0.4H)$, with $H \leq 875$</td>
<td>or $S \geq 1600 \ (t_1+t_2)+850$, with $875 \leq H \leq 1000$ with $H \geq 15 \ (R-50)$: $H \geq 300 \ mm$ for the FF-SYB30 with 2-beam floating blanking. $H \geq 600 \ mm$ for the FF-SYB50 with 1-beam floating blanking FF-SYB50 with 2-beam floating blanking not allowed in parallel approach.</td>
<td></td>
</tr>
<tr>
<td>Angled approach</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Diagram" /></td>
<td>if $\alpha \geq 30^\circ$, then use the normal approach formula, with $Hu \geq 900 \ mm$ and $Hl \leq 300 \ mm$</td>
<td>if $\alpha \leq 30^\circ$, then use the parallel approach formula, with $Hu \leq 1000 \ mm$ and $Hl \geq 15 \ (R-50)$ where $R$ is the light curtain resolution $Hi \geq 300 \ mm$ for the FF-SYB30 with 2-beam floating blanking $Hi \geq 600 \ mm$ for the FF-SYB50 with 1-beam floating blanking FF-SYB50 with 2-beam floating blanking not allowed in angled approach.</td>
<td></td>
</tr>
</tbody>
</table>

$t_1$: light curtain response time (s)
$t_2$: 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

<table>
<thead>
<tr>
<th>FF-SYB14, FF-SYB30, FF-SYB50 with or without floating blanking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal approach</td>
</tr>
</tbody>
</table>

\[ D_s \geq 63 \ (T_s + T_c + T_r) + D_{pf} \]

- If \( R \leq 2.5 \), \( D_{pf} = 3.4 \times (R - 0.275) \), (see table below)
- If \( H_i \leq 12 \) and \( H_u \geq 48 \) (Typical for Reach Thru), \( D_{pf} = 36 \)
- If \( H_i \leq 12 \) and \( 36 \leq H_u \leq 48 \) (Typical for Reach Over), \( D_{pf} = 48 \)
- If \( H_i > 12 \), supplemental safeguarding may be required to detect crawling underneath.

| Parallel approach |

\[ D_s \geq 63 \times (T_s + T_c + T_r) + 48 \]

\[ H \geq 15 \times (R - 2) \]

<table>
<thead>
<tr>
<th>Table for ( H^* )</th>
<th>No blanking</th>
<th>1-beam</th>
<th>2-beam</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYB14</td>
<td>0 &lt; ( H \leq 39 )</td>
<td>0 &lt; ( H \leq 39 )</td>
<td>0 &lt; ( H \leq 39 )</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>0 &lt; ( H \leq 39 )</td>
<td>0 &lt; ( H \leq 39 )</td>
<td>11.3 &lt; ( H \leq 39 )</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>0 &lt; ( H \leq 39 )</td>
<td>23.1 &lt; ( H \leq 39 )</td>
<td>Not allowed</td>
</tr>
</tbody>
</table>

*If \( H > 12 \), supplemental safeguarding may be required to detect crawling underneath.

| Angled approach |

If \( \alpha < 30^\circ \), then use the normal approach formula
If \( \alpha < 30^\circ \), then use the parallel approach formula

<table>
<thead>
<tr>
<th>Table for ( D_{pf} )</th>
<th>No blanking</th>
<th>1-beam</th>
<th>2-beam</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYB14</td>
<td>0.935</td>
<td>2.261</td>
<td>3.587</td>
</tr>
<tr>
<td>FF-SYB30</td>
<td>3.077</td>
<td>5.763</td>
<td>-</td>
</tr>
<tr>
<td>FF-SYB50</td>
<td>5.763</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

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 ±10°).
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)
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.

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.
**Fixed post for FF-SYB light curtain**
(Recommended when the mechanical protection of the light curtain is required)

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

**FF-SXZ630170**
Pair of fixed posts for FF-SYB light curtain

**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 / ø1/46 in fixing holes, 100 mm / 3.94 in pitch
- Rail mounting: 3 pairs of ø5.5 mm / ø1/46 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).

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 ±11° 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-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

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 ±45°

Material: Aluminium alloy housing
Finish: Gold colour anodisation

Ordering guide:

<table>
<thead>
<tr>
<th>Ordering guide</th>
<th>FF-SYB032 and FF-SYB048</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYZMIR004</td>
<td>FF-SYZMIR006</td>
</tr>
<tr>
<td>FF-SYZMIR008</td>
<td>FF-SYZMIR010</td>
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<td>FF-SYZMIR012</td>
<td>FF-SYZMIR014</td>
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<tr>
<td>FF-SYZMIR016</td>
<td>FF-SYZMIR018</td>
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<td>FF-SYZMIR020</td>
<td>FF-SYZMIR024</td>
</tr>
<tr>
<td>FF-SYZMIR028</td>
<td>FF-SYZMIR032</td>
</tr>
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<td>FF-SYZMIR040</td>
<td>FF-SYZMIR064</td>
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<td>FF-SYZMIR080</td>
<td>FF-SYZMIR104</td>
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<td>FF-SYZMIR106</td>
<td>FF-SYZMIR112</td>
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<tr>
<td>FF-SYZMIR144</td>
<td>FF-SYZMIR160</td>
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<td>FF-SYZMIR176</td>
<td>FF-SYZMIR192</td>
</tr>
<tr>
<td>FF-SYZMIR200</td>
<td>FF-SYZMIR216</td>
</tr>
<tr>
<td>FF-SYZMIR224</td>
<td>FF-SYZMIR232</td>
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<td>FF-SYZMIR240</td>
<td>FF-SYZMIR256</td>
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<td>FF-SYZMIR264</td>
<td>FF-SYZMIR280</td>
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<td>FF-SYZMIR344</td>
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<td>FF-SYZMIR456</td>
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<td>FF-SYZMIR672</td>
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<tr>
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<td>FF-SYZMIR696</td>
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<td>FF-SYZMIR720</td>
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<td>FF-SYZMIR728</td>
<td>FF-SYZMIR744</td>
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<td>FF-SYZMIR864</td>
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<tr>
<td>FF-SYZMIR872</td>
<td>FF-SYZMIR888</td>
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<tr>
<td>FF-SYZMIR904</td>
<td>FF-SYZMIR920</td>
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<tr>
<td>FF-SYZMIR928</td>
<td>FF-SYZMIR944</td>
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<td>FF-SYZMIR968</td>
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<td>FF-SYZMIR976</td>
<td>FF-SYZMIR992</td>
</tr>
<tr>
<td>FF-SYZMIR1000</td>
<td>FF-SYZMIR1024</td>
</tr>
</tbody>
</table>

**FF-SXZSHL**

IP67 enclosure for FF-SYB light curtains

<table>
<thead>
<tr>
<th>Enclosures</th>
<th>Light curtains</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SXZSHL048</td>
<td>FF-SYB032 and 048</td>
</tr>
<tr>
<td>FF-SXZSHL096</td>
<td>FF-SYB064 through 096</td>
</tr>
<tr>
<td>FF-SXZSHL128</td>
<td>FF-SYB112 and 128</td>
</tr>
<tr>
<td>FF-SXZSHL144</td>
<td>FF-SYB144</td>
</tr>
<tr>
<td>FF-SXZSHL176</td>
<td>FF-SYB176</td>
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<td>FF-SYB204</td>
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<td>FF-SYB640</td>
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</tr>
<tr>
<td>FF-SXZSHL968</td>
<td>FF-SYB992</td>
</tr>
<tr>
<td>FF-SXZSHL992</td>
<td>FF-SYB1016</td>
</tr>
</tbody>
</table>

□: "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

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

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-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
- cross-fault 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

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.
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.

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.

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.
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.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service

Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact a nearby sales office or:

INTERNET: www.honeywell.com/sensing
E-mail: info.so@honeywell.com
Type 4 Safety light curtain
Compact, Universal, Smart and Full-featured

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
• Two, three and four beam versions for access and beam detection
• Scanning range up to 80 m / 262.4 ft
• M12 connectors
• Mounting brackets included allowing multiple mounting positions
• Safety relay modules for more switching capability (to be ordered separately).

TYPICAL APPLICATIONS
• Access detection to robot areas
• Stacking machines, transporting and conveyor technology
• Handling equipment and assembly lines
• Palletizing industry

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). Its CSA mark 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 reducing 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.

The long scanning distance ensures that most perimeter guarding applications are covered. The optional FF-SYZPF floor mounting posts with individual mirrors can be used to protect several sides of a machine with only one system.

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 made free again, 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:**

- SM1 contact
- SM3 contact
- SM2 contact
- SM4 contact
- 24 Vdc
- 0 Vdc
- FF-SYB receiver
- unit M12 connector
- Pin 3
- Pin 4

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**

With the exception of the 2-beam FF-SYB02, the FF-SYB234 systems are 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 3 - Uni-directional application with four optoelectronic sensors**

**Muting sensors connection:**

- SM1 contact
- SM2 contact
- 24 Vdc
- 0 Vdc
- SM3 contact
- SM4 contact
- FF-SYB receiver
- unit terminal strip
- Pin 3
- Pin 4

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).

(*) 1 beam only for the 3-beam FF-SYB03 model, 1 or 2 beam for the 4-beam FF-SYB04 model.
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

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

Configuration cards

The FF-SYB emitter and receiver are setup in the required configuration through 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

<table>
<thead>
<tr>
<th>Range</th>
<th>Minimum</th>
<th>Medium</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 m to 7 m</td>
<td>4 m to 15 m</td>
<td>10 m to 30 m</td>
</tr>
<tr>
<td></td>
<td>0 ft to 23 ft</td>
<td>13.1 ft to 49.2 ft</td>
<td>32.8 ft to 98.4 ft</td>
</tr>
<tr>
<td>Long range</td>
<td>5 m to 18 m</td>
<td>15 m to 40 m</td>
<td>35 m to 80 m</td>
</tr>
<tr>
<td></td>
<td>16.4 ft to 59.1 ft</td>
<td>49.2 ft to 131.2 ft</td>
<td>114.8 ft to 262.5 ft</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Position</th>
<th>23% NO</th>
<th>50% NO</th>
<th>100% NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Test input type

Figure 9

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

<table>
<thead>
<tr>
<th>Features</th>
<th>Type</th>
<th>FF-SYB02500</th>
<th>FF-SYB03400</th>
<th>FF-SYB04300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of beams</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Beam spacing (mm)</td>
<td>500 / 19.7 in</td>
<td>400 / 15.76 in</td>
<td>300 / 11.82 in</td>
<td></td>
</tr>
<tr>
<td>Nominal scanning range</td>
<td>Standard range: 0 to 30 m/0 to 98.4 ft • Long range: 5 to 80 m/16.4 to 262.5 ft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angle of divergence</td>
<td>±2°, ±2.5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emitting light source (immunity)</td>
<td>Infrared, pulsed, 880 nm (Sunlight: 20 000 Lux • Lamplight: 15 000 Lux)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply voltage and power consumption</td>
<td>24 Vdc (±20%); 5 W max. for the emitter, 5 W max. for the receiver</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety outputs (OSSDs) Output type</td>
<td>2 safety static (solid state) outputs (PNP with NO characteristics) with permanent short-circuit and cross-fault detections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switching capability</td>
<td>350 mA max. at 24 Vdc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>22 ms (beam interruption), 28 ms (Auxiliary Safety Device engaged)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum cable length</td>
<td>100 m / 328 ft (100 nF capacitance)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loads impedance</td>
<td>&gt; 1 s (80 ms without EDM, 150 ms with EDM)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage drop</td>
<td>70 Ω min. / 5 kΩ max.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loads turn-on voltage</td>
<td>&lt; 2 Vdc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protections</td>
<td>Short-circuits and cross-faults, overloads, reversed polarity, micro-cut-off</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-</td>
<td>(10 ms, 100% voltage drop, 10 Hz)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NC signalling or muting lamp/diagnosis output</td>
<td>1 PNP non safety output, NC (signalling contact) or NO (muting/diagnostic indication)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input type</td>
<td>100 mA max. at 24 Vdc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test input (emitter) (1)</td>
<td>Floating input with selectable NO/NC test logic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switching capability</td>
<td>Relay contact, or static (solid state) PNP or static (solid state) NPN (must be activated for at least 20 ms)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External contact type</td>
<td>13 mA typical (750 Ω max.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test loop current (resistance)</td>
<td>3000 Vdc galvanic insulation, reversed polarity, micro-cut-off (14 ms)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protections</td>
<td>Relay contact (must be activated for at least 150 ms, and less than 3 s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restart / EDM input (1)</td>
<td>29 Vdc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External contact type</td>
<td>Relay contact, or static (solid state) PNP or static (solid state) NPN (automatic recognition)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. voltage</td>
<td>100 m / 328 ft (no limitation in capacitance)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutting or serial connection inputs (1)</td>
<td>Emitter: M12/5 pole male receptacle •</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switching capability</td>
<td>Receiver: M12/8 pole male receptacle or terminal strip with M20 cable gland</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test input (emitter) (1)</td>
<td>(see Figure 10 to determine possible modes of operation for each receiver termination type)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test loop current (resistance)</td>
<td>Emitter: polycarbonate (end caps) •</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Front plate: polymethylmethacrylate (PMMA) •</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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
- Vibration: 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
- Shock: 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
- Width: 42 mm (1.65 in); depth: 55 mm (2.16 in); height (2)

NOTICE

NON COMPLIANCE TO ANSI/RIA 15.06-1999 WITH FF-SYB02500
- Only the three beam (FF-SYB03400 Series) and the four beam versions (FF-SYB04300 Series) are in compliance with the beam heights, specified in the US Standard ANSI/RIA R15.06-1999 (Industrial Robots and Robot Systems - Safety Requirements). The two beam version (FF-SYB02500 Series) does NOT comply with ANSI/RIA R15.06 and may require additional protection.
- Refer to applicable standards. In the absence of an applicable standard, ANSI B11.19 and ANSI R15.06 may be used as references for the USA, as well as EN 999 (or the relevant European Type C machine standard) for Europe.
- Verify compliance with ANSI/RIA R15.06 and possibly implement additional protection when floating blanking is used on the 4-beam FF-SYB04 series.
### Figure 10 - Possible modes of operation and corresponding receiver termination type and connexion box

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

(1) Factory setting: card #04

(2) Rotating blanking

<table>
<thead>
<tr>
<th>FF-SYB02</th>
<th>Not available</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYB03</td>
<td>1-beam only</td>
</tr>
<tr>
<td>FF-SYB04</td>
<td>1 or 2 beam</td>
</tr>
</tbody>
</table>

(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

<table>
<thead>
<tr>
<th>Reference</th>
<th>Number of beams</th>
<th>Beam spacing BS</th>
<th>Total height TH (cable gland version)</th>
<th>A</th>
<th>B</th>
<th>Weight per device</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYB02500</td>
<td>2</td>
<td>500 / 19.70</td>
<td>744 / 29.3 (758 / 29.8)</td>
<td>149 / 5.87</td>
<td>87 / 3.42</td>
<td>1.42 / 3.12</td>
</tr>
<tr>
<td>FF-SYB03400</td>
<td>3</td>
<td>400 / 15.76</td>
<td>1064 / 41.9 (1078 / 42.4)</td>
<td>169 / 6.65</td>
<td>87 / 3.42</td>
<td>1.98 / 4.35</td>
</tr>
<tr>
<td>FF-SYB04300</td>
<td>4</td>
<td>300 / 11.82</td>
<td>1064 / 41.9 (1078 / 42.4)</td>
<td>69 / 2.72</td>
<td>87 / 3.42</td>
<td>1.98 / 4.35</td>
</tr>
</tbody>
</table>

**Figure 11 - Dimensions in mm / in**

3 beam version with M12 connector (emitter or receiver)

3 beam version with terminal strip (receiver only)
LED status indicators

Figure 12 - Emitter

- 3 scanning range indicators R1, R2, R3 (yellow)
- Alarm indicator (red)
- Test indicator (red)

Figure 13 - Receiver

- 2 operation indicators (red and green)
- Signal strength indicator (orange)
- Cross-talk indicator (red)
- Muting indicator (orange)
- 2 blanking indicators (yellow)

Restart indicator (yellow)

No blanking
1 blanking
2 blanking

 Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
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)

Option 1: TMM HOLD-TO-RUN DEVICE
Option 2: TMM HOLD-TO-RUN DEVICE
Option 3: The Auxiliary Safety Device (ASD) shall have either relay outputs or static (solid state) outputs. In any case, compliance with as shown polarity is mandatory.
**WARNING**

INCREASED SAFETY DISTANCE DUE TO FLOATING BLANKING

Modify the safety distance between the light curtain and the hazardous area according to the instructions in this chapter.

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

### European EN 999 standard

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

<table>
<thead>
<tr>
<th>FF-SYB234 Multibeam System</th>
<th>FF-SYB02500</th>
<th>FF-SYB03400</th>
<th>FF-SYB04300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of beams</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Beam spacing</td>
<td>500</td>
<td>400</td>
<td>300</td>
</tr>
<tr>
<td>Recommended beam heights above the reference plane per EN 999</td>
<td>Hi = 400 (lowest beam)</td>
<td>Hi = 300 (lowest beam) 700 (intermediate beam)</td>
<td>Hi = 300 (lowest beam) 600 (intermediate beam) 900 (intermediate beam)</td>
</tr>
<tr>
<td></td>
<td>Hu = 900 (uppermost beam)</td>
<td>Hu = 1100 (uppermost beam)</td>
<td>Hu = 1200 (uppermost beam)</td>
</tr>
</tbody>
</table>

Normal approach

\[ S \geq 1600 (t_1 + t_2) + 850 \]

\( t_1 \): light curtain response time (s)
\( t_2 \): machine stopping time (s)

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)

<table>
<thead>
<tr>
<th>FF-SYB234 Multibeam System</th>
<th>FF-SYB03400</th>
<th>FF-SYB04300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of beams</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Beam spacing</td>
<td>15.76</td>
<td>11.82</td>
</tr>
<tr>
<td>Beam heights above the reference plane</td>
<td>11.82</td>
<td>27.58</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Normal approach

\[ D_s \geq 63 (T_s + T_c + T_r) + D_{pf} \]

If \( H_i < 12 \) and \( 36 \leq H_u \leq 48 \)
then \( D_{pf} = 48 \) (Reach Over)

If \( H_i \leq 12 \) and \( H_u > 48 \)
then \( D_{pf} = 36 \) (Reach Thru)

If \( H_i > 12 \), supplemental safeguarding may be required to detect crawling underneath.

\( T_s \): worst case stopping time of the machine (s)
\( T_c \): worst case response time of the machine
\( T_r \): response time of the safety devices (s)
\( D_{pf} \): Depth penetration factor (in.)

**NOTICE**

NON COMPLIANCE TO ANSI/RIA 15.06-1999 WITH FF-SYB02500

- Only the three beam (FF-SYB03400 Series) and the four beam versions (FF-SYB04300 Series) are in compliance with the beam heights, specified in the US Standard ANSI/RIA R15.06-1999 (Industrial Robots and Robot Systems - Safety Requirements). The two beam version (FF-SYB234 Series) does NOT comply with ANSI/RIA R15.06 and may require additional protection.
- Refer to applicable standards. In the absence of an applicable standard, ANSI B11.19 and ANSI R15.06 may be used as reference for the USA, as well as EN 999 (or the relevant European Type C machine standard) for Europe.
- Verify compliance with ANSI/RIA R15.06 and possibly implement additional protection when floating blanking is used on the 3-beam or 4-beam FF-SYB234 system.

For more information, refer to the ANSI/RIA 15.06 American standard.
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 ±10°).
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).
FF-SYB

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 azimuth directions of max. ± 45°)

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)

---

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 azimuth directions of max. ± 45°)

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)

---

FF-SYZ634178

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 azimuth directions of max. ± 45°)

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)

---

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 vibration, 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.
Fixed post for FF-SYB light curtain
(recommended when mechanical protection of the light curtain is required)
To be ordered separately as an option (order 2 pieces 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).
### Part Listings (*

<table>
<thead>
<tr>
<th>Part Listings (*)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYZPF02</td>
<td>Floorstanding post with 2 individual mirrors for use with the FF-SYB2500 multibeam system (*)</td>
</tr>
<tr>
<td>FF-SYZPF12</td>
<td>Floorstanding post with 3 individual mirrors for use with the FF-SYB3400 multibeam system (*)</td>
</tr>
<tr>
<td>FF-SYZPF03</td>
<td>Floorstanding post with 4 individual mirrors for use with the FF-SYB04300 multibeam system (*)</td>
</tr>
</tbody>
</table>

(*) FF-SYZPF0: 10 % loss per mirror
FF-SYZPF1: 25 % loss per mirror
(to be ordered separately as an option)

Front covers are available for additional protection of the FF-SYB234 beam access detection systems:
- FF-SYZB30184-2: Front cover for 2 beams
- FF-SYZB30184-3: Front cover for 3 beams
- FF-SYZB30184-4: Front cover for 4 beams

To be ordered separately as an option.

### Enclosures

<table>
<thead>
<tr>
<th>Enclosures</th>
<th>Light curtains</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SXZSHL096</td>
<td>FF-SYB234</td>
</tr>
<tr>
<td>FF-SXZSHLKIT</td>
<td>Brackets and cable gland kit (order 1 kit per enclosure)</td>
</tr>
</tbody>
</table>

□: “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 808000PO2M... 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).

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, FSF monitoring
- crossfault monitoring of inputs
- 3 NO safety relay outputs
- static outputs for output status and diagnostic information
- 45 mm / 1.77 in

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
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

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.

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**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.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service

Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact a nearby sales office or:

INTERNET: www.honeywell.com/sensing
E-mail: info.sc@honeywell.com
Safety 2-beam system for access detection
with passive deflecting mirrors

FEATURES
• 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
• Model with integrated muting lamp
• Enhanced diagnostic information includes the following indication: cross-talk, muting, restart and failure diagnostic
• Scanning range up to 7 m / 22.9 ft
• M12 connector
• Mounting brackets included allowing multiple mounting positions
• Safety relay modules for more switching capability (to be ordered separately).

TYPICAL APPLICATIONS
• Access detection to robot areas
• Stacking machines, transporting and conveyor technology
• Handling equipment and assembly lines
• Palletizing industry

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). Its CSA mark 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 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 reducing 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 active unit. Muting sensors must be successively actuated for a correct muting sequence to start.

Whenever one of the two muting sensors is made free again, 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 active unit to drive an external muting indicator that should be installed in a suitable location on the machine. A specific model integrates the muting lamp, reducing time spent on wiring.
The following are some configuration examples when using the muting function:

**Figure 1** - Bi-directional application with two optoelectronic sensors

![Diagram of 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.

![Diagram of bi-directional application with four photoelectric sensors]

**Figure 3** - Uni-directional application with four optoelectronic sensors

![Diagram of uni-directional application with four optoelectronic sensors]

Note: this mode of operation requires direct connections to the active unit internal terminal strip. A M20 cable gland is available as an option.

Muting sensors connection:

- SM1 contact
- SM2 contact
- SM3 contact
- SM4 contact
- 24 Vdc
- 0 Vdc
- FF-SYB active unit M12 connector
- Pin 3
- Pin 4
Serial connection

The FF-SYB safety light curtain allows the connection of another safety device with dual outputs through 2 inputs on the active 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.

Configuration cards

The FF-SYB active unit is setup in the required configuration through the use of a configuration card, 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 active unit. The selected settings are written on the configuration card and are visible through the transparent front window.

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.
Type 4 safety light curtain

- Type 4 according to the IEC/EN 61496 - parts 1 and 2 standards
- Built-in muting, inputs for serial connection of an auxiliary device, manual restart and EDM
- Enhanced diagnostic information

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

<table>
<thead>
<tr>
<th>Features</th>
<th>Number of beams</th>
<th>Beam spacing</th>
<th>Nominal scanning range</th>
<th>Angle of divergence</th>
<th>Emitting light source (immunity)</th>
<th>Supply voltage and power consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>500 mm / 19.7 in</td>
<td>0 to 7 m / 0 to 22.9 ft</td>
<td>max. ±2.5°</td>
<td>Infrared, pulsed, 880 nm (Sunlight: 20 000 Lux • Lamplight: 15 000 Lux)</td>
<td>24 Vdc (±20 %); 5,2 W max.</td>
</tr>
</tbody>
</table>

### Safety outputs (OSSDs)

<table>
<thead>
<tr>
<th>Output type</th>
<th>2 safety static (solid state) outputs (PNP with NO characteristics) with permanent short-circuit and cross-fault detections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching capability</td>
<td>350 mA max. at 24 Vdc</td>
</tr>
<tr>
<td>Response time</td>
<td>22 ms (beam interruption), 28 ms (Auxiliary Safety Device engaged)</td>
</tr>
<tr>
<td>Maximum cable length</td>
<td>100 m / 328 ft (100 nF capacitance)</td>
</tr>
<tr>
<td>Restart time after power up (after beam actuation)</td>
<td>&gt; 1 s (80 ms without EDM, 150 ms with EDM)</td>
</tr>
<tr>
<td>Loads impedance</td>
<td>70 Ω min. / 5 kΩ max.</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>&lt; 2 Vdc</td>
</tr>
<tr>
<td>Loads turn-on voltage</td>
<td>5 V min. on resistive loads / 7 V min. on inductive loads</td>
</tr>
<tr>
<td>Protections</td>
<td>Short-circuits and cross-faults, overloads, reversed polarity, micro-cut-off (10 ms, 100% voltage drop, 10 Hz)</td>
</tr>
</tbody>
</table>

### NC signalling or muting lamp/diagnosis output

<table>
<thead>
<tr>
<th>Output type</th>
<th>1 PNP non safety output, NC (signalling contact) or NO (muting/diagnostic indication)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching capability</td>
<td>100 mA max. at 24 Vdc (50 mA for models integrating the muting lamp)</td>
</tr>
<tr>
<td>Protections</td>
<td>Overloads, reversed polarity, micro-cut-off (10 ms, 100% voltage drop, 10 Hz)</td>
</tr>
</tbody>
</table>

### Restart / EDM input (1)

<table>
<thead>
<tr>
<th>External contact type</th>
<th>Relay contact (must be activated for at least 150 ms, and less than 3 s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. voltage</td>
<td>29 Vdc</td>
</tr>
</tbody>
</table>

### Mutting or serial connection inputs (1)

<table>
<thead>
<tr>
<th>External contact type</th>
<th>Relay contact, or static (solid state) PNP or static (solid state) NPN (automatic recognition)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum cable length</td>
<td>100 m / 328 ft (no limitation in capacitance)</td>
</tr>
</tbody>
</table>

### Environmental/physical characteristics

- **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

| 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 |
| IEC/EN 61496-1: | 15 G - 11 ms - 3 per axis, for 3 axes |
| IEC/EN 61496-1: | 10 G - 16 ms - 1000 per axis, for 3 axes |

### Vibrations

| Width: 42 mm (1.65 in); depth: 55 mm (2.16 in); height: see Figure 7 |

### Shocks

| IEC/EN 61496-1: | 10 G - 16 ms - 1000 per axis, for 3 axes |

### Bumps

| IEC/EN 61496-1: | 10 G - 16 ms - 1000 per axis, for 3 axes |

### Product dimension and weight

| Housing: aluminium alloy and (conductive) polycarbonate (end caps) • Front plate: polymethylmethacrylate (PMMA) |

### Ordering information

Each listing consists of an active unit and a passive unit with mounting kit. Configuration cards and cordsets are available separately.

- **FF-SYB02500 M 2-Z**
  - blank: no muting lamp
  - ML: with muting lamp

### 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.

### NOTICE

NON COMPLIANCE TO ANSI/RIA 15.06-1999 WITH FF-SYB02500

- This two beam version does NOT comply with ANSI/RIA R15.06 and may require additional protection.
- Refer to applicable standards. In the absence of an applicable standard, ANSI B11.19 and ANSI R15.06 may be used as reference for the USA, as well as EN 999 (or the relevant European Type C machine standard) for Europe.
(1) Factory setting: card #18. For other modes of operation, the configuration cards must be ordered separately (see Accessories section).

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

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

(4) Termination: some modes require direct connections to the internal active unit terminal strip. A M20 cable gland (available as an option) allows the use of a male M23 cordset (customer supplied).
Table 2

<table>
<thead>
<tr>
<th>Number of beams</th>
<th>Beam spacing BS</th>
<th>Total height TH (cable gland version)</th>
<th>A</th>
<th>B</th>
<th>Weight per device</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mm / in</td>
<td>mm / in</td>
<td>mm / in</td>
<td>mm / in</td>
<td>kg / lbs</td>
</tr>
<tr>
<td>2</td>
<td>500 / 19.70</td>
<td>744 / 29.3 (758 / 29.8)</td>
<td>149 / 5.87</td>
<td>87 / 3.42</td>
<td>1.42 / 3.12</td>
</tr>
</tbody>
</table>

Figure 7 - Dimensions in mm / in

Active unit (with optional muting lamp)

Passive unit
### LED status indicators

**Figure 8 - Active unit**

- 2 operation indicators (red and green)
- Signal strength indicator (orange)
- Cross-talk indicator (red)
- Muting indicator (orange)
- 2 blanking indicators (yellow)

### Wiring

**Figure 9 - Recommended wiring diagram for a 2-sensor muting application with manual restart and Temporary Manual Muting (TMM) (see Figure 1)**

- FF-SYB Active unit
- OSSD1
- OSSD2
- FF-SRE60292 control module
- Dual channel machine control circuit
- 24 Vdc
- 0 Vdc
- Lead indicator
- Restart indicator (yellow)
- EDM / Restart
- Muting 1 (2)
- Muting 2 (2)
- Fuse
- LED status indicators
- 2 operation indicators (red and green)
- Signal strength indicator (orange)
- Cross-talk indicator (red)
- Muting indicator (orange)
- 2 blanking indicators (yellow)
### European EN 999 standard

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

<table>
<thead>
<tr>
<th>Number of beams</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beam spacing</td>
<td>500</td>
</tr>
</tbody>
</table>
| Recommended beam heights above the reference plane per EN 999 | Hi = 400 (lowest beam)  
Hu = 900 (uppermost beam) |

#### Normal approach

\[ S \geq 1600 (t_1 + t_2) + 850 \]

- \( t_1 \): light curtain response time (s)  
- \( t_2 \): machine stopping time (s)

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.
Accessories

**FF-SYZ634178**
Kit of 2 right angle mounting brackets with screws, bolts, nuts and washers to mount one passive unit or one active unit.
Possible mounting positions:
1. At the top and the bottom of the FF-SYB (allowing adjustments in azimuth directions of ±10°).
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 passive and active unit.
(already included in the FF-SYB package).

**FF-SXZ634188**
Kit of 2 adjustable mounting brackets to mount one passive or one active unit, using one of the 2 lateral dovetail slots of the light curtain.
Allows adjustments in azimuth directions of ±5° with front access of the 2 adjusting screws.
Order 2 kits for a complete set of passive and active unit.
(to be ordered separately as an option)

**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.

**NOTICE**
**PROTECTION AGAINST HIGH VIBRATION**
In case of high vibration, order 2 sets of FF-SYZAD for a complete set of passive and active units.
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 passive / active 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 passive / active 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 passive / active set).

**FF-SYZPF**
Fixed post for FF-SYB light curtain
(recommended when mechanical protection of the light curtain is required)
To be ordered separately as an option (order 2 pieces for a complete FF-SYB passive / active set).

A front cover is available for additional protection:
FF-SYZ630184-2: Front cover for 2 beams
To be ordered separately as an option.

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 (for bi-directional muting only).
M20 cable gland

Receiver endcap with M20 cable gland.

*To be ordered separately as an option* (see figure 6).

Cordsets

**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 active unit

- FF-SXZCAM128U02-S 2 m / 6.56 ft length
- FF-SXZCAM128U05-S 5 m / 16.40 ft length
- FF-SXZCAM128U10-S 10 m / 32.8 ft length

Equivalent to the 808000P02M... Micro-change® Series from Brad Harrison

(see vendor catalog for color code)

**FF-SY2BR015T**

**Cable connector**

**M12 screw connector**, female / 8 pin straight for the FF-SYB active unit

**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).*

**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-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

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 active unit.

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.

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.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact a nearby sales office or:

INTERNET: www.honeywell.com/sensing
E-mail: info.sc@honeywell.com

This publication does not constitute a contract between Honeywell and its customers. The contents may be changed at any time without notice. It is the customer’s responsibility to ensure safe installation and operation of the products. Detailed mounting drawings of all products illustrated are available on request.

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Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Type 4 self-contained light curtain
For the protection of operators in Industry

FEATURES
- 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 lightweight 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

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 CSA 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.
**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

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

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Supply voltage</th>
<th>120/240 Vac (+10%, - 20%) 48 to 62 Hz(1)</th>
<th>24 to 48 Vdc(2) ±15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power consumption</td>
<td>8 VA (120/240 Vac), 8 W (24 to 48 Vdc)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switching capacity</td>
<td>2 A/250 Vac, 2 safety relays with guided contacts (50 mA min.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Profile: aluminium alloy yellow painted according to RAL 1021</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing size</td>
<td>56 mm / 2.20 in width, 116 mm / 4.57 in depth, height according to protection height</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emission</td>
<td>Modulated Light Source, infrared LED (880 nm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scanning frequency</td>
<td>9.6 kHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>ø22 mm / 0.86 in min. target size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alignment tolerance</td>
<td>±2° for emitter and receiver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>0 °C to 55 °C / 32 °F to 131 °F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sealing</td>
<td>IP 65 / NEMA 4 and 13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise immunity</td>
<td>According to IEC 801-4: level IV (120/240 Vac), level III (24 to 48 Vdc) according to IEC 801-3: level III</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resistance to ambient light</td>
<td>Sun: 20 000 Lux • Lamp: 15 000 Lux</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output indication</td>
<td>LEDs display on unit front face</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scanning distance</td>
<td>Standard: 0 m to 10 m / 0 ft to 32.8 ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical connection</td>
<td>Metal connectors DIN 43652</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Ordering information (Emitter/Receiver)**

FF-SB12E/R [Q] [Q] -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

**Protection Height (PH) (mm/in):**

- 02: 212.7 / 8.38
- 04: 415.9 / 16.38
- 06: 619.1 / 24.39

**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.
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)**

  \[ S \geq 2000 \ (t_1 + t_2) + 64 \ (\text{mm}) , \text{ with } S \geq 100 \ (\text{mm}) \]

  (or \[ S \geq 78.8 \ (t_1+t_2) + 2.5 \ (\text{in}) , \text{ with } S \geq 3.9 \ (\text{in}) \])

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

  \[ S \geq 1600 \ (t_1 + t_2) + 64 \ (\text{mm}) , \text{ with } S \geq 500 \ (\text{mm}) \]

  (or \[ S \geq 63 \ (t_1+t_2) + 2.5 \ (\text{in}) , \text{ with } S \geq 19.7 \ (\text{in}) \])


  \[ D_s \geq 63 \ (t_1 + t_2) + 2.01 \ (\text{in}) \quad D_s = S \]

  \( D_s: \) minimum safety distance (mm / in)

  \( t_1: \) response time of the light curtain (s)

  \( t_2: \) 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

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

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Supply voltage</th>
<th>Power consumption</th>
<th>Switching capacity</th>
<th>Material</th>
<th>Housing size</th>
<th>Emission</th>
<th>Scanning frequency</th>
<th>Resolution</th>
<th>Alignment tolerance</th>
<th>Ambient temperature</th>
<th>Sealing</th>
<th>Noise immunity</th>
<th>Resistance to ambient light</th>
<th>Output indication</th>
<th>Scanning distance</th>
<th>Electrical connection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>120/240 Vac (+10%, -20%)</td>
<td>8 VA per unit</td>
<td>2 A/250 Vac, 2 safety relays with guided contacts (50 mA min.)</td>
<td>Housing: Aluminium alloy yellow painted according to RAL 1021</td>
<td>Protection Height (PH)</td>
<td>HT</td>
<td>Modulated Light Source, infrared (880 nm)</td>
<td>ø35 mm, 1.38 in min. target size</td>
<td>±2° for emitter and receiver</td>
<td>0 °C to 55 °C / 32 °F to 131 °F</td>
<td>According to IEC 801-4: level IV (120/240 Vac), level III (24 to 48 Vdc)</td>
<td>LEDs display on unit front face</td>
<td>Standard: 0 m to 10 m / 0 ft to 32.8 ft</td>
<td>Metal connector DIN 43652</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>24 to 48 Vdc(1) ±15%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.6 kHz</td>
<td></td>
<td></td>
<td></td>
<td>IP 65 / NEMA 4 or 13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Ordering information (Emitter/Receiver)**

- FF-SB14E/R G6F/G6F/G6F -S/G6F

**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.
Safety distances

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)**

\[
S \geq 2000 (t_1 + t_2) + 168 \text{ (mm)}, \text{ with } S \geq 100 \text{ mm} \\
\text{or } S \geq 78.8 (t_1+t_2) + 6.6 \text{ (in)}, \text{ with } S \geq 3.9 \text{ in}
\]

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

\[
S \geq 1600 (t_1 + t_2) + 168 \text{ (mm)}, \text{ with } S \geq 500 \text{ mm} \\
\text{or } S \geq 63 (t_1+t_2) + 6.6 \text{ (in)}, \text{ with } S \geq 19.7 \text{ in}
\]


\[
D_s \geq 63 (t_1 + t_2) + 3.75 \text{ in} \\
D_s = S
\]

### Parallel approach

**Europe (EN 999)**

\[
S \geq 1600 (t_1 + t_2) + 1200-0.4H \text{ (mm)} \\
\text{where } (1200-0.4 H) \geq 850 \text{ mm} \\
\text{or } S \geq 63 (t_1+t_2) + 47.3-0.4H \text{ (in)} \\
\text{where } (47.3-0.4 H) \geq 33.5 \text{ in}
\]

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 \(H_{\text{min.}} = 0 \text{ mm}\) and the maximum height allowed is \(H_{\text{max.}} = 1000 \text{ mm} / 39.4 \text{ in}\).

### Angled approach

**Europe (EN 999)**

\[30^\circ < \alpha < 90^\circ\]

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

\[0^\circ < \alpha \leq 30^\circ\]

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 \(P_{\text{min.}} = 0 \text{ mm}\) and the maximum height allowed is \(H = 1000 \text{ mm} / 39.4 \text{ in}\). However, if \(P > 300 \text{ mm} / 11.82 \text{ in}\), the risk of inadvertent access from below must be taken into account.

\(S\): Minimum safety distance (mm / in)

\(t_1\): Response time of the light curtain (s)

\(t_2\): 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)

* 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).
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

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

<table>
<thead>
<tr>
<th>Specifications</th>
<th>120/240 Vac +10% -20%, 48 to 62 Hz</th>
<th>24 to 48 Vdc(1) ±15%</th>
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</thead>
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<td>Supply voltage</td>
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<td>24 to 48 Vdc(1) ±15%</td>
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</tr>
<tr>
<td>Material</td>
<td>Housing: aluminium alloy yellow painted according to RAL 1021</td>
<td></td>
</tr>
<tr>
<td>Housing size</td>
<td>56 mm / 2.20 in width, 116 mm / 4.57 in depth, height according to protection height</td>
<td></td>
</tr>
<tr>
<td>Scanning frequency</td>
<td>9.6 kHz</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>ø235 mm / 9.25 in minimum target size</td>
<td></td>
</tr>
<tr>
<td>Alignment tolerance</td>
<td>±2° for emitter and receiver</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>0 °C to 55 °C/ 32 °F to 131 °F</td>
<td></td>
</tr>
<tr>
<td>Sealing</td>
<td>IP 65 / NEMA 4 or 13</td>
<td></td>
</tr>
<tr>
<td>Noise immunity</td>
<td>According to IEC 801-4: level IV (120/240 Vac), level III (24 to 48 Vdc) according to IEC 801-3: level III</td>
<td></td>
</tr>
<tr>
<td>Resistance to ambient light</td>
<td>Sun: 20 000 Lux • Lamp: 15 000 Lux</td>
<td></td>
</tr>
<tr>
<td>Output indication</td>
<td>LEDs display on unit front face</td>
<td></td>
</tr>
<tr>
<td>Scanning distance</td>
<td>3 m to 24 m / 9.84 ft to 78.72 ft</td>
<td></td>
</tr>
<tr>
<td>Electrical connection</td>
<td>Metal connectors DIN 43652</td>
<td></td>
</tr>
<tr>
<td>Ordering information</td>
<td>(Emitter/Receiver) FF-SB15E/RJJJ-S2</td>
<td></td>
</tr>
<tr>
<td>Number of beam sets (PH: mm/in):</td>
<td>06: 2 sets of beams (620 / 24.42)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10: 3 sets of beams (1027 / 40.46)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14: 4 sets of beams (1434 / 56.49)</td>
<td></td>
</tr>
</tbody>
</table>

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.
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)*
  
  \[ S \geq 1600 (t_1 + t_2) + 850 \text{ (mm)} \]
  
  \[ (or \ S \geq 63 (t_1 + t_2) + 33.5 \text{ (in)}) \]

  *S:* Minimum safety distance (mm / in)
  
  *t_1:* Response time of the light curtain (s)
  
  *t_2:* 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-G6F-S2**
  - 400 / 900 mm / in
  - 15.76 / 35.46

- **FF-SB15E/R10-G6F-S2**
  - 300 / 700 / 1100 mm / in
  - 11.82 / 27.58 / 43.34

- **FF-SB15E/R14-G6F-S2**
  - 300 / 700 / 1100 / 1500 mm / in
  - 11.82 / 27.58 / 43.34 / 59.1
**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](image1)

**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](image2)

(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

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/G6F/G6F/G6F/G6F-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 AOX 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/FQ-S2 only.

( black epoxy painting)

Order 2 kits for a complete set (emitter and receiver)
SAFETY SENSITIVE EDGES

FEATURES

• Sensor based on an optoelectronic technology
• Meets the EN 1760-2 standard for Pressure Sensitive Protective Devices
• Permanent self-checking electronics designed in compliance with Category 4 per the EN 954-1 standard
• Protection lengths: from 0.4 to 10 m / 1.31 ft to 32.8 ft
• High resistance to environmental influences
• Robust against mechanical damage
• Sensors sealing: IP68
• Automatic gain control to adjust system to different protection lengths
• Low actuating force and high over-travel
• Supply Voltage: 24 Vdc
• Response Time of the control unit: 32 ms
• Manual or automatic restart
• LED status indicator
• Slim line 22.5 mm / 0.88 in width control unit

TYPICAL APPLICATIONS

• Machine guards, doors and hoods
• Machining centers
• Presses
• Welding machines
• Packaging machines
• Lifting decks, elevating platforms
• Material handling and feeding systems, robots
• Paternoster, theatre stages
• Automatic guided vehicles (AGV)
• Industrial washing machines

The Honeywell FF-SD Safety Sensitive Edge is a pressure sensitive protective device designed in compliance with the requirements of the EN 1760 part 2 European Standard for protection of operators exposed to hazardous moving parts.

Each safety edge system is made up of an emitter and a receiver, a rubber profile mounted on an aluminum rail and a control unit. The complete system complies with Category 4 per EN 954-1 European Standard and therefore can be used in high-risk applications.

The sensors mounted inside the hollow rubber profile use a pulsed infrared light beam to achieve a dynamic monitoring concept together with the control unit. If the light beam is attenuated, the control unit de-energizes its safety output relays.

The Safety Sensitive Edges can easily be adapted to different lengths thanks to an automatic gain control system. Thus, environmental influences like vibrations, dust, or profile damage can be compensated. The Safety Sensitive Edge can protect lengths from 0.4 m to 10 m / 1.31 ft to 32.8 ft.

The industrial rubber profile provides generally good chemical or mechanical resistance. A coated version of the rubber profile is available providing good oil resistance. The rubber profile can be replaced easily and quickly. The sensors, with an IP68 sealing, can be used in harsh industrial environments.

The slim line safety control unit easily fits inside the electrical cabinet and can be installed up to 200 meters away from the Safety Sensitive Edge.

⚠️ 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.
Selection of a Safety Sensitive Edge

The Safety Sensitive Edge is used to protect people from being injured by a moving part. In order to select the right Safety Sensitive Edge system, several parameters are required:

- Which safety category according to EN 954-1 does your application require?
- What is the maximal speed of the hazardous movement?
- What is the stopping travel of the moving part after a stop signal was sent from the control unit?
- What is the maximal permissible force? (depending on the part of body to be protected, e.g. fingers, hands etc.)
- What are the expected environmental specifications of the profil? (e.g. resistance to chemicals, oils etc.)

The minimum over travel required by the safety edge is determined from the measured or given stopping travel at maximum operating speed. The EN 1760-2 standard recommends a safety factor of at least 1.2 times the minimum distance.

If the application involves extremely frequent actuation, care should be taken to choose a profile that recovers its original shape as quickly as possible. Attention must also be paid to the construction of the opposite edge.

When the stopping travel and speed are known, the force-travel diagrams of the safety edges can be used to select the safety device with the required over travel and the required operating speed.

The stopping response time of the machine may have to be improved if no safety edge with sufficient over travel is available.

Installation of the safety edge

The aluminum rail is mounted on the moving part of the machine. To fix it, drill a hole approximately every 70 mm / 2.76 in distance and fix it to the application with the use of head or countersunk head screws (diameter 3 mm to 6 mm / 0.11 in to 0.23 in). The surface should be plain and clean.

The maximum length of the aluminum rail is 2,5 m / 8.2 ft. For lengths over 2,5 m / 8.2 ft, several units with standard size have to be mounted. Care must be taken that neither misalignment nor bends occur (do not exceed 30°).

Slide or clip the sensor profile into the rail. If the safety sensitive edge is mounted vertically, the profile has to be fixed to avoid slipping off the aluminum rail.

The sensors can be wired to the control unit directly or through the junction box. The coil cord is used when the door's motion can damage the cable. A special version of the sensors offering polyester coated cables for better flexibility can also be used for this type of application.
Ordering Information

Rubber profiles and aluminum rails

<table>
<thead>
<tr>
<th>Profile</th>
<th>Code</th>
<th>Dimensions</th>
<th>Available lengths</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SDZP 2530</td>
<td>30 mm x 25 mm rubber profile</td>
<td>[\phi 10.7/0.42]</td>
<td>(01 = 1 \text{ m}, 3.28 \text{ ft}), 25 = 2.5 m / 8.2 ft</td>
</tr>
<tr>
<td>FF-SDZP 3090</td>
<td>90 mm x 30 mm rubber profile</td>
<td>[\phi 10.9/0.43]</td>
<td>(01 = 1 \text{ m}, 3.28 \text{ ft}), 25 = 2.75 m / 9.0 ft</td>
</tr>
</tbody>
</table>

Profile versions:

- **R** = standard profile
- **C** = special coated profile (good oil resistance)

<table>
<thead>
<tr>
<th>Available lengths</th>
<th>FF-SDZP 2530</th>
<th>FF-SDZP 3090</th>
</tr>
</thead>
<tbody>
<tr>
<td>(01) = 1 m / 3.28 ft.</td>
<td>25 = 2.5 m / 8.2 ft.</td>
<td></td>
</tr>
<tr>
<td>(05) = 5 m / 16.4 ft.</td>
<td>(10) = 10 m / 32.8 ft.</td>
<td></td>
</tr>
<tr>
<td>(10) = 10 m / 32.8 ft.</td>
<td>(00) = 25 m / 82.02 ft.</td>
<td></td>
</tr>
</tbody>
</table>

**FF-SDER11A2**
Safety Sensors with standard cable
The FF-SDER11A2 version is recommended when the sensor cable is not in movement.

**FF-SDER11B2**
Safety sensor with special flexible cable
The FF-SDER11B2 version has polyester coated wires inside the sensor cable for better flexibility, and is recommended in applications where the sensor cable is in movement.

---

**FF-SDER11A2**

**Safety Control Unit**

**FF-SDC100R2**

**Accessories (optional)**

**FF-SDZCOIL**

Coil cord

The coil cord is used as a flexible connection between the junction box mounted on the moving part and the control unit. The maximum cable extension is 3 meters.

**FF-SDZJUNCA**

Junction Box

The junction box is used for the cable connection between emitter / receiver and the control unit (sealing: IP 65).
FF-SD

- Pressure sensitive protective device in compliance with the requirements of the EN 1760-2 standard
- Safety Sensitive Edge in compliance with the requirements of the EN 954-1 for Category 4 equipment

TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>CONTROL UNIT SPECIFICATIONS</th>
<th>FF-SDC100R2 control unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>24 Vdc -10% , +20%</td>
</tr>
<tr>
<td>Power consumption</td>
<td>&lt; 4 W</td>
</tr>
<tr>
<td>Response Time</td>
<td>32 ms</td>
</tr>
<tr>
<td>Safety outputs</td>
<td>2 NO safety relay contacts</td>
</tr>
<tr>
<td>Auxiliary outputs</td>
<td>1 NPN static non-safety output (NO characteristics)</td>
</tr>
<tr>
<td>Start modes</td>
<td>Manual or automatic</td>
</tr>
<tr>
<td>Max. operating voltage</td>
<td>250 Vdc/dc</td>
</tr>
<tr>
<td>Max. operating current</td>
<td>4 A resistive load</td>
</tr>
<tr>
<td>Mechanical lifetime</td>
<td>3 Million operations</td>
</tr>
<tr>
<td>Safety Category</td>
<td>Category 4 according to EN 954-1</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>+5 °C to +55 °C / +41 °F to +131 °F</td>
</tr>
<tr>
<td>Sealing</td>
<td>terminal strips: IP 20, housing: IP 40</td>
</tr>
<tr>
<td>Weight</td>
<td>0.2 kg / 0.44 lbs</td>
</tr>
</tbody>
</table>

PHOTOELECTRIC SENSORS SPECIFICATIONS

<table>
<thead>
<tr>
<th>FF-SDER11 2 SENSORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
</tr>
<tr>
<td>Scanning range</td>
</tr>
<tr>
<td>Emission</td>
</tr>
<tr>
<td>Voltage</td>
</tr>
<tr>
<td>Operating Temperature</td>
</tr>
<tr>
<td>Sealing</td>
</tr>
<tr>
<td>Length of the sensor cables</td>
</tr>
<tr>
<td>Max. cable length</td>
</tr>
<tr>
<td>Standard cable of FF-SDER11A2 sensors</td>
</tr>
</tbody>
</table>

GENERAL RUBBER PROFILE SPECIFICATIONS

<table>
<thead>
<tr>
<th>FF-SDZPR Series Standard profiles</th>
<th>FF-SDZPC Series Special coated profiles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material (Chemical marking)</td>
<td>Ethylen-Propylen-Ter-Polymer EPDM (APTK)</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>5 °C to 55 °C / 41 °F to 131 °F</td>
</tr>
<tr>
<td>Storage temperature:</td>
<td>-25 °C to +60 °C / -13 °F to 140 °F</td>
</tr>
<tr>
<td>Rebound elasticity at 20 °C / 68 °F</td>
<td>good</td>
</tr>
<tr>
<td>Resistance against permanent deformation</td>
<td>good</td>
</tr>
<tr>
<td>Sealing level</td>
<td>IP 67</td>
</tr>
<tr>
<td>Operating speed</td>
<td>max.: 100 mm/s</td>
</tr>
<tr>
<td>General weatherproofness</td>
<td>excellent</td>
</tr>
<tr>
<td>Ozone resistance</td>
<td>excellent</td>
</tr>
<tr>
<td>Oil resistance</td>
<td>poor</td>
</tr>
<tr>
<td>Fuel resistance</td>
<td>good</td>
</tr>
<tr>
<td>Chemical solvent resistance</td>
<td>poor to satisfying</td>
</tr>
<tr>
<td>General resistance against acids</td>
<td>good</td>
</tr>
</tbody>
</table>
SPECIFICATIONS OF THE FF-SDZP 2530 RUBBER PROFILE

<table>
<thead>
<tr>
<th>Technical specifications</th>
<th>Dimensions in mm / in</th>
<th>Effective sensing surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardness</td>
<td>60 Shore A</td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>30 mm</td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td>25 mm</td>
<td></td>
</tr>
<tr>
<td>Finger detection</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>0.3 kg / m</td>
<td></td>
</tr>
<tr>
<td>No-detection zone on the profile edges due to the inserted sensors</td>
<td>2 x 35 mm</td>
<td></td>
</tr>
<tr>
<td>Operating speed</td>
<td>Max. 100 mm / s</td>
<td></td>
</tr>
<tr>
<td>Force</td>
<td>Max 500 N applied over the total effective sensing edge surface</td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>5 °C to 55 °C / 41 °F to 131 °F</td>
<td></td>
</tr>
<tr>
<td>Sealing level</td>
<td>IP 67</td>
<td></td>
</tr>
</tbody>
</table>

The no-detection zone of 2 x 35 mm must be clearly indicated on the rubber profile.

The highest total actuating force applied over the effective sensing surface should be less than 500 N.

Force travel relation

Measuring parameters:
- Temperature: T = 23 °C
- Install position: B (per EN 1760-2)
- Measuring point: C3 (per EN 1760-2)
- Speed: 100 mm/s (from 0 to point A)
  10 mm/s (starting from point A)
- Actuation travel: 8 mm

Over travel = Total Travel – Pre-Travel

<table>
<thead>
<tr>
<th>Travel</th>
<th>Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 mm / 0.50 in</td>
<td>80 N</td>
</tr>
<tr>
<td>22 mm / 0.87 in</td>
<td>250 N</td>
</tr>
<tr>
<td>23 mm / 0.9 in</td>
<td>400 N</td>
</tr>
<tr>
<td>24 mm / 0.94 in</td>
<td>600 N</td>
</tr>
</tbody>
</table>
### SPECIFICATIONS OF THE FF-SDZP RUBBER PROFILE

<table>
<thead>
<tr>
<th>Specific profile data</th>
<th>Dimensions in mm / in</th>
<th>Effective sensing surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardness</td>
<td>60 Shore A</td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>90 mm</td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td>30 mm</td>
<td></td>
</tr>
<tr>
<td>Finger detection</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>0.9 kg / m</td>
<td></td>
</tr>
<tr>
<td>No-detection zone of</td>
<td>2 x 25 mm</td>
<td></td>
</tr>
<tr>
<td>on the profile edges</td>
<td></td>
<td></td>
</tr>
<tr>
<td>due to the inserted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sensors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating speed</td>
<td>Max. 100 mm / s</td>
<td></td>
</tr>
<tr>
<td>Force</td>
<td>Max 400 N applied</td>
<td></td>
</tr>
<tr>
<td></td>
<td>over the total effective</td>
<td></td>
</tr>
<tr>
<td></td>
<td>sensing edge surface</td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>5 °C to 55 °C /</td>
<td></td>
</tr>
<tr>
<td></td>
<td>41 °F to 131 °F</td>
<td></td>
</tr>
<tr>
<td>Sealing level</td>
<td>IP 67</td>
<td></td>
</tr>
</tbody>
</table>

The no-detection zone of 2 x 25mm must be clearly indicated on the rubber profile.

The highest total actuating force applied over the effective sensing surface should be less than 400 N.

#### Force travel relation

<table>
<thead>
<tr>
<th>Measuring parameters:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Temperature: T = 23 °C</td>
</tr>
<tr>
<td>• Install position: B (per EN 1760-2)</td>
</tr>
<tr>
<td>• Measuring point: C3 (per EN 1760-2)</td>
</tr>
<tr>
<td>• Speed: 100 mm/s (from 0 to point A)</td>
</tr>
<tr>
<td>10 mm/s (starting from A)</td>
</tr>
</tbody>
</table>

Over Travel = Total travel – Pre Travel

<table>
<thead>
<tr>
<th></th>
<th>Travel</th>
<th>Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>a1/2 = pre-travel</td>
<td>8.8 mm</td>
<td>40.5 N</td>
</tr>
<tr>
<td>b = working travel at 250 N</td>
<td>58.4 mm</td>
<td>250 N</td>
</tr>
<tr>
<td>c = working travel at 400 N</td>
<td>70.4 mm</td>
<td>400 N</td>
</tr>
<tr>
<td>d = total travel at 600 N</td>
<td>72.8 mm</td>
<td>600 N</td>
</tr>
</tbody>
</table>
Electrical connection

Connection to the FF-SDC100R2 control unit

- Connect the power supply to terminals A1(+) and A2(-).
- Connect the start/reset circuit:
  - **Manual start**: connect a normally open start/reset push-button in series with the normally closed contacts of external contactors K3 and K4 (when used) between X2 and X3.
  - **Automatic start**: connect a jumper between X2 and X3 or connect the normally closed contacts of external contactors K3 and K4 (when used) in series.
- Connect the emitter and receiver sensors as follows: connect the brown, white, green emitter and receiver wires to the brown, white, green terminals of the control unit.
- Connect the safety outputs: connect the normally open contacts 13/14 and 23/24 into the machine safety circuit.
- Use the auxiliary signal output X1 (NPN open collector) for signaling purpose.

The safety control unit FF-SDC100R2 has a DIN-rail mount housing:

- Connect the power supply to terminals A1(+) and A2(-).
- Connect the start / reset circuit:
  - **Manual start**: connect a normally open start/reset push-button in series with the normally closed contacts of external contactors K3 and K4 (when used) between X2 and X3.
  - **Automatic start**: connect a jumper between X2 and X3 or connect the normally closed contacts of external contactors K3 and K4 (when used) in series.
- Connect the emitter and receiver sensors as follows: connect the brown, white, green emitter and receiver wires to the brown, white, green terminals of the control unit.
- Connect the safety outputs: connect the normally open contacts 13/14 and 23/24 into the machine safety circuit.
- Use the auxiliary signal output X1 (NPN open collector) for signaling purpose.
Warranty and remedy
Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell’s standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, as its option, 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. In no event shall Honeywell be liable for our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service
Honeywell services its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact a nearby sales office or:
INTERNET: www.honeywell.com/sensing/safety
E-mail: info.scs@honeywell.com

Honeywell
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www.honeywell.com/sensing/safety
107096-20-EN FR26 GLO 0906 Printed in France

This publication does not constitute a contract between Honeywell and its customers. The contents may be changed at any time without notice. It is the customer’s responsibility to ensure safe installation and operation of the products. Detailed mounting drawings of all products illustrated are available on request.

Honeywell, 11 West Spring Street, Freeport, Illinois 61032, USA
www.honeywell.com/sensing/safety
The FF-SE laser scanner from Honeywell is a revolutionary product in the world of industrial safety. This device combines radar and laser principles to scan predefined zones around dangerous machinery or moving vehicles. In case of intrusion in these zones, output relays are immediately opened, eliminating the danger.

An infrared class 1 laser beam strikes a mirror rotating at 8 Hz, allowing it to sweep a 300° area. Any object with a minimum reflectivity of 1.8% (black target) will be detected in a 6 m / 19.7 ft radius. Two safety levels may be set through two zones that can have any shape:

- "alarm zone", in a 10 m / 32.8 ft radius around the FF-SE
- "safety zone" in a 6 m / 19.7 ft radius

These two zones are defined using the software (ordered separately), running on a computer connected to the FF-SE, which allows the areas to be protected to be displayed on the screen. The two zones correspond to two independent outputs, allowing multiple applications:

- the alarm zone can be used to trigger an acoustic or light signal when a person approaches, which indicates that there is a close danger, allowing the intruder to withdraw without stopping the machine.
- the safety zone is used to trigger the immediate stopping of the machinery (2 safety NO contacts).

Restart is automatic after clearing the zone. Use additional safety control module if manual restart is needed.

This system is unique because of its small resolution (0.5° in angle) and its excellent precision, while covering a wide area (262 m² / 2820 ft²). The FF-SE has been designed in agreement with the pr EN 61496-3 that will soon be brought into effect for this new kind of detecting device.

External and internal surveillance systems make it a Type 3 optoelectronic protective system. Its self-cleaning optical head and its good immunity to pollution guarantee a superior reliability.
FF-SE

- Objects and people protection
- Scanning angle up to 300°
- Surveillance up to 262 m² / 2820 ft²

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

<table>
<thead>
<tr>
<th>Features</th>
<th>Power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure and detection angle</td>
<td>24 Vdc, ± 15%</td>
</tr>
<tr>
<td>Consumption</td>
<td>0.75 A at 24 Vdc, rush at startup: 2 A during 100 ms</td>
</tr>
<tr>
<td>Detection distance</td>
<td>300°</td>
</tr>
<tr>
<td>Black target (1.8%): 6 m / 19.7 ft</td>
<td></td>
</tr>
<tr>
<td>Outputs</td>
<td>3 relay outputs, free of potential: 2 A / 48 V</td>
</tr>
<tr>
<td>Head spinning frequency</td>
<td>8 Hz, ± 5%</td>
</tr>
<tr>
<td>Status display</td>
<td>Green: safety zone free • Red: safety zone occupied • Yellow: alarm zone occupied - Diagnostic</td>
</tr>
<tr>
<td>Emitting source</td>
<td>Infrared laser LED, 905 nm, ± 30 nm</td>
</tr>
<tr>
<td>Beam divergence</td>
<td>0.9°</td>
</tr>
<tr>
<td>Interface</td>
<td>RS 232, V.24, 19200 Baud</td>
</tr>
<tr>
<td>Safety class</td>
<td>Sensor: Type 3 according to IEC/EN 61496-1(1) • Laser: Class 1(2) according to IEC 825-1</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 65 (NEMA 4, 13)</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>According to IEC 68</td>
</tr>
<tr>
<td>-20 °C to 70 °C / -4 °F to 158 °F</td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40 °C to 70 °C / -40 °F to 158 °F</td>
</tr>
<tr>
<td>Shock and vibration resistance</td>
<td>According to IEC 68</td>
</tr>
<tr>
<td>Material</td>
<td>Casing: Aluminium • Connector: Steel</td>
</tr>
<tr>
<td>Colour</td>
<td>Yellow paint RAL 1021</td>
</tr>
</tbody>
</table>

Ordering information

FF-SEDGE6G2-1 Sensor kit (Sensor + power cable)
and
FF-SEZ6SOFT2 Software kit (Diskette + PC cable)

Accessories:

- FF-SEZ6BRAC3 Mounting bracket
- FF-SEZ6PLAT Mounting plate
- FF-SEZ6POST Post supporting the bracket

Remarks

(1) Category 3 per EN 954-1.
(2) No special limitation of use in the USA or in Europe.

Infrared beam radius

- At 6 m / 19.7 ft: 100 mm / 3.9 in
- At 10 m / 32.8 ft: 170 mm / 6.7 in

Beam Increment

- 0.5°

Response time

- t1

Device weight

- 3 kg / 6.61 lbs
Tolerance and detection distances

\[ S \geq V(t_1 + t_2) + (L - 0.4H) + E \]

Where:
- \( S \): Distance (mm / in)
- \( t_1 \): Response time of the FF-SE (See technical specifications)
- \( t_2 \): Stopping time of the machine (s); i.e. the time interval necessary to stop the machine, after the protection device has emitted the stop signal
- \( L \): 1200 mm / 47.28 in
- \( H \): Height of the beam from the ground, 300 ≤ H ≤ 1000 mm / 11.82 ≤ H ≤ 39.4 in
- \( V \): Penetration velocity (mm / s or in / s)
  \( (V = 1600 \text{ mm} / \text{s in Europe}) \ V = 63 \text{ in} / \text{s in USA} \)
- \( E \): Maximum Error in measurement (see technical specifications)

Installation distance

The protection zone is made up of 600 beams. Each beam receives a signal corresponding to a distance measured using the light time of flight principle, whatever the reflectivity of the target. If this signal goes below a user defined threshold during the surveillance, it means that an object is present in the protection area. Consequently, the corresponding relay is opened.

The surveillance area includes an alarm zone and a safety zone, that are user-defined. Both may have an irregular shape which corresponds to the environment.

Applications: a greater flexibility

The FF-SE being an optoelectronic detecting device, it has a no touch detection and therefore brings more flexibility on site. Its principle of diffuse reflection simplifies the installation, compared to the traditional emitter/receiver pair of light curtains. The protection zones do not need any additional fixture (wall, fence, door...) since the FF-SE covers a 300° angle and adapts to existing obstacles. Installation costs are reduced to a minimum and the working position is easily accessible since the protection is a no-touch type.

In case of a change in the machine or production floor layout, the FF-SE can adapt very quickly by a re-configuration. The FF-SE is not linked to any particular set up or machine: it is exchangeable just by programming.

Compared to a usual safety device (light curtain, safety mat, door...), the FF-SE includes two protection zones which is a great asset: the alarm zone, used as an early warning zone, allows a signal to an intruder that he is close to a dangerous zone and that his movement is about to stop the machine. There is still time for the individual to change direction and avoid a stoppage of the equipment that can be costly if it occurs often. By avoiding unnecessary stoppage, the FF-SE increases the production lines productivity without decreasing the safety: it protects just what is needed.

Computer connection
Software
The Honeywell software kit allows the protection zones to be easily programmed into the sensor. This software runs under any PC (286 or more), under MS-DOS. The FF-SE is linked to the PC through the serial port (RS232 format) and a cable supplied with the software kit. The custom zone definition can be achieved through 3 different methods that can be combined:

- with the mouse, by clicking on end points forming the limit of the protection field;
- with the keyboard, by plotting points with the cursor keys;
- with a text editor in which the end points are defined by their coordinates;

Defining the protection zones is easy since obstacles are displayed on the screen: they are seen in real time.

Using a PC also allows to store several configurations on a disk, that can be retrieved in a few seconds into the sensor. One can therefore define different shapes according to different situations and transmit them into the sensor whenever needed.

Once the settings are downloaded into the sensor, it is a standalone device that will keep all zone definitions and parameters in a permanent memory, even if the power is cut. Access to this memory and to zone definition is protected by a password. The program also has other features: real time profile measurement, sensor simulation to get familiar with it, surveillance of the zones with intrusion time display.

Self-check
A fixed test target is mounted on top of the housing to ensure the beam self-check: this takes away 60° off the scanning angle to perform various checks: contamination of the lens, accuracy of the distance measurements, status of the beam...

An external test target possibility ensures the correct positioning of the sensor and guarantees the safety if its position is changed since the definition of the zones depend on the position of the sensor. The rotating head is self-cleaning and therefore is much less sensitive to pollution as other fixed-window devices. The internal angular coder is controlled by a “surveillance circuitry”, as are the relays.
For AGVs

Weight and speed of AGVs in industrial environments can represent a certain danger for the workforce. The FF-SE can be installed on these AGVs to ensure people safety: due to its long range, it can stop the AGV before the obstacle, even if its speed is high.

The two distinct zones can be used in an elegant way:

The alarm zone, with its 10 m / 32.8 ft range, acts as a slowing down system: if something is detected in the zone, the AGV will slow down and emit a warning signal to make the way free again.

The safety zone, with its 6 m / 19.7 ft range, acts as an emergency stop: the AGV will immediately be stopped when an object is detected in this zone.

Knowing the AGV stopping distance and the response time of the safety chain, it is possible to calculate the limits of these zones optimally.
Accessories

- **FF-SEZ6BRAC3 Mounting bracket:** It reinforces the protection in installations where the sensor could be reached by humans or vehicles. It allows head up or down mounting. The bracket can be mounted on a vertical surface from behind thanks to 4 M6 holes. There are 2 adjustable screws that allow an adjustment of the scanning plane (±8°) in X, ±4° in Y, so as to allow an accurate placement of the beam, especially in multiple device configurations.

- **FF-SEZ6PLAT Mounting plate:** Mounting plate to mount the scanner on horizontal ground.

- **FF-SEZ6POST:**
  This post is designed to support the mounting bracket FF-SEZ6BRAC3. This allows an adjustment of the scanning plane height. The scanning plane can be adjusted from 300 mm up to 700 mm / 11.82 in to 27.58 in. The bracket can also be rotated around the post. A collar holds the bracket to the post and slides on the post. The bracket can be mounted up or down, so that the laser scanner head is either up or down.

- **FF-SEZ6SOFT2:** The Honeywell software kit allows sensor programming and setup. It is supplied with a manual explaining how to use it and an RS232 cable for PC connection.
Safety light curtain
Compact and cost-effective unit

FEATURES
- Active Optoelectronic Protective Device compliant with the requirements of the IEC/EN 61496-1 and IEC/EN 61496-2 European norms for Type 4 electro-sensitive protective equipment
- Meets applicable parts of North American standards and regulations: OSHA 1910.212 and 217; ANSI B11.1 series; ANSI RIA 15.06 and CSA
- Self-contained unit. No electrical connection necessary between emitter and receiver
- 2 safety static outputs with short-circuit and cross-fault detection
- Integrated dc to dc converter as per the IEC/EN 61496 Standard
- Resolutions available:
  - ø18 mm / 0.7 in for finger detection
  - ø30 mm / 1.2 in for hand detection
- Protection height up to 1470 mm / 58 in
- Scanning range up to 3.5 m / 11.48 ft
- Electrical connection: M12 (8 pin) connectors
- Compact size: only 42 mm² x 55 mm² / 1.65 in² x 2.16 in² cross sectional area
- Optional interface control module for more switching capabilities and additional features

TYPICAL APPLICATIONS
- Presses and punches
- Woodworking machines
- Electronic assembly
- Textile machines
- Pressing, moulding and thermoforming machines

The Honeywell FF-SG is a self-contained light curtain that does not require a separate control unit for operation. As soon as an object is detected inside the protection field, the FF-SG opens its two safety static outputs to generate an emergency stop condition that is used to remove dangerous machine motion when properly interfaced with the machine stopping circuitry. When connected to the FF-SRL60252 optional interface control module, the FF-SG 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.

The FF-SG is designed in compliance with IEC/EN 61496-1 and IEC/EN 61496-2 standards and meets the requirements for a Type 4 Active Optoelectronic Protective Device, the safest level for safety products.

The product received an EC type test certificate from the French INRS notified body, required in Europe for safety equipment as per the 98/37/EC Machinery Directive. It meets the applicable parts of North American standards and regulations (OSHA, ANSI and CSA) for light curtains and control reliability and bears the CSA listing mark, making it a product usable in all parts of the world.

The cross section of 42 mm² x 55 mm² / 1.65 in² x 2.16 in² makes installation possible in tight spaces, especially with the help of the included mounting hardware. Indicators provide information on the output status and failure diagnostics. The housing has a dovetail slot mounting system to adapt brackets anywhere along the housing. The optional FF-SRL60252 interface control module easily fit inside the machine control panel with its DIN rail mount housing.

The FF-SG 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 built in the design.
Safety light curtain
Compact and cost-effective unit

FEATURES
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• Meets applicable parts of North American standards and regulations OSHA 1910.212 and 217; ANSI B11.1 series; ANSI RIA 15.06 and CSA
• Self-contained unit. No electrical connection necessary between emitter and receiver
• 2 safety static outputs with short-circuit and cross-fault detection
• Resolutions available:
  ø18 mm / 0.7 in for finger detection
  ø30 mm / 1.2 in for hand detection
• Protection height up to 1758 mm / 69.2 in
• Scanning range up to 6 m / 19.7 ft
• Electrical connection: M12 (8 pin) connectors
• Compact size: only 42 mm² x 55 mm² / 1.65 in² x 2.16 in² cross sectional area
• Optional interface control module for more switching capabilities and additional features

TYPICAL APPLICATIONS
• Presses and punches
• Woodworking machines
• Electronic assembly
• Textile machines
• Pressing, moulding and thermoforming machines
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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.
Compact and cost-effective unit FF-SG

- Type 4 according to the IEC/EN 61496-1 and IEC/EN 61496-2 standards
- Control reliable per OSHA 29 CFR 1910.217 definition
- 2 safety static outputs with short-circuit and cross-fault detection

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

<table>
<thead>
<tr>
<th>Features</th>
<th>Type</th>
<th>FF-SG18</th>
<th>FF-SG30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolutions</td>
<td></td>
<td>Ø 18 mm / 0.7 in</td>
<td>Ø 30 mm / 1.2 in</td>
</tr>
<tr>
<td>Protection heights</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal scanning ranges</td>
<td></td>
<td>0.3 m to 6 m / 1 ft to 19.67 ft</td>
<td></td>
</tr>
<tr>
<td>Supply voltage</td>
<td></td>
<td>24 Vdc (±15 %)</td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td></td>
<td>Emitter: 5 W max. • Receiver: 5 W max. (see Table 1)</td>
<td></td>
</tr>
<tr>
<td>Outputs</td>
<td></td>
<td>2 safety static outputs (switching capacity: 0.3 A / 24 Vdc)</td>
<td></td>
</tr>
<tr>
<td>Maximum cable length</td>
<td></td>
<td>100 m / 328 ft</td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td></td>
<td>15 ms to 21.5 ms (see Table 1)</td>
<td></td>
</tr>
<tr>
<td>LED status indicators</td>
<td></td>
<td>Emitter: failure alarm, power</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Receiver: outputs status, beam status</td>
<td></td>
</tr>
<tr>
<td>Cross sectional area</td>
<td></td>
<td>W 42 mm² x D 55 mm² / W 1.65 in² x D 2.16 in²</td>
<td></td>
</tr>
<tr>
<td>Emission</td>
<td></td>
<td>Infrared modulated light source (925 nm)</td>
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</tr>
<tr>
<td>Effective aperture angle</td>
<td>±2°, ±25 % (in compliance with the IEC/EN 61496-2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light immunity</td>
<td>Sun: 20 000 lux • Lamp: 15 000 lux</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical noise immunity</td>
<td>IEC 61000-4-4: level III / IEC 61000-4-3: level III</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Operating temperature: 0 °C to 55 °C / 32 °F to 131 °F</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Storage temperature: -20 °C to 75 °C / -4 °F to 167 °F</td>
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<td></td>
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<tr>
<td>Vibrations</td>
<td>IEC/EN 61496-1: 10 to 55 Hz frequency range, 1 octave/min. sweep rate, 0.35 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>±0.05 amplitude, 20 sweeps per axis, for 3 axes</td>
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</tr>
<tr>
<td>Sealing</td>
<td>IP 65, NEMA 4, 13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Housing: aluminium alloy • Front plate: polymethyl methacrylate (PMMA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>End caps: polycarbonate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions (mm / in)</td>
<td>Dimensions (mm / in)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emission</td>
<td>Emission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective aperture angle</td>
<td>Effective aperture angle</td>
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</tr>
<tr>
<td>Light immunity</td>
<td>Light immunity</td>
<td></td>
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</tr>
<tr>
<td>Electrical noise immunity</td>
<td>Electrical noise immunity</td>
<td></td>
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<tr>
<td>Ambient temperature</td>
<td>Ambient temperature</td>
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</tr>
<tr>
<td>Vibrations</td>
<td>Vibrations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sealing</td>
<td>Sealing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions (mm / in)</td>
<td>Dimensions (mm / in)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ordering information
Each listing consists of an emitter, a receiver, two pairs of brackets and a test rod.

FF-SG AM2-L Model (see Table 1)
Resolutions
18: Ø 18 mm / 0.7 in
30: Ø 30 mm / 1.2 in

(1) Protection Height for the minimum detected object size or resolution
(2) Sensing Field Height (full screen height)
(3) Total Height
Table 1

<table>
<thead>
<tr>
<th>Model</th>
<th>031</th>
<th>050</th>
<th>070</th>
<th>089</th>
<th>109</th>
<th>128</th>
<th>147</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection height (mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>FF-SG18</td>
<td>306</td>
<td>498</td>
<td>690</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>FF-SG30</td>
<td>318</td>
<td>510</td>
<td>702</td>
<td>894</td>
<td>1086</td>
<td>1278</td>
<td>1470</td>
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<tr>
<td>Total height (mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>338</td>
<td>530</td>
<td>722</td>
<td>914</td>
<td>1106</td>
<td>1298</td>
<td>1490</td>
</tr>
<tr>
<td>Response time (ms)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>FF-SG18</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15.5</td>
<td>17.5</td>
<td>19.5</td>
<td>NA</td>
</tr>
<tr>
<td>FF-SG30</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15.5</td>
<td>17.5</td>
<td>19.5</td>
<td>21.5</td>
</tr>
</tbody>
</table>

Safety distances

European EN 999 standard (in mm, 100 mm = 3.9 in)

**FF-SG18**

Normal approach

\[ S \geq 2000 \left( t_1 + t_2 \right) + 32, \quad \text{with } S \geq 100 \]

If \( S \geq 500 \), then use:

\[ S \geq 1600 \left( t_1 + t_2 \right) + 32, \quad \text{with } S \geq 500 \]

**FF-SG30**

Normal approach

\[ S \geq 2000 \left( t_1 + t_2 \right) + 128, \quad \text{with } S \geq 100 \]

If \( S \geq 500 \), then use:

\[ S \geq 1600 \left( t_1 + t_2 \right) + 128, \quad \text{with } S \geq 500 \]

Parallel approach

\[ S \geq 1600 \left( t_1 + t_2 \right) + (1200 - 0.4 \ H), \text{ with } H \leq 875 \text{ or} \]
\[ S \geq 1600 \left( t_1 + t_2 \right) + 850, \text{ with } 875 \leq H \leq 1000 \]

Angled approach

If \( \alpha \geq 30^\circ \), then use one of the formula given for a normal approach.

If \( \alpha \leq 30^\circ \), then use one of the formula given for a parallel approach, with \( H_u \leq 1000 \).

Where:

- \( S \): Minimum safety distance (mm, 100 mm = 3.9 in)
- \( t_1 \): Light curtain response time (s)
- \( t_2 \): Machine stopping time (s)
- \( H \): Height of the detection plane above the reference floor (in mm, 100 mm = 3.9 in)
- \( H_u \): Height of the uppermost beam above the reference floor (in mm, 100 mm = 3.9 in)
- \( H_l \): 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 or available) for the considered machine.
Safety distances per USA OSHA/ANSI requirements (in inches, 1 in = 25.4 mm)

<table>
<thead>
<tr>
<th>Approach</th>
<th>Formula</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal approach</td>
<td>( D_s = K \times (T_s + T_c + T_r) + D_{pf} )</td>
<td>( D_s = 63 \times (T_s + T_c + T_r) + 1.48 \text{ in} )</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( D_s = 63 \times (T_s + T_c + T_r) + 3.08 \text{ in} )</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: If ( H_u ) is less than 48&quot;, then ( D_{pf} = 48&quot; ) (reach over).</td>
</tr>
<tr>
<td>Parallel approach</td>
<td>( D_s = 63 \times (T_s + T_c + T_r) + 48 )</td>
<td></td>
</tr>
<tr>
<td>Angled approach</td>
<td>If ( \alpha \geq 30^\circ ) then use a normal approach formula.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If ( \alpha \leq 30^\circ ) then use a parallel approach formula.</td>
<td></td>
</tr>
</tbody>
</table>

Where
- \( D_s \): Minimum safety distance
- \( K \): Approach speed (called “hand speed”) = 63 in / s
- \( T_s \): Worst case stopping time of the machine (s)
- \( T_c \): Worst case response of the machine’s control (s)
- \( T_r \): Response time of the safety devices (light curtain plus its interface – meaning the response time including the mechanical relay outputs in seconds)
- \( D_{pf} \): Depth penetration factor (in)
- \( H \): Height of the detection plane above the reference floor (in)
- \( H_u \): Height of the uppermost beam above the reference floor (in)
- \( H_l \): Height of the lowest beam above the reference floor (in). For Normal approach, assumption is that \( H_l \) is not greater than 12 in unless the application prevents access even with \( H_l \) at a distance greater than 12 in

Wiring diagram (using the FF-SRL60252 safety control module)
The FF-SRL60252 interface control module is set in the Manual restart mode without FSD monitoring:

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-SG light curtain
The cross-monitoring of the FF-SG 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-SRL60252 interface control module is designed to be interfaced with Honeywell safety static outputs devices.

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

Safety control modules

**FF-SRL60252**
Dual channel relay module for safety light curtains with static safety outputs
*(to be ordered separately as an option)*
- compatible with safety light curtains with static outputs only
- 24 Vdc
- Category 4 per EN 954-1
- Selectable start mode and FSD monitoring
- 3 NO, 1 NC internally redundant safety relay outputs
- 22.5 mm / 0.89 in width

**FF-SRM200P2**
Muting module
*(to be ordered separately as an option)*
- connection of 1 or 2 safety devices
- modes of operation: unidirectional or bidirectional muting, mutual exclusion
- connection of 2 or 4 auxiliary muting sensors
- 24 Vdc
- category 4 per EN 954-1
- manual start mode, FSD monitoring
- programmable max. muting time
- crossfault monitoring of inputs
- self monitored muting lamp output
- 3 NO safety relay outputs
- static outputs for output status and diagnostic information
- 45 mm / 1.77 in

**FF-SRL59022**
Multi-safety device control module with Presence Sensing Device Initiation (PSDI)
*(to be ordered separately as an option)*
- accept up to three safety devices working in a guard-only mode or 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
Input voltage: 85 to 264 Vac
Output voltage: 24 to 28 Vdc / 2.1 A to 1.8 A
Dimensions: 97 mm x 75 mm x 45 mm / 3.82 in x 2.95 in x 1.77 in
Mounting: DIN rail
Approvals: UL508 listed, UL1950, cUL/CSA-C22.2, EN/IEC 60950, EN 50178
*(to be ordered separately as an option).*
Mounting bracket kit

**FF-SXZ634178**
Right angle bracket kit (delivered with the FF-SG) includes two right angle brackets with four sets of M5 bolts, nuts and washers.

Anti-vibration kit

**FF-SYZAD**
Kit of 2 straight brackets and 4 anti-vibration dampers (mounting hardware included) - to substitute for the FF-SY2634178 brackets delivered with the FF-SG 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.

M12 single-ended cordsets, female, 8-pin

<table>
<thead>
<tr>
<th>Catalogue listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SXZCAM128U02-S</td>
<td>2 m length, straight</td>
</tr>
<tr>
<td>FF-SXZCAM128U05-S</td>
<td>5 m length, straight</td>
</tr>
<tr>
<td>FF-SXZCAM128U05-90S</td>
<td>5 m length, right angle</td>
</tr>
<tr>
<td>FF-SXZCAM128U10-S</td>
<td>10 m length, straight</td>
</tr>
<tr>
<td>FF-SXZCAM128U10-90S</td>
<td>10 m length, right angle</td>
</tr>
</tbody>
</table>

M12 screw connector, female, straight

**FF-SXZCOM128**
8 pin
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 that period of coverage, Honeywell will repair or replace without charge those items if finds defective. The foregoing is the 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 personally, through our literature and the Honeywell Website, it is up to the customer to determine the suitability of the product in the application. Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and service
Honeywell serves its customers through a world-wide network of sales offices and distributors. For application assistance, current specifications, pricing or the name of the nearest distributor, contact a nearby sales office or call:

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Australia 613 9420 5555
Brazil 55 11 865 2055
China 86 21 623 70 237
Czech Republic 420 602 364 696
Denmark 45 20 60 75 05
Finland 358 9 3480 101
France 33 (0)1 60 19 82 68
Germany 49 69 80 64 559
India 91 22 641 0897
Japan 81 3 67 6730 7208
Korea 822 799 6114 5
Malaysia 037 958 4988
Mexico 52 5 259 19 66
Netherlands 31 20 5656 911
New Zealand 64 9 623 5050
Poland 48 22 606 09 00
Romania 40 1 211 0076
Singapore 656 355 2828
Slovak Republic 421 7 5824 7403
South Africa (Republic of) 27 11 805 1201
South Korea 82 2 799 6167
Sweden 46 8 775 55 00
Switzerland 41 1 855 24 40
United Kingdom 44 1698 481 000
United States 1 800 537 6945
Thailand 662 693 3099

Internet
http://www.honeywell.com/sensing/
info.sc@honeywell.com

Automation and Control Solutions
Honeywell
21 Chemin du Vieux Chêne
38240 Meylan Cedex
Tel: (33) 4 76 41 72 00
www.honeywell.com

Honeywell
Compact and cost-effective unit FF-SG

- Type 4 according to the IEC/EN 61496-1 and IEC/EN 61496-2 standards
- Control reliable per OSHA 29 CFR 1910.217 definition
- 2 safety static outputs with short-circuit and cross-fault detection

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

<table>
<thead>
<tr>
<th>Features</th>
<th>Type</th>
<th>FF-SG18 (ø 18 mm / 0.7 in)</th>
<th>FF-SG30 (ø 30 mm / 1.2 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolutions</td>
<td></td>
<td>ø 18 mm / 0.7 in</td>
<td>ø 30 mm / 1.2 in</td>
</tr>
<tr>
<td>Protection heights</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal scanning ranges</td>
<td></td>
<td>0.3 m to 3.5 m / 1 ft to 11.48 ft</td>
<td></td>
</tr>
<tr>
<td>Supply voltage</td>
<td></td>
<td>24 Vdc (±15 %)</td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td></td>
<td>Emitter: 4 W max. • Receiver: 3 W max. (see Table 2)</td>
<td></td>
</tr>
<tr>
<td>Outputs</td>
<td></td>
<td>2 safety static outputs (switching capacity: 0.3 A / 24 Vdc)</td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td></td>
<td>15 ms</td>
<td>15 ms to 21.5 ms (see Table 2)</td>
</tr>
<tr>
<td>LED status indicators</td>
<td></td>
<td>Emitter: failure alarm, power</td>
<td>Receiver: outputs status</td>
</tr>
<tr>
<td>Cross sectional area</td>
<td></td>
<td>W 42 mm² x D 55 mm² / W 1.65 in² x D 2.16 in²</td>
<td></td>
</tr>
<tr>
<td>(see Tables 1 and 2 for complete housing dimensions)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emission</td>
<td></td>
<td>Infrared modulated light source (925 nm)</td>
<td></td>
</tr>
<tr>
<td>Effective aperture angle</td>
<td></td>
<td>±2° , ±25 % (in compliance with the IEC/EN 61496-2)</td>
<td></td>
</tr>
<tr>
<td>Light immunity</td>
<td></td>
<td>Sun: 20 000 lux • Lamp: 15 000 lux</td>
<td></td>
</tr>
<tr>
<td>Electrical noise immunity</td>
<td></td>
<td>IEC61000-4-4: level III / IEC61000-4-3: level III</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
<td>Operating temperature: 0 °C to 55 °C / 32 °F to 131 °F</td>
<td>Storage temperature: -20 °C to 75 °C / -4 °F to 167 °F</td>
</tr>
<tr>
<td>Vibrations</td>
<td></td>
<td>IEC/EN 61496-1: 10 to 55 Hz frequency range, 1 octave/min.sweep rate, 0.35 mm</td>
<td>±0.05 amplitude, 20 sweeps per axis, for 3 axes</td>
</tr>
<tr>
<td>Sealing</td>
<td></td>
<td>IP 65, NEMA 4, 13</td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td></td>
<td>Housing: aluminium alloy • Front plate polymethyl methacrylate (PMMA)</td>
<td>End caps: polycarbonate</td>
</tr>
<tr>
<td>Electrical connection</td>
<td></td>
<td>M12 8 pole connectors</td>
<td></td>
</tr>
</tbody>
</table>

Ordering information: Each listing consists of an emitter, a receiver, 2 pairs of mounting pins, 4 M5 dovetail shape bolts, 4 M5 nuts and 4 rip-lock washers and a test rod.

<table>
<thead>
<tr>
<th>FF-SG AM2 Model (see Table 2)</th>
<th>(mm / in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SG18 Resolution</td>
<td>øR (resolution)</td>
</tr>
<tr>
<td>FF-SG30 Resolution</td>
<td>øR (resolution)</td>
</tr>
<tr>
<td>P (lens pitch)</td>
<td></td>
</tr>
<tr>
<td>D (lens diameter)</td>
<td></td>
</tr>
<tr>
<td>A (inactive zone)</td>
<td></td>
</tr>
<tr>
<td>B (inactive zone)</td>
<td></td>
</tr>
<tr>
<td>Table 1 (mm / in)</td>
<td></td>
</tr>
</tbody>
</table>
Table 2

<table>
<thead>
<tr>
<th>Model</th>
<th>031</th>
<th>050</th>
<th>070</th>
<th>089</th>
<th>109</th>
<th>128</th>
<th>147</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection height (mm / in) (1) FF-SG18</td>
<td>306 / 12.05</td>
<td>498 / 19.62</td>
<td>690 / 27.18</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FF-SG20</td>
<td>318 / 12.52</td>
<td>510 / 20.09</td>
<td>702 / 27.65</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sensing field height (mm / in) (2) FF-SG18</td>
<td>282 / 11.11</td>
<td>474 / 18.6</td>
<td>666 / 26.24</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FF-SG20</td>
<td>270 / 10.63</td>
<td>462 / 18.2</td>
<td>654 / 25.76</td>
<td>846 / 33.3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total height (mm / in) (3) FF-SG18</td>
<td>376 / 14.8</td>
<td>568 / 22.36</td>
<td>760 / 29.92</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FF-SG20</td>
<td>376 / 14.8</td>
<td>568 / 22.36</td>
<td>760 / 29.92</td>
<td>952 / 37.48</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Response time (ms) FF-SG18</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FF-SG20</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15,5</td>
<td>17,5</td>
<td>19,5</td>
<td>21,5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SG18</td>
<td>1,1/2.4</td>
<td>1,5/3.3</td>
<td>1,5/3.5</td>
<td>1,8/3.9</td>
<td>1,9/4.2</td>
<td>2,2/4.8</td>
<td>2,3/5.5</td>
<td>2,6/5.7</td>
<td>2,9/6.3</td>
<td>3/6.6</td>
<td>3,2/7.2</td>
<td></td>
</tr>
<tr>
<td>FF-SG20</td>
<td>1,2/2.6</td>
<td>1,5/3.3</td>
<td>1,5/3.5</td>
<td>1,8/3.9</td>
<td>1,9/4.2</td>
<td>2,2/4.8</td>
<td>2,3/5.5</td>
<td>2,6/5.7</td>
<td>2,9/6.3</td>
<td>3/6.6</td>
<td>3,2/7.2</td>
<td></td>
</tr>
</tbody>
</table>

| Power consumption (W) FF-SG18 (Emitter/receiver) | 4 | 3 | 4 | 3 | 4 | 3 | - | - | - | - | - | - |
| FF-SG20 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 |

Safety distances

European EN 999 standard (in mm, 100 mm = 3.9 in) FF-SG18 FF-SG30

Normal approach

\[ S \geq 2000 (t_1 + t_2) + 32, \quad S \geq 100 \]

If \( S \geq 500 \), then use:
\[ S \geq 1600 (t_1 + t_2) + 32, \quad S \geq 500 \]

Parallel approach

\[ S \geq 1600 (t_1 + t_2) + (1200 \cdot 0.4 \cdot H), \quad \text{with } H \leq 875 \text{ or } \]
\[ S \geq 1600 (t_1 + t_2) + 850, \quad \text{with } 875 \leq H \leq 1000 \]

Angled approach

If \( \alpha \geq 30^\circ \), then use one of the formula given for a normal approach.

If \( \alpha \leq 30^\circ \), then use one of the formula given for a parallel approach, with \( H_u \leq 1000 \).

Where:
- \( S \): Minimum safety distance (mm, 100 mm = 3.9 in)
- \( t_1 \): Light curtain response time (s)
- \( t_2 \): Machine stopping time (s)
- \( H \): Height of the detection plane above the reference floor (in mm, 100 mm = 3.9 in)
- \( H_u \): Height of the uppermost beam above the reference floor (in mm, 100 mm = 3.9 in)
- \( H_l \): 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 or available) for the considered machine.
Safety distances per USA OSHA/ANSI requirements (in inches, 1 in = 25.4 mm)

<table>
<thead>
<tr>
<th></th>
<th>FF-SG18:</th>
<th>FF-SG30:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.7 in resolution (min. object sensitivity)</td>
<td>1.2 in resolution (min. object sensitivity)</td>
</tr>
<tr>
<td>Normal approach</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\text{Ds} = 63 \times (\text{Ts} + \text{Tc} + \text{Tr}) + 1.48 \text{ in}$</td>
<td>$\text{Ds} = 63 \times (\text{Ts} + \text{Tc} + \text{Tr}) + 3.08 \text{ in}$</td>
</tr>
<tr>
<td></td>
<td>Note: If $\text{Hu}$ is less than 48&quot;, then $\text{Dpf} = 48&quot;$ (reach over).</td>
<td></td>
</tr>
<tr>
<td>Parallel approach</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\text{Ds} = 63 \times (\text{Ts} + \text{Tc} + \text{Tr}) + 48$</td>
<td></td>
</tr>
<tr>
<td>Angled approach</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\text{Ds} = K \times (\text{Ts} + \text{Tc} + \text{Tr}) + \text{Dpf}$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If $\alpha \geq 30^\circ$ then use a normal approach formula.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If $\alpha \leq 30^\circ$ then use a parallel approach formula.</td>
<td></td>
</tr>
</tbody>
</table>

**Where**

- **Ds**: Minimum safety distance
- **K**: Approach speed (called "hand speed") = 63 in / s
- **Ts**: Worst case stopping time of the machine (s)
- **Tc**: Worst case response of the machine’s control (s)
- **Tr**: Response time of the safety devices (light curtain plus its interface – meaning the response time including the mechanical relay outputs in seconds)
- **Dpf**: Depth penetration factor (in)
- **H**: Height of the detection plane above the reference floor (in)
- **Hu**: Height of the uppermost beam above the reference floor (in)
- **Hl**: Height of the lowest beam above the reference floor (in). For Normal approach, assumption is that Hl is not greater than 12 in unless the application prevents access even with Hl at a distance greater than 12 in

**Wiring diagram (using the FF-SRL60252 safety control module)**

The FF-SRL60252 interface control module is set in the Manual restart mode without FSD monitoring:

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-SG light curtain

The cross-monitoring of the FF-SG 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-SRL60252 interface control module is designed to be interfaced with Honeywell safety static outputs devices.

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

**LED status indicators**

**Emitter**

- Power indicator
- Alarm indicator
- Test

**Receiver**

- Operation indicator (green and red)
- Outputs ON
- Outputs OFF
Accessories

Safety control modules

**FF-SRL60252**
Dual channel relay module for safety light curtains with static safety outputs
(to be ordered separately as an option)
- compatible with safety light curtains with static outputs only
- 24 Vdc
- Category 4 per EN 954-1
- Selectable start mode and FSD monitoring
- 3 NO, 1 NC internally redundant safety relay outputs
- 22.5 mm / 0.89 in width

**FF-SRM200P2**
Muting module
(to be ordered separately as an option)
- connection of 1 or 2 safety devices
- modes of operation: unidirectional or bidirectional muting, mutual exclusion
- connection of 2 or 4 auxiliary muting sensors
- 24 Vdc
- category 4 per EN 954-1
- manual start mode, FSD monitoring
- programmable max. muting time
- crossfault monitoring of inputs
- self monitored muting lamp output
- 3 NO safety relay outputs
- static outputs for output status and diagnostic information
- 45 mm / 1.77 in

**FF-SRL59022**
Multi-safety device control module with Presence Sensing Device Initiation (PSDI)
(to be ordered separately as an option)
- accept up to three safety devices working in a guard-only mode or 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
- crossfault 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
Input voltage: 85 to 264 Vac
Output voltage: 24 to 28 Vdc / 2.1 A to 1.8 A
Dimensions: 97 mm x 75 mm x 45 mm / 3.82 in x 2.95 in x 1.77 in
Mounting: DIN rail
Approvals: UL508 listed, UL1950, cUL/CSA-C22.2, EN/IEC 60950, EN 50178
(to be ordered separately as an option).
**Right-angle bracket kit**

**FF-SGZ01002**

One kit includes 2 brackets and 8 M3.5 x 8 screws. Order one bracket kit per emitter or receiver element, 2 kits for an emitter/receiver system. The 8 screws are used if the bracket is fixed on the top and bottom caps of the FF-SG.

*(to be ordered separately as an option)*

**NOTICE**

**PROTECTION AGAINST HIGH VIBRATION**

In case of high vibration, 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).

**Anti-vibration kit**

**FF-SYZAD**

Kit of 2 straight brackets and 4 anti-vibration dampers (mounting hardware included).

**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 1470 mm / 57.91 in.

**Cordsets**

Lumberg single keyway M12, female straight *(to be ordered separately)*.

Order 2 cordsets for emitter + receiver.

Emitter (FF-SG******AM2E) or receiver (FF-SG******AM2R)

**Catalogue listing**

<table>
<thead>
<tr>
<th>Description</th>
<th>Catalogue number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 m / 6.56 ft length</td>
<td>FF-SXZCAM128U02</td>
</tr>
<tr>
<td>5 m / 16.40 ft length</td>
<td>FF-SXZCAM128U05</td>
</tr>
<tr>
<td>10 m / 32.80 ft length</td>
<td>FF-SXZCAM128U10</td>
</tr>
</tbody>
</table>

**Cable connector**

**FF-SXZCOM128**

Binder single keyway M12 female screw type straight connector. 8 set screws M2.5. Gold plated contacts. Pin configuration according to IEC 61076-2-101.
Deflection mirror

FF-SYZMIR
To be ordered separately as an option

<table>
<thead>
<tr>
<th>Features:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deflection mirror with 10% scanning range reduction (FF-SYZMIR0)</td>
</tr>
<tr>
<td>Deflection mirror with 25% scanning range reduction (FF-SYZMIR1)</td>
</tr>
<tr>
<td>Quick mounting and easy mirror adjustment</td>
</tr>
<tr>
<td>Mounting brackets included (top / bottom mounting)</td>
</tr>
<tr>
<td>Adjustment of mirror in azimuth direction of ±45°</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium alloy housing</td>
<td>Gold colour anodisation</td>
</tr>
</tbody>
</table>

| Ordering guide:          |
| FF-SYZMIR04 FF-SGJ031  |
| FF-SYZMIR06 FF-SGJ050  |
| FF-SYZMIR08 FF-SGJ070  |
| FF-SYZMIR10 FF-SGJ089  |
| FF-SYZMIR12 FF-SGJ109  |
| FF-SYZMIR14 FF-SGJ128 FF-SGJ147 |

Floorstanding post

FF-SYZPF
To be ordered separately as an option

Floorstanding post for the installation of the following FF-SG light curtains: FF-SGJ031 to FF-SGJ109.

Adjustable floorstanding post

FF-SYZPA
To be ordered separately as an option

- 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 ±11° 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.
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.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service
Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorised Distributor, contact a nearby sales office or:
INTERNET: www.honeywell.com/sensing
E-mail: info.sc@honeywell.com
Type 4 miniature light curtain, 30 mm / 1.18 in resolution
Designed for the protection of operators work stations

FEATURES

- EC type examination certificate granted by the TÜV
- Designed in compliance with the IEC/EN 61496-1 & 2 for Type 4 Electrosensitive Protective Equipment (permanent self-checking equipment)
- Through-scan small profile sensing unit with separate control unit
- Minimum object detection capability: ø30 mm / 1.18 in suitable for hands detection
- Scanning range: from 0,2 m up to 3,5 m/0.65 ft to 11.48 ft
- Protection heights: from 236 mm up to 1804 mm / 9.29 in up to 71.07 in
- Global response time: less than 50 ms
- Power supply voltage: 24 Vac/dc
- Outputs: 2 guided contacts safety relays
- Test input
- Automatic restart or start & restart interlock
- Sealing: IP 65 (sensing units and control unit)
- Immunity to ambient light: 50 000 Lux max.

TYPICAL APPLICATIONS

- Paper-cutting machines
- Pick-and-place robots
- Light electronic assembling machines
- Good lifts
- Small carousels

The FF-LS equipment is an infrared multibeam device designed to protect operators working on dangerous machines. The FF-LS equipment features are ideal for the protection of work stations on small machines such as paper-cutting machines or pick-and-place robots.

The permanent self-checking electronic process is based upon a microprocessor technology and meets the requirement of the IEC/EN 61496-1 & 2 European standards for Type 4 electrosensitive protective equipment.

It has been examined by the TÜV who granted the EC type examination certificate. The equipment consist of a pair of sensing units connected to a separate control unit via a RS-485 connection.

Each sensing unit is made of a row of emitting circuits alternating with receiving circuits. These circuits are housed in an extremely small aluminium extruded profile: the cross section is only 12 mm x 19.7 mm / 0.47 in x 0.77 in.

The two sensors are matched to each other by individual coding to reduce risk of cross talk with other light curtains and to improve immunity to welding splashes.

The control unit supplies the sensing units, controls the correct operation of the scanning circuits and transmits the resulting commands to the machine control circuitry through its two relay outputs.

The equipment can operate according to two different mode: the automatic mode, the start & restart interlock mode.

In addition, the control unit is featured with a test input to trigger the output relays switching and thus check the correct operation of the final switching devices whenever needed. In case of failure, the control unit provides optical and acoustic signals to ease failure diagnostic.

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.
FF-LS30

- Type 4 according to IEC/EN 61496 - parts 1 & 2
- ø30 mm / 1.18 in object detection capability
- Reduced dimensions (12 mm x 19.7 mm / 0.47 in x 0.77 in cross section)

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

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Supply voltage</th>
<th>Current consumption</th>
<th>Output switching capacity</th>
<th>Material</th>
<th>Housing Size</th>
<th>Emission</th>
<th>Resolution</th>
<th>Alignment tolerance</th>
<th>Operating temperature</th>
<th>Sealing</th>
<th>Electromagnetic immunity</th>
<th>Light immunity</th>
<th>Status indicators</th>
<th>Range</th>
<th>Electrical wiring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>22 to 30 Vdc or 18 to 25 Vac</td>
<td>&lt; 300mA</td>
<td>Main out 1 &amp; out 2: 4 A/250 Vac/Lamp: 4 A/42 V</td>
<td>Sensors: Aluminium profile / Control unit: Polycarbonate</td>
<td>Sensors: 12 mm x 19.7 mm x PH mm / 0.47 in x 0.77 in x PH in</td>
<td>Control unit: 60 mm x 160 mm x 240 mm / 2.36 in x 6.30 in x 9.45 in</td>
<td>Modulated infrared light (880 mm)</td>
<td>ø 30 mm / 1.18 in</td>
<td>According to IEC/EN 61496 - 2 standard</td>
<td>0 °C to 55 °C / 32 °F to 131 °F</td>
<td>Sensors and control unit: IP 65</td>
<td>According to IEC 801-4: level IV / According to IEC 801 level III</td>
<td>Lamps to be connected to outputs available on control units</td>
<td>0.2 m to 3.5 m / 0.65 ft to 11.48 ft</td>
<td>(delivered with the unit) Sensors: RS-485 cable / Pre-wired connectors (10 m / 32.8 ft)</td>
</tr>
</tbody>
</table>

**Ordering information (1) FF-LS30**

- Number of beams
  - 08: 0236 236 / 09.29
  - 16: 0460 460 / 18.12
  - 24: 0684 684 / 26.94
  - 32: 0908 908 / 35.77
  - 40: 1132 1132 / 44.60
  - 48: 1356 1356 / 53.42
  - 56: 1580 1580 / 62.25
  - 64: 1804 1804 / 71.07

<table>
<thead>
<tr>
<th>Number of beams</th>
<th>Model</th>
<th>Protection height (PH) (mm / in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>08</td>
<td>0236</td>
<td>236 / 09.29</td>
</tr>
<tr>
<td>16</td>
<td>0460</td>
<td>460 / 18.12</td>
</tr>
<tr>
<td>24</td>
<td>0684</td>
<td>684 / 26.94</td>
</tr>
<tr>
<td>32</td>
<td>0908</td>
<td>908 / 35.77</td>
</tr>
<tr>
<td>40</td>
<td>1132</td>
<td>1132 / 44.60</td>
</tr>
<tr>
<td>48</td>
<td>1356</td>
<td>1356 / 53.42</td>
</tr>
<tr>
<td>56</td>
<td>1580</td>
<td>1580 / 62.25</td>
</tr>
<tr>
<td>64</td>
<td>1804</td>
<td>1804 / 71.07</td>
</tr>
</tbody>
</table>

**Notes:**
1. Each reference corresponds to the delivery of a complete set: A/B sensors, control unit, 2 RS-485 cables (pre-wired 10 m / 32.8 ft), brackets, 8 cable glands and ø30 mm / 1.18 in test rod.
2. Power supply: The use of one of these supplies brings the galvanic isolation which is necessary for the system to be in compliance with IEC/EN 61496-1 standard. FF-LSUS0605 (230 Vac / 24 Vdc) FF-LSUS0606 (115 Vac / 24 Vdc) These power supplies must be ordered separately.
3. Control unit and sensors.

<table>
<thead>
<tr>
<th>Nominal Protection Height (PH) (mm / in)</th>
<th>Number of beams</th>
<th>Response time</th>
<th>Weight of the device</th>
</tr>
</thead>
<tbody>
<tr>
<td>PH</td>
<td>8</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td>PH</td>
<td>236 / 0.920</td>
<td>460 / 18.12</td>
<td>684 / 26.94</td>
</tr>
<tr>
<td>1.75 / 0.38</td>
<td>1.36 / 0.41</td>
<td>1.97 / 0.74</td>
<td>2.08 / 0.78</td>
</tr>
</tbody>
</table>
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 arrested. For the safety distance, the following formula applies:

**Normal approach**

*Europe (EN 999)*

\[
S \geq 2000 (t_1 + t_2 + 128) \text{ (mm), with } S \geq 100 \text{ mm} \\
\text{or } S \geq 78.8 (t_1 + t_2 + 5) \text{ (in), with } S \geq 3.9 \text{ in}
\]

If the result of this calculation is greater or equal to 500 mm / 19.7 in, then use the following formula:

\[
S \geq 1600 (t_1 + t_2 + 128) \text{ (mm), with } S \geq 500 \text{ mm} \\
\text{or } S \geq 63 (t_1 + t_2 + 5) \text{ (in), with } S \geq 19.7 \text{ in}
\]


\[
D_s \geq 63 (t_1 + t_2 + 3.08) \text{ (in), with } D_s = S
\]

**Parallel approach**

*Europe (EN 999)*

\[
S \geq 1600 (t_1 + t_2) + (1200-0.5H) \text{ (mm)} \\
\text{where } (1200-0.4H) \geq 850 \text{ mm} \\
\text{or } S \geq 63 (t_1+ t_2) + 47.3 \times 0.4H \text{ (in)} \\
\text{where } (47.3 \times 0.4) \geq 33.5 \text{ in}
\]

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)*

\[30^\circ < \alpha < 90^\circ\]

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

\[0^\circ < \alpha \leq 30^\circ\]

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 max. = 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.

Connection diagram:

(1) - Supply (to be ordered separately):

The use of one of these supplies brings the galvanic isolation which is necessary to the system for a use conform to IEC/EN 61496 - 1 standard.

FF-LSZUS0605 (230 Vac / 24 Vdc), FF-LSZUS0606 (115 Vac / 24 Vdc)

(2) - Test duration: The contact must be closed during 100 ms as a minimum.

(3) - The push-button must remain closed during 200 ms at least. It takes 500 ms for the system to restart after releasing the push-button.

(4) - If additional contacts are needed or if the switching capacity must be increased, use the connection diagram given or an example.
Connection diagram example: Start/Restart interlock/Final Switching Device (FSD) monitoring
(please refer to EN 954 for electrical interface)

Accessories

**FF-LSZKA0611:** Connecting cable
One 10 m / 32.8 ft RS485 prewired cable for the connection of one sensing unit to the control unit.

**FF-LSZMS660**

![Straight bracket diagram](image)
Kit of 2 straight brackets for an installation parallel to the sliding rail.

**FF-LSZMS690**

![Right-angle bracket diagram](image)
Kit of 2 right-angle brackets for an installation perpendicular to the sliding rail.

**Note:** All FF-LS equipment is delivered with both types of brackets. The number of brackets available allows to fix one bracket every 500 mm / 19.7 in along the profile.

**Examples**

For a correct installation, brackets must be fixed on a plain base in order to avoid profile deformation.

---

(1) RC (220 Ω + 22 µF) for ac interface (or varistors for dc interfaces) increases the life of contacts and improves electrical noise immunity.
Type 4 miniature light curtain, 14 mm/0.55 in resolution
Designed for the protection of operators work stations

FEATURES
- EC type examination certificate granted by the TÜV
- Designed in compliance with the IEC/EN 61496 - parts 1 & 2 for Type 4 Electrosensitive Protective Equipment (permanent self-checking equipment)
- Through-scan small profile sensing units with separate control unit
- Minimum object detection capability: ø14 mm / 0.55 in suitable for fingers detection
- Scanning range from 0.2 m up to 3.5 m / 0.65 ft up to 11.48 ft.
- Protection heights: from 196 mm up to 744 mm / 7.72 in up to 29.31 in
- Global response time: less than 50 ms
- Power supply voltage: 24 Vac/dc
- Outputs: 2 guided contacts safety relays
- Test input
- Automatic restart or start & restart interlock
- Sealing: IP 65 (sensing units and control unit)
- Immunity to ambient light: 50,000 Lux max.

TYPICAL APPLICATIONS
- Paper-cutting machines
- Pick-and-place robots
- Light electronic assembling machines
- Textile machines
- Leather presses
- Matching centres

The FF-LS14 equipment is an ultra-compact infrared multibeam device designed to protect operators working on dangerous machines. The FF-LS14 equipment features are ideal for the protection of work stations where space is critical such as paper-cutting machines or pick-and-place robots. Thanks to a small resolution, it will spring into action even if a finger gets too close: any intrusion will lead to the immediate stoppage of the moving part of the machine.

Each sensing unit is made up of a row of emitting circuits alternating with receiving circuits. These circuits are housed in an extremely small aluminium extruded profile: the cross section is only 23 mm x 35 mm / 0.90 in x 1.38 in, the smallest available on the market in its class. These ultra-compact dimensions, backed by in-line connectors, allow the FF-LS14 to be mounted on small machines or in other applications where light curtains were previously too large. Its small resolution - the smallest on the market - allows the closest installation to the dangerous area, thanks to no additional safety distance in the safety distance calculation formula (EN 999).

The equipment consists of a pair of identical length sensing units, a separate control unit and a pair of RS-485 connection cables. It is supplied with mounting brackets, a test rod and cable glands for the terminal strip connections.

The two sensors are matched to each other by individual coding to reduce risk of cross talk with other light curtains and to improve immunity to welding splashes.

The control unit supplies the sensing units, controls the correct operation of the scanning circuits and transmits the resulting commands to the machine control circuitry through its two relay outputs.

The equipment can operate according to two different modes selected with an internal selector: the automatic mode or the start & restart interlock mode. In addition, the control unit is featured with a test input to trigger the output relays switching and thus check the correct operation of the final switching devices whenever needed.

In case of failure, the control unit provides an acoustic signal and 6 different optical signals to ease failure diagnostic.

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.
FF-LS14

- Type 4 according to IEC/EN 61496 - parts 1 & 2
- ø14 mm / 0.55 in object detection capability
- Reduced dimensions (23 mm x 35 mm / 0.90 in x 1.38 in cross section)

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

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Supply voltage</th>
<th>Current consumption</th>
<th>Output switching capacity</th>
<th>Material</th>
<th>Housing Size</th>
<th>Emission</th>
<th>Resolution</th>
<th>Alignment tolerance</th>
<th>Operating temperature</th>
<th>Sealing</th>
<th>Electromagnetic immunity</th>
<th>Light immunity</th>
<th>Status indicators</th>
<th>Range</th>
<th>Electrical wiring (delivered with the unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>22 to 30 Vdc or 18 to 25 Vac</td>
<td>&lt; 300 mA</td>
<td>Main out 1 &amp; out 2: 4 A/250 Vac / Lamp: 4 A/42 V</td>
<td>Sensors: Aluminium profile</td>
<td>Sensors: 23 mm x 35 mm x PH mm / 0.90 in x 1.38 in x PH in</td>
<td>Modulated infrared light (880 mm)</td>
<td>ø14 mm / 0.55 in</td>
<td>According to IEC/EN 61496 - 2 standard</td>
<td>0 °C to 55 °C / 32 °F to 131 °F</td>
<td>Sensors and control unit: IP 65</td>
<td>According to IEC 801-4: level IV/According to IEC801-3 level III</td>
<td>50,000 Lux</td>
<td>Lamps to be connected to outputs available on control units</td>
<td>0.2 m to 3.5 m / 0.65 ft to 11.48 ft</td>
<td>Sensors: RS-485 cable/Pre-wired connectors (10 m / 32.8 ft) Control unit: Screw terminal</td>
</tr>
</tbody>
</table>

Ordering information (1)

<table>
<thead>
<tr>
<th>Number of beams</th>
<th>Model</th>
<th>Protection height (PH) (mm / in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>196</td>
<td>196 / 7.72</td>
</tr>
<tr>
<td>32</td>
<td>378</td>
<td>378 / 14.89</td>
</tr>
<tr>
<td>48</td>
<td>561</td>
<td>561 / 22.10</td>
</tr>
<tr>
<td>64</td>
<td>744</td>
<td>744 / 29.31</td>
</tr>
</tbody>
</table>

Notes:
(1) Each reference corresponds to the delivery of a complete set: A/B sensors, control unit, 2 RS-485 cables (pre-wired 10 m / 32.8 in), brackets, 8 cable glands and a ø14 mm / 0.55 in test rod. (2) Power supply: The use of one of these supplies brings the galvanic isolation which is necessary for the system to be in compliance with IEC/EN 61496-1 standard. FF-LSZUS0605 (230 Vac / 24 Vdc) FF-LSZUS0606 (115 Vac / 24 Vdc) These power supplies must be ordered separately. (3) Control unit and sensors.

Nominal Protection Height mm / in | PH
--- | ---
196 / 7.72 | 16
378 / 14.89 | 32
561 / 22.10 | 48
744 / 29.31 | 64

Number of beams | Response time | Weight of the device (3) |
--- | --- | ---
16 | < 50 ms | 1.85 / 4.07 |
32 | < 50 ms | 2.06 / 4.53 |
48 | < 50 ms | 2.26 / 4.97 |
64 | < 50 ms | 2.48 / 5.45 |

Sensors A and B have the same dimensions.

Control unit (4 mounting M4 holes) Power supplies (2)

Connector RS-485

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
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 arrested. For the safety distance, the following formula applies:

- **Normal Approach**
  
  **Europe (EN 999)**
  
  \[ S \geq 2000 \ (t_1 + t_2) \ (mm), \text{ with } S \geq 100 \ mm \]
  
  or \[ S \geq 78.8 \ (t_1 + t_2), \text{ with } S \geq 3.9 \ in \]
  
  If the result of this calculation is greater or equal to 500 mm/19.7 in, then use the following formula:
  
  \[ S \geq 1600 \ (t_1 + t_2) \ (mm), \text{ with } S \geq 500 \ mm \]
  
  or \[ S \geq 63 \ (t_1 + t_2) \ (in), \text{ with } S \geq 19.7 \ in \]
  
  
  \[ D_s \geq (t_1 + t_2) + 0.9315 \ (in) \quad D_s = S \]

As shown in the figure here below, there are 7 LEDs on the control unit. The green LEDs 1, 2 and 3 are constantly alight when the supply voltage is present. The system condition is indicated by the yellow LEDs 4 and 6, the red LEDs 5 and 7 and an acoustic signal. This signal can be switched on or off by the buzzer switch on the PC-board.

---

**Optical and acoustic signals of the control unit**

- **Supply (to be ordered separately):** The use of one of these supplies brings the galvanic isolation which is necessary to the system for a use conform to IEC/EN 61496-1 standard.
  - FF-LSZUS0605 (230 VAC / 24 VDC), FF-LSZUS0606 (115 VAC / 24 VDC)

- **Test duration:** The contact must be closed during 100 ms as a minimum.

- **The push-button must remain closed during 200 ms at least. It takes 500 ms for the system to restart after releasing the push-button.**

- **If additional contacts are needed or if the switching capacity must be increased, use the connection diagram given or an example.**
Connection diagram example: Start/Restart interlock/Final Switching Device (FSD) monitoring (please refer to EN 954 for electrical interface)

(1) $RC (220 \, \Omega + 22 \, \mu F)$ for ac interface (or varistors for dc interfaces) increases the life of contacts and improves electrical noise immunity.

Accessories

**FF-LSZKA0611:** Connecting cable
One 10 m / 32.8 ft RS485 prewired cable for the connection of one sensing unit to the control unit.

**FF-LSZMS720**

Straight bracket
Kit of 2 straight brackets for an installation parallel to the sliding rail.

**FF-LSZMS730**

Right-angle bracket
Kit of 2 right-angle brackets for an installation perpendicular to the sliding rail.

Note: All FF-LS equipment is delivered with both types of brackets. The number of brackets available allows to fix one bracket every 500 mm / 19.7 in along the profile.

Examples

Example of Installation
For a correct installation, brackets must be fixed on a plain base in order to avoid profile deformation.
Type 2 light curtain with separate control unit
For the protection of operators in Industry

FEATURES
• Through scan detection system with separate control unit for ease of connection to the machine controls
• Safeguarding function based on a periodic performance test in compliance with Type 2 defined by the norm IEC/EN 61496 - parts 1 & 2 (Safety of machinery - Electrosensitive protective systems)
• Output: 2 guided contact safety relays
• Operating temperature: 0 to 55°C/32 to 131°F
• Resolution: ø35, ø55, ø184 mm/ ø1.38, ø2.16, ø7.24 in
• Response time < 0.032 sec
• Supply voltage: 24 Vdc
• Protection height of 230 to 1600 mm/9.06 to 63.04 in

APPLICATIONS
• Packaging and wrapping devices
• Automated warehouses
• Protection of working zone instead of sensitive mats
• Machinery for merchandise handling such as palletizing and self-organisers
• Automated assembly lines

The FF-SLC curtain is a no-touch safety device designed to protect operators of dangerous machinery. The safety light curtain detects any opaque object which interrupts the protected zone, the result being immediate arrest of the moving parts of the machine. The FF-SLC series is an excellent alternative to traditional mechanical barriers, providing many benefits such as unobstructed working area, improved productivity, simple installation and maintenance.

The FF-SLC curtain is a multibeam photoelectric barrier made up of an emitter, a receiver and a separate control unit. The three units are combined to provide a Type 2 fail-safe system, the safeguarding function of which is based upon a periodic performance test, as defined by the norm IEC/EN 61496 - parts 1 & 2. The performance test is initiated by the machine and the control unit is provided with a test input that guarantees a safe connection between emitter and receiver and the machinery control circuit. Via a specific feedback monitor, the control unit is preset to check the reaction times and the electrical connections of the external contactors used in the machine control circuitry.

The control unit is equipped with a self-diagnostic output giving information on the internal relays status.

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.
If the feedback monitor is set, this output can also give some information on the external relays status.

Both the emitter and the receiver are built in a modular design. This design permits rapid and simple maintenance of barrier from 230 up to 1600 mm / 9.06 to 63.04 in detection heights. Three different object detection capabilities are available:

- FF-SLC35 versions with a 35 mm / 1.38 in object detection capability, ideal for detecting the hands of the operator.
- FF-SLC55 versions with a 55 mm / 2.16 in object detection capability for arms, legs or the whole body detection.
- FF-SLC18 versions with a 184 mm / 7.24 in object detection capability for the whole body detection.

With a scanning range of up to 12 m / 39.4 ft, the FF-SLC barrier can be used for most industrial applications.

Due to its specific mechanical concept combined with micro-electronics technology, the modular system minimises the size, making it possible to install the system in confined spaces.

The control unit is powered on 24 Vdc. The control unit box (IP 40) can be integrated into the machine control panel at a distance from the barrier of up to 100 m / 328 ft. This control unit is designed for rapid mounting on an Omega rail (EN 50 022). Moreover, the separate control unit makes first level maintenance easier for the customer: it is not necessary to dismantle the receiver to change relays for instance.

The emitter and receiver are optically synchronised, and can be easily mounted using the right-angle brackets which are provided with the system.

The ±4° opening angle of the beams complies with IEC/EN 61496 - 2, enabling simple alignment between emitter and receiver.

LED indicators displayed on the front panel of the emitter, receiver and control units, indicate the status of the system, aiding optical alignment and failure diagnoses.

Design and operation

IEC/EN 61496 requires that a Type 2 electrosensitive protective device maintains its protective function, if an emergency-stop signal is generated after detection of the failure of the protective device due to the cyclic performance test.

The control unit of the FF-SLC barrier is set with a test signal input which allows the machine to generate a periodic test (before each machine cycle for instance). At power up and after any interruption of the detection field, the test command is systematically activated when the safety system is reset. Only a positive response to the test enables the start function, energising the output relays. When a test gives a negative response the output relays de-energise. The control unit remains permanently de-energised until the fault condition is removed (it is not possible to reset the safety system). Reset is activated by external control conditions. Both emitter and receiver columns have integral self-check circuits to control the emission and reception of the infrared light scan. Any failure is immediately detected within the scanning time.

The control unit checks the correct function of the output circuitry of the receiver column, the reaction time of the two internal relays, the electrical connections of the test/start command and the connections with auxiliary external relays (checking the reaction time via the feedback monitor).

The self-diagnostic output provides information on failures of the control unit. When the system detects a drop in synchronisation between the two internal relays A and B, the self-diagnostic output switches off. If the feedback connection is set, a drop in synchronisation between the outer relays K1 and K2 can also be detected. After each switching of the self-diagnostic output, the following should be carried out:

- Switch off the power.
- Remove the failure cause.
- Switch on the power.
- Reset the system (test command).

Installation precautions

The FF-SLC curtain should be protected against moving equipment, oil, dust, etc. The emitter and receiver columns should be rigidly mounted on the same plane.

The control unit should be installed in an IP 54 enclosure. Protection heights above 1600 mm / 63.04 in can be achieved by means of adjacent rows of two or more photoelectric barriers. To prevent mutual interference between the devices, the adjacent devices should be operated in the opposite direction, as shown in the diagram below. To avoid the less favorable resolution of 70 mm / 2.75 in between adjacent protection fields, it is recommended to use the displaced mounting arrangement shown on the right of the diagram following, with a continuous resolution of 35 mm / 1.38 in or 55 mm / 2.16 in. In a side-by-side assembly, the barriers should also be operated in the opposite direction.

In some applications, the right-angled mounting arrangement shown below offers the best solution. For perimetric protection, an arrangement with one, two, or three mirrors is possible.
2.16 in test rod for the FF-SLC55. Each time the machinery is powered up, an immediate shutdown of the machine should occur when any of the beams are interrupted by an opaque object.

Functional test
The response of the photoelectric safety curtain over the whole protection height should be regularly tested using a \( \varnothing 35 \text{ mm} / 1.38 \text{ in} \) test rod for the FF-SLC35 and a \( \varnothing 55 \text{ mm} / 2.16 \text{ in} \) test rod for the FF-SLC55.

<table>
<thead>
<tr>
<th>UNIT</th>
<th>LED Nr</th>
<th>COLOUR</th>
<th>STATE</th>
<th>INDICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emitter</strong></td>
<td>➀</td>
<td>Green</td>
<td>On</td>
<td>Reception of the synchronisation beam</td>
</tr>
<tr>
<td></td>
<td>➁</td>
<td>Yellow</td>
<td>On</td>
<td>Misalignment of the synchronisation beam</td>
</tr>
<tr>
<td></td>
<td>➂</td>
<td>Red</td>
<td>Flickering</td>
<td>Failure on the emitter unit (^{(1)})</td>
</tr>
<tr>
<td><strong>Receiver</strong></td>
<td>➃</td>
<td>Green</td>
<td>On</td>
<td>Protection field is clear/NO outputs are closed</td>
</tr>
<tr>
<td></td>
<td>➄</td>
<td>Yellow</td>
<td>On</td>
<td>Protection field is clear/NO outputs are open</td>
</tr>
<tr>
<td></td>
<td>➅</td>
<td>Red</td>
<td>On</td>
<td>Protection field is entered/NO outputs are open</td>
</tr>
<tr>
<td></td>
<td>➆</td>
<td>Red</td>
<td>Flickering</td>
<td>Failure on the receiver unit (^{(1)})</td>
</tr>
<tr>
<td><strong>Control unit</strong></td>
<td>➇</td>
<td>Green</td>
<td>On</td>
<td>Protection field is clear/NO outputs are closed</td>
</tr>
<tr>
<td></td>
<td>➈</td>
<td>Yellow</td>
<td>On</td>
<td>Protection field is clear/NO outputs are open</td>
</tr>
<tr>
<td></td>
<td>➉</td>
<td>Red</td>
<td>Flickering</td>
<td>Failure on the control unit</td>
</tr>
<tr>
<td></td>
<td>➊</td>
<td>Red</td>
<td>Flickering</td>
<td>Failure on the external relays K1 &amp; K2 (^{(2)})</td>
</tr>
</tbody>
</table>

\(^{(1)}\) The red LED and the yellow LED flicker alternately  
\(^{(2)}\) The 2 red LED flicker simultaneously.

LED status indicators

Test rod of \( \varnothing 35 \text{ mm} / 1.37 \text{ in} \) (FF-SLC35) and \( \varnothing 55 \text{ mm} / 2.16 \text{ in} \) (FF-SLC55)
**FF-SLC35**

- Type 2 according to IEC/EN 61496 - parts 1 & 2
- Φ35 mm / 1.38 in object detection capability
- Scanning range up to 12 m / 39.4 ft

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

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Supply voltage</th>
<th>Output</th>
<th>Resolution</th>
<th>Alignment tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 Vdc ± 20 %</td>
<td>2 safety relays with guided contacts (2 A / 125 Vac); 2 NO contacts and 1 NC contact</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Φ35 mm / 1.37 in</td>
<td></td>
</tr>
</tbody>
</table>

| Resistance to ambient light          | ±4° for both emitter and receiver, in compliance with norm IEC/EN61496 - 2 |

| Temperatures                         | Operating: 0 to 55°C / 32 to 131°F • Storage: -20 to 70°C / -4 to 158°F |
|                                     | > 50 000 Lux |

| Electrical noise immunity according to |
|                                      | Normal IEC 801-4 Level IV |

| Mechanical mounting                  | Control unit: Rail mounting in accordance with EN 50 022-35 |
|                                      | Right-angle brackets |

| Dimensions of control unit           | 100 mm / 3.94 in x 73 mm / 2.87 in x 118 mm / 4.64 in |
| Weight of control unit               | 500 g / 1.1 lb |
| Lens diameter                        | Φ12 mm / 0.47 in |
| Scanning range                       | 0 to 12 m / 0 to 39.4 ft |

| Emitter and receiver: 7-pin plastic plugs type GO610WF,F: 932 484-100 (Hirschmann) |

**Ordering information**

- FF-SLC355-J32
- Protection height (PH) mm/in
  - 02: 230 / 9.06
  - 04: 400 / 15.76
  - 06: 570 / 22.45
  - 07: 745 / 29.35
  - 09: 915 / 36.05
  - 11: 1090 / 42.94
  - 13: 1260 / 49.63
  - 14: 1435 / 56.53
  - 16: 1605 / 63.23

- Control units
  - FF-SLU100R2 (Normal control unit)
  - or
  - FF-SLM200R2 (with muting function)

**Note**

- Each barrier consists of an emitter and a receiver, and is delivered with 4 brackets and 2 connectors (cable is not provided). For a complete set be sure to order the control unit. In case of significant vibrations, order separately 2 kits of vibration dampers.

- Protection height (PH) mm/in
  - 02: 230 / 9.06
  - 04: 400 / 15.76
  - 06: 570 / 22.45
  - 07: 745 / 29.35
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  - 11: 1090 / 42.94
  - 13: 1260 / 49.63
  - 14: 1435 / 56.53
  - 16: 1605 / 63.23

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  - 02: 230 / 9.06
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  - 11: 1090 / 42.94
  - 13: 1260 / 49.63
  - 14: 1435 / 56.53
  - 16: 1605 / 63.23

- Number of beams
  - 9
  - 17
  - 25
  - 33
  - 41
  - 49
  - 57
  - 65
  - 73

- Response time (with control unit, See Note) (ms)
  - 28
  - 29
  - 30
  - 30
  - 31
  - 32

- Weight kg/lbs
  - 2.5/5.5
  - 3.7/15
  - 4.8/10.58
  - 6/13.22
  - 7.4/16.31
  - 8.6/18.95
  - 9.7/21.38
  - 10.8/23.8
  - 12.5/27.55

- Power consumption W
  - 14.3
  - 15.6
  - 17
  - 18.4
  - 19.8
  - 21.1
  - 22.5
  - 23.9
  - 25.3

- Mounting brackets pitch mm/in
  - 6/0.24
  - 10/0.39
  - 13/0.52
  - 16/0.64

- Protection height (PH) mm/in
  - 02: 230 / 9.06
  - 04: 400 / 15.76
  - 06: 570 / 22.45
  - 07: 745 / 29.35
  - 09: 915 / 36.05
  - 11: 1090 / 42.94
  - 13: 1260 / 49.63
  - 14: 1435 / 56.53
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  - 02: 230 / 9.06
  - 04: 400 / 15.76
  - 06: 570 / 22.45
  - 07: 745 / 29.35
  - 09: 915 / 36.05
  - 11: 1090 / 42.94
  - 13: 1260 / 49.63
  - 14: 1435 / 56.53
  - 16: 1605 / 63.23

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  - 9
  - 17
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  - 33
  - 41
  - 49
  - 57
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- Response time (with control unit, See Note) (ms)
  - 28
  - 29
  - 30
  - 30
  - 31
  - 32

- Weight kg/lbs
  - 2.5/5.5
  - 3.7/15
  - 4.8/10.58
  - 6/13.22
  - 7.4/16.31
  - 8.6/18.95
  - 9.7/21.38
  - 10.8/23.8
  - 12.5/27.55

- Power consumption W
  - 14.3
  - 15.6
  - 17
  - 18.4
  - 19.8
  - 21.1
  - 22.5
  - 23.9
  - 25.3

- Mounting brackets pitch mm/in
  - 6/0.24
  - 10/0.39
  - 13/0.52
  - 16/0.64

**Note**

- (with SLU100R2 or SLM200R2 control unit)

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**Courtesy of Steven Engineering, Inc.**

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- Main Office: (650) 588-9200
- Outside Local Area: (800) 258-9200
- www.stevenengineering.com
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 has ended or is interrupted. For the safety distance S, the EN 999 European project norm defines the following formula:

**Normal approach**

- **Europe**
  \[
  S \geq 2000 (t_1+t_2) + 168 \text{ mm} \ , \ S \geq 100 \text{ mm} \\
  \text{ (or } S \geq 78.74 (t_1+t_2) + 6.61 \text{ in}, \ S \geq 3.9 \text{ in} \text{)}
  \]
  This formula applies for all safety distances of S up to and including 500 mm/19.7 in. If S is found to be greater than 500 mm/19.7 in, using the above-mentioned formula, then the distance may be reduced using the following formula:
  \[
  S \geq 1600 (t_1+t_2) + 168 \text{ mm}, \ S \geq 500 \text{ mm} \\
  \text{ (or } S \geq 63.04 (t_1+t_2) + 33.5 \text{ in}, \ S \geq 19.7 \text{ in} \text{)}
  \]

  \[
  D_s \geq 63 (t_1+t_2) + 3.75 \text{ in} \text{, } D_s = S
  \]

**Parallel approach**

\[
S \geq 1600 (t_1+t_2) + 850 \text{ mm with } 875 < H \leq 1000 \text{ mm} \\
\text{ (or } S \geq 63.04 (t_1+t_2) + 33.5 \text{ in with } 875 < H \leq 19.7 \text{ in} \text{)}
\]

or
\[
S \geq 1600 (t_1+t_2) + (1200 - 0.4H) \text{ mm with } 0 < H \leq 34.7 \text{ in}
\]

(4) All the ground terminals must be connected to the same potential.

**Connection diagram**

- **Test input:** The safeguarding function of the system relies on the use of this input. This input enables the cyclic activation of the test and the reset of the system after each power on or intrusion in the detection field (the contact should be maintained during 10 msec/test duration: 150 msec).

- **Feedback control:** The setting of this feedback control allows the monitoring of the external relays K1 and K2. In case of failure of one relay, the control unit remains in a stop condition until the failure cause is removed.

- **Self-diagnosis output:** This output provides an alarm signal when a drop of synchronism is detected between the two inner relays A and B (if the feedback connection is set, the alarm signal is also provided in case of drop of synchronism between the two external relays K1 and K2).

- **Power circuitry:** The connection diagram shows the wiring and interconnections of the system components.
**FF-SLC55**

- Type 2 according to IEC/EN 61496 - parts 1 & 2
- \( \varnothing 55 \text{ mm} / 2.16 \) in object detection capability
- Scanning range up to 12 m / 39.4 ft

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Supply voltage</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>24 Vdc ± 20 %</td>
<td>2 safety relays with guided contacts (2 A / 125 Vac); 2 NO contacts and 1 NC contact</td>
</tr>
<tr>
<td>Alignment tolerance</td>
<td>±4° for both emitter and receiver, in compliance with norm IEC/EN 61496 - 2</td>
<td></td>
</tr>
<tr>
<td>Temperatures</td>
<td>Operating: 0 to 55° C / 32 to 131° F • Storage: -20 to 70° C / -4 to 158° F</td>
<td></td>
</tr>
<tr>
<td>Resistance to ambient light</td>
<td>&gt; 50 000 Lux</td>
<td></td>
</tr>
<tr>
<td>Sealing</td>
<td>Emitter and receiver: IP 65 / Control unit: IP 40</td>
<td></td>
</tr>
<tr>
<td>Electrical noise immunity according to</td>
<td>Norm IEC 801-4 Level IV</td>
<td></td>
</tr>
<tr>
<td>Mechanical mounting</td>
<td>Right-angle brackets</td>
<td></td>
</tr>
</tbody>
</table>

**Ordering information**

- FF-SLC55J2
- Protection height (PH) mm/in
  - 04: 440 / 17.33
  - 06: 610 / 24.03
  - 08: 785 / 30.92
  - 09: 955 / 37.62
  - 11: 1130 / 44.52
  - 13: 1300 / 51.22
  - 15: 1475 / 58.11
  - 16: 1645 / 64.81

- FF-SLU100R2 (Normal control unit)
- FF-SLM200R2 (with muting function)

**Control units**

- The emitter and the receiver have the same dimensions
- Control unit: Rail mounting in accordance with EN 50 022-35

**Plastic Connector**

- OD 610WF, Nb 932 484-100 (Hirschmann)
- Control unit: Plugable terminal blocks / Max. connection length: 100 m / 328 ft

**Electrical connections**

- Cable specifications: ø0.5 to 1 mm² (max. allowable line resistance: 4 Ω)

**Note**

- Each barrier consists of an emitter and a receiver, and is delivered with 4 brackets and 2 connectors (cable is not provided). For a complete set be sure to order the control unit. In case of significant vibrations, order separately 2 kits of vibration dampers.

**Specifications**

<table>
<thead>
<tr>
<th>Protection height mm/in</th>
<th>RH</th>
<th>440 / 17.33</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height of the barrier mm/in</td>
<td>HB</td>
<td>470 / 18.51</td>
</tr>
<tr>
<td>Dimensions height mm/in</td>
<td>HF</td>
<td>525 / 20.68</td>
</tr>
<tr>
<td>Number of beams</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>Response time (with control unit, See Note) (ms)</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>Weight kg/lbs</td>
<td>3.7/8.4</td>
<td>4.8/10.6</td>
</tr>
<tr>
<td>Power consumption W</td>
<td>14.3</td>
<td>15</td>
</tr>
<tr>
<td>Mounting brackets pitch mm/in</td>
<td>Maxm.</td>
<td>340 / 13.4</td>
</tr>
</tbody>
</table>

**Note:** (with SLU100R2 or SLM200R2 control unit)
Safety distances

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 has ended or is interrupted. For the safety distance $S$, EN 999 defines the following formula:

**Normal approach**

$$S \geq 1600 \ (t_1+t_2) + 850 \mathrm{~mm}$$

$$(or \ S \geq 63.04 \ (t_1+t_2) + 33.49 \mathrm{in})$$

The risk of inadvertent access should be taken into account during the risk assessment stage, but in all cases, the height $H$ of the uppermost beam should be greater or equal to 900 mm/35.46 in, and the height $P$ of the lowest beam should be lower or equal to 300 mm/11.82 in.

**Parallel approach**

$$S \geq 1600 \ (t_1+t_2) + 850 \mathrm{~mm} \ with \ 875 < H \leq 1 \ 000 \mathrm{~mm}$$

$$(or \ S \geq 63.04 \ (t_1+t_2) + 47.28 \mathrm{in} \ with \ 0 < H \leq 875 \mathrm{~mm})$$

The height $H$ should be a maximum of $H_{\text{max}} = 1 \ 000 \mathrm{~mm}/39.4 \mathrm{in}$ from the ground and the lowest allowable height of the device $H_{\text{min}} = 75 \mathrm{~mm}/2.95 \mathrm{in}$ from the ground. However, if the installation height $H$ is greater than 300 mm/11.82 in there is a risk of inadvertent undetected access beneath the curtain, and this must be taken into account in the risk assessment.

$t_1$: Response time of the barrier and control unit (sec)

t_2$: Stopping time of the machine (sec)

$H$: Height of the plane of detection (mm/in)

**Angled approach**

$$30^\circ < \alpha < 90^\circ$$

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

$$0^\circ < \alpha \leq 30^\circ$$

If the angle is less than or equal to $30^\circ$, the approach should be considered as parallel, and one of the above-mentioned formulas should be used. In this case the min. height allowed is $P_{\text{min}} = 75 \mathrm{~mm}/2.95 \mathrm{in}$ and the max. height allowed is $H_{\text{max}} = 1 \ 000 \mathrm{~mm}/39.4 \mathrm{in}$. However, if $P > 300 \mathrm{~mm}/11.82 \mathrm{in}$, the risk of inadvertent access from below must be taken into account.

Connection diagram

(1) Test input: The safeguarding function of the system relies on the use of this input. This input enables the cyclic activation of the test and the reset of the system after each power on or intrusion in the detection field (the contact should be maintained during 10 msec/test duration: 150 msec).

(2) Feedback control: The setting of this feedback control allows the monitoring of the external relays K1 and K2. In case of failure of one relay, the control unit remains in a stop condition until the failure cause is remoted.

(3) Self-diagnosis output: This output provides an alarm signal when a drop of synchronism is detected between the two inner relays A and B (if the feedback connection is set, the alarm signal is also provided in case of drop of synchronism between the two external relays K1 and K2).

(4) All the ground terminals must be connected to the same potential.
FF-SLC18

- Type 2 according to IEC/EN 61496 - parts 1 & 2
- ø184 mm / 7.24 in object detection capability
- Scanning range up to 12 m / 39.4 ft

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

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<tr>
<th>Specifications</th>
<th>Supply voltage</th>
<th>24 Vdc ± 20 %</th>
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</thead>
<tbody>
<tr>
<td>Output</td>
<td>2 safety relays with guided contacts (2 A / 125 Vac) : 2 NO contacts and 1 NC contact ø184 mm / 7.24 in</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td></td>
<td></td>
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<tr>
<td>Alignment tolerance</td>
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<tr>
<td>Resistance to ambient light</td>
<td>&gt; 50 000 Lux</td>
<td></td>
</tr>
<tr>
<td>Sealing</td>
<td>Emitter and receiver: IP 65 / Control unit: IP 40</td>
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<tr>
<td>Electrical noise immunity according to</td>
<td>Norm IEC801-4 Level IV</td>
<td></td>
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<tr>
<td>Mechanical mounting</td>
<td>Right-angle brackets</td>
<td></td>
</tr>
<tr>
<td>Dimensions of control unit</td>
<td>100 mm / 3.94 in x 73 mm / 2.87 in x 118 mm / 4.64 in</td>
<td></td>
</tr>
<tr>
<td>Weight of control unit</td>
<td>500 g / 1.1 lb</td>
<td></td>
</tr>
<tr>
<td>Lens diameter</td>
<td>ø12 mm / 0.47 in</td>
<td></td>
</tr>
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<td></td>
</tr>
<tr>
<td>Control unit</td>
<td>Control unit: Plugable terminal blocks / Max. connection length: 100 m / 328 ft</td>
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<tr>
<td>Weight of control unit</td>
<td>500 g / 1.1 lb</td>
<td></td>
</tr>
<tr>
<td>Lens diameter</td>
<td>ø12 mm / 0.47 in</td>
<td></td>
</tr>
<tr>
<td>Scanning range</td>
<td>0 to 12 m / 0 to 39.4 ft</td>
<td></td>
</tr>
<tr>
<td>Electrical connections</td>
<td>Emitter and receiver: 7-pin plastic plugs type GO610WF,Nb 932 484-100 (Hirschmann)</td>
<td></td>
</tr>
</tbody>
</table>

Ordering information
FF-SLC18-J-z2

- Protection height (PH) mm/in
  04: 355/13.98
  06: 525/20.68
  07: 700/27.58
  09: 870/34.27
  11: 1045/41.17
  13: 1215/47.87
  14: 1390/54.76

Control units
- FF-SLU100R2 (Normal control unit)
- FF-SLM200R2 (with muting function)

Note
- Each barrier consists of an emitter and a receiver, and is delivered with 4 brackets and 2 connectors (cable is not provided). For a complete set be sure to order the control unit. In case of significant vibrations, order separately 2 kits of vibration dampers.

- Power consumption | W
  3.7 / 8.15 | 6/13.22 | 15.6 | 17 | 20/0.78

- Mounting brackets pitch | mm / in
  420 / 16.54 | 590/23.24 | 765/30.14 | 935/36.83 | 1110 / 43.73 | 1218 / 47.98 | 1450 / 57.13

- Response time (with control unit, See Note): (ms)
  28 | 28 | 29 | 29 | 30 | 30 | 30

- Weight

- ø184/7.24

- Emitting lens ø12 / 0.47

- Receiver lens ø12 / 0.47

Note: (with SLU100R2 or SLM200R2 control unit)
Safety distances

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 has ended or is interrupted. For the safety distance \( S \), EN 999 defines the following formula:

**Normal approach**

\[
S \geq 1600 \ (t_1+t_2) + (850 \text{ mm})
\]

(or \( S \geq 63.04 \ (t_1+t_2) + (33.5 \text{ in}) \))

\( t_1 \): Response time of the barrier and control unit
\( t_2 \): Stopping time of the machine (sec)

**Recommendations:**

<table>
<thead>
<tr>
<th>Models</th>
<th>Beam Heights</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( P ) (mm/in)</td>
</tr>
<tr>
<td>FF-SLC18042(1)</td>
<td>578 / 22.77</td>
</tr>
<tr>
<td>FF-SLC18062(2)</td>
<td>400 / 15.76</td>
</tr>
<tr>
<td>FF-SLC18072</td>
<td>300 / 11.82</td>
</tr>
<tr>
<td>FF-SLC18092</td>
<td>300 / 11.82</td>
</tr>
<tr>
<td>FF-SLC18112</td>
<td>300 / 11.82</td>
</tr>
<tr>
<td>FF-SLC18132</td>
<td>200 / 7.88</td>
</tr>
<tr>
<td>FF-SLC18142</td>
<td>200 / 7.88</td>
</tr>
</tbody>
</table>

**Connection diagram**

(1) This equipment may be installed at a height similar to the one mentioned in the EN 999 for single safety beams.

(2) This risk of inadvertent access beneath the light curtain must be taken into account during the risk assessment stop.

(3) Self-diagnosis output: This output provides an alarm signal when a drop of synchronism is detected between the two inner relays A and B (if the feedback connection is set, the alarm signal is also provided in case of a drop of synchronism between the two external relays K1 and K2).

(4) All the ground terminals must be connected to the same potential.
FF-SLC accessories (Brackets/connectors are provided with light curtains)

**Single mounting bracket (HP < 1 000 mm / 39.4 in)**
Mounting bracket for one mounting pin, supplied with screws and nuts (order 2 brackets per emitter or receiver with a protection height lower than 1 000 mm / 39.4 in).

**Double mounting bracket (HP ≥ 1 000 mm / 39.4 in)**
Mounting bracket for two mounting pins, supplied with screws and nuts (order 2 brackets per emitter or receiver with a protection height greater or equal to 1 000 mm / 39.4 in).

**Mounting pin**
Mounting pin (order one mounting pin for the 7200037 bracket and 2 mounting pins for the 7200081 bracket).

**Kit of 4 anti-vibration dampers**
In case of significant vibrations, use one kit of 4 anti-vibration dampers for two 7200037 brackets (supplied with screws and nuts).

**Kit of 6 anti-vibration dampers**
In case of very significant vibrations, use one kit of 6 anti-vibration dampers for two 7200081 brackets (supplied with screws and nuts).

**Plastic connector**
Mobile female supply plug for emitter and receiver, Hirschmann 7 pin GO 610WF, no. 932 484-100 (order one plug per emitter and receiver).

**Test rods**
Test rods of ø35 mm / 1.37 in for FF-SLC35 barrier and ø55 mm/2.16 in for FF-SLC55 barrier.
Type 2 safety light curtain
Compact and cost-effective unit

**FEATURES**
- Active Optoelectronic Protective Device compliant with the requirements of the IEC/EN 61496-1 and IEC/EN 61496-2 European norms for Type 2 electrosensitive protective equipment
- Self-contained unit. No electrical connection necessary between emitter and receiver
- 2 safety static outputs with short-circuit and cross-fault detection
- Resolutions available:
  - ø18 mm / 0.7 in for finger detection
  - ø30 mm / 1.2 in for hand detection
- Protection height up to 1470 mm / 58 in
- Scanning range up to 3.5 m / 11.48 ft
- Electrical connection: M12 8 pole connectors
- Compact size: only 42 mm² x 55 mm² / 1.65 in² x 2.16 in² cross sectional area
- Optional interface control module for more switching capability and additional features

**TYPICAL APPLICATIONS**
- Woodworking machines
- Electronic assembly
- Textile machines

The Honeywell FF-SLG is a self-contained light curtain that does not require a separate control unit for operation. As soon as an object is detected inside the protection field, the FF-SLG opens its two safety static outputs to generate an emergency stop condition that is used to remove dangerous machine motion when properly interfaced with the machine stopping circuitry. When connected to the FF-SRL60252 optional interface control module, the FF-SLG 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.

The FF-SLG is designed in compliance with IEC/EN 61496-1 and IEC/EN 61496-2 standards and meets the requirements for a Type 2 Active Optoelectronic Protective Device. It can be used on low to medium danger machines.

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.

The cross section of 42 mm x 55 mm / 1.65 in x 2.16 in makes installation possible in tight spaces, especially with the help of the T-shape bolts supplied with the light curtains. Indicators provide information on the output status and on failure diagnostic.

Optional right angle brackets allow for bottom and top mounting. The optional FF-SRL60252 interface control module easily fits inside the machine control panel with its 22.5 mm / 0.89 in width DIN rail mount housing.

A test input on the emitter allows for a cyclical test of the system, as per the requirements of IEC/EN 61496-1 and IEC/EN 61496-2.

**WARNING**

- Improper safety product use in the US
  - Type 2 safety light curtains as defined by IEC/EN 61496-1 and IEC/EN 61496-2 do not meet US OSHA 1910.217, US ANSI B11.1, B11.2, B11.19 and B11.20 requirements. Although Type 2 safety products are acceptable for certain applications outside the US, they are not generally acceptable in the US due to current US regulations and standards.
  - In the US, Type 2 safety light curtains may be used under limited circumstances as defined by the ANSI/R15.06-1999 standard.
  - In Canada, IEC/EN 61496-1 and IEC/EN 61496-2 are recognised as product standards, however application standards do not typically allow Type 2 light curtain use.
  - Do not use Type 2 safety products in the US if the applicable standard requires a control reliable solution.

- Consult with local safety agencies before installing a Type 2 safety light curtain product.

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

**DANGER**

- Improper safety product use in the US

- Type 2 safety light curtains as defined by IEC/EN 61496-1 and IEC/EN 61496-2 do not meet US OSHA 1910.217, US ANSI B11.1, B11.2, B11.19 and B11.20 requirements. Although Type 2 safety products are acceptable for certain applications outside the US, they are not generally acceptable in the US due to current US regulations and standards.
- In the US, Type 2 safety light curtains may be used under limited circumstances as defined by the ANSI/R15.06-1999 standard.
- In Canada, IEC/EN 61496-1 and IEC/EN 61496-2 are recognised as product standards, however application standards do not typically allow Type 2 light curtain use.
- Do not use Type 2 safety products in the US if the applicable standard requires a control reliable solution.

Failure to comply with these instructions will result in death or serious injury.
Type 2 compact and cost-effective unit FF-SLG

- Type 2 according to the IEC/EN 61496-1 and IEC/EN 61496-2 standards
- 2 safety static outputs with short-circuit and cross-fault detection

**Ordering information**
Each listing consists of an emitter, a receiver, 2 pairs of mounting pins, 4 M5 dovetail shape bolts, 4 M5 nuts and 4 rip-lock washers, and a test rod.

**Table 1 (mm / in)**

<table>
<thead>
<tr>
<th>Features</th>
<th>Type</th>
<th>FF-SLG18</th>
<th>FF-SLG30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td></td>
<td>ø 18 mm / 0.7 in</td>
<td>ø 30 mm / 1.2 in</td>
</tr>
<tr>
<td>Protection height</td>
<td></td>
<td>See Table 2</td>
<td></td>
</tr>
<tr>
<td>Nominal scanning range</td>
<td></td>
<td>0.3 m to 3.5 m / 1 ft to 11.48 ft</td>
<td></td>
</tr>
<tr>
<td>Supply voltage</td>
<td></td>
<td>24 Vdc (±15 %)</td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td></td>
<td>Emitter: 4 Wmax. • Receiver: 3 Wmax. (see Table 2)</td>
<td></td>
</tr>
<tr>
<td>Outputs</td>
<td></td>
<td>2 safety static outputs (switching capacity: 0.3 A / 24 Vdc)</td>
<td></td>
</tr>
<tr>
<td>Maximum cable length</td>
<td></td>
<td>25 m / 82 ft when connected on the relevant Honeywell control module</td>
<td></td>
</tr>
<tr>
<td>Test input</td>
<td></td>
<td>Voltage free (normally closed contact)</td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td></td>
<td>15 ms</td>
<td>15 ms to 21.5 ms (see Table 2)</td>
</tr>
<tr>
<td>LED status indicators</td>
<td></td>
<td>Emitter: failure alarm / power, test</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Receiver: outputs status</td>
<td></td>
</tr>
<tr>
<td>Cross sectional area</td>
<td></td>
<td>W 42 mm² x D 55 mm² / W 1.65 in² x D 2.16 in²</td>
<td></td>
</tr>
<tr>
<td>(see Tables 1 and 2 for complete housing dimensions)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emission</td>
<td></td>
<td>Infrared modulated light source (925 nm)</td>
<td></td>
</tr>
<tr>
<td>Effective aperture angle</td>
<td></td>
<td>±4°, ±25 % (in compliance with the IEC/EN 61496-2)</td>
<td></td>
</tr>
<tr>
<td>Light immunity</td>
<td></td>
<td>Sun: 20 000 lux • Lamp: 15 000 lux</td>
<td></td>
</tr>
<tr>
<td>Electrical noise immunity</td>
<td></td>
<td>IEC61000-4-4: level III / IEC61000-4-3: level III</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
<td>Operating temperature: 0 °C to 55 °C / 32 °F to 131 °F</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Storage temperature: -20 °C to 75 °C / -4 °F to 167 °F</td>
<td></td>
</tr>
<tr>
<td>Vibration</td>
<td></td>
<td>IEC/EN 61496-1: 10 to 55 Hz frequency range, 1 octave/min. sweep rate, 0.35 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>±0.05 amplitude, 20 sweeps per axis, for 3 axes</td>
<td></td>
</tr>
<tr>
<td>Sealing</td>
<td></td>
<td>IP 65, NEMA 4.13</td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td></td>
<td>Housing: black anodised aluminium alloy • Front plate: polymethyl methacrylate (PMMA)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>End caps: polycarbonate</td>
<td></td>
</tr>
<tr>
<td>Electrical connection</td>
<td></td>
<td>M12 8 pole connectors</td>
<td></td>
</tr>
<tr>
<td>Dimensions (mm / in)</td>
<td></td>
<td>See Table 2</td>
<td></td>
</tr>
<tr>
<td>Emission</td>
<td></td>
<td>42 / 1.65</td>
<td>55 / 2.16</td>
</tr>
<tr>
<td>Effective aperture angle</td>
<td></td>
<td>11.2 / 0.44</td>
<td>8 / 0.32</td>
</tr>
<tr>
<td>Light immunity</td>
<td></td>
<td>376 / 14.8</td>
<td>21 / 0.82</td>
</tr>
<tr>
<td>Electrical noise immunity</td>
<td></td>
<td>8 / 0.32</td>
<td>21 / 0.82</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
<td>35.65 / 1.40</td>
<td>9,7 / 0.38</td>
</tr>
<tr>
<td>Vibration</td>
<td></td>
<td>21 / 0.82</td>
<td>2,6 / 0.10</td>
</tr>
<tr>
<td>Sealing</td>
<td></td>
<td>15,6 / 0.61</td>
<td>20,2 / 0.79</td>
</tr>
<tr>
<td>Material</td>
<td></td>
<td>19,9 / 0.79</td>
<td>15,2 / 0.60</td>
</tr>
<tr>
<td>Electrical connection</td>
<td></td>
<td>276.45 / 10.89</td>
<td>276.45 / 10.89</td>
</tr>
<tr>
<td>Dimensions (mm / in)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Features**

- **Resolutions**
  - 18: ø 18 mm / 0.7 in
  - 30: ø 30 mm / 1.2 in
- **Protection heights**
  - See Table 2
- **Nominal scanning ranges**
  - 0.3 m to 3.5 m / 1 ft to 11.48 ft
- **Supply voltage**
  - 24 Vdc (±15 %)
- **Power consumption**
  - Emitter: 4 W max. • Receiver: 3 W max. (see Table 2)
- **Outputs**
  - 2 safety static outputs (switching capacity: 0.3 A / 24 Vdc)
- **Maximum cable length**
  - 25 m / 82 ft when connected on the relevant Honeywell control module
- **Test input**
  - Voltage free (normally closed contact)
- **Response time**
  - 15 ms
- **LED status indicators**
  - Emitter: failure alarm / power, test
  - Receiver: outputs status
- **Cross sectional area**
  - W 42 mm² x D 55 mm² / W 1.65 in² x D 2.16 in²
  - (see Tables 1 and 2 for complete housing dimensions)
- **Emission**
  - Infrared modulated light source (925 nm)
- **Effective aperture angle**
  - ±4°, ±25 % (in compliance with the IEC/EN 61496-2)
- **Light immunity**
  - Sun: 20 000 lux • Lamp: 15 000 lux
- **Electrical noise immunity**
  - IEC61000-4-4: level III / IEC61000-4-3: level III
- **Ambient temperature**
  - Operating temperature: 0 °C to 55 °C / 32 °F to 131 °F
  - Storage temperature: -20 °C to 75 °C / -4 °F to 167 °F
- **Vibration**
  - 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: black anodised aluminium alloy • Front plate: polymethyl methacrylate (PMMA)
  - End caps: polycarbonate
- **Electrical connection**
  - M12 8 pole connectors

**Notes**

1. Protection Height for the minimum detected object size or resolution
2. Sensing Field Height (full screen height)
3. Total Height
Table 2

<table>
<thead>
<tr>
<th>Model</th>
<th>031</th>
<th>050</th>
<th>070</th>
<th>089</th>
<th>109</th>
<th>128</th>
<th>147</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection height (mm / in) (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SLG18</td>
<td>306 / 12.05</td>
<td>498 / 19.62</td>
<td>690 / 27.18</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FF-SLG30</td>
<td>318 / 12.52</td>
<td>510 / 20.09</td>
<td>702 / 27.65</td>
<td>894 / 35.22</td>
<td>1086 / 42.78</td>
<td>1278 / 50.35</td>
<td>1470 / 57.91</td>
</tr>
<tr>
<td>Sensing field height (mm / in) (2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SLG18</td>
<td>282 / 11.11</td>
<td>474 / 18.6</td>
<td>666 / 26.24</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FF-SLG30</td>
<td>270 / 10.63</td>
<td>462 / 18.2</td>
<td>654 / 25.76</td>
<td>846 / 33.33</td>
<td>1038 / 40.89</td>
<td>1230 / 48.46</td>
<td>1422 / 56.02</td>
</tr>
<tr>
<td>Total height (mm / in) (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SLG18</td>
<td>376 / 14.8</td>
<td>568 / 22.36</td>
<td>760 / 29.92</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FF-SLG30</td>
<td>376 / 14.8</td>
<td>568 / 22.36</td>
<td>760 / 29.92</td>
<td>952 / 37.48</td>
<td>1144 / 45.03</td>
<td>1336 / 52.6</td>
<td>1528 / 60.15</td>
</tr>
<tr>
<td>Response time (ms)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SLG18</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>FF-SLG30</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15,5</td>
<td>17,5</td>
<td>19,5</td>
<td>21,5</td>
</tr>
</tbody>
</table>

<table>
<thead>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SLG18</td>
<td>1.1/2.4</td>
<td>1.2/2.6</td>
<td>1.3/2.7</td>
<td>1.4/3.0</td>
<td>1.5/3.2</td>
<td>1.6/3.3</td>
<td>1.8/3.7</td>
<td>1.9/3.8</td>
<td>2.0/4.3</td>
<td>2.3/4.5</td>
<td>2.5/4.8</td>
<td>2.6/5.1</td>
<td>2.8/5.4</td>
<td>3.0/5.7</td>
<td>3.2/6.0</td>
<td>3.4/6.3</td>
<td>3.6/6.6</td>
<td>3.8/6.9</td>
</tr>
<tr>
<td>FF-SLG30</td>
<td>1.1/2.4</td>
<td>1.2/2.6</td>
<td>1.3/2.7</td>
<td>1.4/3.0</td>
<td>1.5/3.2</td>
<td>1.6/3.3</td>
<td>1.8/3.7</td>
<td>1.9/3.8</td>
<td>2.0/4.3</td>
<td>2.3/4.5</td>
<td>2.5/4.8</td>
<td>2.6/5.1</td>
<td>2.8/5.4</td>
<td>3.0/5.7</td>
<td>3.2/6.0</td>
<td>3.4/6.3</td>
<td>3.6/6.6</td>
<td>3.8/6.9</td>
</tr>
</tbody>
</table>

Power consumption (W) | FF-SLG18 | FF-SLG30 | FF-SLG18 | FF-SLG30 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Emitter/receiver</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Emitter/receiver</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

Safety distances (North American information not provided due to limited applicability)

European EN 999 standard (in mm, 100 mm = 3.9 in)

**Normal approach**

\[ S \geq 2000 \times (t_1 + t_2) + 32, \quad S \geq 2000 \times (t_1 + t_2) + 128, \]

with \( S \geq 100 \)

\[ \text{If } S \geq 500, \text{ then use: } \]

\[ S \geq 1600 \times (t_1 + t_2) + 32, \quad S \geq 1600 \times (t_1 + t_2) + 500, \]

with \( S \geq 500 \)

**Parallel approach**

\[ S \geq 1600 \times (t_1 + t_2) + (1200 - 0.4 \times H), \quad S \geq 1600 \times (t_1 + t_2) + 850, \]

with \( 875 \leq H \leq 1000 \)

**Angled approach**

If \( \alpha \geq 30^\circ \), then use one of the formula given for a normal approach.

If \( \alpha \leq 30^\circ \), then use one of the formula given for a parallel approach, with \( H_u \leq 1000 \).

Where:

- \( S \): Minimum safety distance (mm, 100 mm = 3.9 in)
- \( t_1 \): Light curtain response time (s)
- \( t_2 \): Machine stopping time (s)
- \( H \): Height of the detection plane above the reference floor (in mm, 100 mm = 3.9 in)
- \( H_u \): Height of the uppermost beam above the reference floor (in mm, 100 mm = 3.9 in)
- \( H_l \): 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 or available) for the considered machine.
Wiring diagram (using the FF-SRL60252 safety control module)
The FF-SRL60252 interface control module is set in the Manual restart mode:

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-SLG light curtain
The cross-monitoring of the FF-SLG 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-SRL60252 interface control module is primarily designed to be interfaced with Honeywell safety static outputs devices. Compatibility of the FF-SLG with any other emergency stop safety control module is not guaranteed.

**LED status indicators**

- **Emitter**
  - Power (yellow) or alarm (flickering red)
  - Test indicator (red)

- **Receiver**
  - Operation indicator (green and red)
  - Outputs ON
  - Outputs OFF
Accessories

Safety control modules

**FF-SRL60252**
Dual channel relay module for safety light curtains with static safety outputs  
(to be ordered separately as an option)
- compatible with safety light curtains with static outputs only
- 24 Vdc
- Category 4 per EN 954-1
- Selectable start mode and FSD monitoring
- 3 NO, 1 NC internally redundant safety relay outputs
- 22.5 mm / 0.89 in width

**FF-SRM200P2**
Muting module  
(to be ordered separately as an option)
- connection of 1 or 2 safety devices
- modes of operation: unidirectional or bidirectional muting, mutual exclusion
- connection of 2 or 4 auxiliary muting sensors
- 24 Vdc
- category 4 per EN 954-1
- manual start mode, FSD monitoring
- programmable max. muting time
- crossfault monitoring of inputs
- self monitored muting lamp output
- 3 NO safety relay outputs
- static outputs for output status and diagnostic information
- 45 mm / 1.77 in

**FF-SRL59022**
Multi-safety device control module with Presence Sensing Device Initiation (PSDI)
- accept up to three safety devices working in a guard-only mode or 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
Input voltage: 85 to 264 Vac
Output voltage: 24 to 28 Vdc / 2.1 A to 1.8 A
Dimensions: 97 mm x 75 mm x 45 mm / 3.82 in x 2.95 in x 1.77 in
Mounting: DINrail
Approvals: UL508 listed, UL1950, cUL/CSA-C22.2, EN/IEC 60950, EN 50178
(to be ordered separately as an option).
Right-angle bracket kit

**FF-SGZ001002**
One kit includes 2 brackets and 8 M3.5 x 8 screws. Order one bracket kit per emitter or receiver element, 2 kits for an emitter/receiver system. The 8 screws are used if the bracket is fixed on the top and bottom caps of the FF-SLG.
(to be ordered separately as an option).

**NOTICE**
PROTECTION AGAINST HIGH VIBRATION
In case of high vibration, 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).

Anti-vibration kit

**FF-SYZAD**
Kit of 2 straight brackets and 4 anti-vibration dampers (mounting hardware included).

**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 1470 mm / 57.91 in.

Cordsets

Lumberg single keyway M12, female straight (to be ordered separately)
Order 2 cordsets for emitter + receiver.
Emitter (FF-SLG••••••BM2E) or receiver (FF-SLG••••••BM2R)

<table>
<thead>
<tr>
<th>Catalogue listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SXZCAM128U02</td>
<td>2 m / 6.56 ft length</td>
</tr>
<tr>
<td>FF-SXZCAM128U05</td>
<td>5 m / 16.40 ft length</td>
</tr>
<tr>
<td>FF-SXZCAM128U10</td>
<td>10 m / 32.80 ft length</td>
</tr>
</tbody>
</table>

Cable connector

**FF-SXZCOM128**
Binder single keyway M12 female screw type straight connector. 8 set screws M2.5. Gold plated contacts.
Pin configuration according to IEC 61077-2-101.
Deflection mirror

FF-SYZMIR

To be ordered separately as an option

**Features:**
- Deflection mirror with 10% scanning range reduction (FF-SYZMIR0)
- Deflection mirror with 25% scanning range reduction (FF-SYZMIR1)
- Quick mounting and easy mirror adjustment
- Mounting brackets included (top/bottom mounting)
- Adjustment of mirror in azimuth direction of ±45°
- Housing compatible with FF-SBSMR Series

**Material:** Aluminium alloy housing

**Finish:** Gold colour anodisation

**Ordering guide:**
- FF-SYZMIR04: FF-SLGJ031
- FF-SYZMIR06: FF-SLGJ050
- FF-SYZMIR08: FF-SLGJ070
- FF-SYZMIR10: FF-SLGJ089
- FF-SYZMIR12: FF-SLGJ109
- FF-SYZMIR14: FF-SLGJ128 and FF-SLGJ147

Floorstanding post

FF-SYZPF

To be ordered separately as an option

Floorstanding post for the installation of the following FF-SLG light curtains: FF-SLGJ031 to FF-SLGJ109.

Adjustable floorstanding post

FF-SYZPA

To be ordered separately as an option
- 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 ±11° ensures an easy alignment
- 700 mm / 27.58 in corner protection for light curtain included
- Baseplate can be mounted independently
- Finish: RAL 1021 yellow paint.
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.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service

Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact a nearby sales office or:

INTERNET: www.honeywell.com/sensing
E-mail: info.sc@honeywell.com
Type 4 modular light curtain with separate control unit
Designed to enhance application flexibility

FEATURES
- Meets applicable parts of US OSHA 29CFR 1910.212 and RIA 15.06 regulations for Control Reliability
- Through scan detection system
- Complete system, ready for installation (amplifier, sensors, plug and cable)
- Safety amplifier with permanent self-checking, Type 4 according to IEC/EN 61496 - parts 1 & 2
- EC type examination certificate delivered by the German BG E+MIII
- Can drive from 2 to 8 multiplexed photoelectric beams
- Two guided contact output relays
- Resolution: ø40 mm to 400 mm / 1.57 in to 15.76 in in compliance with EC regulations (EN 999 standard)
- Built-in individual beam alignment aid
- Restart modes available:
  - automatic restart
  - start and restart interlock after power on and any beam interruption; in this mode the FSD monitoring facility is available
- Test input for FSD monitoring

TYPICAL APPLICATIONS
- Access protection on palletising areas
- Access control of areas containing robots or automatic machines
- Detection of automatic guided vehicles
- Ejection control
- Tool control
- Reliability of the detection information
- Thermoforming, agglomerating and moulding presses
- Door control

The FF-SCAN system uses an invisible, modulated infrared curtain. Due to its flexibility, it offers a customised solution for the protection of personnel working on dangerous machinery.

The system contains a positive-safety self-checking amplifier, M18 photoelectric sensors, connectors and one or two rolls of cable (1 shielded pair). Optional accessories are available (mounting brackets, deflection mirrors, multibeam post) to make the installation easy.

The sensors used to analyse an access area operate in through scan mode. The distance separating emitters and receivers can be as high as 33 m / 108.24 ft. Receivers are fitted with a line impedance adaptor allowing cabling connections of up to 50 m / 164 ft.

The amplifier drives from 2 to 8 sensors, that can provide a resolution of 40 mm to 400 mm / 1.57 in to 15.76 in (see sensors installation).

A built-in individual beam alignment aid provides visual information, which helps optimise optical adjustments when installing sensors. This alignment aid is helpful for any protection and any scanning ranges up to 33 m / 108.24 ft. Accessories are designed to ease sensors installation and a laser pen designed for alignment purposes can be used for perimetric protections involving one or several mirrors.

The dynamic electronic processing and the permanent self-checking of circuits provide a high level of intrinsic safety. The start and restart interlock allows reliable access control of dangerous areas surrounded by the infrared beam. The use of a test input facility provides a reliable control of the electrical interface which connects the FF-SCAN to the machine control circuits.

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.
Sensors installation
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 ended or interrupted. The safety distance “S” (or D) is calculated according to the following formula:

\[ S \geq K(t_1 + t_2) + C \]

- **S**: Minimum safety distance (mm / in)
- **K**: Approach speed of the operator (mm / s)
- **t_1**: Response time of the photoelectric curtain (30 ms)
- **t_2**: Stopping time of the machine (ms)
- **C**: Additional guarding space depending on the curtain sensitivity (mm / in)

Resolution of the photoelectric curtain
Parameter C depends on the maximum resolution of the photoelectric curtain. This resolution is determined by the sensing width of two adjacent beams as follows:

\[ R = P + \varnothing \]

- **R**: Maximum resolution of the curtain (mm / in)
- **P**: Maximum distance separating the centers of two adjacent sensors (mm / in)
- **\varnothing**: Lens diameter (15 mm / 0.59 in)

Values of K and C parameters according to the European EN 999 standard
The approach speed “K” depends upon the position of the curtain, and the guarding space “C” depends upon the resolution of the curtain.

Normal approach

Safety curtain with a resolution greater than \( \varnothing 40 \text{ mm} / 1.57 \text{ in} \) and less than \( \varnothing 70 \text{ mm} / 2.75 \text{ in} \)
Protective devices with such a resolution are considered by the EN 999 European project norm to be sets of multiple independent beams. They will not detect intrusion of the hands, and therefore shall only be used where the risk assessment indicates that detection of intrusion of the hands is inappropriate. When the resolution of the FF-SCAN system is set between \( \varnothing 40 \text{ mm} / 1.57 \text{ in} \) and \( \varnothing 70 \text{ mm} / 2.75 \text{ in} \), the sensing field will detect arms, legs, or the whole body of the operator.

In that case, the minimum allowable safety distance “S” from the dangerous zone to the vertical detection plane shall be calculated using the following formula:

\[ S \geq 1600 (t_1 + t_2) + 850 \text{ (mm)} \]

or \[ S \geq 63 (t_1 + t_2) + 33.5 \text{ (in)} \]

- **S**: Minimum safety distance (mm / in)
- **t_2**: Stopping time of the machine (s)
- **t_1**: 30 ms (response time of the FF-SCAN curtain)

The risk of inadvertent access shall be taken into account during the risk assessment stage, and if it is the case, the height “H” of the uppermost beam shall be greater or equal to 900 mm / 35.46 in, and the height “P” of the lowest beam shall be lower or equal to 300 mm / 11.82 in.

Where the photoelectric safety curtain may not offer sufficient protection, additional safety devices or further photoelectric controls are required in order to prevent the operator from entering the dangerous zone without being detected, and from staying between the dangerous zone and the photoelectric safety grid.

Multiple individual beam devices
(resolution > 70 mm / 2.75 in)
When the resolution of the photoelectric safety curtain is greater than 70 mm / 2.75 in, the EN 999 project norm recommends the number of beams and their heights above the floor as follows:

<table>
<thead>
<tr>
<th>Number of beams</th>
<th>Heights</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mm</td>
</tr>
<tr>
<td>2</td>
<td>400 / 900</td>
</tr>
<tr>
<td>3</td>
<td>300 / 700 / 1100</td>
</tr>
<tr>
<td>4</td>
<td>300 / 600 / 900 / 1200</td>
</tr>
</tbody>
</table>

Multiple individual beam devices may not necessarily detect intrusion of the body or parts of the body towards the dangerous zone. If it is the case, additional safety devices are required.
## Light indicators located on the front panel of the FF-SC10

### Sensors alignment procedure

- Connect a voltmeter between terminals 16 and 19 of the FF-SC10 amplifier (scale: 20 Vdc).
- Select the tuning mode with the “On - Off” push-button.
- Select channel number 1 with the “n + 1” push-button (the first channel indicator must light up).
- Adjust the mechanical position of the sensors connected on the first channel until the voltage reaches a maximum on the voltmeter.
- Repeat these operations for each channel and go back to the normal mode of operation.

### Parallel approach

![Parallel approach diagram](https://via.placeholder.com/150)

The minimum safety distance “S” from the dangerous zone to the outer beam is dependent on the part of the body detected, which sets the height “H” of the curtain above the floor and the resolution “R” of the curtain. This safety distance shall be calculated using the following formula:

\[
S \geq 1600 (t_1 + t_2) + 1200 - 0.4H \text{ (mm)}
\]

where \(1200 - 0.4H \geq 850 \text{ mm}\)

\[
(\text{or } S \geq 63 (t_1 + t_2) + 47.3 - 0.4H \text{ (in})
\]

where \(47.3 - 0.4H \geq 33.5 \text{ in}\)

\(t_1: 30 \text{ ms (response time of the FF-SCAN curtain)}\)

\(t_2: \text{Stopping time of the machine (s)}\)

\(H: \text{Height (mm / in) of the curtain above the floor}\)

\(R: \text{Resolution of the curtain (mm / in)}\)

### Note

The height “H” shall be a maximum of 1000 mm / 39.4 in. However, if the installation height “H” is greater than 300 mm / 11.82 in, there is a risk of inadvertent undetected access beneath the curtain and this must be taken into account in the risk assessment.

The height “H” of the detection plane above the floor is related to the maximum allowable resolution “R” of the curtain.

\[H = 15 (R - 50)\]

\(H: \text{Height (mm / in) of the curtain}\)

\(R: \text{Resolution of the curtain (in mm)}\)

In this way, where the height “H” of the curtain is known or fixed, a maximum allowable resolution can be calculated according to the above mentioned formula:

\[R = H/15 + 50\]

The above mentioned mountings are given as possible mountings. For any other kind of mounting, or for more information, please refer to EN 999 or get in touch with us.
**FF-SCAN**

- Type 4 according to IEC/EN 61496 - parts 1 & 2
- Meets applicable parts of OSHA and RIA regulations for Control Reliability
- Modular photoelectric safety curtain
- Scanning range up to 33 m / 108 ft

**Ordering information**

<table>
<thead>
<tr>
<th>FF-SCAN</th>
<th>FF-MPF with connector FF-MPFCCONN</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SCAN/G6F 18</td>
<td>Leave enough space to unplug device</td>
</tr>
<tr>
<td>FF-MPF/G6F 18A-C</td>
<td></td>
</tr>
<tr>
<td>Nominal scanning range: Blank: 0 m to 25 m / 0 ft to 82 ft (standard)</td>
<td></td>
</tr>
<tr>
<td>L: 15 m to 33 m / 49.2 ft to 108.2 ft (long range)</td>
<td></td>
</tr>
<tr>
<td>Supply voltage:</td>
<td></td>
</tr>
<tr>
<td>E: 120 Vac</td>
<td></td>
</tr>
<tr>
<td>G: 240 Vac</td>
<td></td>
</tr>
<tr>
<td>4: 24 to 48 Vdc(1)</td>
<td></td>
</tr>
<tr>
<td>Number of beams: 2 to 8(3)</td>
<td></td>
</tr>
</tbody>
</table>

**Note**

1. DC versions are 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. A complete set includes: a number of sensors, relevant connectors and cable, the FF-SC10 amplifier.

3. For 2 to 4 beams: cable length is 100 m / 328 ft
   For 5 to 8 beams: cable length is 200 m / 656 ft

The 2 beam programming must be done by the manufacturer and cannot be modified by the user.
**Connection diagram**

**FF-SC10 Amplifier**

![Connection diagram](image)

**Locating the configuration devices**

![Locating the configuration devices](image)

**Multiple amplifier connection**

![Multiple amplifier connection](image)

**SR and SE switches positions:**

<table>
<thead>
<tr>
<th>Number of channels</th>
<th>Number of beams used</th>
<th>Position SR</th>
<th>Position SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1 to 3</td>
<td>1 1 1 1 1</td>
<td>0 0 0 0 0</td>
</tr>
<tr>
<td>4</td>
<td>1 to 4</td>
<td>1 1 1 1 0</td>
<td>1 0 0 0 0</td>
</tr>
<tr>
<td>5</td>
<td>1 to 5</td>
<td>1 1 1 0 0</td>
<td>1 1 0 0 0</td>
</tr>
<tr>
<td>6</td>
<td>1 to 6</td>
<td>1 1 0 0 0</td>
<td>1 1 1 0 0</td>
</tr>
<tr>
<td>7</td>
<td>1 to 7</td>
<td>1 0 0 0 0</td>
<td>1 1 1 1 0</td>
</tr>
<tr>
<td>8</td>
<td>1 to 8</td>
<td>0 0 0 0 0</td>
<td>1 1 1 1 1</td>
</tr>
</tbody>
</table>

The 2 beam programming must be done by the manufacturer and cannot be modified by the user.

**Restart mode:**

- SC in position 1 - 1: Automatic mode
- SC in position 0 - 0: Start and restart mode

**Connection diagram**

(please refer to EN 954 for electrical interface)

Example with start and restart interlock / FSD monitoring.

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

Explosion-proof photoelectric sensor

**FF-MPFE/R32EX-□**
(emitter and receiver)  
**Cable length:** 2 m, 3 m, 5 m, 10 m / 6.56 ft, 9.84 ft, 16.4 ft, 32.8 ft

**FF-MPZS32EX**
Mounting bracket with adjustment of ± 10°

**FF-MPZT32EX**
Protective hood

Connection on compressed air:

\[ P = 0.3 \text{ Bar approximately} \]

Order 2 mountings FF-MPZS32XP for one beam.

Order 2 hoods FF-MPZT32EX for one beam to keep dust/paint away from sensor lens.

**Connecting box**

Box for the connection of 3 sensors max.

**Application**

<table>
<thead>
<tr>
<th>Explosive atmosphere 1 or 2</th>
<th>Safe atmosphere</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emitter</td>
<td>Connecting box FF-MPZBOX-03</td>
</tr>
<tr>
<td>. . . . . . . . . . . . . . .</td>
<td>Control unit FF-SC10</td>
</tr>
<tr>
<td>Emitter</td>
<td>FF-MPZBOX-03</td>
</tr>
<tr>
<td>. . . . . . . . . . . . . . .</td>
<td></td>
</tr>
</tbody>
</table>

Sensor

- Infrared through-scan detection
- Certified by the L.C.I.E. no. 9106094.
- In accordance with CENELEC European standard EN 50014 and EN 50018.
- Group EEX “d” II CT6.
- Detection up to 15 m / 49.2 ft with the FF-SC10 amplifier.
- Max. response time: 30 ms
- Diameter of glass lens: ø12 mm / 0.47 in
- Aperture angle: ± 2°
- Operating temperature: 0 °C to 55 °C / 32 °F to 131 °F
- Material of the protective covering: Nickel-plated brass
- Explosion-proof cord extension:
  - FF-MP1750EX (100 m / 328 ft of shielded cable, to be ordered separately)

Connecting box

Box for the connection of 3 sensors max.
**Basic bracket**
- Suitable for detection distances up to 6 m / 19.7 ft
- Sturdy construction from 4 mm / 0.16 in aluminium alloy
- Black anodized finish
- Adjustable (± 10° azimuth)
- Mounting with 4 mm / 0.16 in screws

**Adjustable sensor mounting bracket (parallel to optical axis)**
- Suitable for detection distances up to 33 m / 108.3 ft
- Sturdy construction from 4 mm / 0.16 in aluminium
- Black anodized finish
- Adjustment springs
- Easy adjustment (± 5°: site / ± 10°: azimuth)
- Mounting with 4 mm / 0.16 in screws

**Adjustable sensor mounting bracket (perpendicular to optical axis)**
- Suitable for detection distances up to 33 m / 108.3 ft
- Sturdy construction from 4 mm / 0.16 in aluminium
- Black anodized finish
- Adjustment springs
- Easy adjustment (± 5°: site / ± 10°: azimuth)
- Mounting with 4 mm / 0.16 in screws

**Sensor mounting rail**
- Suitable for detection distances up to 33 m / 108.3 ft
- Sturdy construction from 4 mm / 0.16 in aluminium
- L-shaped extrusion 40 mm x 40 mm / 1.57 in x 1.57 in, 1 m / 3.28 ft long
- 18 mm / 0.70 in diameter sensor mounting holes, 30 mm / 1.18 in distance between centers
- Can be easily cut to any desired length
- Mounting with 5 mm / 0.19 in screws

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

**Mechanical adapter M18x90**
To be used with the laser pen (to be installed on the FF-MPZS4018 brackets).

**Shielded cable**
- FF-MP175090 100 m / 328 ft shielded cable (2 x 0.22 mm² / AWG32).
- FF-MP1750EX 100 m / 328 ft shielded cable (2 x 0.68 mm² / AWG24) for explosive atmospheres.
**Multibeam safety column for access control**
- Floor mounting column for the FF-SCAN M18 sensor
- Mounting positions for sensors in compliance with European norm requirements for 2, 3, or 4 safety beams (EN 999)
- Optical alignment:
  - Vertical and angular column position easily adjusted
  - Separate mounting brackets FF-MPZS4018 for optimum adjustment of the emitters
- Emitters and receivers can be mounted together for fully closed areas
- Finish: RAL 1021 yellow paint
- Weight: 21 kg / 46.2 lbs

**European norm (EN 999) specifies beam heights as follows:**

<table>
<thead>
<tr>
<th>Number of beams</th>
<th>Heights mm</th>
<th>Heights in</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>400 / 900</td>
<td>15.76 / 35.46</td>
</tr>
<tr>
<td>3</td>
<td>300 / 700 / 1100</td>
<td>11.82 / 27.58 / 43.34</td>
</tr>
<tr>
<td>4</td>
<td>300 / 600 / 900 / 1200</td>
<td>11.82 / 23.64 / 35.46 / 47.28</td>
</tr>
</tbody>
</table>

**Typical applications**
Access control for dangerous zones: robotic areas, automatic machinery, transporting and conveyor systems, punching and shearing machines, etc.

The FF-SCZS1218 safety column provides a full area trip protection when used with FF-SCZO...MIR deflection mirrors and the FF-SCAN modular safety curtain.

**Bracket for FF-MPF emitter**
The FF-MPZS4018 brackets allow optimum adjustments. They must be ordered separately and are not supplied with the FF-SCZS1218 column.

Order one bracket per emitter.

For alignment operation, the FF-SPZLASER laser pen can be installed on the emitter bracket with the FF-SCZ504764 mechanical adapter.
Type 4 self-contained single beam
For access control

FEATURES

- Meets applicable parts of US OSHA 1910.212, ANSI B11.19 and RIA 15.06 for Control Reliability
- Active optoelectronic protective equipment, Type 4 according to the norm IEC/EN 61496 - parts 1 & 2
- Protection against mutual interference by selection of the emission frequency
- Through scan device with permanent self-checking ensuring the highest level of safety
- Power supplies: 120 Vac, 240 Vac and 24 Vdc
- Response time: 0.020 s
- Scanning range:
  - 0.5 m to 40 m / 1.6 ft to 131.2 ft (standard)
  - 0.5 m to 20 m / 1.6 ft to 65.6 ft (lens heating)
  - 30 m to 75 m / 98.4 ft to 246 ft (long range)
- Beam aperture angle: ± 2° in compliance with the norm IEC/EN 61496 - 2
- Connection: terminal strips or connectors
- Outputs: 2 safety relays with guided contacts
- Sealing: IP 67 / NEMA 6 (terminal) or IP 65 / NEMA 4 (connector)
- Available restart modes:
  - automatic restart
  - start interlock (at power up only)
  - start & restart interlock (at power up and after any beam interruption)
- Final Switching Devices monitoring input
- Test input
- Numerous LED status indicators
- Accessories: individual and adjustable beam deflection mirror, floor mounting deflection mirrors for 2, 3 or 4 beams
- Alignment aid kit: compact and self-contained laser pen, signal margin LED indicator

TYPICAL APPLICATIONS
Access control: perimeter protection around a robot, zone trip device at the entrance and the exit of a paint shop, etc.

The FF-SPS4 Active Optoelectronic Protective Device is a single through scan infrared beam designed to detect the body of an operator on approach to a dangerous zone.

The interruption of the beam de-energizes the output contacts which in turn de-energizes the machine stop circuitry.

The emission source is modulated infrared which makes the operation almost completely independent of ambient light conditions. Moreover, the device is equipped with an emission frequency selector to avoid possible mutual interference between sets.

The processing is a permanent dynamic self-checking principle meeting the requirements of the norm IEC/EN 61496 - parts 1 & 2 for Type 4 Electro-sensitive Protective Equipment. Any internal failure will be immediately detected and disable the output relays.

The Canadian cCSA gave an approval to this device which meets applicable parts of US ANSI, RIA 15.06 standards and OSHA 29 CFR and 1910.212 regulations for Control Reliability.

The FF-SPS4 is preset with the start and restart interlock mode on delivery. The start and restart interlock guarantees that the equipment remains in alarm at power up or after an interruption of the beam. The operator must press a push-button to restart the protective equipment. However, an automatic restart can be easily programmed by internal switches.

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MISUSE OF DOCUMENTATION

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- Failure to comply with these instructions could result in death or serious injury.
The receiver unit is equipped with 2 safety relays with guided contacts which can be directly used to stop the dangerous movement. However, most of the time, additional relaying (or Final Switching Devices) between the equipment outputs and the machine circuitry is necessary. For this reason, the FF-SPS4 has a Final Switching Device monitoring input to negate the use of a self-checking relay module. A test input is also available. The use of the test input sets the equipment in an alarm condition. When used in conjunction with the monitoring input, the test input facility provides the ability to regularly check the correct operation of interface relays.

A lens heating system is available on some models to prevent condensation where conditions of use may require such an equipment. These models can operate down to -25 °C / -13 °F ambient temperature.

LED indicators provide useful visual information on the equipment status during installation and operation. They ease beam adjustment and warn the operator about a lens contamination or misalignment before an unexpected emergency stop signal is generated.

The equipment is delivered with a pair of standard adjustable brackets for ease of installation. The use of deflection mirrors is a cost effective solution for designing multiple separate beam trip devices or perimetric protections around a dangerous area.

A laser pen is available as an accessory. It helps a single person adjust rapidly and easily the infrared beams even if deflection mirrors are used.

The device features the highest level of safety and can be used for a wide range of dangerous machines.

### Multiple separate beams

Multiple separate beams are often used to detect the intrusion of the whole body rather than parts of the body.

The installation of a multiple separate beam arrangement has to be carried out in such a way that access to the dangerous moving parts is impossible without breaking the beams.

The **EN 999** European standard gives the following formula for the calculation of the minimum safety distance between the dangerous zone and the detection plane. Compliance to this formula will ensure reliable detection of an operator and stop the dangerous motion before the operator reaches the danger:

\[
S \geq 1600 (t_1 + t_2) + 850 \text{ (mm)}
\]

\[
(\text{or } D_s \geq 63 (t_1 + t_2) + 33.5 \text{ (in)}) \quad D_s = S
\]

- **S**: Minimum safety distance (mm / in)
- **t_1**: Response time of the FF-SPS4 equipment (0.02 s)
- **t_2**: Response time of the machine (s), i.e. time required to stop the machine or remove the risk after receiving the output signal from the protective equipment

**Recommended beam heights**

EN 999 recommends the following heights which have been found to be the most practical in application for multiple separate beams.

<table>
<thead>
<tr>
<th>Number of beams</th>
<th>Beam heights above the reference floor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>400 / 900</td>
</tr>
<tr>
<td>3</td>
<td>300 / 700 / 1100</td>
</tr>
<tr>
<td>4</td>
<td>300 / 600 / 900 / 1200</td>
</tr>
</tbody>
</table>

The number of beams to be used needs to be defined according to the risk assessment and to the importance for the machine operator to pass undetected. Particularly, during risk assessment, methods of defeating the safety equipment shall be taken into account before selecting the correct configuration.

**Protection against mutual interference**

When more than one FF-SPS4 is used, mutual interference may occur between sets.

To avoid these undesirable disturbances, the device is equipped with internal switches designed to select the emission frequency F1 or F2 of the infrared modulated light. The position of these switches can be changed to avoid mutual interference between two systems.

In some cases, mutual interference can be cancelled by using two different emission frequencies and by reversing the transmission direction of the through scan beams. This would be the case for a three beam trip device for instance:
Laser alignment procedure

The use of the FF-SPZLASER pen is recommended to perform easy and fast beam alignment, particularly if the scanning distance is greater than 10 m / 32.8 ft. The FF-SPS4 equipment housing is designed to support the laser pen without any additional mechanical adapter. A location notch found on the top of the housing is designed to support the laser pen which should be used in conjunction with a target (such as a white sheet of paper) as shown below. However, in the absence of the laser pen, the notch can be used as a “backsight notch” to ease alignment operations.
FF-SPS4

- Type 4 according to IEC/EN 61496 - parts 1 & 2
- Scanning range up to 75 m / 246 ft without adjustment
- ø35 mm / 1.4 in detection capability
- Meets applicable parts of US OSHA, ANSI and RIA for Control Reliability

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

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Power supply voltage</th>
<th>Power consumption</th>
<th>Output switching capacity</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply voltage</td>
<td>120 Vac or 240 Vac (+10%, -20%)</td>
<td>Standard: 8 • Long range: E = 4 VA / 3 W, R = 6 VA / 5 W • Lens heating: E = 7 VA, R = 9 VA</td>
<td>2 A/250 Vac, 2 safety relays with guided contacts (10 mA min.)</td>
<td>Housing: Aluminium alloy, yellow painted according to RAL 1021 (polyurethane)</td>
</tr>
<tr>
<td>Power supply frequency</td>
<td>48 to 62 Hz (for the power supplies 120 Vac or 240 Vac)</td>
<td>Front face polycarbonate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alignment tolerance</td>
<td>± 2° in compliance with IEC/EN 61496 - 2 requirements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Standard: 0 °C to 55 °C / 32 °F to 131 °F • Lens heating: -25 °C to 55 °C / -13 °F to 131 °F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sealing</td>
<td>Terminal: IP 67 or NEMA 6 • Connector: IP 65 or NEMA 4 and 13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise immunity</td>
<td>Electrical: IEC 801-4, level IV • Electromagnetic: IEC 801-3, level IV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immunity to ambient light</td>
<td>Sun: 20 000 Lux • Lamp: 15 000 Lux</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Status indicator</td>
<td>LEDs display on unit front face</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scanning range</td>
<td>Standard: 0.5 m to 40 m / 1.6 ft to 131.2 ft • Lens heating: 0.5 m to 20 m / 1.6 ft to 65.6 ft • Long range: 30 m to 75 m / 98.4 ft to 246 ft</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ordering information (Emitter/Receiver) (2)

FF-SPS4 R  R  R

- Power supply voltage:
  - E: 120 Vac
  - G: 240 Vac
  - 2: 24 Vdc (1)
- With test input
- Electrical wiring:
  - T: Terminal strip (snap-in-clip)
  - C: DIN 43652 connector
- Scanning range:
  - 1: 0.5 m to 40 m / 1.6 ft to 131.2 ft (standard model)
  - 2: 0.5 m to 20 m / 1.6 ft to 65.6 ft (lens heating model, available with terminal strip and Vac supply only)
  - 7: 30 m to 75 m / 98.4 ft to 246 ft (long range)

Note
(1) - Dc versions are 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.
(2) - The equipment is delivered with two standard brackets and two separate plugs (for the FF-SPS4C/G6F models) or two cable glands and one reducer (for the FF-SPS4C/G6F models).

Response time (10^-3 s)  t1  20
Mass per device  kg / lbs  1.15 / 2.5  1.35 / 3
**Connection diagram**

The FF-SPS4 can be easily connected to the machine control circuitry due to the FSD monitoring and start and restart interlock facilities:

![Connection diagram](image)

1. RC (220 Ω + 0.22 µF) for ac interfaces or varistors for dc interfaces.

FSD: Final Switching Device.

**Frequency switches and restart mode selectors**

The position of the emission frequency switches must be changed on both the emitter and the receiver units otherwise the system remains permanently in alarm.

It is recommended to use the start and restart interlock facility when using the equipment as a trip device to control access to a dangerous zone. The restart push-button should be installed outside the dangerous zone. However, if the application does not require this facility, it can be removed using the following indications:

<table>
<thead>
<tr>
<th>Position of the switches (see *)</th>
<th>Frequency F1 (50 kHz)</th>
<th>Frequency F2 (40 kHz)</th>
<th>Start &amp; restart interlock</th>
<th>Start interlock</th>
<th>Automatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiver</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 switches for restart mode</td>
<td>2 switches for frequency adjustment</td>
<td>Indicator status</td>
<td>Indicator status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emitter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 jumper for test input setting</td>
<td>1 switch for frequency adjustment</td>
<td>Indicator status</td>
<td>Indicator status</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Factory settings: the equipment is preset on the emission frequency F1 (50 kHz), Start & Restart interlock and a NO test contacts.
Accessibility FF-SPS4

Mounting bracket (already included in the FF-SPS4 package)
Mounting bracket for fixing a unit onto a wall (tool: Allen key no. 5).

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

<table>
<thead>
<tr>
<th>Laser</th>
<th>Red visible light diode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classification</td>
<td>Class II</td>
</tr>
<tr>
<td>Optical power</td>
<td>Max. 1 mW</td>
</tr>
<tr>
<td>Wavelength</td>
<td>635 nm</td>
</tr>
<tr>
<td>Beam diameter</td>
<td>4 mm / 0.15 in</td>
</tr>
<tr>
<td>Beam spread</td>
<td>Less than 0.7 mrad</td>
</tr>
<tr>
<td>Supply</td>
<td>2 AAA batteries (1.5 V)</td>
</tr>
<tr>
<td>Endurance time</td>
<td>Typically 20 hours continuous</td>
</tr>
<tr>
<td>Lifetime</td>
<td>MTBF greater than 10 000 hours</td>
</tr>
<tr>
<td>Material</td>
<td>Aluminium</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 80 gr / 0.17 lb (2.8 oz)</td>
</tr>
</tbody>
</table>

Tools

FF-SPZSCREW
Torx T15 screwdriver for FF-SPS4 cover.

FF-SBZCRIMP
Crimping tool for female contacts (for connector version).

FF-SBZREMOV
Removal tool for female contacts (for connector version).
Access control systems

MAIN FEATURES
- Meets applicable parts of US OSHA 1910.212, ANSI B11.19 and RIA 15.06 for Control Reliability
- 2 or 3-beam electrosensitive protective devices designed in compliance with the IEC 61496-1/2 standard for Type 4 protective equipment
- Easy and quick installation
- Beam height in compliance with the EN 999 European standard
- Different models available with scanning ranges from 8 m to 75 m / 26.24 ft to 246 ft
- Supply voltages: 24 Vdc, 120 Vac, 240 Vac
- Selectable restart modes (automatic or manual restart)
- Final Switching Devices monitoring loop
- Mutual interference immunity
- Wiring: terminal strips, connectors or 10 m / 32.8 ft cable
- Laser pen for beam alignment

TYPICAL APPLICATIONS
Access control: perimetric protection around a robot zone, trip device at the entrance and the exit of a paint shop, etc.

The FF-SPS4 access control systems are protective equipment designed for the control of dangerous zones in Industry. The intrusion of a person inside the zone is detected by the interruption of one or several infrared beams permanently self-checked by an electronic circuitry which outputs an alarm signal toward the machine control circuitry. The opening of the output contacts due to the detection immediately stops the dangerous movement.

These systems offer different solutions which fit any need. Each system consists of two columns which support one or several FF-SPS4 single safety beams and 45° deflection mirrors for some of them. The nominal scanning distance of the beam allows to cover distances from 8 m to 75 m / 26.24 ft to 246 ft with or without mirrors, offering a cost effective solution. The installation of beams and mirrors is done on delivery to shorten time spent on setting up the system. The mechanics of both column and mirrors is designed to fulfill the requirements of the optics, and eases beam alignment adjustment. Moreover, a laser pen can be used to adjust beam alignment quickly.

The integrated functions simplify the electrical interfacing of the machine control circuits while saving cost: the restart input and the final switching device monitoring loop reduce the number of components used in the interface with two relays (with guided contacts). Prewired models are also available and add flexibility to the application.

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2-beam access control systems

- Scanning ranges: 0 m to 20 m / 0 ft to 65.6 ft, 5 m to 75 m / 16.4 ft to 246 ft
- Terminal strips or connector option
- Meets applicable parts of US OSHA, ANSI and RIA for Control Reliability, and IEC/EN 61496 - parts 1 & 2 requirements for Type 4 protective equipment

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

<table>
<thead>
<tr>
<th>Features</th>
<th>Range</th>
<th>0 m to 20 m / 0 ft to 65.6 ft</th>
<th>5 m to 75 m / 16.4 ft to 246 ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beam heights</td>
<td>400 mm and 900 mm</td>
<td>15.76 in and 35.4 in</td>
<td></td>
</tr>
<tr>
<td>Supply voltages</td>
<td>120 Vac (+10 %, -20 %)</td>
<td>240 Vac (+10%, -20%), 24 Vdc (±15%)</td>
<td></td>
</tr>
<tr>
<td>Consumption</td>
<td>10 VA or 8 W per system</td>
<td>20 VA or 16 W per system</td>
<td></td>
</tr>
<tr>
<td>Outputs</td>
<td>Contacts: 2 NO + 1 NC</td>
<td>Switching capacity: 2 A/250 Vac (10 mA min.)</td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>0.02 s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Materials</td>
<td>Column: steel (4 mm / 0.15 in thickness), yellow painted according to RAL 1021 (epoxy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emission</td>
<td>Modulated infrared LED (880 nm), 2 emission frequencies: 40 kHz or 50 kHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective aperture angle</td>
<td>≤ 1,6°</td>
<td></td>
<td>≤ 2,5°</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>0 °C to 55 °C / 32 °F to 131 °F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sealing</td>
<td>FF-SPS4 single beam: IP 67 or NEMA 6 • Connector: IP 65 / Premised: IP 54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical immunity</td>
<td>IEC 801-4 (level IV), IEC 801-3 (level III)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optical immunity</td>
<td>Surr. 20 000 Lux • Lamp: 15 000 Lux</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicators</td>
<td>Front panel LEDs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connecting terminals</td>
<td>Terminal strips located on each FF-SPS4 unit</td>
<td>Connectors located at the bottom of each column</td>
<td></td>
</tr>
</tbody>
</table>

Tools (refer to the accessories section)

FF-SPZ12MIR
Laser pen for beam alignment

FF-SCZ604764
Mechanical adapter for laser pen

For safety distances see Type 4 self-contained single beam section

Notes

(1) This system does not fully comply with certain requirement of the IEC 61496-2 standard for distances below 5 m / 16.4 ft. If necessary, use models with a smaller nominal scanning range.

(2) The 24 Vdc models are featured with a galvanic insulation (dc/dc converter) that provides the immunity to external disturbances; this is essential to guarantee the safety integrity of the equipment (per IEC 61496-1 standard)

(3) Final Switching Devices

(4) Order each of the two listings for a complete system. Each column is delivered with a protective cover (refer to the accessories section).
3-beam access control systems

- Scanning ranges 0 m to 8 m / 0 ft to 26.24 ft, 5 m to 75 m / 16.4 ft to 246 ft
- Terminal strips or connector option
- Meets applicable parts of US OSHA, ANSI and RIA for Control Reliability, and IEC/EN 61496 - parts 1 & 2 requirements for Type 4 protective equipment

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

<table>
<thead>
<tr>
<th>Features</th>
<th>Range</th>
<th>Beam heights</th>
<th>Supply voltages</th>
<th>Consumption</th>
<th>Outputs</th>
<th>Response time</th>
<th>Inputs</th>
<th>Material</th>
<th>Dimensions</th>
<th>Emission</th>
<th>Effective aperture angle</th>
<th>Ambient temperature</th>
<th>Sealing</th>
<th>Electrical immunity</th>
<th>Optical immunity</th>
<th>Indicators</th>
<th>Connecting terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 m to 8 m / 0 ft to 26.24 ft</td>
<td>300 mm, 700 mm and 1100 mm / 11.82 in , 27.58 in and 43.34 in</td>
<td>120 Vac (+10%, -20%), 240 Vac (+10%, -20%), 24 Vdc (±15%) (1)</td>
<td>10 VA or 8 W per system</td>
<td>Contacts: 2 NO + 1 NC / switching capacity : 2 A/250 Vac (10 mA min.)</td>
<td>0.02 s</td>
<td>Manual or automatic restart / FSD monitoring loop (2)</td>
<td>Column: steel (4 mm / 0.15 in thickness), yellow painted according to RAL 1021 (epoxy)</td>
<td>1170 mm x 133 mm x 128 mm / 46.09 in x 5.24 in x 5.04 in, base plate: 200 mm x 200 mm / 7.88 in x 7.88 in</td>
<td>Modulated infrared LED (880 nm), 2 emission frequencies: 40 kHz or 50 kHz</td>
<td>≤ 1.6°</td>
<td>0 °C to 55 °C / 32 °F to 131 °F</td>
<td>FF-SPS4 single beam: IP 67 or NEMA 6 • Connector: IP 65 / Pre wired: IP 54</td>
<td>IEC 801-4 (level IV), IEC 801-3 (level III)</td>
<td>Sun: 20 000 Lux • Lamp: 15 Lux</td>
<td>Terminal strips located on each FF-SPS4 unit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 m to 75 m / 16.4 ft to 246 ft</td>
<td>30 mm, 700 mm and 1100 mm / 11.82 in, 27.58 in and 43.34 in</td>
<td>120 Vac (+10%, -20%), 240 Vac (+10%, -20%), 24 Vdc (±15%) (1)</td>
<td>30 VA or 24 W per system</td>
<td>Contacts: 2 NO + 1 NC / switching capacity : 2 A/250 Vac (10 mA min.)</td>
<td>0.02 s</td>
<td>Manual or automatic restart / FSD monitoring loop (2)</td>
<td>Column: steel (4 mm / 0.15 in thickness), yellow painted according to RAL 1021 (epoxy)</td>
<td>1170 mm x 133 mm x 128 mm / 46.09 in x 5.24 in x 5.04 in, base plate: 200 mm x 200 mm / 7.88 in x 7.88 in</td>
<td>Modulated infrared LED (880 nm), 2 emission frequencies: 40 kHz or 50 kHz</td>
<td>≤ 1.6°</td>
<td>0 °C to 55 °C / 32 °F to 131 °F</td>
<td>FF-SPS4 single beam: IP 67 or NEMA 6 • Connector: IP 65 / Pre wired: IP 54</td>
<td>IEC 801-4 (level IV), IEC 801-3 (level III)</td>
<td>Sun: 20 000 Lux • Lamp: 15 Lux</td>
<td>Connectors located at the bottom of each column</td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

(1) The 24 Vdc models are featured with a galvanic insulation (dc/dc converter) that provides the immunity to external disturbances: this is essential to guarantee the safety integrity of the equipment (per IEC 61496-1 standard)
(2) Final Switching Devices
(3) Order each of the two listings for a complete system. Each column is delivered with a protective cover (refer to the accessories section).

**Ordering information**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(weight: 18.25 kg / 40.23 lbs)</td>
<td>(weight: 18.4 kg / 40.56 lbs)</td>
<td>(weight: 19.35 kg / 42.65 lbs)</td>
<td>(weight: 19.15 kg / 42.21 lbs)</td>
</tr>
</tbody>
</table>

**Tools (refer to the accessories section)**

- FF-SPZLASER
  Laser pen for beam alignment
- FF-SCZ604764
  Mechanical adapter for laser pen

For safety distances see Type 4 self-contained single beam section
(1): RC (200 Ω ± 0.22 μF) for ac interfaces, or varistors for dc interfaces.

**Dimensions (in mm / in)**

**FF-SPZLASER**

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

**FF-SCZ604764**

Mechanical adapter M18 x 90.

To be used for the installation of the laser pen on the columns.
Safety Products
Safety Light Curtain Detector™ 3
Blanking capability: fixed and floating

FEATURES
• Independent testing and certification by Canadian Standards (NRTL/C) per CSA 22.2-0.8 and 22.2-14
• Safety outputs: two relays with force-guided contacts
• Floating blanking (1 beam)
• Fixed blanking capability using optional external blanking windows (up to 5 contiguous beams)
• Easy to install and mount
• Adaptable and versatile controller - one or two emitter/receiver pairs can share the same controller

APPLICATIONS
• Area guarding
• Automated assembly
• Automatic sand blasters
• Component insertion
• Die casting machines
• Encapsulated machines
• Filter presses
• Hydraulic presses
• Injection molding
• Load/unload stations
• Packaging/converting
• Robotic systems
• Special machine guarding
• Weld lines

Honeywell’s Detector™ 3 safety light curtain is a compact, state-of-the-art, 3-box light curtain system used to protect personnel from hazardous equipment. It provides dependable personnel protection without the interference of mechanical guards. The light curtain produces an array of invisible infrared light beams between an emitter and a receiver. If a person or object interrupts the detection field, the Detector™ 3 controller activates its output relays, sending a stop signal.


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## Safety Products

### Safety Light Curtain Detector™ 3

- **Blanking capability:** fixed and floating

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

<table>
<thead>
<tr>
<th>Specifications</th>
<th>General</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection heights (in/mm)</td>
<td>184 to 1860 mm / 7.25 to 73.25 in - See Table 1</td>
</tr>
<tr>
<td>Scanning range (ft/m)</td>
<td>Standard: 0 to 7.6 m / 0 to 25 ft</td>
</tr>
<tr>
<td></td>
<td>Extended: 0 to 15.3 m / 0 to 50 ft</td>
</tr>
<tr>
<td>Resolution (min. object sensitivity)</td>
<td>31.75 mm / 1.25 in - See Table 2</td>
</tr>
<tr>
<td>Effective aperture angle</td>
<td>± 3.5° for emitter and receiver</td>
</tr>
<tr>
<td>Emission</td>
<td>Pulsed infrared light (880 nm)</td>
</tr>
<tr>
<td>Blanking/Floating</td>
<td>Fixed: external blanking window required (for first beam, master blanking window required; for each additional beam, 1 slave blanking window is required, up to 4 slaves)</td>
</tr>
<tr>
<td></td>
<td>Floating: 1 beam floating capability standard via switch inside the controller</td>
</tr>
<tr>
<td>Response time</td>
<td>30 ms to 40 ms - See Table 1</td>
</tr>
<tr>
<td></td>
<td>75 ms max. - for the weld controllers</td>
</tr>
<tr>
<td>Outputs</td>
<td>2 stop relays with force-guided contacts; plus 1 auxiliary relay</td>
</tr>
<tr>
<td></td>
<td>and 4 solid state indicator outputs</td>
</tr>
<tr>
<td>Switching capacity</td>
<td>4 A/240 Vac or DC resistive; selectable NO or NC contact available with all outputs relays</td>
</tr>
<tr>
<td>Indicator outputs</td>
<td>4 open collector NPN, opto-isolated</td>
</tr>
<tr>
<td></td>
<td>70 Vdc/2 mA maximum when &quot;ON&quot;</td>
</tr>
<tr>
<td>Inputs</td>
<td>24 Vdc ±10%, -20%; 120/240 Vac ± 10% selectable 50/60 Hz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>27 VA maximum, 27 watts maximum</td>
</tr>
<tr>
<td>Emitter/Receiver sets</td>
<td>2 sets (any height) can be connected to same control box</td>
</tr>
<tr>
<td>FSDs/MPCEs Monitoring input</td>
<td>Dry contacts rated 20 mA when contacts are closed and 20 Vdc when open;</td>
</tr>
<tr>
<td>Selectable restart interlock</td>
<td>Closure to ground. Max. on voltage 20 V/2 mA when &quot;ON&quot;</td>
</tr>
<tr>
<td>Selectable start interlock</td>
<td>Closure to ground. Max. on voltage 20 V/2 mA when &quot;ON&quot;</td>
</tr>
<tr>
<td>Indicators</td>
<td>Emitter: Amber (Power ON)</td>
</tr>
<tr>
<td></td>
<td>Receiver: Green (unobstructed), Red (obstructed), and flashing amber (floating enabled)</td>
</tr>
<tr>
<td></td>
<td>Control box: Green (unobstructed/output relays energized), Red (stop signaled/output relays de-energized), Yellow (reset required), flashing amber (floating enabled)</td>
</tr>
<tr>
<td>Material</td>
<td>Emitter and receiver Housing</td>
</tr>
<tr>
<td></td>
<td>Extruded aluminium 0.12 in/3 mm wall minimum</td>
</tr>
<tr>
<td></td>
<td>End caps</td>
</tr>
<tr>
<td></td>
<td>Window</td>
</tr>
<tr>
<td></td>
<td>Control box (dimensions)</td>
</tr>
<tr>
<td></td>
<td>enclosure 17.8 x 22.9 x 8.9 cm / 7 x 9 x 3.5 in</td>
</tr>
<tr>
<td></td>
<td>Cables (dimensions)</td>
</tr>
<tr>
<td>Environmental</td>
<td>Emitter, Receiver Sealing</td>
</tr>
<tr>
<td></td>
<td>NEMA 4 / IP 65</td>
</tr>
<tr>
<td></td>
<td>Control Box Sealing</td>
</tr>
<tr>
<td></td>
<td>Cable Sealing</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0 to 50°C / 32° to 122°F</td>
</tr>
<tr>
<td>Humidity</td>
<td>30 - 95% relative humidity, non condensing</td>
</tr>
<tr>
<td>Vibration</td>
<td>0.03 inch displacement, 10-150 Hz frequency (3 axes):</td>
</tr>
<tr>
<td>Shock testing</td>
<td>50 g, 11 ms pulse per MIL-STD-810 C, Method 516, Procedure 1 (applies to all 3 axes)</td>
</tr>
<tr>
<td>Weight</td>
<td>Emitter or receiver</td>
</tr>
<tr>
<td></td>
<td>0.64 to 5.17 kg / From 1.4 to 11.3 lbs - See Table 1</td>
</tr>
<tr>
<td></td>
<td>Control box</td>
</tr>
</tbody>
</table>

For application help: call 1-800-537-6945

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Mounting dimensions
(mm/in for reference only)

Table 1: Safety light curtain characteristics
Dimensions in mm/in, weights in kg/lbs, response times in ms

<table>
<thead>
<tr>
<th>Model</th>
<th>06</th>
<th>12</th>
<th>18</th>
<th>24</th>
<th>30</th>
<th>36</th>
<th>42</th>
<th>48</th>
<th>60</th>
<th>72</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection height</td>
<td>184.2</td>
<td>7.25</td>
<td>336.6</td>
<td>13.25</td>
<td>469</td>
<td>19.25</td>
<td>641.4</td>
<td>25.25</td>
<td>703.8</td>
<td>31.25</td>
</tr>
<tr>
<td>Sensing field height</td>
<td>146.1</td>
<td>5.75</td>
<td>298.5</td>
<td>11.75</td>
<td>450.9</td>
<td>17.75</td>
<td>603.3</td>
<td>23.75</td>
<td>755.7</td>
<td>29.75</td>
</tr>
<tr>
<td>Total height without blanking</td>
<td>314.3</td>
<td>12.38</td>
<td>466.7</td>
<td>18.38</td>
<td>619.1</td>
<td>24.38</td>
<td>771.5</td>
<td>30.38</td>
<td>923.9</td>
<td>36.38</td>
</tr>
<tr>
<td>Total height with blanking</td>
<td>336.6</td>
<td>13.25</td>
<td>489</td>
<td>19.25</td>
<td>641.4</td>
<td>25.25</td>
<td>703.8</td>
<td>31.25</td>
<td>946.2</td>
<td>37.25</td>
</tr>
<tr>
<td>Response time with stand. controller (ms)</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Response time with weld controller (ms)</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>Weight per device (kg/lbs)</td>
<td>0.64</td>
<td>1.4</td>
<td>1.05</td>
<td>2.3</td>
<td>1.46</td>
<td>3.2</td>
<td>1.87</td>
<td>4.1</td>
<td>2.29</td>
<td>5.0</td>
</tr>
</tbody>
</table>

A 196.9 | 7.75 | 349.3 | 13.75 | 501.7 | 19.75 | 654.1 | 25.75 | 806.5 | 31.75 | 958.9 | 37.75 | 1111.3 | 43.75 | 1263.7 | 49.75 | 1568.5 | 61.75 |
B 241.3 | 9.50 | 393.7 | 15.50 | 546.1 | 21.50 | 698.5 | 27.50 | 850.9 | 33.50 | 1003.3 | 39.50 | 1155.7 | 45.50 | 1308.1 | 51.50 | 1612.9 | 63.50 |
C 279.4 | 11.00 | 431.8 | 17.00 | 584.2 | 23.00 | 736.6 | 29.00 | 889 | 35.00 | 1041.4 | 41.00 | 1193.8 | 47.00 | 1346.2 | 53.00 | 1651 | 65.00 |

(1) Protection height for the min. object sensitivity or resolution
(2) Total height including bracket and connector
(3) Total height including connectors when a blanking window is used

Table 2: Safety light curtain blanking characteristics

<table>
<thead>
<tr>
<th>Without blanking</th>
<th>1 beam blanking</th>
<th>2 beam blanking</th>
<th>3 beam blanking</th>
<th>4 beam blanking</th>
<th>5 beam blanking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution R*</td>
<td>31.75</td>
<td>1.25</td>
<td>50.80</td>
<td>2</td>
<td>69.85</td>
</tr>
<tr>
<td>Beam spacing</td>
<td>19.05</td>
<td>0.75</td>
<td>19.05</td>
<td>0.75</td>
<td>19.05</td>
</tr>
<tr>
<td>Beam diameter</td>
<td>12.70</td>
<td>0.50</td>
<td>12.70</td>
<td>0.50</td>
<td>12.70</td>
</tr>
</tbody>
</table>

* Minimum object sensitivity
For application help: call 1-800-537-6945

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
### Safety distances per USA's OSHA/ANSI requirements (in inches, 1 in = 25.4 mm)

<table>
<thead>
<tr>
<th>Normal approach</th>
<th>Without blanking</th>
<th>1-beam blanking*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ds = K x (Ts + Tc + Tr) + Dpf</td>
<td>Ds = 63 x (Ts + Tc + Tr) + 3.3 &lt;br&gt;Note: If Hu is less than 48”, then Dpf = 48” (reach over).</td>
<td>Ds = 63 x (Ts + Tc + Tr) + 5.9 for 1 beam blanked (2.0” resolution) &lt;br&gt;Note: If more than one contiguous beam is blanked, the resolution (minimum object sensitivity) becomes greater than 2.5”, then: &lt;br&gt;- Dpf = 36” if Hu is greater or equal to 48” (reach through) or,  &lt;br&gt;- Dpf = 48” if Hu is less than 48” (reach over).</td>
</tr>
<tr>
<td>Parallel approach</td>
<td>Ds = 63 x (Ts + Tc + Tr) + 48 &lt;br&gt;Note: H is to be not greater than 39 inches. if the blanked area is not entirely obstructed, H is not to be less than: &lt;br&gt;- 7” for 2 contiguous blanked beams (2.75” resolution) or,  &lt;br&gt;- 15” for 3 contiguous blanked beams (3.5” resolution) or,  &lt;br&gt;- 30” for 4 contiguous blanked beams (4.25” resolution) or,  &lt;br&gt;- 39” for 5 contiguous blanked beams (5” resolution).</td>
<td></td>
</tr>
<tr>
<td>Angled approach</td>
<td>If α ≥ 30° then use a normal approach formula.</td>
<td>If α ≤ 30° then use a parallel approach formula.</td>
</tr>
</tbody>
</table>

Where:
- **Ds**: Minimum safety distance
- **K**: Approach speed (called “hand speed”) = 63 in/sec
- **Ts**: Worst case stopping time of the machine (seconds)
- **Tc**: Worst case response of the machine’s control (seconds)
- **Tr**: Response time of the safety devices (light curtain plus its interface – meaning the response time including the mechanical relay outputs in seconds)
- **Dpf**: Depth penetration factor (inches)
- **H**: height of the detection plane above the reference floor (inches)
- **Hu**: height of the uppermost beam above the reference floor (inches)
- **Hl**: height of the lowest beam above the reference floor (inches). For Normal approach, assumption is that Hl is not greater than 12 inches unless the application prevents access even with Hl at a distance greater than 12 inches. 

(*) Floating or fixed blanking windows affect safety distance

USA’s OSHA and ANSI safety distance formulas state that if the resolution (minimum object sensitivity) increases, the safety distance must also increase. If the blanked area is not completely physically obstructed, use of blanking windows requires moving the light curtain farther back from the hazardous area. The rule for increasing the safety distance is to add 2.6 in. to the safety distance for one beam blanked if the blanked area is not obstructed physically. If two or more contiguous beams are blanked then the Depth penetration factor (Dpf) is at least 36” when Hu is greater or equal to 48” (personnel are detected while reaching through the light curtain field). However Dpf is at least 48” if the Hu is less than 48” (personnel are detected reaching over the light curtain field). The light curtain must be sized and installed such that a stop would be signaled and the hazard cease prior to a person accessing the hazard. If the blanked area is entirely blocked by a fixture, the safety distance remains unchanged. Blanking two beams or more can create a large unprotected area through the light curtain. If this passageway is not completely filled by a fixture, personnel would be subject to a dangerous working environment.

Detector safety light curtain

Detector™3 provides excellent protection. Once properly installed, Detector does not require additional adjustment, and no maintenance is required.

Detector™3’s controller is both adaptable and versatile. One or two emitter/receiver pairs can use the same controller. The controller contains a power supply, light curtain logic, relays outputs, and configuration switches. These switches are used to configure the system: one or two sets of emitter/receiver pairs and other options.

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After installation, access to the controller interior is not necessary. To secure the installation and configuration, close and lock the controller.

For added security and to comply with supervisory control requirements, the controller is equipped with a keyed reset switch. To reset, turn the keyed reset switch to the right (clockwise).

For other configurations and capabilities, see the product installation manual.
### Ordering a system

1. Select the appropriate control box.
2. Determine the protected height requirements.
3. Select the appropriate emitter/receiver pair to match the application requirements.
4. Select the appropriate cable length(s) to match the installation requirements.

### Emitter/receiver pair order guide

#### Standard Range - up to 25 ft (7.6 m) scanning range

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Protection Height</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(mm)</td>
</tr>
<tr>
<td>3LC06</td>
<td>184.2</td>
</tr>
<tr>
<td>3LC12</td>
<td>336.6</td>
</tr>
<tr>
<td>3LC18</td>
<td>489</td>
</tr>
<tr>
<td>3LC24</td>
<td>641.4</td>
</tr>
<tr>
<td>3LC30</td>
<td>793.8</td>
</tr>
<tr>
<td>3LC36</td>
<td>946.2</td>
</tr>
<tr>
<td>3LC42</td>
<td>1098.6</td>
</tr>
<tr>
<td>3LC48</td>
<td>1251</td>
</tr>
<tr>
<td>3LC60</td>
<td>1555.8</td>
</tr>
<tr>
<td>3LC72</td>
<td>1860.6</td>
</tr>
</tbody>
</table>

#### Extended Range - up to 50 ft (15.3 m) scanning range

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Protection Height</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(mm)</td>
</tr>
<tr>
<td>3LC06X</td>
<td>184.2</td>
</tr>
<tr>
<td>3LC12X</td>
<td>336.6</td>
</tr>
<tr>
<td>3LC18X</td>
<td>489</td>
</tr>
<tr>
<td>3LC24X</td>
<td>641.4</td>
</tr>
<tr>
<td>3LC30X</td>
<td>793.8</td>
</tr>
<tr>
<td>3LC36X</td>
<td>946.2</td>
</tr>
<tr>
<td>3LC42X</td>
<td>1098.6</td>
</tr>
<tr>
<td>3LC48X</td>
<td>1251</td>
</tr>
<tr>
<td>3LC60X</td>
<td>1555.8</td>
</tr>
<tr>
<td>3LC72X</td>
<td>1860.6</td>
</tr>
</tbody>
</table>

### Control box order guide

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3LC-B</td>
<td>NEMA 2 and IP 52 enclosure, 120/240 Vac (selectable)</td>
</tr>
<tr>
<td>3LC-BW</td>
<td>NEMA 2 and IP 52 enclosure with 75 ms response for welding applications, 120/240 Vac (selectable)</td>
</tr>
<tr>
<td>3LC-B24</td>
<td>NEMA 2 and IP 52 enclosure, 24 Vac</td>
</tr>
<tr>
<td>3LC-B4</td>
<td>NEMA 4 and IP 65 enclosure with 120/240 Vac (selectable)</td>
</tr>
</tbody>
</table>

Note: cable glands are not included (customer supplied)

### Cables' order guide

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3LC-C05</td>
<td>1.52</td>
</tr>
<tr>
<td>3LC-C15</td>
<td>4.57</td>
</tr>
<tr>
<td>3LC-C30</td>
<td>9.14</td>
</tr>
<tr>
<td>3LC-C50</td>
<td>15.24</td>
</tr>
<tr>
<td>3LC-C100</td>
<td>30.48</td>
</tr>
</tbody>
</table>

* Order two cables for a complete emitter and receiver pair.
Blanking window* order guide

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3DBWM-24</td>
<td>Master, 0,61 m / 24 in cable length</td>
</tr>
<tr>
<td>3DBWM-48</td>
<td>Master, 1,22 m / 48 in cable length</td>
</tr>
<tr>
<td>3DBWM-72</td>
<td>Master, 1,83 m / 72 in cable length</td>
</tr>
<tr>
<td>3DBW-S</td>
<td>Slave for any size</td>
</tr>
</tbody>
</table>

*Order 1 master and up to 4 slaves

Maximum of five beams may be blanked; this does not include the floating blanking window.

Fixed blanking windows can be used with floating blanking window.

Master fixed blanking windows have cables that connect to the top of the receiver.

Slave fixed blanking windows look like a master window, but have no cable.

Slave fixed blanking windows snap on top of Master – no jumpers are required.

Weld shield kits** order guide

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Protection Heights</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(mm)</td>
</tr>
<tr>
<td>3WS06</td>
<td>184,2</td>
</tr>
<tr>
<td>3WS12</td>
<td>336,6</td>
</tr>
<tr>
<td>3WS18</td>
<td>489</td>
</tr>
<tr>
<td>3WS24</td>
<td>641,4</td>
</tr>
<tr>
<td>3WS30</td>
<td>793,8</td>
</tr>
<tr>
<td>3WS36</td>
<td>946,2</td>
</tr>
<tr>
<td>3WS42</td>
<td>1098,6</td>
</tr>
<tr>
<td>3WS48</td>
<td>1251</td>
</tr>
<tr>
<td>3WS60</td>
<td>1555,8</td>
</tr>
<tr>
<td>3WS72</td>
<td>1860,6</td>
</tr>
</tbody>
</table>

**Weld shield kit; 1 clear acrylic (plastic) shield with mechanical clips that attach to blanking window grooves

Other accessories order guide

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3LC-LAT</td>
<td>Laser alignment tool, 3V lithium battery, 20-hour life</td>
</tr>
</tbody>
</table>

Laser alignment tool

For application help: call 1-800-537-6945
WARRANTY/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.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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.

For application assistance, current specifications, or name of the nearest Authorized Distributor, contact a nearby sales office. Or call:
1-800-537-6945 USA
1-800-737-3360 Canada
1-815-235-6847 International
FAX
1-815-235-6545 USA
INTERNET
www.honeywell.com/sensing
info.sc@honeywell.com
Safety Mat
based on a fiber optic technology

FEATURES
• Permanent self-checking electronic designed in compliance with the requirements of the EN 954-1 standard for Category 4 Electrosensitive Protective Devices
• Sensor based on a fiber optic technology for a positive light operating mode and designed in compliance with the requirements of the EN 954 - 1 standard for Category 3 protective devices
• Standard sizes in mm (and ft): 500x750 (1.64x2.46), 500x1000 (1.64x3.28), 500x1500 (1.64x4.92), 750x750 (2.46x2.46), 750x1000 (2.46x3.28), 750x1500 (2.46x4.92), 1000x1000 (3.28x3.28), 1000x1500 (3.28x4.92)
• Several safety mats can be connected in series
• Number of operations > 10 million
• Shock and overload resistance
• Sensor: IP 67 / NEMA 6 control unit: IP 65 / NEMA 4
• Highly resistant to chemical agent and oils
• Supply voltage: 120 Vac, 240 Vac & 24 Vdc
• Response time: 0.025 sec
• Test input
• LED status indicators

APPLICATIONS
• Presence sensing device for the control of dangerous areas such as robot areas, automotive transfer lines
• Additional protection for optoelectronic trip devices

The FF-SM safety mat is a pressure sensitive protective device designed in compliance with the requirements of the EN 1760 - part 1 European standard for the detection of operators inside a dangerous zone. The sensor uses an infrared modulated light source spread by a fiber optic cable and operates in the light operated mode for a positive safety: the presence of a load greater than the 30 kg / 66.14 lbs detection capability causes a bending of the fiber optic cable on the whole of the sensing surface. The loss in signal resulting from this bending de-energizes the output relays of the control unit and stops the dangerous movement of the machine. The fiber optic technology is totally immune to electromagnetic disturbances and it allows longer connections than electrical wires. Several safety mats can be connected in series and monitored by one single control unit.

The sensor is designed in compliance with the requirements of the EN 954 - 1 European standard for Category 3 Pressure Sensitive Protective Devices. A load distributor forms part of the sensor mechanics and protects the sensing surface from damage caused by the falling of heavy objects (such as a 5 kg / 11 lbs steel sphere being dropped from a 1 m / 3.3 ft height). Due to the mechanical structure of the sensor, the safety mat is resistant to occasional overloads caused by fork lift trucks, and features an exceptional life expectancy when used in normal conditions.

The available industrial coatings provide excellent chemical resistance and sealing. Sensor: IP 67 / NEMA 6, and control unit: IP 65 / NEMA 4.

(1) Note: The 30 kg / 66.14 lbs sensitivity is suitable for adult detection only (15 kg / 33.07 lbs is the sensitivity for children detection).
The control unit complies with the requirements of the EN954-1 European Standard for Category 4 safety related parts of control systems and is based on a permanent self-checking principle.

The control unit is equipped with 2 safety relays with guided contacts which can be directly used to stop the dangerous movement. However, most of the time, additional relaying (or «Final Switching Devices» - FSD) between the control unit outputs and the machine control circuitry is necessary.

For this reason, the use of an emergency stop relay module is recommended. This relay module must integrate a start and re-start interlock facility for a correct installation of the safety mat as required by the EN 1760-1 European standard.

A test input is also available on the control unit. The test input is used to set the equipment in an alarm condition. It provides the ability to regularly check the correct operation of the interface relays.

LED indicators provide useful information on the equipment status during installation and operation.

**Safety Distances**

The safety mat must be dimensioned and positioned so access to the dangerous zone is impossible without actuating the sensing zone. The EN 999 standard or ANSI B11.19 1990 provides a formula for calculating the minimum distance between the dangerous zone and the edge of the safety mat for ground level trip devices.

To prevent access to dangerous sides of machinery not protected by safety mats, install additional hard guarding and/or safety protection type products.

**Floor Mounting safety distance formula:**

Ensure hard guarding protection is installed on the rear face and on both sides.

**Europe (EN 999)**

\[
S \geq 1600 (t_1 + t_2) + 1200 \text{ (mm)}
\]

or

\[
S \geq 63 (t_1 + t_2) + 47.3 \text{ (in)}
\]

**US (ANSI B11.19 1990)**

\[
D_s \geq 63 (t_1 + t_2) + C \text{ (in)} \quad S = D_s
\]

where C is an additional safety distance (see local Health and Safety Regulations for this value).

**Step mounting safety distance formula:**

Ensure hard guarding protection is installed on the rear face and on both sides.

**Europe (EN 999)**

\[
S \geq 1600 (t_1 + t_2) + 850 \text{ (mm)}
\]

or

\[
S \geq 63 (t_1 + t_2) + 33.5 \text{ (in)}
\]

**Combined protective devices**

If a safety mat is used with a safety light curtain or multiple safety single beam devices, the minimum safety distance between the dangerous zone and the safety beams or the edge of the safety mat should be calculated using the following formula:

Ensure hard guarding protection is installed on the rear face and on both sides.

**Europe (EN 999)**

\[
S \geq 1600 (t_1 + t_2) + 850 \text{ (mm)}
\]

or

\[
S \geq 63 (t_1 + t_2) + 33.5 \text{ (in)}
\]

\[S: \text{ minimum safety distance (mm/in)}\]

\[t_1: \text{ global response time of the multiple safety single beam device (sec)}\]

\[t_2: \text{ stopping time of the machine, application dependent (sec)}\]

\[H: \text{ height of the platform (mm/in)}\]
**LED status indicators**

The 4 LED’s available on the front panel have the following meaning:

<table>
<thead>
<tr>
<th></th>
<th>Output status</th>
<th></th>
<th>TEST</th>
<th>Test</th>
<th></th>
<th>Power supply</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>● Machine operation enabled</td>
<td>● Machine operation disabled</td>
<td>● Normal operation</td>
<td>● Device in test condition</td>
<td>● Power off</td>
<td>● Power on</td>
<td></td>
</tr>
</tbody>
</table>
|     | Light off | Light on

**Area controlled by several safety mats run by a single control unit**

The fiber optic technology allows the connection in series of up to 4 mats to cover a larger detection zone while using a single channel control unit. The following applications can be performed:

- Protection of several zones with several mats run by a single control unit:

**Control unit**

![Control unit diagram](image)

Connection in series of more than 2 safety mats must be done inside an additional connecting box.

**Resistance to chemical materials**

<table>
<thead>
<tr>
<th>Coatings</th>
<th>Aluminium sheet metal</th>
<th>Nitrile checker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Aromatic solvents</td>
<td>▲</td>
<td>■</td>
</tr>
<tr>
<td>Chlorinated solvents</td>
<td>▲▲</td>
<td>■</td>
</tr>
<tr>
<td>Aliphatic hydrocarbons</td>
<td>■</td>
<td>▲</td>
</tr>
<tr>
<td>Acetone</td>
<td>▲</td>
<td>■</td>
</tr>
<tr>
<td>Animal oils</td>
<td>■</td>
<td>▲</td>
</tr>
<tr>
<td>Vegetable oils</td>
<td>▲</td>
<td>■</td>
</tr>
<tr>
<td>Water (absorption)</td>
<td>▲▲</td>
<td>■</td>
</tr>
<tr>
<td>Dilute acid</td>
<td>▲▲</td>
<td>■</td>
</tr>
<tr>
<td>Concentrated acid</td>
<td>▲▲</td>
<td>■</td>
</tr>
<tr>
<td>Bases</td>
<td>▲▲</td>
<td>▲▲</td>
</tr>
</tbody>
</table>

- excellent resistance
- poor resistance
- bad resistance

**Control unit**

![Control unit diagram](image)

Connection in series of 2 safety mats can be done inside the control unit box.
FF-SM

- Pressure sensitive device in compliance with the requirements of the EN 1760-1 standard
- Control unit in compliance with the requirements of the EN 954-1 standard for Category 4 equipment
- Sensor unit based on a fiber optic technology and designed in compliance with the requirements of the EN 954-1 standard for Category 3 equipment
- Meets applicable parts of ANSI/RIA/OSHA regulations

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

<table>
<thead>
<tr>
<th>Product Line</th>
<th>Compliance</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor unit</td>
<td>Category</td>
<td>Detection sensitivity, Number of operations, Shock resistance, Overload resistance, Quality of coating</td>
</tr>
<tr>
<td>Control unit</td>
<td>Category</td>
<td>Supply voltage, Frequency, Power consumption, Global response time, Connection, Electrical noise immunity</td>
</tr>
<tr>
<td>Safety Mat</td>
<td></td>
<td>Fixing on the reference floor, Weight, Sealing, Fixing, Sealing, Weight</td>
</tr>
</tbody>
</table>

**Ordering information**

- **SAFETY MAT**
  - FF-SM Series
  - **0.5**
  - Coating: 1: aluminium, 2: nitrile
  - Dimensions: 0.750x0500 mm² / 2.46x1.64 ft²

- **CONTROL UNIT**
  - FF-SMC100T
  - Supply voltage: E:120Vac / G:240Vac / 2:24Vdc
  - If the control unit is installed on a flexible structure submitted to vibrations, the use of anti-vibration dampers FF-SM646095 is necessary.
  - Secure the installation by fixing the safety mat with the recommended FF-SM2TAPE double-sided adhesive tape.
  - Also refer to the accessory section.

**Europe**: Compliance with EN 1760-1 standard


- Category 3 according to EN 954-1 standard
  - ≥ 30 kg / 66.14 lbs
  - Tested up to 10 million with a ø80 mm / 75 kg (3.15 in / 165 lbs) stamp applied on 1 point
  - 50 Joules (energy released by the falling of a 5 kg/11 lbs sphere dropped from 1 m / 3.28 ft)
  - Max. static load: 1000 N/cm² (resist to fork lift trucks)
  - Aluminium bulb plate: welding splash resistant (3 mm / 0.11 in thickness)
  - Nitrile checker: oil resistant (5 mm / 0.2 in thickness)
  - Oils / Diluted bases / Usual cleaning liquids: up to 55°C / 32 to 131°F
  - Electrical noise immunity: according to IEC 801-4: level IV (Vac) or level III (Vdc)

- Category 4 according to EN 954-1 standard
  - 120 Vac (+10%, -20%), 240 Vac (+10%, -20%), 24 Vdc (±15%)
  - Frequency: 50 to 60 Hz
  - Power consumption: 6 VA / 9 W
  - 0.025 sec. (safety mat included)
  - A fiber optic cable equipped with 2 ST connectors (5 m / 16.4 ft) cable length, PVC sheath
  - Snap-in clips for electrical wires - ST connectors for fiber optic cables
  - Connection in series

- Tested up to 4 mats per control unit

--Sealing: IP 67 / NEMA 6
- Connection to the control unit
- Connection in series
- Laid on the reference floor and maintained by edges, or embedded in the reference floor
- Up to 4 mats per control unit
- Laid on the reference floor and maintained by edges, or embedded in the reference floor

- Compliance with EN 1760-1 standard

- Compliance with EN 954-1 standard
  - Category 3: Tested up to 10 million with a ø80 mm / 75 kg (3.15 in / 165 lbs) stamp applied on 1 point
  - 50 Joules (energy released by the falling of a 5 kg/11 lbs sphere dropped from 1 m / 3.28 ft)
  - Max. static load: 1000 N/cm² (resist to fork lift trucks)
  - Aluminium bulb plate: welding splash resistant (3 mm / 0.11 in thickness)
  - Nitrile checker: oil resistant (5 mm / 0.2 in thickness)
  - Oils / Diluted bases / Usual cleaning liquids: up to 55°C / 32 to 131°F
  - Electrical noise immunity: according to IEC 801-4: level IV (Vac) or level III (Vdc)
  - A fiber optic cable equipped with 2 ST connectors (5 m / 16.4 ft) cable length, PVC sheath
  - Snap-in clips for electrical wires - ST connectors for fiber optic cables
  - Connection in series

- Sealing: IP 67 / NEMA 6

- Outputs Functions
- Sealing
- Fixing
- Weight

- **References**
  - a (mm² / ft²)
  - b (mm² / ft²)

- **Control unit**
  - FF-SM150100-
  - FF-SM100100-
  - FF-SM150075-
  - FF-SM100075-
  - FF-SM075075-
  - FF-SM150050-
  - FF-SM100050-
  - FF-SM075050-

- **Sensor unit**
  - FF-SM075050-
  - FF-SM100050-
  - FF-SM150050-
  - FF-SM075075-
  - FF-SM100075-
  - FF-SM150075-
  - FF-SM075050-
  - FF-SM100075-
  - FF-SM150075-

- **Test input**
  - 2NO-1NC (2 safety relays with guided contacts, 2A/250 Vac, 10 mA mini.)
  - Test input 2NO-1NC (2 safety relays with guided contacts, 2A/250 Vac, 10 mA mini.)

- **Position of the cable exit**
  - Usage of the peripheral cable duct for the selection of the cable exit

- **Dimensions**
  - 0.750x0500 mm² / 2.46x1.64 ft²
  - 1000x0500 mm² / 3.28x1.64 ft²
  - 1500x0500 mm² / 4.92x1.64 ft²
  - 0.750x0750 mm² / 2.46x2.64 ft²
  - 1000x0750 mm² / 3.28x2.64 ft²
  - 1500x0750 mm² / 4.92x2.64 ft²
  - 100100: 1000x1000 mm² / 3.28x3.28 ft²
  - 150100: 1500x1000 mm² / 4.92x3.28 ft²

- **Supply voltage**
  - E:120Vac / G:240Vac / 2:24Vdc
  - If the control unit is installed on a flexible structure submitted to vibrations, the use of anti-vibration dampers FF-SM646095 is necessary.
  - Secure the installation by fixing the safety mat with the recommended FF-SM2TAPE double-sided adhesive tape.
  - Also refer to the accessory section.

- **Use of the peripheral cable duct**
  - Usage of the peripheral cable duct for the selection of the cable exit
Wiring diagram with safety relays

Wiring diagram with Honeywell safety module

(1) RC (220 Ω + 0.22 μF) for AC interfaces or varistors for DC interfaces

FSD: Final Switching Device

Note: The start and restart interlock facility and the cross-monitored Final Switching Devices may be provided by a safety relay module from the FF-SR Series.
Accessories FF-SM

Dimensions in millimeters / inches, meters / feet

- **FF-PSZ1030**

- **FF-SMZBOX**: Connecting box (delivered without cable-to-cable connector)
  For a reliable installation, it is recommended to use the connecting box for the connection in series of several mats. It allows the connection in series of 2 to 4 mats to the control unit via a cable extension. The connecting box is equipped with a cable drum to absorb the excess cable, it improves the IP sealing of connectors (dust proof - IP 60) and protects them from mechanical damages.

Notes:
- Connection in series of 2 safety mats can be made inside the control unit box if no cable extension is required.

Kit of 2 cable-to-cable connectors
This kit of 2 ST cable-to-cable connectors must be used for the interconnection of optical cables. 2 cable-to-cable connectors are necessary for the connection of a mat to the control unit via a cable extension, and one cable-to-cable connector is necessary for the connection in series of 2 mats to the control unit. (Example: Order 2 kits of cable-to-cable connectors for the connection in series of 3 mats to the control unit via a cable extension).

Cable extensions (delivered without cable-to-cable connector)
Each mat is pre-wired with a fiber optic cable. If the control unit is installed at a greater distance, the use of a cable extension is necessary.

Kit of 4 antivibration dampers with 8 HM5 nuts for the control unit

Sellotape 0485 double-sided adhesive tape:
0.4 mm/0.016 in thickness and 30 m / 98.36 ft length, to secure the mats installation

Edges

If the safety mat is laid on the reference floor, then the EN 1760-1 standard makes the use of edges all around the accessible periphery of the sensing zone mandatory. They prevent people from stumbling over the safety mats and keep them in position. The edges are delivered per 3 m / 9.84 ft and must be cut to the right length according to the application.

---

**Reference L (m / ft)**

<table>
<thead>
<tr>
<th>Reference</th>
<th>L (m / ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SMZFOC02</td>
<td>2 / 6.56</td>
</tr>
<tr>
<td>FF-SMZFOC05</td>
<td>5 / 16.4</td>
</tr>
<tr>
<td>FF-SMZFOC10</td>
<td>10 / 32.8</td>
</tr>
<tr>
<td>FF-SMZFOC20</td>
<td>20 / 65.6</td>
</tr>
</tbody>
</table>

---

**Commercial Details**

- Media
  - **Customer Service**
    - Toll Free: (800) 258-9200
    - Inside CA: (650) 588-9200
  - **Technical Service**
    - Toll Free: (800) 258-9200
    - Inside CA: (650) 588-9200
  - **Internet**
    - www.stevenengineering.com

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**Honeywell**

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* Industrial Safety Products *
Safety Non Contact Switch
Based on Magnetic Coded Technology

FF-SNC Series

FEATURES
- Meets applicable parts of European EN 1088 standard for Interlocking devices associated with guards
- Permanent self-checking electronic designed in compliance with the requirements of the EN 954-1 standard for Category 3 protective Devices
- Operating range:
  5 mm - 7 mm / 0.20 in - 0.27 in ON,
  8 mm - 12 mm / 0.32 in - 0.47 in OFF
- High resistance to environmental influences
- ABS and Stainless Steel housings sensors available
- Sensors sealing: IP 67
- Prewired or M8 plug termination
- Supply voltage: 24 Vdc/Vac ±15 %; 110 Vac ±15 % (only available for the 4-sensor control unit)
- Response time of the control unit: 15 ms
- Manual or automatic restart
- LED status indicator
- 2-sensor control unit: (DIN rail mount 22.5 mm / 0.89 in width)
- 4-sensor control unit: (DIN rail mount 75 mm / 2.95 in width)
- 5-sensor extension module: (DIN rail mount 22.5 / 0.89 in width)

TYPICAL APPLICATIONS
Interlocking guard for non locked mechanical screens offering free access (machines must achieve instant stop):
- Machine door or casting "open/closed" detection
- Guard-in-place detection, gate/access door detection
- Control of mechanical screens used in addition to a safety light curtain
- Food & Beverage, Packaging, Machine Tool, Automotive and Textile.

The FF-SNC Honeywell safety non contact switch is a tamper resistant safety system for monitoring machine guards. The actuator being a passive component, the safety switch is the only component that needs to be wired to the control unit and cannot be defeated by regular magnet.

Each system is made up of one or several safety switches, actuators and a control unit. The Honeywell FF-SNC safety non contact switches are designed in compliance with the requirements of the EN 954-1 European Standard for Category 3 Protective Devices.

The FF-SNC is especially suited for applications where perfect door alignment cannot be obtained. The FF-SNC Series can be mounted on sliding, hinged or removable machine guards. The output of the control unit is triggered as soon as the distance between the safety switch and the actuator is greater or equal to 8 mm / 0.32 in. This switching distance compensates for the machine vibration or any issue with the installation alignment.

The sensor and actuator small size makes it usable under tight space requirements. The safety switches and the actuators provide excellent chemical and mechanical resistance. Stainless steel housing versions fulfil the requirements of the Food and Beverage industry.

The FF-SNC400 safety control unit comes in a 75 mm / 2.95 in package and can monitor up to 4 sensors.

The FF-SNC200R2 safety control unit with its 22.5 mm / 0.89 in width will easily find a place in the electrical cabinet and can monitor 2 sensors. Both control units can be placed up to 100 m / 328 ft away from the safety non contact switches. The indicators located on the front cover of both control units provide individual door status information.

The FF-SNC1EXT extension module can be added to the FF-SNC400 or FF-SNC200 control unit and allows the connection of 5 additional sensors.
## Safety Non Contact Switch FF-SNC

- Complies with the requirements of the EN 954-1 for Category 3 equipment
- Meets applicable parts of ANSI/RIA/OSHA regulations

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

<table>
<thead>
<tr>
<th>Features</th>
<th>Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Material</strong></td>
<td>ABS (FF-SNC1SADQPA-Q) or Stainless Steel 316 and Resin filled (FF-SNC1SAQOPS)</td>
</tr>
<tr>
<td><strong>Sensing range</strong></td>
<td>5 mm - 7 mm / 0.20 in - 0.27 in ON, 8 mm - 12 mm / 0.32 in - 0.47 in OFF</td>
</tr>
<tr>
<td><strong>Minimum gap</strong></td>
<td>1 mm</td>
</tr>
<tr>
<td><strong>Standard cable length</strong></td>
<td>Prewired 3 m / 9.84 ft or 5 m / 16.4 ft (ABS only) - M8 plug: 5 mm / 16.4 ft (ABS only)</td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td>Operating: -10 °C to +55 °C / 14 °F to 131 °F, Storage: -20 °C to +60 °C / -4 °F to 140 °F</td>
</tr>
<tr>
<td><strong>Connection to the control unit</strong></td>
<td>Sealing: IP 67 prewired or M8 plug</td>
</tr>
<tr>
<td><strong>Sealing</strong></td>
<td>Fixing: 2 x (M4 x 20 mm) Tamper proof screws (supplied with the product)</td>
</tr>
</tbody>
</table>

### Control unit / extension module

- **Category**: Category 3 according to EN 954-1
- **Supply voltage**: 24 Vdc / Vac ±15 %, 110 Vac ±15 % (FF-SNC400RE only)
- **Response time of the control unit**: 15 ms (with or without extension module)
- **Power consumption (including sensors)**: 6 VA (with or without ext. module) - FF-SNC400, 3 VA (with or without ext. module) - FF-SNC200
- **Operating temperature**: -10 °C to +55 °C / 14 °F to 131 °F
- **Storage temperature**: -20 °C to 60 °C / -4 °F to 140 °F
- **Max. cable length**: 100 m / 328 ft
- **Sealing**: IP 67 prewired or M8 plug
- **Fixing**: 2 x (M4 x 20 mm) Tamper proof screws (supplied with the product)
- **Restart**: Manual or automatic
- **Sealing**: IP 40 Housing, Terminals IP 20
- **Mounting**: 35 mm / 1.37 in DIN rail
- **LED Indicators**: FF-SNC200R2 control unit: Power, Run and 2 guard status indicators
- **Material**: Polycarbonate, red

### Dimensions (mm/in)

<table>
<thead>
<tr>
<th>Side</th>
<th>Prewired M8 plug</th>
</tr>
</thead>
<tbody>
<tr>
<td>a x b</td>
<td>ø 8.1 / 0.32 x ø 4.2 / 0.16</td>
</tr>
<tr>
<td>c</td>
<td>6 / 0.23</td>
</tr>
</tbody>
</table>

M4 x 20 mm Torx screws are supplied with the switches.
Safety Distance Calculations per EN 294 European standard

The dimensions of openings correspond to the narrowest dimension of a slot opening (for openings greater than 120 mm / 4.72 in, refer to the EN 294 standard).

Safety distances $sr$ for regular openings for persons of 14 years of age and above:

<table>
<thead>
<tr>
<th>Part of body</th>
<th>Illustration</th>
<th>Opening size</th>
<th>Safety distance $sr$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fingertip</td>
<td></td>
<td>$e \leq 4$</td>
<td>$\geq 2$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$4 &lt; e \leq 6$</td>
<td>$\geq 10$</td>
</tr>
<tr>
<td>Finger up to knuckle joint</td>
<td></td>
<td>$6 &lt; e \leq 8$</td>
<td>$\geq 20$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$8 &lt; e \leq 10$</td>
<td>$\geq 80$</td>
</tr>
<tr>
<td>Or</td>
<td></td>
<td>$10 &lt; e \leq 12$</td>
<td>$\geq 100$</td>
</tr>
<tr>
<td>hand</td>
<td></td>
<td>$12 &lt; e \leq 20$</td>
<td>$\geq 120$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$20 &lt; e \leq 30$</td>
<td>$\geq 850^*$</td>
</tr>
<tr>
<td>Arm up to junction with shoulder</td>
<td></td>
<td>$30 &lt; e \leq 40$</td>
<td>$\geq 850$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$40 &lt; e \leq 120$</td>
<td>$\geq 850$</td>
</tr>
</tbody>
</table>

*If the length of the slot opening is $\leq 65$ mm / 2.56 in, the thumb will act as a stop and the safety distance can be reduced to 200 mm / 7.88 in. For more information on the guards installation, refer to the European standards: EN 811, EN 953, EN 294

Safety Distance Calculations per US ANSI / OSHA standard

$$Ds = K(Ts + Tc + Tr) + Dpf$$

With:

$Ds =$ minimum safe distance between safeguarding device and hazard

$K =$ speed constant: 1.6 m/sec (63 in/sec) minimum based on the movement being the hand/arm only and the body being stationary (a greater value may be required in specific applications and when body motion must also be considered)

$Ts =$ worst stopping time of the machine/equipment

$Tc =$ worst stopping time of the control system

$Tr =$ response time of the safeguarding device including its interface (Tr for interlocked barrier may include a delay due to actuation. This delay may result in Tr being a deduct– negative value).

$Dpf =$ the “Depth penetration factor” is the maximum travel towards the hazard if the guard can be opened a certain width or amount before a stop is signaled.

$Dpf$ values from OSHA O-10 Table:

<table>
<thead>
<tr>
<th>If the maximum width or diameter of the opening is less than or equal to (mm/in)</th>
<th>Dpf equals (mm/in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.4 / 0.25</td>
<td>12.7 / 0.5</td>
</tr>
<tr>
<td>9.5 / 0.375</td>
<td>38.1 / 1.5</td>
</tr>
<tr>
<td>12.7 / 0.5</td>
<td>63.5 / 2.5</td>
</tr>
<tr>
<td>15.9 / 0.625</td>
<td>88.9 / 3.5</td>
</tr>
<tr>
<td>19.1 / 0.75</td>
<td>139.7 / 5.5</td>
</tr>
<tr>
<td>22.2 / 0.875</td>
<td>165.1 / 6.5</td>
</tr>
<tr>
<td>31.8 / 1.25</td>
<td>190.5 / 7.5</td>
</tr>
<tr>
<td>38.1 / 1.5</td>
<td>317.5 / 12.5</td>
</tr>
<tr>
<td>47.6 / 1.875</td>
<td>393.7 / 15.5</td>
</tr>
<tr>
<td>54 / 2.125</td>
<td>444.5 / 17.5</td>
</tr>
</tbody>
</table>

Note: Over 54 mm / 2.125 in, the Dpf equals 800 mm / 31.5 in, with a maximum allowable opening of 152.4 mm / 6 in.

Example: Dpf = 0 when the guard can be opened up to, but less than 6.4 mm / 0.25 in before issuing a stop command. Dpf = 444.5 mm / 17.5 in if the guard can be opened 54.0 mm / 2.125 in. At no time can the opening be greater than 152.4 mm / 6 in before issuing a stop command.

Connection diagram:

FF-SNC200R2 Control Unit
(Manual reset option)

FF-SNC400R2/FF-SNC400RE Control Unit
(Manual reset option)

FF-SNC1EXT Extension Module
(can be used with FF-SNC400 or FF-SNC200 Series, 24 Vac/dc only)

24 Vdc

Mechanical safety switch or E-Stop input and Manual Reset

Up to 28 gates can be monitored using 6 extension modules with the FF-SNC400R2. The extension module can only be used with the 24 Vac/dc control units.
LED indicators:

FF-SNC200R2 Control Unit

- POWER (RED)
- GATE 1 (YELLOW)
- GATE 2 (YELLOW)
- RUN (GREEN)

FF-SNC400R2/FF-SNC400RE Control Unit

- POWER LED (RED)
- GATE 1 (YELLOW)
- GATE 2 (YELLOW)
- GATE 3 (YELLOW)
- GATE 4 (YELLOW)

- GATE SELECTION SWITCH
- UNDER LID

- NOSEL LED (GREEN)
- POWER LED (RED)
- GATE SELECTION SWITCH
- UNDER LID

GATE SELECTION SWITCH (MANUAL OR AUTOMATIC)
RESET SELECTION SWITCH (MANUAL OR AUTOMATIC)

Ordering information

<table>
<thead>
<tr>
<th>Part number</th>
<th>Description</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SNC200R2</td>
<td>24 Vdc/Vac Control unit for monitoring up to 2 gates</td>
<td>Max. 183 g / 0.403 lb</td>
</tr>
<tr>
<td>FF-SNC400R2</td>
<td>24 Vdc/Vac Control unit for monitoring up to 4 gates</td>
<td>Max. 575 g / 1.26 lb</td>
</tr>
<tr>
<td>FF-SNC400RE</td>
<td>110 Vac Control unit for monitoring up to 4 gates</td>
<td>Max. 575 g / 1.26 lb</td>
</tr>
<tr>
<td>FF-SNC1EXT</td>
<td>Extension module</td>
<td>Max. 135 g / 0.297 lb</td>
</tr>
<tr>
<td>FF-SNC1SA03PA</td>
<td>Safety switch + actuator, 3 m / 9.84 ft cable, ABS housing</td>
<td>Max. 150 g / 0.330 lb</td>
</tr>
<tr>
<td>FF-SNC1SA05PA</td>
<td>Safety switch + actuator, 5 m / 16.40 ft cable, ABS housing</td>
<td>Max. 200 g / 0.441 lb</td>
</tr>
<tr>
<td>FF-SNC1SA03PS</td>
<td>Safety switch + actuator, 3 m / 9.84 ft cable, stainless steel 316 housing</td>
<td>Max. 250 g / 0.551 lb</td>
</tr>
<tr>
<td>FF-SNC1SA05PS</td>
<td>Safety switch + actuator, 5 m / 16.40 ft cable, stainless steel 316 housing</td>
<td>Max. 300 g / 0.662 lb</td>
</tr>
<tr>
<td>FF-SNC1SA05PA-QD</td>
<td>Safety switch + actuator + M8 cordset, 5 m / 16.40 ft cable, ABS housing</td>
<td>Max. 350 g / 0.771 lb</td>
</tr>
<tr>
<td>FF-SNC1SA05PS-QD</td>
<td>Safety switch + actuator + M8 cordset, 5 m / 16.40 ft cable, stainless steel 316 housing</td>
<td>Max. 450 g / 0.992 lb</td>
</tr>
<tr>
<td>FF-SNC1SA-050-CBL</td>
<td>Single core cable, 50 m / 164 ft roll</td>
<td>Max. 1.5 kg / 3.307 lbs</td>
</tr>
</tbody>
</table>
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.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service

Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact a nearby sales office or:

INTERNET: www.honeywell.com/sensing
E-mail: info.sc@honeywell.com

Honeywell
21 Chemin du Vieux Chêne
38240 Meylan Cedex
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Honeywell
11 West Spring Street
Freeport, Illinois 61032
USA
This section contains information about the Honeywell deflection mirrors which can be used with safety light curtains to perform the following perimeter protections:

**Applications**

**Without mirror**

**With 1 mirror**

**With 2 mirrors**

**With 3 mirrors**
Wall mounting deflection mirrors for FF-SB, FF-SY, FF-LS, FF-SG, FF-SLG, FF-SLC, Detector™3:

- Deflection mirrors (for arms and body detection).
- Design for perimetric protections with small resolution.
- Material: Aluminium alloy housing
  - 25% scanning range reduction: silver reflecting material laid on the back of an ordinary glass protected by a vernish.
  - 10% scanning range reduction: copper reflecting material laid on the back of a white glass protected by a vernish.
- Finish: anodized gold colour.
- Provided with 2 adjustable brackets for easy adjustment.

Dimensions mirror profile (mm/in)
Dimensions, weights and part numbers

<table>
<thead>
<tr>
<th>Mirror type</th>
<th>Scanning range loss per mirror</th>
<th>Total height (mm/in) L</th>
<th>Reflecting surface (mm/in) U</th>
<th>Weight (kg/lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYZMIR002</td>
<td>10%</td>
<td>282 / 11.1</td>
<td>272 / 10.7</td>
<td>4.4 / 9.70</td>
</tr>
<tr>
<td>FF-SYZMIR102</td>
<td>25%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SYZMIR004</td>
<td>10%</td>
<td>485 / 19.11</td>
<td>475 / 17.7</td>
<td>6 / 13.23</td>
</tr>
<tr>
<td>FF-SYZMIR104</td>
<td>25%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SYZMIR006</td>
<td>10%</td>
<td>688 / 27.11</td>
<td>678 / 26.7</td>
<td>7.5 / 16.53</td>
</tr>
<tr>
<td>FF-SYZMIR106</td>
<td>25%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SYZMIR008</td>
<td>10%</td>
<td>893 / 35.18</td>
<td>883 / 34.8</td>
<td>8.9 / 19.62</td>
</tr>
<tr>
<td>FF-SYZMIR108</td>
<td>25%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SYZMIR010</td>
<td>10%</td>
<td>1096 / 43.18</td>
<td>1086 / 42.8</td>
<td>10.5 / 23.15</td>
</tr>
<tr>
<td>FF-SYZMIR110</td>
<td>25%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SYZMIR012</td>
<td>10%</td>
<td>1299 / 51.18</td>
<td>1289 / 50.8</td>
<td>13.6 / 29.98</td>
</tr>
<tr>
<td>FF-SYZMIR112</td>
<td>25%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SYZMIR014</td>
<td>10%</td>
<td>1504 / 59.26</td>
<td>1494 / 58.9</td>
<td>15.2 / 33.51</td>
</tr>
<tr>
<td>FF-SYZMIR114</td>
<td>25%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SYZMIR016</td>
<td>10%</td>
<td>1707 / 67.26</td>
<td>1697 / 66.9</td>
<td>17.1 / 37.70</td>
</tr>
<tr>
<td>FF-SYZMIR116</td>
<td>25%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SYZMIR018</td>
<td>10%</td>
<td>1910 / 67.26</td>
<td>1900 / 74.9</td>
<td>18.8 / 41.45</td>
</tr>
<tr>
<td>FF-SYZMIR118</td>
<td>25%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Compatibility

<table>
<thead>
<tr>
<th>Mirror type</th>
<th>FF-SB Series</th>
<th>FF-SY Series</th>
<th>FF-SG Series</th>
<th>FF-LS Series</th>
<th>FF-SLC Series</th>
<th>Detector 3™ Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SY12E/R02-S2</td>
<td>FF-SB12E/R02-S2</td>
<td></td>
<td>FF-SG03122</td>
<td>FF-LS082802362 / FF-LS16141962</td>
<td>FF-SLC35022</td>
<td>3LCE06</td>
</tr>
<tr>
<td>FF-SY12E/R04-S2</td>
<td>FF-SB12E/R04-S2</td>
<td>FF-SY03222</td>
<td>FF-SG03122</td>
<td>FF-LS32143782</td>
<td>FF-SLC042</td>
<td>3LCE12</td>
</tr>
<tr>
<td>FF-SY12E/R06-S2</td>
<td>FF-SB12E/R06-S2</td>
<td>FF-SY04822</td>
<td>FF-SG05022</td>
<td>FF-LS162804602 / FF-LS48145612</td>
<td>FF-SLC062</td>
<td>3LCE18</td>
</tr>
<tr>
<td>FF-SY12E/R08-S2</td>
<td>FF-SB12E/R08-S2</td>
<td>FF-SY06422</td>
<td>FF-SG07022</td>
<td>FF-LS242806842</td>
<td>FF-SLC072</td>
<td>3LCE24</td>
</tr>
<tr>
<td>FF-SY12E/R10-S2</td>
<td>FF-SB12E/R10-S2</td>
<td>FF-SY09622</td>
<td>FF-SG08922</td>
<td>FF-LS322809082</td>
<td>FF-SLC092</td>
<td>3LCE36</td>
</tr>
<tr>
<td>FF-SY12E/R12-S2</td>
<td>FF-SB12E/R12-S2</td>
<td>FF-SY11222</td>
<td>FF-SG10922</td>
<td>FF-LS402811322</td>
<td>FF-SLC112</td>
<td>3LCE42</td>
</tr>
<tr>
<td>FF-SY12E/R14-S2</td>
<td>FF-SB12E/R14-S2</td>
<td>FF-SY12822</td>
<td>FF-SG12822</td>
<td>FF-LS482813562</td>
<td>FF-SLC142</td>
<td>3LCE48</td>
</tr>
<tr>
<td>FF-SY12E/R16-S2</td>
<td>FF-SB12E/R16-S2</td>
<td>FF-SY14422</td>
<td>FF-SG12822</td>
<td>FF-LS482813562</td>
<td>FF-SLC142</td>
<td>FF-SLC555152</td>
</tr>
<tr>
<td>FF-SY12E/R18-S2</td>
<td>FF-SB12E/R18-S2</td>
<td>FF-SY16022</td>
<td>FF-SG12822</td>
<td>FF-LS482813562</td>
<td>FF-SLC142</td>
<td>FF-SLC555152</td>
</tr>
<tr>
<td>FF-SY12E/R20-S2</td>
<td>FF-SB12E/R20-S2</td>
<td>FF-SY17622</td>
<td>FF-SG12822</td>
<td>FF-LS482813562</td>
<td>FF-SLC142</td>
<td>FF-SLC555152</td>
</tr>
</tbody>
</table>

Detector 3™

- Safety light curtain: FF-SB
- Mirror type: FF-SYZMIR
- Detector 3™ Series: 3LCE06, 3LCE12, 3LCE18, 3LCE24, 3LCE30, 3LCE36, 3LCE42, 3LCE48, 3LCE60, 3LCE72
### Scanning distance (in m / ft) using FF-SYZMIR1□□ (10 % loss per mirror)

<table>
<thead>
<tr>
<th>Safety light curtain</th>
<th>Max. range without mirror (A)</th>
<th>Max. range with 1 mirror (B)</th>
<th>Max. range with 2 mirrors (C)</th>
<th>Max. range with 3 mirrors (D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SY□□14</td>
<td>6 / 19.7</td>
<td>5,4 / 17.7</td>
<td>4,9 / 16</td>
<td>4,4 / 14.4</td>
</tr>
<tr>
<td>FF-SB14 filtered</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other FF-SY□□□</td>
<td>20 / 65.6</td>
<td>18 / 59</td>
<td>16,2 / 53.1</td>
<td>14,6 / 47.8</td>
</tr>
<tr>
<td>FF-SG18, FF-SG30,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-LS14, FF-LS30</td>
<td>3,5 / 11.5</td>
<td>3,2 / 10.5</td>
<td>2,8 / 9.2</td>
<td>2,6 / 8.5</td>
</tr>
<tr>
<td>FF-SLG18, FF-SLG30</td>
<td>4 / 13.12</td>
<td>3,6 / 11.8</td>
<td>3,2 / 10.5</td>
<td>2,9 / 9.51</td>
</tr>
<tr>
<td>FF-SB12, FF-SB14 standard</td>
<td>10 / 32.8</td>
<td>9 / 29.5</td>
<td>8,1 / 26.6</td>
<td>7,3 / 23.9</td>
</tr>
<tr>
<td>FF-SB14 long range,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SB15</td>
<td>24 / 78.8</td>
<td>21,6 / 70.9</td>
<td>19,4 / 63.8</td>
<td>17,5 / 57.4</td>
</tr>
<tr>
<td>FF-SLC35, FF-SLC55,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SLC18</td>
<td>12 / 39.4</td>
<td>10,8 / 35.5</td>
<td>9,7 / 31.9</td>
<td>8,7 / 28.7</td>
</tr>
<tr>
<td>Detector™ 3 standard range</td>
<td>7,6 / 25</td>
<td>6,8 / 18.7</td>
<td>6,2 / 20.3</td>
<td>5,5 / 18</td>
</tr>
<tr>
<td>Detector™ 3 long range</td>
<td>15,3 / 50</td>
<td>13,8 / 45.3</td>
<td>12,4 / 40.7</td>
<td>11,2 / 36.7</td>
</tr>
</tbody>
</table>

### Scanning distance (in m / ft) using FF-SYZMIR1□□ (25 % loss per mirror)

<table>
<thead>
<tr>
<th>Safety light curtain</th>
<th>Max. range without mirror (A)</th>
<th>Max. range with 1 mirror (B)</th>
<th>Max. range with 2 mirrors (C)</th>
<th>Max. range with 3 mirrors (D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SY□□14</td>
<td>6 / 19.7</td>
<td>4,5 / 14.8</td>
<td>3,4 / 11.1</td>
<td>2,5 / 8.3</td>
</tr>
<tr>
<td>FF-SB14 filtered</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other FF-SY□□□</td>
<td>20 / 65.6</td>
<td>15 / 49.2</td>
<td>11,3 / 36.9</td>
<td>8,4 / 27.7</td>
</tr>
<tr>
<td>FF-SG18, FF-SG30,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-LS14, FF-LS30</td>
<td>3,5 / 11.5</td>
<td>2,6 / 8.6</td>
<td>2 / 6.5</td>
<td>1,5 / 4.8</td>
</tr>
<tr>
<td>FF-SLG18, FF-SLG30</td>
<td>4 / 13.12</td>
<td>3 / 9.8</td>
<td>2,3 / 7.6</td>
<td>1,7 / 5.6</td>
</tr>
<tr>
<td>FF-SB12, FF-SB14 standard</td>
<td>10 / 32.8</td>
<td>7,5 / 24.6</td>
<td>5,6 / 18.5</td>
<td>4,2 / 13.8</td>
</tr>
<tr>
<td>FF-SB14 long range,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SB15</td>
<td>24 / 78.8</td>
<td>18 / 59.1</td>
<td>13,5 / 44.3</td>
<td>10,1 / 33.2</td>
</tr>
<tr>
<td>FF-SLC35, FF-SLC55,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF-SLC18</td>
<td>12 / 39.4</td>
<td>9 / 29.5</td>
<td>6,8 / 22.1</td>
<td>5,1 / 16.6</td>
</tr>
<tr>
<td>Detector™ 3 standard range</td>
<td>7,6 / 25</td>
<td>5,7 / 18.7</td>
<td>4,3 / 14.1</td>
<td>3,2 / 10.5</td>
</tr>
<tr>
<td>Detector™ 3 long range</td>
<td>15,3 / 50</td>
<td>11,5 / 37.7</td>
<td>8,6 / 28.2</td>
<td>6,5 / 21.3</td>
</tr>
</tbody>
</table>
Floor mounting deflection mirrors FF-SYZPF for FF-SY, FF-SB, FF-SG, FF-SLG

- Plain mirror or individual mirrors with mounting positions in compliance with European norm requirements for 2, 3 or 4 beams (EN 999).
- Mechanics designed for easy adjustment of vertical and angular positioning: due to its design, optical alignment of all the beams is achieved by adjusting the uppermost beam only.
- Material: Aluminium alloy housing
- 10% scanning range reduction:
- 25% scanning range reduction:
- Finish: RAL 1021 yellow paint

FF-SYZPFM post with a plain mirror (mm/in)
## FF-SYZPF posts with individual mirrors

### Beam heights, weights and part numbers

<table>
<thead>
<tr>
<th>Part listings</th>
<th>Scanning range loss per mirror</th>
<th>Beam heights above the reference plane per EN 999 mm (A / B / C / D) in (A / B / C / D)</th>
<th>Weight (kg/lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYZPF12 FF-SYZPF13 FF-SYZPF14</td>
<td>10% 25%</td>
<td>400 / 900 300 / 700 / 1100 300 / 600 / 900 / 1200</td>
<td>15.76 / 35.46 11.82 / 27.58 / 43.34 11.82 / 23.64 / 35.46 / 47.28</td>
</tr>
<tr>
<td>FF-SYZPFM01 FF-SYZPFM11</td>
<td>10% 25%</td>
<td>Lower beam: 106 Upper beam: 1168</td>
<td>Lower beam: 40.2 Upper beam: 46</td>
</tr>
</tbody>
</table>
### Compatibility

<table>
<thead>
<tr>
<th>FF-SB Series</th>
<th>FF-SY(\text{L}) Series</th>
<th>FF-SG Series</th>
<th>FF-LS Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYZPFM01 FF-SYZPFM11</td>
<td>FF-SB12E/R02 to 06 FF-SB14E/R04 to 10 FF-SB15E/R06 to 10</td>
<td>FF-SY(\text{L})14032 to 096 FF-SY(\text{L})30032 to 096 FF-SY(\text{L})60032 to 096 FF-SY(\text{L})02 to 04</td>
<td>FF-SG18031 to 070 FF-SG30031 to 109 FF-SLGL18031 to 070 FF-SLGL30031 to 109 FF-SLG02 to 04</td>
</tr>
<tr>
<td>FF-SYZPF02 FF-SYZPF12</td>
<td>Not applicable</td>
<td>FF-SY(\text{L})02</td>
<td>FF-SLG02</td>
</tr>
<tr>
<td>FF-SYZPF03 FF-SYZPF13</td>
<td>Not applicable</td>
<td>FF-SY(\text{L})03</td>
<td>FF-SLG03</td>
</tr>
<tr>
<td>FF-SYZPF04 FF-SYZPF14</td>
<td>Not applicable</td>
<td>FF-SY(\text{L})04</td>
<td>FF-SLG02 to 04</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FF-SLC Series</th>
<th>Detector 3™ Series</th>
<th>FF-SCAN Series</th>
<th>FF-SPS4 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYZPFM01 FF-SYZPFM11</td>
<td>FF-SLC3502 to FF-SLC3511 FF-SLC5504 to FF-SLC5509 FF-SLC1804 to FF-SLC1811</td>
<td>3LCE06 to 3LCE42</td>
<td>FF-SCAN2 to FF-SCAN8 FF-SPS4 (x2 to x4)</td>
</tr>
<tr>
<td>FF-SYZPF02 FF-SYZPF12</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>FF-SCAN2 FF-SPS4 (x2)</td>
</tr>
<tr>
<td>FF-SYZPF03 FF-SYZPF13</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>FF-SCAN3 FF-SPS4 (x3)</td>
</tr>
<tr>
<td>FF-SYZPF04 FF-SYZPF14</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>FF-SCAN4 FF-SPS4 (x4)</td>
</tr>
</tbody>
</table>
### Scanning distance (in m/ft) using FF-SYZMIR0-G6F (10% loss per mirror)

<table>
<thead>
<tr>
<th>Safety light curtain</th>
<th>Max. range without mirror (A)</th>
<th>Max. range with 1 mirror (B)</th>
<th>Max. range with 2 mirrors (C)</th>
<th>Max. range with 3 mirrors (D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SY14, FF-SB14 filtered</td>
<td>6 / 19.7</td>
<td>5.4 / 17.7</td>
<td>4.9 / 16</td>
<td>4.4 / 14.4</td>
</tr>
<tr>
<td>Other FF-SY</td>
<td>20 / 65.6</td>
<td>18 / 59</td>
<td>16.2 / 53.1</td>
<td>14.6 / 47.8</td>
</tr>
<tr>
<td>FF-SG18, FF-SG30, FF-LS14, FF-LS30</td>
<td>3.5 / 11.5</td>
<td>3.2 / 10.5</td>
<td>2.8 / 9.2</td>
<td>2.6 / 8.5</td>
</tr>
<tr>
<td>FF-SL14, FF-SL18, FF-LS24</td>
<td>4 / 13.12</td>
<td>3.6 / 11.8</td>
<td>3.2 / 10.5</td>
<td>2.9 / 9.51</td>
</tr>
<tr>
<td>FF-LS14, FF-LS30</td>
<td>10 / 32.8</td>
<td>9 / 29.5</td>
<td>8.1 / 26.6</td>
<td>7.3 / 23.9</td>
</tr>
<tr>
<td>FF-SB14 long range FF-SB15</td>
<td>24 / 78.8</td>
<td>21.6 / 70.9</td>
<td>19.4 / 63.8</td>
<td>17.5 / 57.4</td>
</tr>
<tr>
<td>FF-SLC35, FF-SLC55 FF-SLC18</td>
<td>12 / 39.4</td>
<td>10.8 / 35.5</td>
<td>9.7 / 31.9</td>
<td>8.7 / 28.7</td>
</tr>
<tr>
<td>Detector 3™ standard range</td>
<td>7.6 / 25</td>
<td>6.8 / 22.3</td>
<td>6.2 / 20.3</td>
<td>5.5 / 18</td>
</tr>
<tr>
<td>Detector 3™ long range</td>
<td>15.3 / 50</td>
<td>13.8 / 45.3</td>
<td>12.4 / 40.7</td>
<td>11.2 / 36.7</td>
</tr>
<tr>
<td>FF-SCAN</td>
<td>25 / 82.1</td>
<td>22.5 / 73.9</td>
<td>20.3 / 66.5</td>
<td>18.2 / 59.8</td>
</tr>
<tr>
<td>FF-SCAN long range FF-SCAN18</td>
<td>33 / 108.3</td>
<td>29.7 / 97.5</td>
<td>26.7 / 87.7</td>
<td>24.1 / 79</td>
</tr>
<tr>
<td>FF-SCAN long range FF-SCAN18</td>
<td>40 / 131.3</td>
<td>36 / 118.2</td>
<td>32.4 / 106.3</td>
<td>29.2 / 95.7</td>
</tr>
<tr>
<td>FF-SPS4 long range FF-SPS4 long range</td>
<td>75 / 246.1</td>
<td>67.5 / 221.5</td>
<td>60.8 / 199.4</td>
<td>54.7 / 179.4</td>
</tr>
</tbody>
</table>

### Scanning distance (in m/ft) using FF-SYZMIR0-G6F (25% loss per mirror)

<table>
<thead>
<tr>
<th>Safety light curtain</th>
<th>Max. range without mirror (A)</th>
<th>Max. range with 1 mirror (B)</th>
<th>Max. range with 2 mirrors (C)</th>
<th>Max. range with 3 mirrors (D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SY14, FF-SB14 filtered</td>
<td>6 / 19.7</td>
<td>4.5 / 14.8</td>
<td>3.4 / 11.1</td>
<td>2.5 / 8.3</td>
</tr>
<tr>
<td>Other FF-SY</td>
<td>20 / 65.6</td>
<td>15 / 49.2</td>
<td>11.3 / 36.9</td>
<td>8.4 / 27.7</td>
</tr>
<tr>
<td>FF-SG18, FF-SG30, FF-LS14, FF-LS30</td>
<td>3.5 / 11.5</td>
<td>2.6 / 8.6</td>
<td>2 / 6.5</td>
<td>1.5 / 4.8</td>
</tr>
<tr>
<td>FF-SL14, FF-SL18, FF-LS24</td>
<td>4 / 13.12</td>
<td>3 / 9.8</td>
<td>2.3 / 7.6</td>
<td>1.7 / 5.6</td>
</tr>
<tr>
<td>FF-LS14, FF-LS30</td>
<td>10 / 32.8</td>
<td>7.5 / 24.6</td>
<td>5.6 / 18.5</td>
<td>4.2 / 13.8</td>
</tr>
<tr>
<td>FF-SB14 long range FF-SB15</td>
<td>24 / 78.8</td>
<td>18 / 59.1</td>
<td>13.5 / 44.3</td>
<td>10.1 / 33.2</td>
</tr>
<tr>
<td>FF-SLC35, FF-SLC55 FF-SLC18</td>
<td>12 / 39.4</td>
<td>9 / 29.5</td>
<td>6.8 / 22.1</td>
<td>5.1 / 16.6</td>
</tr>
<tr>
<td>Detector 3™ standard range</td>
<td>7.6 / 25</td>
<td>5.7 / 18.7</td>
<td>4.3 / 14.1</td>
<td>3.2 / 10.5</td>
</tr>
<tr>
<td>Detector 3™ long range</td>
<td>15.3 / 50</td>
<td>11.5 / 37.7</td>
<td>8.6 / 28.2</td>
<td>6.5 / 21.3</td>
</tr>
<tr>
<td>FF-SCAN</td>
<td>25 / 82.1</td>
<td>18.8 / 61.6</td>
<td>14.1 / 46.2</td>
<td>10.5 / 34.7</td>
</tr>
<tr>
<td>FF-SCAN long range FF-SCAN18</td>
<td>33 / 108.3</td>
<td>24.8 / 81.3</td>
<td>18.6 / 61</td>
<td>13.9 / 45.7</td>
</tr>
<tr>
<td>FF-SPS4 long range FF-SPS4 long range</td>
<td>40 / 131.3</td>
<td>30 / 98.5</td>
<td>22.5 / 73.9</td>
<td>16.9 / 55.4</td>
</tr>
<tr>
<td>FF-SPS4 long range FF-SPS4 long range</td>
<td>75 / 246.1</td>
<td>56.3 / 184.6</td>
<td>42.2 / 138.5</td>
<td>31.6 / 103.9</td>
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</tbody>
</table>
Applications

With 2 individual mirrors

Perimeter A

Mirrors

<table>
<thead>
<tr>
<th>FF-SPZ01MIR or FF-MSK2</th>
<th>FF-SPS44 □□□□</th>
<th>FF-SPS47 □□□□</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SCAN □□□□</td>
<td>16 / 52.3</td>
<td>30.1 / 98.8</td>
</tr>
<tr>
<td></td>
<td>9.9 / 32.4</td>
<td>13.1 / 43</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FF-SPZ11MIR</th>
<th>FF-SPS44 □□□□</th>
<th>FF-SPS47 □□□□</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SCAN □□□□</td>
<td>11 / 36.1</td>
<td>20.8 / 68.3</td>
</tr>
<tr>
<td></td>
<td>6.8 / 22.2</td>
<td>9 / 29.6</td>
</tr>
</tbody>
</table>

Dimensions in m / ft

Also refer to the access detection systems FF-SPZ12MIR post.

With 1 floor mounting mirror and 2 individual mirrors

Perimeter B

Mirrors

<table>
<thead>
<tr>
<th>FF-SPZ01MIR or FF-MSK2 (x2) and FF-SCZ02MIR (x1)</th>
<th>FF-SPS44 □□□□</th>
<th>FF-SPS47 □□□□</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SCAN □□□□</td>
<td>12.9 / 42.2</td>
<td>24.4 / 79.8</td>
</tr>
<tr>
<td></td>
<td>8 / 26.1</td>
<td>10.6 / 34.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FF-SZ011MIR (x2) and FF-SCZ02MIR (x1)</th>
<th>FF-SPS44 □□□□</th>
<th>FF-SPS47 □□□□</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SCAN □□□□</td>
<td>8.9 / 29.1</td>
<td>16.8 / 55.2</td>
</tr>
<tr>
<td></td>
<td>5.4 / 17.9</td>
<td>7.3 / 23.8</td>
</tr>
</tbody>
</table>

Dimensions in m / ft

Also refer to the access detection systems FF-SPZ12MIR post.

With 2 floor mounting mirrors and 2 individual mirrors

Perimeter C

Mirrors

<table>
<thead>
<tr>
<th>FF-SPZ01MIR or FF-MSK2 (x2) and FF-SCZ02MIR (x2)</th>
<th>FF-SPS44 □□□□</th>
<th>FF-SPS47 □□□□</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SCAN □□□□</td>
<td>10.4 / 34</td>
<td>19.7 / 64.5</td>
</tr>
<tr>
<td></td>
<td>6.4 / 21</td>
<td>8.5 / 27.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FF-SZ011MIR (x2) and FF-SCZ02MIR (x2)</th>
<th>FF-SPS44 □□□□</th>
<th>FF-SPS47 □□□□</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SCAN □□□□</td>
<td>7.1 / 23.4</td>
<td>13.6 / 44.6</td>
</tr>
<tr>
<td></td>
<td>4.4 / 14.3</td>
<td>5.8 / 19.1</td>
</tr>
</tbody>
</table>

Dimensions in m / ft

Also refer to the access detection systems FF-SPZ12MIR post.

Note: The use of deflection mirrors is not recommended with the lens heating model FF-SPS42□□□□.
Individual and adjustable mirrors FF-SPZ\[MIR\] for FF-SCAN and FF-SPS4

**Dimensions in mm / in**

<table>
<thead>
<tr>
<th>Mirror listings</th>
<th>Scanning range attenuations</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SPZ01MIR</td>
<td>10 % per mirror</td>
<td>Aluminium alloy housing</td>
</tr>
<tr>
<td>FF-SPZ11MIR</td>
<td>25 % per mirror</td>
<td>Aluminium alloy housing</td>
</tr>
</tbody>
</table>

Note: -35° ≤ α1 ≤ 35° if β = 0° or 180°

Note: -45° ≤ α2 ≤ 45° if β = 0° or 180°

The adjustable mirror is mounted on a pivoting base which can be fixed on a wall or on a ø35 mm/1.37 in. tube with a clamping ring.

Each mirror is delivered with a target drawn on an adhesive paper (the electrostatic process guarantees the cleanliness of the mirror). This target eases quick infrared beam alignment.

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Floor mounting post for FF-SY, FF-SG, FF-SLG safety light curtains

- Designed for vertical installation of a safety light curtain with protection heights of up to 1100 mm (43.30 in)
- T-slot mounting system allowing quick installation and easy height adjustment
- Material: Aluminium alloy housing
- Use of straight connectors recommended

Dimensions (mm/in)

- 1301 / 51.25
- 175 / 6.89
- 15 / 0.59
- 30.2 / 1.18
- 14.6 / 0.57
- 175 / 6.89
- 132 / 5.20
- 132 / 5.20
- 90 / 3.55
- 64 / 2.52
- 64 / 2.52
- 12 / 0.47
- 64 / 2.52
- 64 / 2.52
- 64 / 2.52
- 64 / 2.52
- R 6.5 / 0.26
- ø M10 / 0.39
- 181 / 7.13
- 66 / 2.60
- 175 / 6.89
**NOTICE**

Use of straight connectors is necessary when installing the safety light curtain on the FF-SYZPF fixed floor mounting post (see product datasheet).

<table>
<thead>
<tr>
<th>Compatibility</th>
<th>FF-SY14/30/50/60 Series (finger/hand/arm detection)</th>
<th>FF-SG18/30 Series (finger &amp; hand detection)</th>
<th>FF-SY234 Series (body detection)</th>
<th>FF-SLG234 Series (body detection)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SYZPF</td>
<td>FF-SYA14032 to 096</td>
<td>FF-SG18031 to 070</td>
<td>FF-SYA02 to 04</td>
<td>FF-SLG02 to 04</td>
</tr>
<tr>
<td>Recommended bracket kits</td>
<td>FF-SYZ634178 (delivered with the safety light curtain)</td>
<td>FF-SGZ001002 (to be ordered separately)</td>
<td>FF-SYZ634178 (delivered with the safety light curtain)</td>
<td>FF-SLGZ634178 (to be ordered separately)</td>
</tr>
<tr>
<td>Front cover</td>
<td>Not available</td>
<td>Not available</td>
<td>FF-SY630184-2 (2-beam)</td>
<td>FF-SY630184-2 (2-beam)</td>
</tr>
<tr>
<td>Mounting top view</td>
<td></td>
<td></td>
<td>FF-SY630184-3 (3-beam)</td>
<td>FF-SY630184-3 (3-beam)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FF-SY630184-4 (4-beam)</td>
<td>FF-SY630184-4 (4-beam)</td>
</tr>
</tbody>
</table>
ADJUSTABLE FLOOR MOUNTING POST FOR FF-SB, FF-SYA, FF-SG & FF-SLG

Adjustable floor standing post

- Designed for horizontal, vertical or inclined installation of a safety light curtain
- Allows quick installation and easy alignment
- 360° rotating arm with adjustments in azimuth directions (± 11°)
- Installation heights from 63,5 mm (2,5 in) up to 1100 mm (43.31 in).

WARNING

IMPROPER USE OF THE FF-SYZPA FLOOR MOUNTING POST

- Do NOT use the FF-SYZPA adjustable floor mounting post for horizontal or inclined installation of the following access detection systems: FF-SY/G6F234, FF-SLG234, FF-SB15.
- Prefer the FF-SYZPF fixed floor mounting post for installing vertically the FF-SY/G6F234 or FF-SLG234 access detection systems.

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

Dimensions (mm/in)

- Tightening strap
- Rotating bracket
- Sliding arm

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Recommended brackets

<table>
<thead>
<tr>
<th>Recommended bracket kits</th>
<th>FF-SB Series</th>
<th>FF-SY Series</th>
<th>FF-SG18/30 Series</th>
<th>FF-SLG234 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SBZS5000 (to be ordered separately)</td>
<td>FF-SGZ001001 (delivered with the safety light curtain)</td>
<td>FF-SGZ001001 (delivered with the safety light curtain)</td>
<td>FF-SGZ001001 (delivered with the safety light curtain)</td>
<td></td>
</tr>
</tbody>
</table>

Installation heights (mm/in)

<table>
<thead>
<tr>
<th>H min. / max.</th>
<th>Lower position</th>
<th>Upper position</th>
</tr>
</thead>
<tbody>
<tr>
<td>H4</td>
<td>333,5 mm / 425,5 mm [13.13 in / 16.75 in]</td>
<td>546,5 mm / 1100 mm [21.51 in / 43.31 in]</td>
</tr>
<tr>
<td>H3</td>
<td>243,5 mm / 335,5 mm [9.58 in / 13.21 in]</td>
<td>456,5 mm / 1010 mm [17.97 in / 39.76 in]</td>
</tr>
<tr>
<td>H2</td>
<td>153,5 mm / 245,5 mm [6.04 in / 9.66 in]</td>
<td>366,5 mm / 920 mm [14.43 in / 36.22 in]</td>
</tr>
<tr>
<td>H1</td>
<td>63,5 mm / 155,5 mm [2.5 in / 6.12 in]</td>
<td>276,5 mm / 830 mm [10.88 in / 32.68 in]</td>
</tr>
</tbody>
</table>
**FF-SYZAD**

**Anti-vibration kit**

Kit of 2 straight brackets and 4 anti-vibration dampers (mounting hardware included) - to substitute for the standard brackets delivered with the FF-SY or FF-SG light curtain.

**NOTICE**

**PROTECTION AGAINST HIGH VIBRATION**

In case of high vibration, 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.

**Dimensions (mm/in)**

---

**Rear mount**
ac to dc power supply

FF-SXZPWR050

- Worldwide approvals: UL508 listed, UL1950, cUL/CSA-C22.2 No.950-M90, EN/IEC 60 950, 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.
- No external fuse required (the unit provides T3A internal fuse— not accessible).
- Special industrial overload design: the unit does not switch off at overload but delivers up to 1.5 time nominal current at reduced voltage.
- dc signal output and LED indicator (ON when output voltage exceeds 20 V ±4 %).
- Hold up time: >17 ms @ 100 Vac or >170 ms @ 230 Vac.
- Sealing: IP 20 (EN 60529), Protection class 1 (IEC 536).
- Operational temperature range: -10 °C to +70 °C (-14 °F to 158 °F); storage temperature: -25 °C to 85°C (-13 °F to 185 °F).
- DIN rail mounting.
- Connection by spring clamp terminals with integrated lever for wire fixing (2 terminals per outputs).
- Weight: 240 g / 0.52 lbs

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Safety Control Modules for Emergency Stop Circuits

<table>
<thead>
<tr>
<th>TYPICAL APPLICATIONS</th>
<th>APPROVALS</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Channel Emergency Stop Module</td>
<td>According to the Machinery Directive 98/37/EC and IEC/EN 60204</td>
<td>Front view</td>
</tr>
<tr>
<td>- E-Stop circuits up to Category 2 (EN 954-1)</td>
<td></td>
<td>35 ms - G6E/G6E/G6E/G20/G6E/G6E/G6E/G6E</td>
</tr>
<tr>
<td></td>
<td></td>
<td>106 IP 20 24 Vdc</td>
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<tr>
<td></td>
<td></td>
<td>120 Vac</td>
</tr>
<tr>
<td></td>
<td></td>
<td>230 Vac</td>
</tr>
<tr>
<td>Single Channel Emergency Stop Module</td>
<td>According to the Machinery Directive 98/37/EC and IEC/EN 60204</td>
<td>Front view</td>
</tr>
<tr>
<td>- E-Stop circuits up to Category 2 (EN 954-1)</td>
<td></td>
<td>35 ms - G6E/G6E/G6E/G20/G6E/G6E/G6E/G6E</td>
</tr>
<tr>
<td>Dual Channel Emergency Stop Module</td>
<td>According to the Machinery Directive 98/37/EC and IEC/EN 60204</td>
<td>Front view</td>
</tr>
<tr>
<td>- Door protection</td>
<td></td>
<td>0.75 x 10^6 - G6E/G6E/G6E/G20/G6E/G6E/G6E/G6E/G6E</td>
</tr>
<tr>
<td>Dual Channel Emergency Stop Module</td>
<td>According to the Machinery Directive 98/37/EC and IEC/EN 60204</td>
<td>Front view</td>
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<tr>
<td>- Door protection</td>
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<td>0.75 x 10^6 - G6E/G6E/G6E/G20/G6E/G6E/G6E/G6E/G6E</td>
</tr>
<tr>
<td>Dual Channel Emergency Stop Module</td>
<td>According to the Machinery Directive 98/37/EC and IEC/EN 60204</td>
<td>Front view</td>
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According to the Machinery Directive: 98/37/EC and IEC/EN 60204
<table>
<thead>
<tr>
<th>TYPICAL APPLICATIONS</th>
<th>APPROVALS</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two Hand Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Interfaces up to Category 1 (EN954-1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Category IIIA (EN574)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Hand injury protection e.g. due to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dangerous machine movement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Robotics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pick and place machines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety Door Monitor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Interfaces up to Category 4 (EN954-1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Monitors the status of limit</td>
<td></td>
<td></td>
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<tr>
<td>switches on a safety door</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extension Module</td>
<td></td>
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<tr>
<td>• Interfaces up to Category 4 (EN954-1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Contact multiplication:</td>
<td></td>
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<tr>
<td>- safety control modules</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- safety light curtains with relay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>outputs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- other safety devices</td>
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</tr>
<tr>
<td>Extension Module</td>
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<tr>
<td>• Interfaces up to Category 4 (EN954-1)</td>
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<td></td>
</tr>
<tr>
<td>• Contact multiplication:</td>
<td></td>
<td></td>
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<tr>
<td>- safety control modules</td>
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<td></td>
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<td>- safety light curtains with relay</td>
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<tr>
<td>outputs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- other safety devices</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The overall safety category depends on the category of the main safety control module. Therefore a higher safety category may be reached.*

- **Response time**
- **Alarm type**
- **Auxiliary output**
- **Power supply**
- **DIN rail mount**
- **VDE**
- **Class**
- **Certification**
- **Safety contact**
- **Switching capacity**
- **Category per EN**
- **Typical electrical lifespan**
- **Input channels**
- **Safety contacts**
- **FSD monitoring**
- **Power status indicator**
- **Outputs status indicator**
- **Cross-fault detection**
- **Simultaneity of 2 input channels**
- **Voltage**
- **Sealing**
- **Internal terminal strips**
- **FSD monitoring**

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### TYPICAL APPLICATIONS

#### Time Delay Module
- Time delay before disconnection of safety interface circuits
  - According to Machinery Directive 98/37/EC and IEC61508

#### Emergency Stop Module with Time
- Time delay before disconnection of safety interface circuits
  - Direct protection: delayed opening of an interlocked protective gate

#### Standstill Monitor
- Standstill detection of induction motors
  - Used to unlock a safety door guarding a rotating machine only when the hazardous movement is stopped
  - Used to activate an emergency brake when an e-stop signal is received and while the motion is still present

#### Standstill and Low Speed Monitor
- Standstill monitor / low speed monitor for any kind of rotating devices
  - Used to unlock a safety door guarding a rotating machine only when the hazardous movement is stopped
  - Used to activate an emergency brake when an e-stop signal is received and while the motion is still present

### APPROVALS

- According to Machinery Directive 98/37/EC and IEC61508

### DIMENSIONS

- 45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in

### TYPICAL APPLICATIONS APPROVALS DIMENSIONS

#### FF-SR05932

- 45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in
- Ø 7 x 1 x 1 x 1 1/4 x 1 1/2
- 1 A
- 1 NO
- 1 NC

#### FF-SR05936

- 45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in
- Ø 7 x 1 x 1 x 1 1/4 x 1 1/2
- 1 A
- 1 NO
- 1 NC

#### FF-SRST

- 45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in
- Ø 7 x 1 x 1 x 1 1/4 x 1 1/2
- 1 A
- 1 NO
- 1 NC

#### FF-SR05932 FF-SR05936

- Category 1 per EN 954-1
- Suitable for interfaces up to Category 3 per EN 954-1

### Category per IEC 60204

- Category 1
- Category 3
- Category 4

According to Machinery Directive 98/37/EC and IEC/EN 60204
### Relay Control Modules to be used with ESPE equipment

<table>
<thead>
<tr>
<th>TYPICAL APPLICATIONS</th>
<th>APPROVALS</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual channel control module (for ESPE with static safety outputs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compatible with Honeywell ESPE FF-SYA, FF-SG, FF-SLG Series</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front view</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in</td>
<td>15 ms</td>
<td></td>
</tr>
<tr>
<td>FF-SR59392</td>
<td>Front view</td>
<td>4</td>
</tr>
<tr>
<td>45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in</td>
<td>15 ms</td>
<td></td>
</tr>
<tr>
<td>FF-SR59392</td>
<td>Front view</td>
<td>4</td>
</tr>
<tr>
<td>45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in</td>
<td>15 ms</td>
<td></td>
</tr>
<tr>
<td>FF-SR59912</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### TYPICAL APPLICATIONS APPROVALS

- **Dual channel control module**
- **Compatible with Honeywell ESPE FF-SYA, FF-SG, FF-SLG Series**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Front view</th>
<th>4</th>
<th>2</th>
<th>2 NC</th>
<th>6 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in</td>
<td>15 ms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in</td>
<td>15 ms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in</td>
<td>15 ms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

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### Safety Control Modules to be used with ESPE equipment

#### TYPICAL APPLICATIONS

<table>
<thead>
<tr>
<th>Category 4 Muting for Conveyor or Machine Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatible with any Honeywell Type 2, Type 3 or Type 4 electro-sensitive protective equipment*</td>
</tr>
<tr>
<td>Accept one muted safety device and one auxiliary safety device (muted or non-muted)</td>
</tr>
<tr>
<td>*with some restrictions (see product installation manual)</td>
</tr>
</tbody>
</table>

#### APPROVALS

- UL
- CE

#### DIMENSIONS

- Front view
- 40 mm x 42 mm x 41 mm (1.57 in x 1.65 in x 1.61 in)

#### FF-SRM200P2

- 25 ms
- DIN rail mounting
- 4 x NO 5 A 24 Vdc (pending)

#### Safety Products for Machine Safeguarding

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The FF-SRS5924 Emergency Stop modules are designed to be used in emergency stop circuits when danger to personnel or machinery is present. This slim housing device has two safety relays with positive-guided contacts to ensure redundancy.

In the manual start mode, the module accepts input from the safety device (Type 2 safety light curtain, safety limit or interlock switch, etc.) at A1(+) after activation of the push-button between S33 and S34; then, the normally open safety contacts (13/14...33/34) will close and the normally closed contact (41/42) will open.

In the automatic start mode, the module accepts immediate input from the safety device at A1(+); if S33/S34 is jumpered the normally open safety contacts (13/14...33/34) will close and the normally closed contact (41/42) will open.

In either mode, if the safety device is actuated (emergency stop condition occurs), the normally open contact will open immediately and the normally closed contact will close. This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

The FF-SRS5924 is a single channel device and relies on a single safety input. If a single safety input does not provide the level of safety required, use one of the dual channel safety control modules (FF-SRS5925, FF-SRS5935, FF-SRS5988).
FF-SRS5924 Single Channel Emergency Stop Module

SPECIFICATIONS
- Single channel Emergency Stop circuits

<table>
<thead>
<tr>
<th>Input</th>
<th>Nominal voltage</th>
<th>24 Vdc (-10%, +10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominal consumption</td>
<td>1.2 W</td>
</tr>
<tr>
<td>Output</td>
<td>Contact complement</td>
<td>Three NO contacts, one NC contact</td>
</tr>
<tr>
<td></td>
<td>Contact type</td>
<td>Safety relay, positive-guided</td>
</tr>
<tr>
<td></td>
<td>Response time</td>
<td>Opening in supply circuit (A1 (+)): 35 ms</td>
</tr>
<tr>
<td></td>
<td>Start time</td>
<td>Manual/automatic START function: 100 ms</td>
</tr>
<tr>
<td></td>
<td>Switching capability</td>
<td>Power factor = 1 with resistive load</td>
</tr>
<tr>
<td></td>
<td>Current range (min. to max.)</td>
<td>10 mA to 4 A</td>
</tr>
<tr>
<td></td>
<td>Voltage range (min. to max.)</td>
<td>10 to 250 Vac/dc</td>
</tr>
</tbody>
</table>
|                | Switching capability per ac15 | NO contact: 3 A / 250 V  
              |                  | NC contact: 2 A / 250 V |
|                | Typical electrical life expectancy | Power factor = 1 at 230 Vac/dc (See Note 1)  
              |                  | 2 A: 1 000 000 operations  
              |                  | 3 A: 500 000 operations  
              |                  | 4 A: 300 000 operations |
|                | Typical power factor (cos ϕ) | Limitation factor (See Note 2)  
              |                  | 0.3: 0.45  
              |                  | 0.5: 0.7  
              |                  | 0.7: 0.85  
              |                  | 1: 1 |
|                | Output contact fuse rating | Time delay 4 A (max.) |
|                | Mechanical life | Ten million switching operations |
| General        | Temperature range | -15 °C to +55 °C / 5 °F to 131 °F at max. 90% humidity (max.) |
|                | Sealing          | Housing: IP 40  
              |                  | Terminals: IP 20 |
|                | Housing material | Thermoplastic |
|                | Vibration resistance | Amplitude 0.35 mm; Frequency 10 to 55 Hz |
|                | Wire / conductor connection | 1 x 2.5 mm² solid (max.) [14 AWG] or 2 x 1.5 mm² (max.) [16 AWG] stranded wire  
              |                  | with sleeve DIN 46288 |
|                | Wire / conductor attachment | Removable terminal strips with M3.5 screws; wire contacts are enclosed to prevent electrical shock |
|                | Mounting         | Quick install rail mounting EN 50022-35, width: 35 mm / 1.38 in |
|                | Weight           | 210 g / 0.46 lb |

ORDERING INFORMATION
FF-SRS5924/G71 2 = 24 Vdc (only)

Note 1: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 2: Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0.5 at 230 Vac, 3 A (1 000 000 operations), the limitation factor is 0.70.

1 000 000 x 0.70 = 700 000 total operations.

CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)
(Note 1) Power factor = 1 (cos ϕ)

LIMITATION FACTOR FOR INDUCTIVE LOADS
(Note 2) Power factor < 1 (cos ϕ)

240 • Industrial Safety Products • FF-SRS5924 Series
**MOUNTING DIMENSIONS**

Width: 22.5 mm / 0.89 in; Height: 84 mm / 3.31 in; Depth: 121 mm / 4.76 in

**INTERNAL CIRCUITRY**

**FRONT PANEL**

**REMovable TERMINAL BLOCKS**

**FUNCTIONAL DIAGRAM**

Functional description

After activation of the safety device (emergency stop condition occurred), the K1/K2 LED will turn OFF, indicating that the two internal safety relays K1 and K2 are de-energized. The normally open safety outputs 13/14...33/34 will open and the normally closed contact 41/42 will close.

There exist two different start modes:

**Manual start mode:**

1. After removing the emergency stop condition, press the START push-button to start the safety control module.
2. The K1/K2 LED will turn ON indicating that the internal safety relays K1 and K2 are energized. The three normally open safety contacts will close allowing the machine to operate.

**Automatic start mode:**

1. After removing the stop condition, the safety control module will immediately reset.
2. The K1/K2 LED will turn ON indicating that the safety relays K1 and K2 are energized. The three normally open safety contacts will close allowing the machine to operate.
APPLICATION EXAMPLES

Single channel emergency stop connection

24 Vdc (+) Fuses Power

Emergency stop (A)

Start

Honeywell FF-SRS 5924

K2(-)

K1

24 Vdc (-) Fuses

Machine Control

Single channel emergency stop connection (with external contactors)

24 Vdc (+) Fuses

Emergency stop (A)

Start

Honeywell FF-SRS 5924

K2(-)

K1

24 Vdc (-) Fuses

Machine Control

Application notes

Note (A): Single channel safety devices:
This may be an emergency stop push-button with a single output safety device in series such as safety limit or interlock switches (for example: CLS, GK and GSS).

Note (B): Start modes:
Manual start mode: Insert start push-button; the jumper in the start loop S33/S34 is omitted; Automatic start mode: Insert jumper in the start loop S33/S34.

Note (C): External contactors:
With switching currents higher than 4 A, the output contacts should be reinforced by external contactors with positive guided contacts (K3 and K4). The proper operation of the external contactors must be monitored by looping their normally closed contacts into the Start loop between terminals S33/S34 (Final Switching Device (FSD) monitoring).
The FF-SRS5934 Emergency Stop Modules are designed to be used in emergency stop circuits when danger to personnel or machinery is present. This device has two safety relays with positive-guided contacts to ensure redundancy. To ensure proper operation, the module's internal components are monitored once every restart cycle. If your application requires a higher level of safety, use the FF-SRS5935 module.

In an automatic restart configuration, the module accepts immediate input from the safety device (emergency stop push-button or safety switch) between L1/A1 (see application example). If S33/S34 and Y1/Y2 are jumpered (or closed), the normally open safety contacts (13/14 and 23/24) will close.

In a start/restart interlock configuration (restart push-button is between S33/S34), the module accepts input from the safety device (emergency stop push-button or safety switch) between L1/A1 after activation of the restart push-button (see application example). If Y1/Y2 are jumpered (or closed) when the restart push-button closes, the normally open safety contacts (13/14 and 23/24) will close.

In either configuration, if the safety device is actuated (emergency stop condition occurs), the normally open contacts will open immediately. This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

**FEATURES**
- Complies with the Machinery Directive 98/37/EC, IEC 204 part 1 (09.92), EN 60204 part 1 (06.93) and UL 508
- Output: two NO contacts, for 250 Vac
- Single channel connection
- Automatic restart
- Start/restart interlock operation is possible with the addition of a push-button (see application examples).
- Mechanical life up to ten million operations
- Electrical life up to one million operations
- Switching current up to 10 A
- Voltage drop protection
- LED display for power and internal relay status
- Short circuit protection
- 45 mm / 1.77 in width

**TYPICAL APPLICATIONS**
- One channel emergency stop circuits
- Sliding door protection
- Conveyors/transfer lines
**FF-SRS5934 Single Channel Emergency Stop Module**

**SPECIFICATIONS**
- Single channel Emergency Stop circuits

<table>
<thead>
<tr>
<th>Input</th>
<th>Nominal voltage</th>
<th>Start time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>120 Vac (-15%, +10%), 230 Vac (-15%, +10%), 24 Vdc (-10%, +10%)</td>
<td>Manual/automatic START function: 100ms</td>
</tr>
<tr>
<td></td>
<td>24 Vdc: 1.6 W</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th>Contact complement</th>
<th>Response time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 NO contacts</td>
<td>35 ms</td>
</tr>
</tbody>
</table>

| Contact type   | Safety relay, positive-guided |            |
| Response time  |                               |             |

<table>
<thead>
<tr>
<th>Switching Capability</th>
<th>Power factor = 1 with resistive load</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Current Range (min. to max.)</th>
<th>Voltage Range (min. to max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 mA to 6 A</td>
<td>0.1 to 250 Vac/dc</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NO contact: 5 A / 250 Vac - NC contact: 2 A / 250 Vac</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Typical Electrical Life Expectancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 A</td>
</tr>
<tr>
<td>1 000 000 operations</td>
</tr>
<tr>
<td>5 A</td>
</tr>
<tr>
<td>500 000 operations</td>
</tr>
<tr>
<td>10 A</td>
</tr>
<tr>
<td>220 000 operations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Typical Power Factor (cos ϕ)</th>
<th>Limitation Factor (See Note 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,3</td>
<td>0,45</td>
</tr>
<tr>
<td>0,5</td>
<td>0,70</td>
</tr>
<tr>
<td>0,7</td>
<td>0,85</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ten million switching operations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fuse Rating</th>
<th>6 A time delayed</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>General</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature range</td>
<td>-15 °C to +55 °C / 5 °F to 131 °F at max. 90 % humidity</td>
</tr>
<tr>
<td>Sealing</td>
<td>Housing: IP 40 • Terminals: IP 20</td>
</tr>
<tr>
<td>Housing material</td>
<td>Thermoplastic</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>Amplitude 0.35 mm; Frequency 10 to 55 Hz</td>
</tr>
<tr>
<td>Conductor connection</td>
<td>1 x 4 mm² solid (max.) 12 AWG or 2 x 1.5 mm² (max.)</td>
</tr>
<tr>
<td>Conductor attachment</td>
<td>M3.5 screws terminals; wire contacts are enclosed to prevent electrical shock</td>
</tr>
<tr>
<td>Mounting</td>
<td>Quick install rail mounting EN 50022-35</td>
</tr>
<tr>
<td>Weight</td>
<td>450 g / 0.99 lb</td>
</tr>
</tbody>
</table>

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>FF-SRS5934</th>
<th>Voltage:</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF-SRS5934</td>
<td>2 = 24 Vdc</td>
</tr>
<tr>
<td>FF-SRS5934</td>
<td>E = 120 Vac</td>
</tr>
<tr>
<td>FF-SRS5934</td>
<td>G = 230 Vac</td>
</tr>
</tbody>
</table>

**CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)**

<table>
<thead>
<tr>
<th>Power factor = 1 (cos ϕ)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10^5</td>
<td></td>
</tr>
<tr>
<td>10^6</td>
<td></td>
</tr>
<tr>
<td>10^7</td>
<td></td>
</tr>
<tr>
<td>10^8</td>
<td></td>
</tr>
</tbody>
</table>

**LIMITATION FACTOR FOR INDUCTIVE LOADS**

<table>
<thead>
<tr>
<th>Power factor &lt; 1 (cos ϕ)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0,2</td>
<td>0,5</td>
</tr>
<tr>
<td>0,4</td>
<td>0,6</td>
</tr>
<tr>
<td>0,6</td>
<td>0,7</td>
</tr>
<tr>
<td>0,8</td>
<td>0,9</td>
</tr>
</tbody>
</table>

**Note 1:** Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

**Note 2:** Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0.5 at 230 Vac, 3 A (1 000 000 operations), the limitation factor is 0.70.

1 000 000 x 0.70 = 700 000 total operations.
**INSTALLATION DIAGRAM**

**INTERNAL CIRCUITY**

**APPLICATION EXAMPLES**

One-channel emergency stop connection (Y1-Y2, connected), optional automatic or manual start. For automatic restart, set the connection S33 - S34.

Contact reinforcement through external relays (K3, K4). For currents > 10 A, the output contacts can be reinforced by external guided relays. The status of the external relays will be monitored through their NC contacts in the Y1-Y2 loop.

**MOUNTING DIMENSIONS**

Width: 45 mm / 1.77 in; Height: 74 mm / 2.91 in; Depth: 121 mm / 4.76 in

**WIRING DIAGRAM**

**FUNCTIONAL DIAGRAM**
FF-SRS5925 Dual channel Emergency Stop Module

FEATURES
- Complies with EU Directive for machines 98/37/EC, IEC 204, EN 60204, DIN VDE 0113
- Dual channel input
- Output: two NO contacts and one NC contact
- Switching current from 1 mA to 7 A (5 µm gold plated contacts allow low current)
- Automatic start or manual start modes
- Line fault detection and detection of blocked start push button
- Selectable cross fault detection in emergency stop control circuit
- LED indicates power and the status of both internal relays
- Mechanical life up to ten million operations
- Electrical life up to one million operations
- Voltage drop protection
- Removable terminal strips for ease of maintenance
- Slim housing 22.5 mm / 0.89 in width

TYPICAL APPLICATIONS
- Emergency-stop circuits on machines
- Door protection
- Conveyors/transfer lines
- Use with Type 3 or Type 4 Electro-sensitive Protective Equipment for:
  - Point-of operation protection
  - Perimeter/zone guarding protection

The FF-SRS5925 Emergency Stop modules are designed to be used in emergency stop circuits when danger to personnel or machinery is present. This slim housing device has two safety relays with positive-guided contacts to ensure redundancy.

In the manual start mode, the module accepts input from the safety device (light curtain, safety mat, safety switches, etc) between S11/S12 and S21/S22 after activation of the push-button between S33 and S34; then, the normally open safety contacts (13/14, 23/24) will close and the normally closed contact (31/32) will open.

In the automatic start mode, the module accepts immediate input from the safety device (light curtain, mat, safety switches, etc) between S11/S12 and S21/S22; if S33/S34 are jumpered, the normally open safety contacts (13/14, 23/24) will close and the normally closed contact (31/32) will open.

In either mode, if the safety device is actuated (emergency stop condition occurs), the normally open contact will open immediately and the normally closed contact will close. This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

Cross fault monitoring must be used when two independent safety inputs are provided to this module to increase the overall safety level of the solution (see typical application examples).

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.
### FF-SRS5925 Dual channel Emergency Stop Module

#### SPECIFICATIONS

- **Input**
  - Nominal voltage: 24 Vdc (-5 %, +10 %)
  - Nominal power consumption: 2 W (approximately)
  - Nominal frequency: 50 to 60 Hz
  - Start time:
    - Manual START function: 40 ms
    - Automatic START function: 500 ms
  - Nominal voltage at S11: 23 Vdc (provided by control module)
  - Input current between S11/S12 and S21/S22: 40 mA
  - Minimum voltage at S12: 21 Vdc when activated
  - Cable resistance between S11/S12 and S21/S22: 68 Ω (max.)

- **Output**
  - Contact complement: 2 NO contacts, 1 NC contact
  - Response time:
    - Opening of inputs (S11/12; S21/22): 15 ms
    - Opening in supply circuit (24 Vac/dc(+)/A1): 50 ms
  - Contact type: Safety relay, positive-guided
  - Current Range (min. to max.): 1 mA to 7 A (See Note 1)
  - Voltage Range (min. to max.): 0.1 to 250 Vac/dc
  - Switching Capability per act5 (EN 60947-5-1):
    - NO contacts: 3 A / 230 V, NC contact: 2 A / 230 V
  - Typical Electrical Life Expectancy:
    - 2 A: 1,000,000 operations
    - 5 A: 220,000 operations
    - 7 A: 110,000 operations
  - Typical Power Factor (cos ϕ): Limitation Factor (See Note 3)
    - 0.3: 0.45
    - 0.5: 0.7
    - 0.7: 0.85
    - 1: 1
  - Operating frequency: 1,200 switching cycles/hour (max.)
  - Mechanical life: Ten million switching operations

#### General

- Temperature range: -15 °C to +55 °C / 5 °F to 131 °F at 90% humidity (max.)
- Housing: IP 40 • Terminals: IP 20
- Vibration resistance: Amplitude 0.35 mm; Frequency 10 to 55 Hz
- Wire/conductor connection:
  - 1 x 2.5 mm² solid (max.) [14 AWG] or 2 x 1.5 mm² (max.) [16 AWG] stranded wire with sleeve DIN 46288
- Wire/conductor attachment: Removable block terminals with M3.5 screws; wire contacts are enclosed to prevent electrical shock
- Mounting: Quick install rail mounting EN 50022-35, width: 35 mm / 1.38 in
- Weight: 220 g / 0.49 lb

### ORDERING INFORMATION

**FF-SRS5925/G71**

- **2 = 24 Vdc (only)**

### Note 1: Contact damage

To ensure the 1 mA capability during the lifetime of the contact, never exceed 300 mA or 60 V.

### Note 2: Install arc suppression device across load to ensure specified relay life expectancy.

### Note 3: Total Operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0.5 at 230 Vac, 2 A (750,000 operations), the limitation factor is 0.70. 750,000 x 0.70 = 525,000 total operations.

### CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

(Re: Note 2) Power factor = 1 (cos ϕ)

<table>
<thead>
<tr>
<th>Operations</th>
<th>Switching Power [kVA]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>1.5</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>

### LIMITATION FACTOR FOR INDUCTIVE LOADS

(Re: Note 3) Power factor < 1 (cos ϕ)

<table>
<thead>
<tr>
<th>Power Factor</th>
<th>Limitation Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>0.70</td>
</tr>
<tr>
<td>0.6</td>
<td>0.75</td>
</tr>
<tr>
<td>0.7</td>
<td>0.80</td>
</tr>
<tr>
<td>0.8</td>
<td>0.85</td>
</tr>
<tr>
<td>0.9</td>
<td>0.90</td>
</tr>
</tbody>
</table>

---

*Industrial Safety Products* •  FF-SRS5925 Series
FF-SRS5925 Series
Industrial Safety Products

MOUNTING DIMENSIONS
Width: 22.5 mm / 0.89 in; Height: 74 mm / 2.91 in;
Depth: 118 mm / 4.65 in

INTERNAL CIRCUITY

FRONT PANEL

FUNCTIONAL DIAGRAM

Functional description
If the safety device is actuated (emergency stop condition occurs), the internal relays K1 and K2 de-energize, the normally open safety contacts 13/14..23/24 will open immediately and the normally closed safety contact 31/32 will close. This emergency stop condition is relayed via the contacts of the module (and optional external contactors K3/K4) to the machine control circuitry to arrest dangerous motion and/or remove power.

* Line fault Detection on Start push-button
If the start push button is closed before voltage is applied to S12 and S22 the safety contacts of the module cannot close. This additional feature ensures the detection of a line fault via the start push-button or a blocked start push button. In case of a push-button failure the module can not be restarted.

Two switches S1 and S2 are used to select the restart mode and the operating mode for cross fault detection. These switches are located behind the front panel.
Switch S1 is used to select an operating mode for cross fault detection between the two input channels (S11/S12 and S21/S22).
Switch S2 is used to select automatic or manual restart mode. In the automatic restart mode, an additional jumper must be set into the restart loop (S33/S34, see Application Examples).

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Protective gates are designed to limit or block access to the moving parts of dangerous machinery. These gates can be equipped with locking or interlocking devices, usually safety limit switches or any other safety sensors/switches.

The FF-SRS5925 Emergency Stop module monitors the status of these safety sensor positions. When the protective gate is open, the initiation of dangerous motion is prevented. When the door is closed again, the next machine cycle can start, but only after initiating an external manual restart sequence.

After opening the door, the two external safety switch contacts Sa and Sb will open and the two internal safety relays K1 and K2 will de-energize. The normally open safety outputs 13/14 and 23/24 will open relaying the stop condition to the machine control circuitry. After closing the door, Sa and Sb close and the internal relays K1 and K2 will energize automatically. The two normally open safety contacts will close and an external manual restart sequence may then be initiated (allowing the machine to operate).

Application notes:

Note (A): Start modes:
Manual start mode: Insert start push-button into the start loop S33/S34 and select internal switch to manual start mode
Automatic start mode: Insert jumper into the start loop S33/S34 and select internal switch S2 to automatic start mode

Note (B): Dual channel safety devices:
This may be an emergency stop push-button in series with dual output safety switching devices (OSSD) such as: safety light curtains (FF-SB, FF-LS), single beam (FF-SPS4), modular safety light curtains (FF-SCAN), safety laser scanner (FF-SE), safety mats (FF-SM), dual output safety limit or interlock switches (for example, QL, QL.S and QL.K).

Note (C): External contactors:
With switching currents higher than 7 A, the output contacts should be reinforced by external contactors with positive guided contacts (K3 and K4). The proper operation of the external contactors must be monitored by looping their normally closed contacts in series into the Start loop between S33/ S34 (Final Switching Device (FSD) monitoring).
**FF-SRS5935 Dual Channel Emergency Stop Module**

**FEATURES**
- Complies with the Machinery Directive 98/37/EC, IEC 204, EN 60204, DIN VDE 0113 and UL 508
- Output: three NO contacts and one NC contact for ac 250 V
- Gold plated, 5 µm contacts allow accurate low current to PLC (PLC is NOT to be used as a safety function)
- Dual channel connection
- Line fault detection and detection of blocked start push-button
- Automatic restart or start/restart interlock modes of operation
- Selectable cross fault detection in emergency stop control circuit
- Operating status display
- LED indicates power and channels one and two (internal relays) status
- Mechanical life up to ten million operations
- Electrical life up to one million operations
- Switching current up to 10 A
- Voltage drop protection
- Removable terminal strips for ease of maintenance
- 45 mm / 1.77 in width

**TYPICAL APPLICATIONS**
- Two channel emergency stop circuits on machines
- Point-of operation protection
- Door protection
- Perimeter/zone guarding protection
- Conveyors/transfer lines

The FF-SRS5935 Emergency Stop modules are designed to be used in emergency stop circuits when danger to personnel or machinery is present. This device has two safety relays with positive-guided contacts to ensure redundancy.

This module contains two internal switches (S1 and S2) that are used to set various modes of operation. This feature ensures application flexibility. In the **start/restart interlock mode**, the module accepts input from the safety device (light curtain, safety mat, safety switches, etc.) between S11/S12 and S21/S22 after activation of the push-button between S33 and S34; then, the normally open safety contacts (13/14, 23/24, 33/34) will close and the normally closed contact (41/42) will open.

In the **automatic restart mode**, the module accepts immediate input from the safety device (light curtain, mat, safety switches, etc.) between S11/S12 and S21/S22 (S33 and S34 are jumpered if external relay monitoring is not needed); then normally open safety contacts (13/14, 23/24, 33/34) will close and the normally closed contact (41/42) will open.

In either mode, if the safety device is actuated (emergency stop condition occurs), the normally open contact will open immediately and the normally closed contact will close. This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

**Cross fault monitoring** must be used when two independent safety inputs are provided to this module to increase the overall safety level of the solution (see typical application examples).

**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.
**FF-SRS5935 Dual Channel Emergency Stop Module**

**SPECIFICATIONS**

- **Dual channel Emergency Stop circuits**

<table>
<thead>
<tr>
<th>Input</th>
<th>Nominal voltage</th>
<th>120 Vac (-15%, +10%), 230 Vac (-15%, +10%), 24 Vdc (-10%, +20%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominal power consumption</td>
<td>24 Vdc: 2 W; 230 Vac: 4 VA</td>
</tr>
<tr>
<td></td>
<td>Nominal frequency</td>
<td>50 to 60 Hz</td>
</tr>
<tr>
<td></td>
<td>Start time</td>
<td>Manual START function: 50 ms (-25%, +50%); Automatic START function: 1 s (-25%, +50%)</td>
</tr>
<tr>
<td>Nominal voltage between S11/S12 and S21/S22</td>
<td>24 Vdc with 35 mA current ± 25% (provided by control module)</td>
<td></td>
</tr>
<tr>
<td>Minimum voltage between S11/S12 and S21/S22</td>
<td>21 Vdc when activated</td>
<td></td>
</tr>
<tr>
<td>Cable resistance between S11/S12 and S21/S22</td>
<td>68 Ω (max.)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th>Contact complement</th>
<th>3 NO contacts, 1 NC contact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Response time</td>
<td>After opening of input S12/11 or S21/22: 25 ms; Opening in supply circuit (L1(+)/A1): 50 ms</td>
</tr>
<tr>
<td></td>
<td>Contact type</td>
<td>Safety relay, positive-guided</td>
</tr>
<tr>
<td></td>
<td>Switching Capability</td>
<td>Power factor = 1 with resistive load</td>
</tr>
<tr>
<td></td>
<td>Current Range (min. to max.)</td>
<td>1 mA to 10 A (See Note 1)</td>
</tr>
<tr>
<td></td>
<td>Voltage Range (min. to max.)</td>
<td>0,1 to 250 Vac/dc</td>
</tr>
<tr>
<td></td>
<td>Switching capability per ac15 (EN 60947-5.1)</td>
<td>NO contact: 5 A / 250 Vac - NC contact: 2 A / 250 Vac</td>
</tr>
<tr>
<td></td>
<td>Typical Electrical Life Expectancy</td>
<td>Power factor = 1 at 230 Vac (See Note 2)</td>
</tr>
<tr>
<td></td>
<td>3 A</td>
<td>1 000 000 operations</td>
</tr>
<tr>
<td></td>
<td>5 A</td>
<td>500 000 operations</td>
</tr>
<tr>
<td></td>
<td>10 A</td>
<td>220 000 operations</td>
</tr>
<tr>
<td></td>
<td>Typical Power Factor (cos $\phi$)</td>
<td>Limitation Factor (See Note 3)</td>
</tr>
<tr>
<td></td>
<td>0,3</td>
<td>0,45</td>
</tr>
<tr>
<td></td>
<td>0,5</td>
<td>0,70</td>
</tr>
<tr>
<td></td>
<td>0,7</td>
<td>0,85</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Operating frequency</td>
<td>600 switching cycles/h</td>
</tr>
<tr>
<td></td>
<td>Fuse Rating</td>
<td>6 A time delayed</td>
</tr>
<tr>
<td></td>
<td>Mechanical life</td>
<td>Ten million switching operations</td>
</tr>
<tr>
<td><strong>General</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>-15 °C to +55 °C / 5 °F to 131 °F at max. 90% humidity (max.)</td>
<td></td>
</tr>
<tr>
<td>Sealing</td>
<td>Housing: IP 40 • Terminals: IP 20</td>
<td></td>
</tr>
<tr>
<td>Housing material</td>
<td>Thermoplastic</td>
<td></td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>Amplitude 0,35 mm; Frequency 10 to 55 Hz</td>
<td></td>
</tr>
<tr>
<td>Conductor connection</td>
<td>1 x 4 mm² solid (max.) [12 AWG] or 2 x 1,5 mm² (max)</td>
<td></td>
</tr>
<tr>
<td>Conductors</td>
<td>[16 AWG] stranded wire with sleeve DIN 46288</td>
<td></td>
</tr>
<tr>
<td>Conductor attachment</td>
<td>Removable block terminals with M3,5 screws; wire contacts are enclosed to prevent electrical shock</td>
<td></td>
</tr>
<tr>
<td>Mounting</td>
<td>Quick install rail mounting EN 50022-35</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>450 g / 0.99 lb</td>
<td></td>
</tr>
</tbody>
</table>

**ORDERING INFORMATION**

FF-SRS5935

- **Voltage:**
  - 2 = 24 Vdc
  - E = 120 Vac
  - G = 230 Vac

**Note 1:** To ensure the 1 mA capability during the lifetime of the contact, NEVER exceed 300 mA or 60 V.

**Note 2:** Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

**Note 3:** Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0,5 at 230 Vac, 3 A (1 000 000 operations), the limitation factor is 0,70. 1 000 000 x 0,70 = 700 000 total operations.

**CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)**

Power factor = 1 (cos $\phi$)

**LIMITATION FACTOR FOR INDUCTIVE LOADS**

Power factor < 1 (cos $\phi$)

![Graph 1](image1.png)

- Industrial Safety Products -

FF-SRS5935 Series
**FUNCTIONAL DESCRIPTION**

If the start push-button is closed before voltage is applied to S12 and S22 (also, if a line fault occurs via the start push-button), the output contacts cannot be switched to START.

The module’s PE testing terminal allows insulation monitoring on IT networks. This terminal serves as a reference point for checking the control voltage and provides a connection contact during an emergency stop with cross fault detection.

Notice that connecting the PE terminal to ground on dc versions implies the deactivation of the internal short-circuit protection.

One or more FF-SRE3081 Extension Modules or external contactors with positively driven contacts can be used to multiply the number of contacts of the FF-SRS5935 Emergency Stop Module. If multiple safety contacts are used in parallel with one load, the maximum admissible current can be increased.
The circuit redundancy in the emergency stop control circuit and therefore gives the highest safety level.

This circuit has no redundancy in the emergency stop circuit.

With switching current > 10 A, the output contacts should be reinforced by external contactors (K4 and K5) with positive-guided contacts. The proper operation of the external contactors is monitored by looping NC contacts into the restart circuit (terminals S33-S34).
**FEATURES**

- Complies with EU Directive for machines 98/37/EC, IEC 204, EN 60204-1, DIN VDE 0113
- Dual channel input
- Output: six NO contacts and one NC contact
- Dual voltage device 24 Vdc/120 Vac or 24 Vdc/230 Vac
- Switching current from 1 mA to 10 A (5 µm gold plated contacts allow low current)
- Line fault detection and detection of blocked start push-button
- Automatic start or manual start modes
- Selectable cross fault detection in emergency stop control circuit
- LED indicates power and the status of the two output channels (internal relays)
- Mechanical life up to thirty million operations
- Electrical life up to one million operations
- Voltage drop protection
- Removable terminal strips for ease of maintenance
- 100 mm / 3.94 in width

**TYPICAL APPLICATIONS**

- Emergency stop circuits on machines
- Door protection
- Conveyors/transfer lines
- Use with Type 3 or Type 4 Electro-sensitive Protective Equipment for:
  - Point-of operation protection
  - Perimeter/zone guarding protection

The FF-SRS5988 Emergency Stop modules are designed to be used in emergency stop circuits when danger to personnel or machinery is present. This device offering six NO and one NC output contacts has two safety relays with positive-guided contacts to ensure redundancy.

In the **manual start mode**, the module accepts input from the safety device (light curtain, safety mat, safety switches, etc.) between S11/S12 and S21/S23 after activation of the push-button between S33 and S34; then, the normally open safety contacts (13/14...63/64) will close and the normally closed contact (81/82) will open.

In the **automatic start mode**, the module accepts input from the safety device (light curtain, mat, safety switches, etc.) between S11/S12 and S21/S23 (Y1 and Y2 are jumpered if external relay monitoring is not needed); then, the normally open safety contacts (13/14...63/64) will close and the normally closed contact (81/82) will open.

In either mode, if the safety device is actuated (emergency stop condition occurs), the normally open contact will open immediately and the normally closed contact will close. This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

Cross fault monitoring is used when two independent safety inputs are provided to this module to increase the overall safety level of the solution (see typical application examples).
FF-SRS5988 Dual Channel Emergency Stop Module

SPECIFICATIONS

- Dual channel Emergency Stop circuits

### Input

- **Nominal voltage**
  
  | (Dual voltage device) | 120 Vac (-20 %, +10 %) / 24 Vdc (-10 %, +20 %) |
  | 230 Vac (-20 %, +10 %) / 24 Vdc (-10 %, +20 %) |

- **Nominal power consumption**
  
  DC: 3 W / AC: 6 VA

- **Nominal frequency**
  
  50 to 60 Hz

- **Start time**
  
  Manual START function: 30 ms
  Automatic START function: 1 s

- **Nominal voltage at S11 / at S21**
  
  23 Vdc (provided by control module) / 0 V

- **Input current between S11/S12 and S21/S23**
  
  110 mA dc

- **Minimum voltage at S12/A4 and at S22/A4**
  
  21 Vdc when activated

- **Cable resistance between S11/S12 and S21/S23**
  
  68 Ω (max.)

### Output

- **Contact complement**
  
  6 NO contacts, 1 NC contact

- **Response time**
  
  Opening of inputs (S11/12; S21/23): 30 ms
  Opening in supply circuit: 50 ms

- **Switching capability**
  
  Power factor = 1 with resistive load

- **Current Range (min. to max.)**
  
  1 mA to 10 A (See Note 1)

- **Voltage Range (min. to max.)**
  
  0.1 to 250 Vac/dc

- **Switching Capability per ac15 (EN 60947-5-1)**
  
  NO contacts: 5 A / 230 V; NC contact: 2 A / 230 V

- **Typical Electrical Life Expectancy**
  
  - Power factor = 1 at 230 Vac/dc (See Note 2)
    - 3 A: 1,000,000 operations
    - 5 A: 500,000 operations
    - 10 A: 220,000 operations

- **Typical Power Factor (cos ϕ)**
  
  Limitation Factor (See Note 3)
  - 0.3: 0.45
  - 0.5: 0.7
  - 0.7: 0.85
  - 1: 1

- **Operating frequency**
  
  600 switching cycles/hour (max.)

- **Mechanical life**
  
  Thirty million switching operations

### General

- **Temperature range**
  
  -15 °C to +55 °C / 5 °F to 131 °F at 90% humidity (max.)

- **Sealing**
  
  Housing: IP 40 • Terminals: IP 20

- **Housing material**
  
  Thermoplastic

- **Vibration resistance**
  
  Amplitude 0.35 mm; Frequency 10 to 55 Hz

- **Wire/conductor connection**
  
  1 x 4 mm² solid (max.) [12 AWG] or 2 x 1.5 mm² (max.) [16 AWG] stranded wire with sleeve DIN 46288

- **Wire/conductor attachment**
  
  Removable block terminals with M3.5 screws; wire contacts are enclosed to prevent electrical shock

- **Mounting**
  
  Quick install rail mounting EN 50022-35, width: 35 mm / 1.38 in

- **Weight**
  
  840 g / 1.85 lbs

### ORDERING INFORMATION

FF-SRS5988

- P = 120 Vac / 24 Vdc
- R = 230 Vac / 24 Vdc

### Note 1: Contact damage

To ensure the 1 mA capability during the lifetime of the contact, never exceed 300 mA or 60 V.

### Note 2: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

### Note 3: Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0.5 at 230 Vac, 3 A (1,000,000 operations), the limitation factor is 0.70. 1,000,000 x 0.70 = 700,000 total operations.

### CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

(Note 2) Power factor = 1 (cos ϕ)

### LIMITATION FACTOR FOR INDUCTIVE LOADS

(Note 3) Power factor < 1 (cos ϕ)
**INTERNAL CIRCUITRY**

- **Overvoltage and short-circuit protection**
- **Monitoring logic**
- **Power**

**WIRING DIAGRAMS**

**INTERNAL CIRCUITRY**

- **K1**
- **K2**
- **K3**

**FUNCTIONAL DIAGRAM**

- **Start push-button**
- **Emergency stop**
- **K2**
- **K3**

**REMovable TERMINAL BLOCKS**

**MOUNTING DIMENSIONS**

Width: 100 mm / 3.94 in; Height: 74 mm / 2.91 in; Depth: 121 mm / 4.76 in

**SETTING OF START MODE**

<table>
<thead>
<tr>
<th>Start Mode</th>
<th>Jumper between X1/X2</th>
<th>Start push-button between S33/S34</th>
<th>This module offers the possibility to function in the automatic start mode or manual start mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual start mode</td>
<td>• not connected</td>
<td>•</td>
<td>Insert the start push-button between terminals S33/S34 for manual start mode.</td>
</tr>
<tr>
<td>Automatic start mode</td>
<td>• connected</td>
<td>•</td>
<td>Insert a jumper between X1/X2 for automatic start mode to function</td>
</tr>
</tbody>
</table>
APPLICATION EXAMPLES

Dual-channel emergency stop circuitry (with cross fault monitoring, manual start mode, external contactors)

Protective gates are designed to limit or block access to the moving parts of dangerous machinery. These gates can be equipped with locking or interlocking devices, usually safety limit switches or any other safety sensors/switches. The FF-SRS5988 Emergency Stop module monitors the status of these safety sensor positions. When the protective gate is open, the initiation of dangerous motion is prevented. When the door is closed again, the next machine cycle can start, but only after initiating an external manual restart sequence. After opening the door, the two external safety switch contacts S1 and S2 will open (as illustrated above) and the two internal safety relays K2 and K3 will de-energize. The normally open safety outputs 13/14… 63/64 will open relaying the stop condition to the machine control circuitry. After closing the door, S1 and S2 close and the internal relays K2 and K3 will energize. The six normally open safety contacts will close and an external manual restart sequence may then be initiated (allowing the machine to operate).

Dual-channel safety door monitoring (with cross fault monitoring, automatic start mode)

APPLICATION NOTES

Note (A): Dual channel safety devices:
This may be an emergency stop push-button in series with dual output safety switching devices (OSSD) such as safety light curtains (FF-SB, FF-LS), single beam (FF-SPS4), modular safety light curtain (FF-SCAN), safety mat (FF-SM), safety laser scanner (FF-SE), or safety limit switches (i.e. 2CLS, GK).

Note (B): Start modes:
Manual start mode: Insert start push-button between S33/S34; no jumper must be set between X1/X2
Automatic start mode: Insert jumper between X1/X2

Note (C): External contactors:
With switching currents higher than 10 A, the output contacts should be reinforced by external contactors with positive guided contacts (K4 and K5). The proper operation of the external contactors must be monitored by looping their normally closed contacts into the Final Switching Device (FSD) monitoring loop (Y1/Y2). If no external contactors are used, Y1/Y2 has to be jumpered to let the module function.
FF-SRS59392 Dual Channel Interface Control Module
for Electrosensitive Protective Equipment

FEATURES
• Complies with EU Directive for machines 98/37/EC, IEC 204, EN 60204, DIN VDE 0113
• Supply voltage: 24 Vdc
• Dual input compatible with the safety static outputs of Honeywell Electrosensitive protective Equipment
• Two cross-monitored relays with guided contacts delivering two N.O. contacts and one N.C. contact
• Switching current from 1 mA to 6 A (gold plated 5 µm contacts allow low current)
• Response time: 15 ms
• Selectable automatic or manual restart modes (with permanent short-circuit detection)
• Selectable Final Switching Devices monitoring loop for the control of external relays or contactors
• LEDs indicates inputs and outputs status, and restart condition
• Removable terminal strips for ease of maintenance
• 45 mm / 1.77 in width housing

TYPICAL APPLICATIONS
To be used with the FF-SYA safety light curtain in point-of-operation protection or zone guarding protection such as:
• Metal-forming, milling and drilling machines
• Spot-welding machines and fine-boring machines
• Pressing, moulding and thermoforming machines
• Conveyors/transfer lines

The FF-SRS59392 Interface Control Module is designed to be used with the FF-SYA Safety Light Curtain in emergency stop circuits when danger to personnel or machinery is present. Its slim 45 mm / 1.77 in width housing is ideal for space restricted areas. This module provides a Control Reliable interface between the FF-SYA Light Curtain and the machine control circuitry. A single fault does not prevent the normal stopping action from taking place but will prevent the next machine cycle to start until the fault is corrected. This is accomplished by the use of redundant circuitry, self-checking capability and positive guided safety relay outputs. These redundant safety relay outputs are rated for 6 amps to directly operate with the machine control actuators using 2 NO and 1 NC output contacts. These output contacts are also gold plated to ensure compatibility with very low current requirements (such as a monitoring circuit).

The FF-SRS59392 Module can be wired for either Automatic or Manual Restart modes of operation and also provides Final Switching Device (FSD) monitoring if interfaced with external switching devices. The FF-SRS5939 is equipped with LED indicators that provide diagnostic information and is equipped with removable wiring strips to make replacement fast and easy.

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.

MISUSE OF PRODUCT
• The FF-SRS59392 module is designed to be used with the Honeywell FF-SYA safety light curtain equipped with fail-safe solid state outputs. The FF-SYA performs cross-fault detection between its outputs. The FF-SRS59392 module does not perform the cross-fault detection between its inputs. To ensure the highest safety category, do NOT use the FF-SRS59392 with any other equipment. For other equipment, use the FF-SRS5935 or FF-SRS5925 dual channel emergency stop module. Both modules perform the cross-fault detection between the safety device outputs.

Failure to comply with these instructions could result in death or serious injury.
### Supply voltage
Nominal voltage (A1/A2) | 24 Vdc (-15 %, +15 %)
---|---
Power consumption | 3.5 W
Fuse protection | 315 mA, time delayed

### Restart functions
Restart push-button input (S33/S34)
- For the connection of a N.O. contact, 0.1 to 1.5 s closing time, permanent short-circuit detection, 20 Vdc min. voltage (without pressing the push-button), 10 mA/24 Vdc min. current, 470 Ω max. cable resistance
- For setting the manual or automatic restart mode, voltage presence
Restart mode input (X1/X3)
- 100 ms after the ESPE inputs are energized (automatic restart) or push-button release (manual restart)
FSD monitoring loop
- For the connection in series of the FSDs N.C. contacts (FSDs reaction time: 250 ms), permanent short-circuit detection, 20 Vdc min. voltage, 30 mA/24 Vdc min. current, 150 Ω max. cable resistance

### ESPE inputs
- Input current: 30 mA/24 Vdc (relays energized), 5 mA/24 Vdc (relays de-energized)
- Input voltage: 19 to 27.6 Vdc
- Protection: Reversed polarity, over-voltages up to 32 Vdc

### Outputs
- Contacts available: 2 N.O., 1 N.C. (2 safety relays with guided contacts)
- Response time: 15 ms max. (See timing diagrams)
- Start time at power up: 100 ms (automatic restart mode)
- Current range: 1 mA min., 6 A max. (See Note 1)
- Voltage range: 0.1 Vac/dc min., 250 Vac/dc max.
- Switching capability per ac15 (EN 60947-5-1)
  - N.O. contact: 3 A / 230 Vac, N.C. contact: 2 A / 230 Vac
- Typical electrical life expectancy: Power factor = 1 at 230 Vac (See Figure 1, Note 3)
- Typical power factor (See Fig. 2, Note 2 and 3)
  - Operating frequency: 6 A max. time delayed
  - External fuse rating: 10 million switching operations

### Environmental specifications
- Temperature range: Operation: 0 °C to 55 °C / 32 °F to 131 °F
  - Storage: -20 °C to 70 °C / -4 °F to 170 °F, at 90 % humidity max.
- Sealing: IP 40
- Housing material: Thermoplastic
- Vibration resistance: Amplitude 0.35 mm, frequency 10 to 55 Hz
- Connection: Removable terminal strips, one ø2.5 mm² (14 AWG) or two ø1.5 mm² (16 AWG) stranded wires per terminal
- Mounting: Quick install rail mounting
- Weight: 280 g / 0.61 lb

### Ordering information
- FF-SRS59392 (24 Vdc)

**Note 1:** To ensure the 1 mA capability during the lifetime of the contact, NEVER exceed 300 mA and 60 V.

**Note 2:** Install arc suppression device across loads to avoid module contact arcing and ensure specified relay life expectancy.

**Note 3:** Total operations = operations at power factor 1 multiplied by the limitation factor. If the power factor is 0.5 at 3 A/230 Vac, the limitation factor is 0.70 and the number of operations is 500 000 x 0.70 = 350 000.
Mounting dimensions

a Width: 45 mm / 1.77 in
b Height: 74 mm / 2.91 in
c Depth: 121 mm / 4.76 in

Mounting procedure

Removable terminal strips

Jumper links setting diagram

Module front panel

Automatic restart functional diagram (with Final Switching Devices monitoring)

1. Normal operation: emergency stop condition is removed and the FSDs monitoring loop opens.
2. Normal operation: emergency stop condition occurs and the FSDs monitoring loop closes.
3. Normal operation: emergency stop condition is removed and the FSDs monitoring loops opens.
4. Failure on the FSDs: emergency stop condition occurs and the FSDs monitoring loop remains open.
5. Failure on the FSDs: emergency stop condition is removed but the machine cannot restart.

In the automatic restart mode, the Normally Open (N.O.) contacts (13/14, 23/24) will close and the Normally Closed (N.C.) contact (31/32) will open if the two input signals from the FF-SYA light curtain are present, provided these signals are coincident and the external relays reaction time is within the specification (if the Final Switching Devices monitoring loop is set). If the emergency stop condition occurs the N.O. contacts will open within the 15 ms response time and the normally closed contact will close. This
emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power. The module will not restart if the FSD monitoring loop remains permanently open, or remains closed for more than 250 ms or permanently.

**Manual restart functional diagram** (with Final Switching Devices monitoring)

1. Normal operation: emergency stop condition is removed and the FSDs monitoring loop opens after the push-button is pressed and released.
2. Normal operation: emergency stop condition occurs and the FSDs monitoring loop closes.
3. Normal operation: emergency stop condition is removed and the FSDs monitoring opens after the push-button is pressed and released.
4. Failure on the FSDs: emergency stop condition occurs and the FSDs monitoring loop remains open.
5. Failure on the FSDs: emergency stop condition is removed but the machine cannot restart after the push-button is pressed and released.

In the manual restart mode, the N.O. contacts (13/14, 23/24) will close and the N.C. contact (31/32) will open after the push-button is pressed and released, provided the two input signals are available and provided the Final Switching Devices monitoring loop is closed (if is set). If the emergency stop condition occurs the N.O. contacts will open within the 15 ms response time and the normally closed contact will close. This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

The module will not restart:
- if the push-button is actuated for more than 1.5 s, or if a permanent short-circuit of the restart push-button input occurs,
- if the FSD monitoring loop remains permanently open, or remains closed for more than 250 ms or permanently.

**Wiring diagram** (using 2 N.O. contacts): Manual restart with FSD monitoring

(1) Always install arc suppressors across the coils of external safety relays (these arc suppressors are not necessary, if the FSDs relays K3 & K4 are supplied by the FF-SRE3081 extension module for which correct wiring is also indicated).

(2) Use a 120 or 230 Vac electrically insulated push-button.

(3) The module and the ESPE must be connected to the same 0 V. ESPE: Electrosensitive Protective Equipment.

(A) Jumpered if the manual restart mode is not used.

(B) Jumpered if the FSDs K3 and K4 are not used.
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.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service

Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact a nearby sales office or:

INTERNET:  www.honeywell.com/sensing
E-mail:  info.sc@honeywell.com
**FEATURERS**

- Complies with EU Directive for machines 98/37/EC
- Meets the applicable parts of the US & Canadian regulations and standards ANSI/RIA/OSHA
- Category 4 as per the EN 954-1 European standard
- Dual channel input
- Output: three NO contacts and one NC contact
- Switching current from 10 mA to 5 A
- Automatic start or manual start modes
- Detection of blocked start push-button
- Selectable cross-fault detection in emergency stop control circuit
- LED indicates power and the status of both internal relays
- Very high mechanical and electrical lifetime
- Overvoltage and short-circuit protection
- Slim housing 22.5 mm / 0.89 in width

**TYPICAL APPLICATIONS**

- Emergency-stop circuits on machines
- Door protection
- Conveyor/transfer lines
- Monitoring of safety devices like:
  - emergency stop push-buttons
  - safety light curtains
  - safety switches
  - safety mats

The FF-SRS6025 dual channel emergency stop modules are designed for use in emergency stop circuits when danger to personnel or machinery is present.

The FF-SRS6025 safety control module monitors the outputs of safety devices (e.g., emergency stop push-buttons, safety light curtains, safety mats, safety switches, etc.). If the safety device is actuated, the emergency stop condition is relayed via the safety contacts of the safety control module to the machine control circuitry to stop the hazard and to remove power.

The FF-SRS6025 helps to create a control reliable safety solution by providing redundancy and self-checking circuitry.

This device offers two channel inputs and two internal safety relay outputs with positive-guided contacts. This ensures redundancy in its in-and outputs.

The slim housing of only 22.5 mm (0.89 in.) width allows this safety control module to fit into every cabinet or even helps to reduce the overall cabinet size.

Other features include high current capability, an automatic start and manual start mode, cross-fault monitoring and external relays monitoring.

**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.
**LIMITATION FACTOR F FOR INDUCTIVE LOADS**

(Power factor \(\cos \phi < 1\) See Note 2)

<table>
<thead>
<tr>
<th>Power factor</th>
<th>Limitation Factor</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>10</td>
<td>5.5 x 10^7</td>
</tr>
<tr>
<td>0.3</td>
<td>7</td>
<td>0.5 x 10^8</td>
</tr>
<tr>
<td>0.4</td>
<td>5</td>
<td>2 x 10^8</td>
</tr>
<tr>
<td>0.5</td>
<td>3.5</td>
<td>8 x 10^7</td>
</tr>
<tr>
<td>0.6</td>
<td>2.5</td>
<td>1.5 x 10^8</td>
</tr>
<tr>
<td>0.7</td>
<td>2</td>
<td>2 x 10^7</td>
</tr>
<tr>
<td>0.8</td>
<td>1.5</td>
<td>5 x 10^8</td>
</tr>
<tr>
<td>0.9</td>
<td>1</td>
<td>1 x 10^6</td>
</tr>
</tbody>
</table>

**CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)**

(Power factor \(\cos \phi = 1\), see Note 1)

<table>
<thead>
<tr>
<th>Switching power [kVA]</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>10^5</td>
</tr>
<tr>
<td>1.0</td>
<td>10^7</td>
</tr>
<tr>
<td>1.5</td>
<td>10^8</td>
</tr>
<tr>
<td>2.0</td>
<td>10^9</td>
</tr>
</tbody>
</table>

**ORDERING INFORMATION**

**FF-SRS6025**

\(2 = 24\) Vdc (only)

**Note 1:** Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

**Note 2:** Total operations = operations (power factor 1) x limitation factor \(F\).

Example:

\[
U = 230\text{ Vac}, I = 1\text{ A}, \ \text{power factor } \cos \phi = 0.5
\
\text{Switching power } P = U \times I = 230\text{ VA}
\
\text{Contact life (}\cos \phi = 1\text{, }P = 230\text{ VA}) = 2\ 000\ 000\ \text{operations}
\
\text{Limitation factor } F(\cos \phi = 0.5) = 0.7
\
\text{Contact life (}\cos \phi = 0.5\text{, }P = 230\text{ VA}) = F \times \text{contact life (}\cos \phi = 1\text{, }P = 230\text{ VA}) = 2\ 000\ 000 \times 0.7 = 1\ 400\ 000\ \text{operations}.
\]
The FF-SRS6025 safety control monitors dual channel outputs of safety devices (e.g. emergency stop push-buttons, light curtains, mats, switches, etc.).

If the safety device is actuated, the emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to stop the hazard and to remove power.

In the manual start mode, a push-button needs to be pushed and released, to re-energise the internal safety relays K1 and K2. In the automatic start mode, the internal safety relays K1 and K2 re-energise automatically.

Both relays K1 and K2 must be energised to have the normally open contacts 13/14, 23/24 and 33/34 in a closed position.

The FF-SRS6025 emergency stop module contains two internal switches (S1 and S2) for the mode settings. To access to these switches, remove the front panel using a screwdriver.

Switch S1 is used to select an operating mode for cross-fault detection between the two inputs. Cross-fault monitoring must be used when two independent safety inputs are provided to this module to achieve the overall level of the solution.

Switch S2 is used to select the start/restart modes. In the manual start/restart mode, a start push-button needs to be pushed and released to energise the safety relay contacts. In the automatic start mode, the safety relay contacts energise automatically, after releasing the connected safety device.

Line fault Detection on Start push-button
If the start push-button is closed before voltage is applied to S12 and S22 the safety contacts of the module cannot close. This additional feature ensures the detection of a line fault via the start push-button or a blocked start push button. In case of a push-button failure the module can not be restarted.
FUNCTIONAL DESCRIPTION

In the case of an emergency stop condition, the safety device (see "Application note 'B'") is actuated and opens its normally closed contacts connected to the dual input channels S11/S12 and S21/S22. The internal safety relays K1 and K2 de-energise. The normally open safety relay contacts (13/14, 23/24, 33/34) will open and the normally closed contact (41/42) will close. The emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to stop the hazard. When removing the emergency stop condition, the normally closed safety device contacts close again and the module is ready to be restarted.

In the manual start mode, a push-button needs to be pushed and released, to energise the internal safety relays K1 and K2. The normally open safety contacts (13/14, 23/24, 33/34) will close and the normally closed contact (41/42) will open, allowing the machine to operate. In the automatic start mode, the internal safety relays K1 and K2 energise automatically.

Application notes:

Note (A): Start modes:
- Manual start mode: Insert start push-button into the start loop S33/S34 and select internal switch to manual start mode
- Automatic start mode: Insert jumper into the start loop S33/S34 and select internal switch S2 to automatic start mode

Note (B): Dual channel safety devices:
- Emergency stop push-buttons, safety light curtains, safety mats, safety limit or interlock switches.

Note (C): Externally contacts:
The proper operation of external safety contactors and FF-SRE extension modules must be monitored by using the External Device Monitoring (EDM) function of the FF-SRS6025 module. Connect one normally closed contact of each safety contactor (or the FF-SRE Extension module) into the start loop between S33/S34.

APPLICATION EXAMPLES

Dual-channel emergency stop circuitry (with cross fault monitoring, external contactors)

Dual-channel safety door monitoring (with cross fault monitoring, without external contactors)
Two-hand safety controls ensure protection against injury due to machine movement. They are cost effective solutions for machine guarding, when the upper limbs of a single operator are exposed to a hazard. A two-hand safety control system is made of two elements: a control panel and a safety control module. The control panel has two push-buttons which force the operator to use both hands. The safety control module is a device like the FF-SR25933 module which controls the simultaneity of action between both push-buttons.

The module accepts input from two NO and NC contacts delivered by each of the two push-buttons. When both push-buttons are activated within half a second and maintained, the normally open safety contacts of the module switch on. Otherwise another activation is required.

When one of the push-buttons is released, the normally open safety contacts of the FF-SR25933 module switch off immediately.
FF-SR25933 Two-hand Safety Control Module

SPECIFICATIONS

- Two-hand Safety Control for single operation protection

| Input | Nominal voltage | 120 Vac (-15% +10%), 230 Vac (-15% +10%), 24 Vdc (-10% +10%) and 24 Vac (-15% +10%) |
|-------|-----------------|--------------------------------------------------------------------------------|---|
| Nominal consumption | 120 Vac or 230 Vac: 4 VA; 24 V: 2.3 W |
| Nominal frequency | 50 Hz to 60 Hz |
| Nominal input current through | S1/S12, S11/S13, S21/S22 and S21/S23 |
| Time required for simultaneous contact closure | S11/S12 and S21/S22 |

| Output | Contact complement | 2 NO, 1 NC contacts (24 Vdc version); 3 NO, 1 NC contacts (120 Vac or 230 Vac versions) |
|--------|---------------------|--------------------------------------------------------------------------------|---|
| ON response time | Safety relay, positive-guided |
| OFF response time | (to energize relays) |
| Switching Capability | Power factor = 1 with resistive load |
| Current Range (min. to max.) | 1 mA to 5 A (See Note 1) |
| Voltage Range (min. to max.) | NO contact: 5 A / 250 Vac |
| Switching capability (per AC15: EN 60947-5-1) | 0.1 to 250 Vac/dc |
| Typical Electrical Life Expectancy | Power factor = 1 at 230 Vac (See Note 2) |
| 1 A | 2 000 000 operations |
| 2 A | 1 000 000 operations |
| 5 A | 220 000 operations |
| Typical Power Factor (cos \( \phi \)) | Limitation Factor (See Note 3) |
| 0,3 | 0.45 |
| 0,5 | 0.70 |
| 0,7 | 0.85 |
| 1 | 1 |

- Mechanical life: Ten million switching operations
- Fuse Rating: 6 A time delayed

**ORDERING INFORMATION**

- FF-SR25933
- Voltage: 2 = 24 Vdc/24 Vac
- E = 120 Vac
- G = 230 Vac

**Note 1:** To ensure the 1 mA capability during the lifetime of the contact, NEVER exceed 300 mA and 60 V.

**Note 2:** Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

**Note 3:** Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0.5 at 230 Vac, 2 A (1 000 000 operations), the limitation factor is 0.70.

Total operations: 1 000 000 x 0.70 = 700 000.

**CONTACT LIFE FOR 100 % RESISTIVE LOAD (TYPICAL)**

- Power factor = 1 (cos \( \phi \))

**LIMITATION FACTOR FOR INDUCTIVE LOADS**

- Power factor < 1 (cos \( \phi \))
MOUNTING DIMENSIONS
Width (W): 45 mm / 1.77 in (120 Vac or 230 Vac version) or 22.5 mm / 0.88 in (24 V version); Height (H): 84 mm / 3.3 in; Depth (D): 118 mm / 4.64 in

INSTALLATION DIAGRAM

TERMINAL BLOCK CONFIGURATION

REMOVABLE TERMINAL BLOCKS
Screwdriver
Removable terminal block

FF-SR25933E (120 Vac version)
FF-SR25933G (230 Vac version)

FF-SR259332 (24 V version)

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Industrial Safety Products for Machine Safeguarding •
INTERNAL CIRCUITRY

FF-SR259332 (24 V version)

FF-SR25933E (120 Vac version)
FF-SR25933G (230 Vac version)

FUNCTIONAL DIAGRAM

* when final switching devices are connected to Y1/Y2
TYPICAL WIRING DIAGRAMS

Two-hand control (24 V version)

Two-hand control with contact reinforcement via external positive guided safety contacts (120 Vac or 230 Vac versions)
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.

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Sales and Service

Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact a nearby sales office or:

INTERNET: www.honeywell.com/sensing

E-mail: info.so@honeywell.com
Two-hand safety controls ensure protection against hand injury due to dangerous machine movement. A two-hand safety control system is made up of two elements: a control board and a safety control module. The control board has two control devices that force the use of two-hand activation simultaneously. The safety control element is a device like the FF-SR25980 two-hand safety module. This control module relay is linked to the control board and is located in an enclosure.

The module will accept input from the two control devices (between S13/S14 and S23/S24) if Y1/Y2 are jumpered (or closed). When both input contacts close within half a second and remain closed, the two normally open safety contacts (13/14 and 23/24) will close. If these input contacts fail to close within half a second, or if power has been removed, another activation is required.

When one of the input contacts opens, the two normally open safety contacts of the FF-SR25980 module will open immediately.
**FF-SR25980 Two-hand Safety Module**

**SPECIFICATIONS**
- Two-hand Safety Control for hand injury protection

### Input
- **Nominal voltage:** 120 Vac (-15%, +10%), 230 Vac (-20%, +10%), 24 Vdc (-10%, +10%)
- **Nominal consumption:** 120 and 230 Vac: 4 VA; 24 Vdc: 2.5 W
- **Nominal frequency:** 50 to 60 Hz
- **Nominal voltage between S13/S14 and S23/S24:** 24 Vdc with 35 mA current; control line length must not exceed 30 m / 98 ft and must be routed separately from power cables
- **Time required for simultaneous contact closure S13/S14 and S23/S24:** 0.5 s

### Output
- **Contact complement:** 2 NO contacts
- **Contact type:** Safety relay, positive-guided
- **Response time:** Activation/deactivation by inputs S13/S14 and S23/S24: 30 ms
- **Switching Capability:** Power factor = 1 with resistive load
  - 1 mA to 10 A (See Note 1)
  - 0.1 to 250 Vac/dc
  - NO contact: 5 A / 250 Vac
- **Voltage Range (min. to max.):** 100000 operations
  - 3 A
  - 5 A
  - 10 A
- **Typical Power Factor (cos ϕ):**
  - 0.3
  - 0.5
  - 0.7
  - 1
- **Mechanical life:** Ten million switching operations
  - 6 A time delayed

### General
- **Temperature range:** -15 °C to +55 °C / 5 °F to 131 °F at max. 90% humidity
  - Housing: IP 40
  - Terminals: IP 20
- **Housing material:** Thermoplastic
- **Vibration resistance:** Amplitude 0.35 mm; Frequency 10 to 55 Hz
  - 1 x 4 mm² solid (max.) [12 AWG] or 2 x 1.5 mm² (max.) [16 AWG]
  - stranded wire with sleeve DIN 46288
- **Conductor attachment:** M 3,5 screws terminals; wire contacts are enclosed to prevent electrical shock
- **Mounting:** Quick install rail mounting EN 50022-35
- **Weight:** 410 g / 0.90 lb

### Ordering Information
- FF-SR25980
- Voltage:
  - 2 = 24 Vdc
  - E = 120 Vac
  - G = 230 Vac

**Note 1:** To ensure the 1 mA capability during the lifetime of the contact, NEVER exceed 300 mA or 60 V.

**Note 2:** Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

**Note 3:** Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0.5 at 230 Vac, 3 A (1 000 000 operations), the limitation factor is 0.70.

1 000 000 x 0.70 = 700 000 total operations.

### Contact Life for 100% Resistive Load (Typical)

<table>
<thead>
<tr>
<th>Power factor (cos ϕ)</th>
<th>Operation</th>
<th>10^2</th>
<th>10^3</th>
<th>10^4</th>
<th>10^5</th>
<th>10^6</th>
<th>10^7</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>0.5</td>
<td>2</td>
<td>5</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Limitation Factor for Inductive Loads

<table>
<thead>
<tr>
<th>Power factor (cos ϕ)</th>
<th>Limitation Factor F</th>
<th>0.5</th>
<th>1</th>
<th>1.5</th>
<th>2</th>
<th>2.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>0.2</td>
<td>0.4</td>
<td>0.6</td>
<td>0.8</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com**
INSTALLATION DIAGRAM

INTERNAL CIRCUITRY

MOUNTING DIMENSIONS
Width: 45 mm / 1.77 in; Height: 74 mm / 2.9 in; Depth: 121 mm / 4.76 in

WIRING DIAGRAM

TYPICAL APPLICATION SCHEMATICS

FUNCTIONAL DIAGRAM

Two-hand control

Two-hand control with contact reinforcement via external positive
guided safety contacts
The FF-SR05932 standstill / low speed monitor module measures the rotation frequency of rotating devices using two external proximity sensors.

When the rotation frequency falls below a programmable threshold level, the FF-SR05932 standstill / low speed monitor module will energise its safety relay outputs. Then, the two normally open contacts (13/14, 23/24) of the module will close and the normally closed contact 31/32 will open.

The detection threshold of the rotation frequency is programmable in four ranges using internal DIP switches. A fine adjustment selector helps to fine adjust the threshold frequency within the selected frequency range.

The FF-SR05932 standstill / low speed monitor module is designed to be connected to proximity sensors with PNP or NPN static outputs. Both proximity sensors must detect that rotation frequency is below the programmed frequency threshold, in order to energise both internal safety relays. Both internal safety relays K1 and K2 need to be energised to close the normally closed contacts (13/14, 23/24) of the module and to open the normally open contact 31/32.

The sensors are powered by the module. Two sensors must be connected to the module in order to have redundant inputs.
FF-SR05932 Standstill and Low Speed Monitor

SPECIFICATIONS

- Safety low speed monitor for rotating devices

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>Nominal voltage: 24 Vdc (ac: -20 %, +10 %), 120 Vac (-20 %, +10 %), 230 Vac (-20 %, +10 %)</td>
</tr>
<tr>
<td></td>
<td>Nominal power consumption: ac: approx. 4 VA, dc: approx. 4 W</td>
</tr>
<tr>
<td></td>
<td>Frequency: 50 Hz to 60 Hz</td>
</tr>
<tr>
<td>Proximity sensors (see Note 1)</td>
<td>Voltage: 24 Vdc (provided by the module)</td>
</tr>
<tr>
<td></td>
<td>Sensor type: 3-wire type, PNP O V NPN solid state output</td>
</tr>
<tr>
<td>Current consumption</td>
<td>max. 20 mA per sensor</td>
</tr>
<tr>
<td>Switching frequency</td>
<td>max. 20 kHz per sensor</td>
</tr>
<tr>
<td>Pulse duration</td>
<td>min. 2 ms</td>
</tr>
<tr>
<td>Simultaneity condition (between two</td>
<td>max. 0.5 s (falling edge)</td>
</tr>
<tr>
<td>proximity sensor outputs)</td>
<td></td>
</tr>
<tr>
<td>Selectable detection frequency</td>
<td>Detection frequency: 0.12 Hz - 312.5 Hz (DIP switch selectable in four ranges)</td>
</tr>
<tr>
<td>Relay outputs</td>
<td>Response time tv:</td>
</tr>
<tr>
<td></td>
<td>Examples:</td>
</tr>
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INSTALLATION DIAGRAM

SETTING OF DETECTION FREQUENCY
Two DIP switches are used to select one of the four different ranges for the detection frequency. The fine tuning can be done using the fine adjustment selector. The DIP switches and the fine selectors are located behind the front panel.

FUNCTIONAL DIAGRAM

APPLICATION EXAMPLES (with external contactors)
External contactors: When switching currents are higher than 4 A, the output contacts should be reinforced by external contactors with positive guided contacts (K3 and K4).
The proper operation of the external contactors must be monitored by looping their normally closed contacts into the FSD-loop between terminals Y1/Y2 (FSD = Final Switching Device monitoring). If K3 or K4 is welded, the FSD loop will not close, preventing further operation of the module.
APPLICATION EXAMPLE

Door protection using a solenoid key operated safety interlock switch (GKR/GKL Series) and a standstill / low speed monitor module FF-SR05932

FUNCTIONAL DESCRIPTION

Start sequence
Initially, the motor is not operating and the door is open. To initiate the start sequence, close the door. This action will close the two normally closed contacts of the key operated interlock switch. It will also automatically restart the FF-SRS5935 emergency stop module. As the Unlock push-button is not actuated, the solenoid coil of the key operated interlock switch is de-energized and the door is locked.

The motor may now be started. To start the motor, press the Start Motor push-button. This action will energize the self-maintained external relays K4 and K5, and will start the motor.

Stop Sequence
Initially, the motor is operating and the door is closed and locked. To initiate the stop sequence, press the Stop push-button. This action will de-energize the external safety relays K4 and K5 and stop the motor. When the FF-SR05932 standstill / speed monitor detects the rotation frequency is below the programmed threshold level, it is possible to unlock the door. The threshold levels can be programmed by internal DIP switches and a selector for fine tuning.

In order to unlock the door, press the Unlock push-button. This action will energize the coil of the solenoid of the GKL/GKR key operated interlock switch and unlock the door. The door may now be opened. No hazardous motor motion is present anymore.

Emergency Stop Sequence
In case of an emergency stop situation, the two channel inputs of the FF-SRS5935 emergency stop control module will open. This action de-energizes the external safety relays K4 and K5, stopping the motor. All other steps remain the same as described above (Stop Sequence).

APPLICATION NOTE:
Proximity sensors with the following specifications are compatible with the FF-SR05932 standstill / low speed monitor module:
- 3-wire 24 Vdc
- PNP solid state output (for FF-SR05932 version)
- NPN solid state output (for FF-SR05932-N version)
- Current consumption < 20 mA.
- Maximum switching frequency: 20 kHz
- Minimum pulse duration: 2 ms
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.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service

Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact a nearby sales office or:

INTERNET: www.honeywell.com/sensing
E-mail: info.sc@honeywell.com
FF-SRD5985 Safety Door Monitor

FEATURES
- Complies with the Machinery Directive 98/37/EC, IEC 204, EN 60204, DIN VDE 0113, ZH1-457 and UL 508
- Input for two position switches
- Output for two NO contacts ac 250 V
- Gold plated, 5 µm contacts allow low current input
- Mechanical life up to ten million operations
- Electrical life up to one million operations
- Switching current up to 10 A
- Voltage drop protection
- Monitors external contactors for contact multiplication and reinforcement via feedback circuit
- 45 mm / 1.77 in width

TYPICAL APPLICATIONS
- Dual channel safety door monitoring

Protective gates are designed to limit or block access to the moving parts of dangerous machinery. These gates can be equipped with locking or interlocking devices, usually limit switches or any other safety sensors.

The FF-SRD5985 Safety Door Monitor module monitors the status of these safety sensor positions. When the protective gate is open, the initiation of dangerous motion is prevented. When the door is closed again, the next machine cycle can start, but only after initiating a manual restart sequence.

If the module receives input (between S13/S14 and S23/S24) from two safety position switches that are monitoring door closure, and this occurs in less than three seconds (assuming the external monitoring loop circuitry (Y1/Y2) is closed), the two normally open contacts of the module (13/14 and 23/24) will close.

When the door opens, the two normally open contacts (13/14 and 23/24) will open relaying the emergency stop condition to the machine control circuitry.

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.
**FF-SRD5985 Safety Door Monitor**

### SPECIFICATIONS

- **Dual channel monitoring of a safety door**

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<tr>
<th>Input</th>
<th>Nominal voltage</th>
<th>120 Vac (-15%, +10%); 230 Vac (-20%, +10%); 24 Vdc (-10%, +20%)</th>
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<td></td>
<td>Nominal consumption</td>
<td>120 Vac, 230 Vac: 4 VA; 24 Vdc: 2.5 W</td>
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<td>Nominal frequency</td>
<td>50 to 60 Hz</td>
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<td>Control contacts</td>
<td>Two NO contacts</td>
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<td>Nominal voltage between S13/S14 and S23/S24</td>
<td>24 Vdc with 35 mA current</td>
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<td>Time required for simultaneous contact closure S13/S14 and S23/S24</td>
<td>3 s (max)</td>
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<tr>
<th>Output</th>
<th>Contact complement</th>
<th>2 NO contacts</th>
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<td></td>
<td>Contact type</td>
<td>Safety relay, positive-guided</td>
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<td>Response time</td>
<td>Activation/deactivation by inputs S13/S14 and S23/S24: 30 ms</td>
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<td>Switching Capability</td>
<td>Power factor = 1 with resistive load</td>
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<td>Current Range (min. to max.)</td>
<td>1 mA to 10 A (See Note 1)</td>
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<td>Voltage Range (min. to max.)</td>
<td>0.1 to 250 Vac/dc</td>
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<td>Switching capacity per ac15 (EN 60947-5.1)</td>
<td>NO contact: 5A / 250 Vac</td>
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<td>Typical Electrical Life Expectancy</td>
<td>Power factor = 1 at 230 Vac/dc (See Note 2)</td>
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<td>Typical Power Factor (cos ϕ)</td>
<td>Limitation Factor (See Note 3)</td>
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<td></td>
<td>3 A</td>
<td>1000000 operations</td>
</tr>
<tr>
<td></td>
<td>5 A</td>
<td>500000 operations</td>
</tr>
<tr>
<td></td>
<td>10 A</td>
<td>220000 operations</td>
</tr>
<tr>
<td></td>
<td>Fuse Rating</td>
<td>6 A, time-delayed</td>
</tr>
<tr>
<td></td>
<td>General</td>
<td>Ten million switching operations</td>
</tr>
<tr>
<td></td>
<td>Temperature range</td>
<td>-15 °C to +55 °C / 5 °F to 131 °F at 90% humidity (max.)</td>
</tr>
<tr>
<td></td>
<td>Sealing</td>
<td>Housing: IP 40 • Terminals: IP 20</td>
</tr>
<tr>
<td></td>
<td>Housing material</td>
<td>Thermoplastic</td>
</tr>
<tr>
<td></td>
<td>Vibration resistance</td>
<td>Amplitude 0.35 mm; Frequency 10 to 55 Hz</td>
</tr>
<tr>
<td></td>
<td>Conductor connection</td>
<td>1 x 4 mm² solid (max.) [12 AWG] or 2 x 1,5 mm² (max.) [16 AWG] stranded wire with sleeve DIN 46288</td>
</tr>
<tr>
<td></td>
<td>Conductor attachment</td>
<td>M3,5 screws terminals; wire contacts are enclosed to prevent electrical shock</td>
</tr>
<tr>
<td></td>
<td>Mounting</td>
<td>Quick install rail mounting EN 50022-35</td>
</tr>
<tr>
<td></td>
<td>Weight</td>
<td>450 g / 0.99 lb</td>
</tr>
</tbody>
</table>

### ORDERING INFORMATION

**FF-SRD5985**

- **Voltage:**
  - 2 = 24 Vdc
  - E = 120 Vac
  - G = 230 Vac

**Note 1:** To ensure the 1 mA capability during the lifetime of the contact, NEVER exceed 300 mA or 60 V.

**Note 2:** Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

**Note 3:** Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0.5 at 230 Vac, 3 A (1 000 000 operations), the limitation factor is 0.70.

1 000 000 x 0.70 = 700 000 total operations.

### CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

- **Power factor = 1 (cos ϕ)**

### LIMITATION FACTOR FOR INDUCTIVE LOADS

- **Power factor < 1 (cos ϕ)**
**INSTALLATION DIAGRAM**

**INTERNAL CIRCUITRY**

- Overvoltage and short-circuit protection
- Monitoring logic

**APPLICATION SCHEMATICS**

- FF-SRD5985
- Dual channel safety door monitoring

**MOUNTING DIMENSIONS**

- Width: 45 mm / 1.77 in
- Height: 74 mm / 2.91 in
- Depth: 121 mm / 4.76 in

**WIRING DIAGRAM**

**FUNCTIONAL DIAGRAM**

- Activation: NC contact (contact position: open)
- Dual channel safety door monitoring
The FF-SRE3081 Extension Module provides contact multiplication of emergency stop modules, safety door modules and other safety devices with external relay monitoring capability (safety light curtain, safety mat, etc.).

This module receives two safety inputs between A1/A2 and A3/A4 from a connected safety device.

Immediately, the normally open safety contacts (13...73/14...74) will close and the normally closed safety contacts (81/82) will open.

If a safety device is actuated (an emergency stop condition occurs), the normally open contact will open immediately and the normally closed contact will close.

This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

The normally closed contact of the extension module (81/82) must be connected to the external loop monitoring circuit of the connected safety device. This configuration will ensure that the two safety relays in the extension module are operating correctly.

FEATURES
- Complies with the Machinery Directive 98/37/EC, IEC 204, EN 60204, DIN VDE 0113, and UL 508
- Redundant and positive-guided contacts
- Output: seven NO contacts and one NC contact
- LEDs indicate channel one and two status
- Mechanical life up to ten million operations
- Electrical life up to one million operations
- Switching current up to 10 A
- Removable terminal strips for easy maintenance
- 100 mm / 3.94 in width

TYPICAL APPLICATIONS
Extension for:
- Emergency stop modules
- Safety door monitors
- Safety light curtains
- Other safety devices
**FF-SRE3081 Extension Module**

**SPECIFICATIONS**

- Contact multiplication of safety modules and safety devices

<table>
<thead>
<tr>
<th>Input</th>
<th>Nominal voltage</th>
<th>120 Vac (-15%, +10%), 230 Vac (-20%, +10%), 24 Vdc (-10%, +20%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>Nominal consumption</td>
<td>24 Vdc: 2,8 W; 230 Vac: 5 VA</td>
</tr>
<tr>
<td></td>
<td>Nominal frequency</td>
<td>50 to 60 Hz</td>
</tr>
<tr>
<td>Output</td>
<td>Contacts</td>
<td>7 NO, 1 NC contacts</td>
</tr>
<tr>
<td></td>
<td>Contact type</td>
<td>Safety relay, positive-guided</td>
</tr>
<tr>
<td>Output</td>
<td>Response time</td>
<td>15 ms</td>
</tr>
<tr>
<td>Output</td>
<td>Switching Capability</td>
<td>Power factor = 1 with resistive load</td>
</tr>
<tr>
<td></td>
<td>Current Range (min. to max.)</td>
<td>1 mA to 10 A (See Note 1)</td>
</tr>
<tr>
<td></td>
<td>Voltage Range (min. to max.)</td>
<td>0,1 to 250 Vac/dc</td>
</tr>
<tr>
<td>Output</td>
<td>Switching capability per act15 (EN 60947-5.1)</td>
<td>NO contact: 5 A / 250 Vac - NC contact: 2 A / 250 Vac</td>
</tr>
<tr>
<td></td>
<td>Typical Electrical Life Expectancy</td>
<td>Power factor = 1 at 230 Vac/dc (See Note 2)</td>
</tr>
<tr>
<td></td>
<td>3 A</td>
<td>1 000 000 operations</td>
</tr>
<tr>
<td></td>
<td>5 A</td>
<td>500 000 operations</td>
</tr>
<tr>
<td></td>
<td>10 A</td>
<td>220 000 operations</td>
</tr>
<tr>
<td>Output</td>
<td>Typical Power Factor (cos (\phi))</td>
<td>Limitation Factor (See Note 3)</td>
</tr>
<tr>
<td></td>
<td>0.3</td>
<td>0.45</td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td>0.7</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Output</td>
<td>Operating frequency</td>
<td>6000 operating cycles/h</td>
</tr>
<tr>
<td></td>
<td>Fuse Rating</td>
<td>10 A time delayed</td>
</tr>
<tr>
<td>Output</td>
<td>Mechanical life</td>
<td>Ten million operating cycles</td>
</tr>
<tr>
<td>General</td>
<td>Temperature range</td>
<td>-15 °C to +55 °C / 5 °F to 131 °F at 90% humidity (max.)</td>
</tr>
<tr>
<td></td>
<td>Housing: IP 40 • Terminals: IP 20</td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>Housing material</td>
<td>Thermoplastic</td>
</tr>
<tr>
<td>General</td>
<td>Vibration resistance</td>
<td>Amplitude 0,35 mm / Frequency 10 to 55 Hz</td>
</tr>
<tr>
<td>General</td>
<td>Wire connection</td>
<td>2 x 2,5 mm² [14 AWG] solid or 2 x 1,5 mm² [16 AWG] stranded wire with sleeve DIN 46288</td>
</tr>
<tr>
<td>General</td>
<td>Wire attachment</td>
<td>Removable terminal strip; flat terminals with self-lifting wire clamp; DIN 46206 and DIN 57699; VDE 0609</td>
</tr>
<tr>
<td>General</td>
<td>Mounting</td>
<td>Quick install rail mounting EN 50022-35</td>
</tr>
<tr>
<td>General</td>
<td>Weight</td>
<td>510 g / 1.12 lb</td>
</tr>
</tbody>
</table>

**ORDERING INFORMATION**

FF-SRE3081

- Voltage: 
  - 2 = 24 Vdc
  - E = 120 Vac
  - G = 230 Vac

**CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)**

Power factor = 1 (cos \(\phi\))

**LIMITATION FACTOR FOR INDUCTIVE LOADS**

Power factor < 1 (cos \(\phi\))

Note 1: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 2: Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0.5 at 230 Vac, 3 A (1 000 000 operations), the limitation factor is 0.70.

1 000 000 x 0.70 = 700 000 total operations.

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APPLICATION EXAMPLE

The FF-SRE3081 application example above illustrates contact multiplication of an emergency stop module FF-SRS5935 using a two-channel connection. A single-channel connection of a FF-SRE3081 to an emergency stop module is also possible.

One failure in an extension module that is connected to a safety control circuit will switch off all the modules in a control system due to redundant interfacing.

Multiple contacts of FF-SRE, used to switch one load, reduce the current of each contact and improve the life of the device.

When incorporating a FF-SRE3081 device into an installation, observe the applicable local safety regulations.
FF-SRE5929 Extension Module

FEATURES
- Complies with the Machinery Directive 98/37/EC, IEC/EN 60204, UL 508 and NFPA 79
- Redundant and positive-guided contacts
- Output: four NO contacts and one NC contact
- LEDs indication for channel one and two status
- High electrical lifetime
- Switching current up to 5 A
- Removable terminal strips for easy maintenance
- 22.5 mm / 0.89 in slim housing

TYPICAL APPLICATIONS
Contact multiplication:
- Emergency stop modules
- Safety door monitors
- Safety light curtains
- Other safety sensors

The FF-SRE5929 Extension Module provides, in a slim housing, contact multiplication of emergency stop modules, safety door modules and other safety sensors with external relay monitoring capability (FF-SB, FF-LS, FF-SCAN, FF-SPS4 or Detector™ 3 safety light curtains).

This module receives two safety inputs between A1/A2 and A3/A4 from dual channel safety sensors.

On actuation of the inputs, the normally open safety contacts (13...43/14...44) will close and the normally closed safety contacts (51/52) will open.

For example: a safety sensor is actuated or an emergency stop condition occurs, the normally open contacts will open immediately and the normally closed contact will close.

When wired correctly to a proper machine control, the emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to stop dangerous motion and/or remove power.

The normally closed contact of the extension module (51/52) must be connected to the final switching device monitoring circuit of the connected safety device. This configuration will ensure that the two safety relays in the extension module are checked by the safety sensor.

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.
FF-SRE5929 Extension Module

SPECIFICATIONS

- Contact multiplication for safety control modules and safety sensors

### Input

<table>
<thead>
<tr>
<th>Nominal voltage</th>
<th>24 Vac (-20%, +10%), 24 Vdc (-10%, +10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal consumption</td>
<td>ac: 2.1 VA • dc: 1.5 W</td>
</tr>
<tr>
<td>Nominal frequency</td>
<td>50 Hz to 60 Hz</td>
</tr>
</tbody>
</table>

### Output

<table>
<thead>
<tr>
<th>Contacts</th>
<th>4 NO, 1 NC contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact type</td>
<td>Safety relay, positive-guided</td>
</tr>
<tr>
<td>Response time</td>
<td>max. 35 ms</td>
</tr>
</tbody>
</table>

### Switching Capability

| Current Range (min. to max.) | 1 mA to 5 A (See Note 1) |
| Voltage Range (min. to max.) | 0.1 to 250 Vac/dc |

### Switching capability per AC15 (EN 60947-5-1)

<table>
<thead>
<tr>
<th>NO contact: 3 A / 250 Vac</th>
<th>NC contact: 2 A / 250 Vac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power factor = 1 at 230 Vac (See Note 2)</td>
<td></td>
</tr>
</tbody>
</table>

### Typical Electrical Life Expectancy

<table>
<thead>
<tr>
<th>Power factor (cos ϕ)</th>
<th>Limitation Factor (See Note 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>0.45</td>
</tr>
<tr>
<td>0.5</td>
<td>0.70</td>
</tr>
<tr>
<td>0.7</td>
<td>0.85</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Operating frequency

| 1200 operating cycles/h |

### Fuse Rating

| 4 A time delayed (max.) |

### Mechanical life

| Ten million operating cycles |

### General

| Temperature range | -15 °C to +55 °C / 5 °F to 131 °F at 90 % humidity (max.) |
| Sealing | Housing: IP 40 • Terminals: IP 20 |
| Housing material | Thermoplastic |
| Vibration resistance | Amplitude 0.35 mm / Frequency 10 to 55 Hz |
| Wire connection | 1 x 2.5 mm² [14 AWG] solid or 2 x 1.5 mm² [16 AWG] |
| Wire attachment | Removable terminal strip; with M 3.5 screws; |
| Mounting | wire contacts are enclosed to prevent from electrical shock |
| Weight | Quick install rail mounting EN 50022-35, width: 35 mm / 1.38 in |

### ORDERING INFORMATION

| FF-SRE5929 | Voltage: 2 =24 Vac/dc (only) |

### CONTACT LIFE FOR 100 % RESISTIVE LOAD (TYPICAL)

| Power factor = 1 (cos ϕ) (See Note 3) |

### LIMITATION FACTOR FOR INDUCTIVE LOADS

| Power factor < 1 (cos ϕ) (See Note 3) |

---

**Note 1:** Contact damage
To ensure the 1 mA capability during the life time of the contact, never exceed 300 mA or 60 V.

**Note 2:** Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

**Note 3:** Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0.5 at 230 Vac, 2 A (1 000 000 operations), the limitation factor is 0.70.
Total operations = 1 000 000 x 0.70 = 700 000.
APPLICATION EXAMPLE

This application example shows a FF-SRE59292 Extension Module providing contact multiplication to a FF-SRS59352 Emergency Stop Module. The Extension Module is connected to the Emergency Stop Module with two redundant channels powered with different polarities. A cross-fault between both channels can therefore be detected. The relay contacts of the Extension module must be monitored looping its normally closed contact into the restart circuit of the emergency stop module (Final Switching Device monitoring). A welded relay contact can therefore be detected at the next cycle preventing the emergency stop module from being restarted.

Connecting multiple safety contacts in parallel with one load increases the maximum admissible current and the lifetime of the contacts.

When incorporating a FF-SRE59292 Extension Module into an electrical interface, observe the applicable local safety regulations.
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.

ASIA PACIFIC

<table>
<thead>
<tr>
<th>Country</th>
<th>Address</th>
<th>Contact Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Korea</td>
<td>Honeywell Korea Co. Ltd</td>
<td>Phone: +(822) 799-6114 FAX: +(822) 792-9011</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Honeywell Engineering Sdn Bhd</td>
<td>Phone: +(60-3) 7953-9088 FAX: +(60-3) 7953-8922</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Honeywell Pty Limited</td>
<td>Phone: +(64-9) 623-5060 FAX: +(64-9) 623-5060 Toll Free (0800) 202-088</td>
</tr>
<tr>
<td>Philippines</td>
<td>Honeywell Systems (Philippines) Inc.</td>
<td>Phone: +(63-6) 636-1694 FAX: +(63-6) 636-1650</td>
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<tr>
<td>Singapore</td>
<td>Honeywell Southeast Asia</td>
<td>Phone: +(65) 6355-2828 FAX: +(65) 6445-3033</td>
</tr>
<tr>
<td>Thailand</td>
<td>Honeywell Thailand Ltd</td>
<td>Phone: +(662) 693-3099 FAX: +(662) 693-3093</td>
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<tr>
<td>Taiwan R.O.C.</td>
<td>Honeywell Taiwan Ltd</td>
<td>Phone: +(86-2) 2245-1000 FAX: +(86-2) 2245-3242</td>
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<tr>
<td>Thailand</td>
<td>Honeywell Systems Ltd</td>
<td>Phone: +(66) 693 3099 FAX: +(66) 693 3085</td>
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<tr>
<td>NORTH AMERICA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>Honeywell LTD</td>
<td>Phone: 1-800-737-3360 FAX: 1-800-565-4130</td>
</tr>
<tr>
<td>Japan</td>
<td>Yamatake Corporation</td>
<td>Phone: +(81) 3 5440 1395 FAX: +(81) 3 5440 1314</td>
</tr>
<tr>
<td>India</td>
<td>Tata Honey India Ltd</td>
<td>Phone: +(91) 20 6875-532/534 FAX: +(91) 20 6875 992</td>
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<tr>
<td>Indonesia</td>
<td>Honeywell Indonesia Pte Ltd</td>
<td>Phone: +(6521) 521-3330 FAX: +(6521) 521-3735</td>
</tr>
<tr>
<td>South Korea</td>
<td>Honeywell Korea Ltd</td>
<td>Phone: 1-800-737-3360 FAX: 1-800-565-4130</td>
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<td>Malaysia</td>
<td>Honeywell Engineering Sdn Bhd</td>
<td>Phone: +(60-3) 7953-9088 FAX: +(60-3) 7953-8922</td>
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<td>Honeywell Pty Limited</td>
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<td>Honeywell Taiwan Ltd</td>
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<td>Thailand</td>
<td>Honeywell Systems Ltd</td>
<td>Phone: +(66) 693 3099 FAX: +(66) 693 3085</td>
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</tbody>
</table>

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Sales and Service

Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorised Distributor, contact a nearby sales office or:

INTERNET: www.honeywell.com/sensing

E-mail: info.sc@honeywell.com
FF-SRE6029 Extension Module

FEATURES
• Complies with the Machinery Directive 98/37/EC
• Meets the applicable parts of the US & Canadian regulations and standards ANSI/RIA/OSHA
• Redundant and positive-guided contacts
• Output: four NO contacts and two NC contacts
• LED indicates status of internal relays
• Very high mechanical and electrical lifetime
• Switching current from 10 mA to 5 A
• Slim housing width 22.5 mm / 0.89 in

TYPICAL APPLICATIONS
• Contact multiplication of safety devices with the External Device Monitoring capability, like
  - FF-SYB and FF-SB safety light curtains
  - FF-SR safety control modules
  - FF-SM safety mats

The FF-SRE6029 Extension Module provides contact multiplication for safety devices with External Device Monitoring (EDM) capability (e.g. FF-SRS e-stop modules, FF-SYB, and FF-SB light curtains, FF-SM safety mats).

This product has two safety relays with positive-guided contacts to ensure redundancy and offers four NO and one NC safety contact.

Its slim housing of only 22.5 mm (0.89 in) width allows this safety control module to fit into most cabinets and even helps to keep the overall cabinet size small.

WARNING
MISUSE OF DOCUMENTATION
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• 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.
**FF-SRE6029 Extension Module**

**SPECIFICATIONS**

- Contact multiplication of safety devices with EDM capability

<table>
<thead>
<tr>
<th>Input</th>
<th>Nominal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 Vdc (-10 %, +10 %)</td>
</tr>
<tr>
<td></td>
<td>dc: 1.5 W</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th>Nominal consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 NO, 1 NC (plus 1 NC for External Device Monitoring Loop)</td>
</tr>
<tr>
<td></td>
<td>Safety relay, positive-guided</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contacts</th>
<th>Response time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>max. 15 ms (delay on de-energisation)</td>
</tr>
<tr>
<td></td>
<td>Typ. 25 ms</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Delay on energisation</th>
<th>Switching capability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Power factor = 1 with resistive load</td>
</tr>
<tr>
<td></td>
<td>10 mA to 5 A</td>
</tr>
<tr>
<td></td>
<td>0.1 to 250 Vac</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current range (min. to max.)</th>
<th>Voltage range (min. to max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC15: NO contact: 3 A / 230 Vac, NC contact: 2 A / 250 Vac</td>
<td></td>
</tr>
<tr>
<td>DC13: NO contact, NC contact: 8 A/24 Vdc</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Typical Electrical Life Expectancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Operations</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>0.5 A</td>
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<tr>
<td>1 A</td>
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<table>
<thead>
<tr>
<th>Current Operations</th>
<th>Limitation factor F (see Figure 2, note 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>0.45</td>
</tr>
<tr>
<td>0.7</td>
<td>1</td>
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<table>
<thead>
<tr>
<th>Operating frequency</th>
<th>Fuse rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200 operating cycles/h</td>
<td>6 A time delayed (max.)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical life</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 000 000 operating cycles</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature range</td>
</tr>
<tr>
<td>- 15 °C to + 55 °C (5 °F to 131 °F) at 90% humidity (max.)</td>
</tr>
<tr>
<td>Housing: IP 40 • Terminals: IP 20</td>
</tr>
<tr>
<td>Sealing</td>
</tr>
<tr>
<td>Vibration resistance (IEC/EN 60 068-2-6)</td>
</tr>
<tr>
<td>Amplitude: 0.35 mm • Frequency: 10 to 55 Hz</td>
</tr>
<tr>
<td>Solid wire: 1 x 4 mm² [12 AWG] or 2 x 2.5 mm² [14 AWG]</td>
</tr>
<tr>
<td>Stranded wire with sleeve: 1 x 2.5 mm² [14 AWG] or 2 x 1.5 mm² [16 AWG]</td>
</tr>
<tr>
<td>M3.5 screw terminals</td>
</tr>
<tr>
<td>Wire connection</td>
</tr>
<tr>
<td>Flexible wire: 1 x 4 mm² [12 AWG] or 2 x 2.5 mm² [14 AWG]</td>
</tr>
<tr>
<td>Stranded wire with sleeve: 1 x 2.5 mm² [14 AWG] or 2 x 1.5 mm² [16 AWG]</td>
</tr>
<tr>
<td>M3.5 screw terminals</td>
</tr>
<tr>
<td>Mounting</td>
</tr>
<tr>
<td>Quick install rail mounting IEC/EN 60715 (width: 35 mm/1.38 in)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>205 g / 0.45 lb</td>
</tr>
</tbody>
</table>

**ORDERING INFORMATION**

**FF-SRE6029**

2 = 24 Vac/dc

**Note 1:** Install arc suppressors across load to avoid module contact arcing and ensure specified contact life expectancy.

**Note 2:** Total operations = operations (power factor 1) x limitation factor F.

Example:

U = 230 Vac, I = 1 A, power factor cos ϕ = 0.5

Switching power P = U x I = 230 Vac

Contact life (cos ϕ = 1, P = 230 VA) = 2 000 000 operations (see Figure 1)

Limitation factor F (cos ϕ = 0.5) = 0.7

(see Figure 2)

Contact life (cos ϕ = 0.5, P = 230 VA) = F x contact life (cos ϕ = 0.5, P= 230 VA) = 2 000 000 x 0.7 = 1 400 000 operations.

**FIGURE 1. TYPICAL CONTACT LIFE FOR 100 % RESISTIVE LOAD**

(power factor cos ϕ = 1, note 1)

**FIGURE 2. LIMITATION FACTOR FOR INDUCTIVE LOADS**

(power factor cos ϕ < 1, note 2)
APPLICATION EXAMPLES

Connection of an FF-SRS59352 emergency stop module

After activation of the safety device (see application note (A)), the normally open safety contacts of the FF-SRS59352 dual channel emergency stop module (13/14 to 33/34) and the connected FF-SRE6029 extension module (13/14, 23/24, 33/34, 43/44) will open. The normally closed contacts (41/42, 51/52) will close. The LED relay output indicators (K2, K3 and K1, K2) of both modules go off indicating that the internal safety relays are de-energized. After removing the emergency stop condition, press and release the restart push-button to restart the FF-SRS59352 emergency stop module. If the FF-SRE6029 extension module is operating properly, the normally closed contact (Y1/Y2) for the External Device Monitoring is closed and both safety modules are energising their internal safety relays. The normally open contacts will close and the normally closed contacts will open. The LED relay output indicators all illuminate. This action will allow the machine to operate.

APPLICATION NOTES:

Note (A): Dual channel output safety devices with relay outputs or safety switches (examples)
- emergency stop push-button
- safety light curtains (FF-SB, FF-LS), single beam (FF-SPS4), modular safety light curtains (FF-SCAN),
- safety mats (FF-SM)
- safety limit or interlock switches (e.g. CPS, GK, GSS)
Connection of an FF-SYB type 4 safety light curtain

After interrupting the sensing field of the FF-SYB safety light curtain, both static safety outputs (5, 6) of the receiver switch off. Then, the normally open contacts of the connected FF-SRE6029 extension module (13/14, 23/24, 33/34, 43/44) will open and the normally closed contacts (51/52, Y1/Y2) will close. The LED relay output indicators (K1, K2) of the module go off indicating that the internal safety relays K1 and K2 are de-energized.

After clearing the sensing field of the FF-SYB safety light curtain, press and release the restart push-button to restart the receiver. If the FF-SRE6029 extension module is operating properly, the normally closed contact (Y1/Y2) for the External Device Monitoring (EDM) is closed and the static safety outputs of the FF-SYB receiver are energising. The normally open contacts of the FF-SRE6029 module will close and the normally closed contacts will open. The LED relay output indicators K1 and K2 illuminate. This action will allow the machine to operate.

APPLICATION NOTES:

Note (A): Dual channel output safety devices with static safety outputs AND External Device Monitoring (EDM) function (e.g. FF-SYB safety light curtains).

Note (B): CONFIGURATION CARDS

Various mode settings are possible with the FF-SYB safety light curtain (e.g. start / restart, muting, floating blanking) using configuration cards. The example above uses the factory setting configuration card for the receiver (#1: manual start, no muting, no blanking). Refer to the FF-SYB installation manual for more information.
Warranty and remedy

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E-mail: info.sc@honeywell.com

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**FF-SRT Time Delay Module**

**FEATURES**
- Complies with the Machinery Directive 98/37/EC, IEC 255, VDE 0435, and UL 508
- Provides a delay after module is de-energized
- Output: one NC, one NO positive-guided contacts
- Available with one or two time delay circuits (channels)
- Available with fixed or selectable delay up to 30 seconds
- LED status indication
- Mechanical life up to ten million operations
- Electrical life up to 300,000 operations
- Switching current up to 8A
- Voltage drop protection
- 45 mm (1.77 in.) width

**APPLICATIONS**
- Time delay required before disconnection of safety interface circuit

The FF-SRT Time Delay module provides a time delay before safety contacts are opened.

If a two-channel version is used, the output contacts of the two time delay circuits are connected in series. When the displayed time has elapsed, the safety contacts within the module open safely, even if one of the other contacts is welded.

When power is applied to the module (A1/A2), the normally closed contact (15/16) will open immediately and the normally open contact (27/28) will close.

After power is removed from the module (A1/A2), the normally closed contact (15/16) will close and the normally open contact (27/28) will open after the fixed or set time has elapsed.

For example, this module may be used with an emergency stop module. The emergency stop module will immediately forward the emergency stop condition to the machine control circuitry. The time delay module can be used to keep some non-safety related machinery operating (door locked) for a short period of time to avoid an unsafe condition or simplify the machine startup cycle.

**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.
**FF-SRT Time Delay Module**

**SPECIFICATIONS**

- Time delay before disconnection of safety interface circuits

### General technical data

<table>
<thead>
<tr>
<th>Available time ranges</th>
<th>Adjustable 1 channel: SRT___1R: 0.1 to 1 sec; 0.3 to 3 sec; 0.5 to 5 sec; 1 to 10 sec; 3 to 30 sec.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fixed 1 channel: SRT___1F: 1, 5, 10, and 30 sec.</td>
</tr>
<tr>
<td></td>
<td>Adjustable 2 channels: SRT___2R: 0.1 - 1 sec; 0.5 - 5 sec; 1 - 10 sec.</td>
</tr>
<tr>
<td></td>
<td>Fixed 2 channels: SRT___2F: 1, 5, 10 sec</td>
</tr>
<tr>
<td>Repeatability precision</td>
<td>± 15% from selected value</td>
</tr>
</tbody>
</table>

### Input

- Nominal voltage: 120 Vac (-15%, +10%), 230 Vac (-20%, +10%), 24 Vdc (-10%, +20%)
- Nominal frequency: 50 to 60 Hz
- Nominal consumption: One channel model: 0.85 W, 4.5 VA; Two channel model: 1.7 W, 4.5 VA

### Output

- Contact complement: 1 NO contact, 1 NC contact
- Switching Capability: Power factor = 1 with resistive load
- Current Range (min. to max.): 30 mA to 8 A
- Voltage Range (min. to max.): DC 10 to 110 Vdc; AC 10 to 250 Vac

### Typical Electrical Life Expectancy

<table>
<thead>
<tr>
<th>Power factor (cos j)</th>
<th>Limitation Factor (Note 1, Note 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>0.45</td>
</tr>
<tr>
<td>0.5</td>
<td>0.70</td>
</tr>
<tr>
<td>0.7</td>
<td>0.85</td>
</tr>
<tr>
<td>1.0</td>
<td>1.00</td>
</tr>
</tbody>
</table>

### Operating frequency

- 2000 switching cycles/hour (max.)
-Fuse rating: 6 A time delayed

### Mechanical life

- Ten million switching operations

### General

- Temperature range: -20°C to +60°C (-4°F to 140°F) at max. 90% humidity
- Sealing: Housing IP 40; Terminals IP 20
- Housing material: Thermoplastic
- Vibration resistance: Amplitude 0.35 mm; Frequency 10 to 55 Hz
- Conductor connection: 2 x 2.5 mm² solid (max.) [12 AWG] or 2 x 1.5 mm² [16 AWG] (max.) stranded wire with sleeve DIN 46288
- Conductor attachment: Flat terminal according to DIN 46206 and DIN 57609/VDE
- Mounting: Quick install rail mounting EN 50022-35
- Weight: 200 g (0.44 lb.) for Vdc / 350 g (0.77 lb) for Vac

### ORDERING INFORMATION

- FF-SRT Voltage: 2 = 24 Vdc  
  E = 120 Vac  
  G = 230 Vac  

| Number of channels: 1 = 1 Channel  
| Time adjustable  
| 2 = 2 Channel (24 Vdc only)  

Max delay time:

| 01: 1 s  
| 05: 5 s  
| 10: 10 s  
| 30: 30 s  

Note: see table above for available time ranges

### CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

- power factor = 1 (cos j)

### LIMITATION FACTOR FOR INDUCTIVE LOADS

- power factor < 1 (cos j)

**Note 1:** Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0.5 at 230 Vac, 0.2A (300,000 operations), the limitation factor is 0.70. 300,000 x 0.70 = 210,000 total operations.

**Note 2:** Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.
**INSTALLATION DIAGRAM**

**MOUNTING DIMENSIONS**
Width: 45 mm/1.77 in; Height: 74 mm/2.91 in; Depth: 121 mm/4.76 in

**WIRING DIAGRAM**

**APPLICATION EXAMPLE**

The example shows an emergency stop circuit with a motor using a speed driver. When an emergency stop condition occurs (e.g., the emergency push-button is pressed), the speed driver is shut down immediately via the emergency stop module FF-SRS5935 and the dangerous movement of the motor is stopped. When the delay time has elapsed, the power will be removed via the FF-SRT time delay module. External, positive guided relays have to be monitored in the S33/S34 loop by its normally closed contacts.
FF-SRST Emergency Stop Module with Timer

FEATURES
- Complies with the Machinery Directive for 98/37/EC, IEC 204, EN 60204, DIN VDE 0113 and UL 508
- Dual channel input
- Safety outputs: two direct NO contacts, one direct NC contact, two NO delayed contacts and one NC delayed contact
- Wide range of fixed and adjustable delay times
- Switching current from 1 mA to 5 A
- Automatic start or manual start mode with short-circuit detection on the push-button input
- Selectable cross-fault detection in emergency stop control circuit
- LEDs indicate power and internal relays status
- Mechanical life up to ten million operations
- Electrical life up to one million operations
- Overvoltage and short-circuit protection
- Removable terminal strips for ease of maintenance
- 45 mm / 1.77 in width

APPLICATIONS
- Emergency stop circuits on machines
- Category 1 emergency stop circuits per EN 418 and NFPA79: delayed isolation of power after machine stoppage
- Door protection: delayed opening of an interlocked protective gate

The FF-SRST Emergency Stop modules with Timer are designed to be used in emergency stop circuits where danger to personnel or machinery is present. This device has four internal standard safety relays with positive-guided contacts, of which two of these safety relays are delayed.

In the manual start mode, the module accepts input from the safety device (safety light curtain, safety mat, safety switches, etc.) between S21/S22 and S31/S32 after activation of the push-button between S33 and S34.

In the automatic start mode, the module accepts immediate input from the safety device between S21/S22 and S31/32.

After restart, the normally open safety contacts (13/14, 23/24, 47/48, 57/58) will close and the normally closed contacts (31/32, 65/66) will open. If an emergency stop condition occurs (safety device is actuated), the normally open contacts (13/14, 23/24) will open and the normally closed contact (31/32) will close immediately. After the selected delay time has elapsed the normally open contacts (47/48, 57/58) will open and the normally closed contact (65/66) will close.

This emergency stop condition is signalled by the direct safety contacts (13/14, 23/24, 31/32) for the machine control circuitry to first stop the dangerous motion and then to remove power after a certain time by the delayed contacts (57/58, 65/66).

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FF-SRST Emergency Stop Module with Timer

**SPECIFICATIONS**
- Dual channel Emergency Stop circuits with time delayed contacts

### Supply voltage
- **Nominal voltage**: 24 Vac/dc (ac: ±10 %, dc: -20 %, +10 %)  
- **Nominal power consumption**: dc: 3.5 W, ac: 3.5 VA (or dc)  
- **Nominal frequency**: 50 Hz to 60 Hz
- **Fuse protection**: Internal PTC

### Restart input
- **Restart delay time**: Manual start mode: 40 ms; automatic start mode: 500 ms

### Emergency stop inputs
- **Input voltage at S11**
- **Minimum voltage at S12, S22, S32**
- **Input current between S11/S12 and S21/S22**
- **Cable resistance between S11/S12, S21/S22, S31/S32**

### Relay outputs
- **Relay type**: Safety relay with positive guided contacts
- **Safety contacts**: 2 NO, 1 NC, 2 NO off-delayed, 1 NC off-delayed (if Y39/Y40 is jumpered)
- **Time delay on de-energisation**: Adjustable: FF-SRST/G6F/G6F/G6F/R2: 0.06 s to 0.3 s; 0.1 s to 1 s; 0.3 s to 3 s; 0.5 s to 5 s; 1 s to 10 s; 3 s to 30 s; 30 s to 300 s / Fixed: FF-SRST/G6F/G6F/G6F/F2: 0.5 s; 1 s; 3 s; 5 s; 10 s; 30 s; 300 s ± 1 % of set value
- **Repeat accuracy of time delay**: FF-SRST/G6F/G6F/G6F/R2: 1 mA to 5 A (see Note 1)
- **Response time**: Power factor = 1 with resistive load
- **Switching capability**: Opening of inputs (S11/S12, S21/S22, S31/S32) : 15 ms; Opening in supply circuit (A1(+)/A2(-)): 40 ms
- **Voltage range (min. to max.)**: 23 Vdc at nominal voltage (provided by control module)
- **Typical electrical life expectancy**: Power factor = 1 Vac/dc (see Note 2)
- **Typical power factor (cos φ)**
  - For 2 A: 0.3, 0.5, 0.7, 1
  - For 5 A: 0.45, 0.70, 0.85, 1
- **Operating frequency**: 1200 switching cycles/h (max.)
- **Fuse rating (external)**: 6 A time delayed (max.)
- **General**
  - **Temperature range**: -15 °C to + 55 °C / 5 °F to 131 °F
  - **Sealing**: Housing: IP 40, Terminals: IP 20
  - **Housing material**: Thermoplastic
  - **Vibration resistance**: Amplitude: 0.35 mm; frequency: 10 Hz to 55 Hz
- **Connector connection (max.)**: 2 x 1,5 mm² [16 AWG], 1 x 2,5 mm² [14 AWG], 1 x 4 mm² [12 AWG]
- **Connector attachment**: Removable block terminals with M3,5 screws; wire contacts are enclosed to prevent electrical shock
- **Mounting**: Quick install rail mounting EN 50022-35, 35 mm x 15 mm / 1.38 in x 0.59 in size
- **Weight**: 400 g / 0.88 lb

### ORDERING INFORMATION

**FF-SRST/G6F/G6F/G6F/G6F**
- **Max. delay time**
  - D30: 0.3 s (adj. only)  
  - D50: 0.5 s (fixed only)
- **Voltage**: 24 Vac/dc  
- **R**: Time adjustable  
- **F**: Time fixed

### CONTACT LIFE FOR 100 % RESISTIVE LOAD (TYPICAL)
- **Power factor = 1 (cos φ)** (see Note 3)

### LIMITATION FACTOR FOR INDUCTIVE LOADS
- **Power factor < 1 (cos φ)** (see Note 3)

---

**Note 1**: Contact damage - To ensure the 1 mA capability during the lifetime of the contact, never exceed 300 mA or 60 V.

**Note 2**: Install arc suppressors across load to avoid module contact arcing and ensure specified contact life expectancy.

**Note 3**: Total operations = operations at power factor 1 multiplied by the limitation factor. If the power factor is 0.5 at 230 Vac and 2 A (1 000 000 operations), the limitation factor is 0.70. 1 000 000 x 0.70 = 700 000 total operations.
### MOUNTING DIMENSIONS
Width: 45 mm/1.7 in; Height: 74 mm/2.91 in; Depth: 121 mm/4.76 in

![MOUNTING DIMENSIONS Diagram](image)

### INTERNAL CIRCUITRY

![INTERNAL CIRCUITRY Diagram](image)

### FUNCTIONAL DIAGRAM

![FUNCTIONAL DIAGRAM](image)

### FRONT PANEL

![FRONT PANEL](image)

### REMOVABLE TERMINAL BLOCKS

![REMovable TERMINAL BLOCKS](image)

### SETTING OF START MODE

<table>
<thead>
<tr>
<th>Start Mode</th>
<th>Jumper between S13/S14</th>
<th>Start push-button between S33/S34</th>
<th>This module offers the possibility to function in the automatic start mode or manual start mode.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual start mode</td>
<td></td>
<td>![Jumper diagram]</td>
<td>Insert the start push-button between terminals S33/S34 for manual start mode.</td>
</tr>
<tr>
<td>Automatic start mode</td>
<td>![Jumper diagram]</td>
<td>![Start button diagram]</td>
<td>Insert a jumper between S13/S14 for automatic start mode to function.</td>
</tr>
</tbody>
</table>

### SETTING OF THE DELAYED CONTACTS

The off-delayed safety relays K1t and K2t (safety contacts 47/48 to 65/66) are only operational, if a jumper is set between Y39/Y40.
APPLICATION EXAMPLES

Dual channel emergency stop circuitry (with cross-fault monitoring, manual start mode, external contactors)

If an emergency stop condition occurs (emergency push-button or another safety device is actuated), the internal relays K1 and K2 de-energize immediately. The normally open contacts (13/14, 23/24) will open and the normally closed contact (31/32) will close. This emergency stop condition is signalled by these safety contacts for the machine control circuitry (e.g. a speed driver) to stop hazard.

The internal relays K1t and K2t will de-energize after the selected delay time has elapsed, leading to the opening of the normally open contacts (47/48, 57/58) and the closure of the normally closed contacts (65/66)(see note (D)). These contacts may be used to isolate the machine from power (category 1 emergency stop per EN 418) and NFPA79.

The emergency-stop condition can be reset while de-activating and activating the connected safety devices (inputs: S22 and S32). After restarting the module (manual or automatic restart: see note (B)), all internal safety relays K1, K2, K1t and K2t will energize immediately. All normally open contacts (13/14, 23/24, 47/48, 57/58) will close and the normally closed contacts (31/32, 65/66) will open, allowing the machine to operate (see note (D)).

APPLICATION NOTES

Note (A): DUAL CHANNEL SAFETY DEVICES:
This may be an emergency stop push-button in series with dual output safety switching devices (OSSD) such as safety light curtains (FF-SB, FF-LS), single beam (FF-SPS4), modular safety light curtain (FF-SCAN), safety mat (FF-SM), safety laser scanner (FF-SE), or safety limit switches (i.e. 2CLS, GK).

Note (B): START MODES:
Manual start mode: Insert start push-button between S33/S34; no jumper must be set between S13/S14.
Automatic start mode: Insert jumper between S13/S14; the start push-button is omitted.

Note (C): EXTERNAL CONTACTORS:
If contact reinforcement via external safety contactors with positive-guided contacts is necessary, the proper operation of the external contactors must be monitored by looping their normally closed contacts into the restart loop (manual start mode: S33/S34; automatic start mode: S13/S14).

Note (D): DELAYED CONTACTS:
The off-delayed safety relays K1t and K2t (safety contacts 47/48, 57/58, 65/66) are only operational, if a jumper is set between Y39/Y40.
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.

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INTERNET: www.honeywell.com/sensing
E-mail: info.sc@honeywell.com
FF-SR05936 Standstill Monitor

FEATURES
- Designed for Category 1 Emergency Stop functions per EN 418
- Monitors back EMF generated by 3-phase and single phase inductive motors
- No motor impedance limit
- Broken wire detection on monitoring circuit
- Positive-guided output contacts: two NO, two NC for ac 250 V
- Green LED’s indicate stopped motor and power status
- Red LED indicates Z1-Z2 line breakage status
- Mechanical life up to ten million operations
- Electrical life up to one million operations
- Switching current up to 10 A
- Voltage drop protection
- 45 mm / 1.77 in width

TYPICAL APPLICATIONS
- Stopped motor monitor for three phase and single phase asynchronous motors
- Used to unlock a door which is guarding a rotating machine only when the movement is stopped
- Used to activate an emergency brake

If the stopping time of the machinery is unpredictable, use the FF-SR05936 Standstill Monitor.

This module measures (between Z1/Z2) the back EMF of the connected motor from the terminals of one stator winding. When the EMF has decreased near zero, the FF-SR05936 detects that the motor has stopped and energizes its output relays.

In addition, FF-SR05936 monitors the connections to the motor for broken wires on terminals Z1, Z2.

If an open (line break) is detected, the output relay contacts latch in the de-energized position as if the motor was running. After the break has been repaired, the module is reset by removing power to the module momentarily.

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.
**FF-SR05936 Standstill Monitor**

**SPECIFICATIONS**

- Stopped motor monitor for asynchronous motors

<table>
<thead>
<tr>
<th>Input</th>
<th>Nominal voltage</th>
<th>120 Vac (-15%, +10%), 230 Vac (-20%, +10%), 24 Vdc (-20%, +10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal consumption</td>
<td>120 or 230 Vac: 4 VA; 24 Vdc: 2.5 W</td>
<td></td>
</tr>
<tr>
<td>Nominal frequency</td>
<td>50 to 60 Hz</td>
<td></td>
</tr>
<tr>
<td>Measuring input protection</td>
<td>690 Vac</td>
<td></td>
</tr>
<tr>
<td>Engaging voltage</td>
<td>40 mV</td>
<td></td>
</tr>
<tr>
<td>Release voltage</td>
<td>20 mV</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th>Contact complement</th>
<th>2 NO contacts, 2 NC contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact type</td>
<td>Safety relay, positive-guided</td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>2 s after EMF drops below 20 mV</td>
<td></td>
</tr>
<tr>
<td>Switching Capability</td>
<td>Power factor = 1 with resistive load</td>
<td></td>
</tr>
<tr>
<td>Current Range (min. to max.)</td>
<td>10 mA to 10 A</td>
<td></td>
</tr>
<tr>
<td>Voltage Range (min. to max.)</td>
<td>10 to 250 Vac/dc</td>
<td></td>
</tr>
<tr>
<td>Switching capability per ac15 (EN 60 947-5.1)</td>
<td>NO contact: 3 A/250 Vdc - NC contact: 1 A/250 Vdc</td>
<td></td>
</tr>
</tbody>
</table>

**Typical Electrical Life Expectancy**

<table>
<thead>
<tr>
<th>Power factor</th>
<th>3 A</th>
<th>0.3</th>
<th>0.5</th>
<th>0.7</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations</td>
<td>1,000,000</td>
<td>0.45</td>
<td>0.70</td>
<td>0.85</td>
<td>1</td>
</tr>
</tbody>
</table>

**Fuse Rating**

<table>
<thead>
<tr>
<th>Power factor</th>
<th>Limitation Factor (See Note 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>0.45</td>
</tr>
<tr>
<td>0.5</td>
<td>0.70</td>
</tr>
<tr>
<td>0.7</td>
<td>0.85</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**General**

- **Temperature range**: -15 °C to +55 °C / 5 °F to 131 °F at max. 90% humidity
- **Housing**: IP 40 • **Terminals**: IP 20
- **Vibration resistance**: Amplitude 0.35 mm; Frequency 10 to 55 Hz
- **Conductor connection**: 1 x 4 mm² solid (max.) [12 AWG] or 2 x 1.5 mm² (max) [16 AWG] stranded wire with sleeve DIN 46288
- **Conductor attachment**: M 3,5 screw terminals; wire contacts are enclosed to prevent electrical shock
- **Mounting**: Quick install rail mounting EN 50022-35
- **Weight**: 325 g / 0.72 lb

**ORDERING INFORMATION**

**FF-SR05936**

- **Voltage**: 2 = 24 Vdc
- E = 120 Vac
- G = 230 Vac

**Note 1**: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

**Note 2**: Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0.5 at 230 Vac, 3 A (1,000,000 operations), the limitation factor is 0.70.

1,000,000 x 0.70 = 700,000 total operations.

**CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)**

- **Power factor = 1 (cos ϕ)**

**LIMITATION FACTOR FOR INDUCTIVE LOADS**

- **Power factor < 1 (cos ϕ)**
**INSTALLATION DIAGRAM**

**TYPICAL CONNECTION DIAGRAM**

**FUNCTIONAL DIAGRAM**

**MOUNTING DIMENSIONS**

Width: 45 mm / 1.77 in; Height: 74 mm / 2.91 in; Depth: 121 mm / 4.76 in

**WIRING DIAGRAM**

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Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
APPLICATION EXAMPLE
Door protection using key operated interlock switch (GKR/GKL Series) and standstill monitor module (FF-SR05936)

FUNCTIONAL DESCRIPTION

Start Sequence
Initially, the motor is not operating and the door is open. To initiate the start sequence, close the door. This action will close the two normally closed contacts of the key operated interlock switch. It will also automatically restart the emergency stop modules. As the Unlock push-button is open, the solenoid coil of the key operated interlock switch is de-energized and the door is locked.
The motor may now be started.

To start the motor, press the Start push-button. This action will energize the self-maintained external relays K4 and K5, and will start the motor.

Stop Sequence
Initially, the motor is operating and the door is closed and locked.

To initiate the stop sequence, press the Stop push-button. This action will de-energize the external safety relays K4 and K5 and immediately stop the motor.

To unlock the door when the motor has reached zero motion, press the Unlock push-button. This action will energize the coil of the solenoid of the key operated interlock switch and unlock the door. The door may now be opened safely. No hazardous motor motion is present.

Emergency stop Sequence
In case of an emergency stop situation, the two channel inputs of the FF-SR5935 emergency stop control module will open. This action de-energizes the external safety relays K4 and K5, stopping the motor. All other steps remain the same as described above (Stop Sequence).
FF-SRS5939 Dual Channel Interface Control Module for Electrosensitive Protective Equipment

FEATURES
- Complies with EU Directive for machines 98/37/EC, IEC 204, EN 60204, DIN VDE 0113
- Supply voltage: 24 Vdc
- Dual input compatible with the fail-safe solid state outputs of Honeywell Electrosensitive Protective Equipment
- Two cross-monitored relays with guided contacts delivering two N.O. contacts and one N.C. contact
- Switching current from 1 mA to 6 A (gold plated 5 μm contacts allow low current)
- Response time: 15 ms
- Selectable automatic or manual restart modes (with permanent short-circuit detection)
- Selectable Final Switching Devices monitoring loop for the control of external relays or contactors
- LEDs indicates inputs and outputs status, and restart condition
- Removable terminal strips for ease of maintenance
- 45 mm/1.77 in. width housing

APPLICATIONS
To be used with the FF-SYA safety light curtain in point-of operation protection or zone guarding protection such as:
- Metal-forming, milling and drilling machines
- Spot-welding machines and fine-boring machines
- Pressing, moulding and thermoforming machines
- Conveyors/transfer lines

The FF-SRS5939 Interface Control Module is designed to be used with the FF-SYA Safety Light Curtain in emergency stop circuits when danger to personnel or machinery is present. Its slim 45 mm/1.77 in. width housing is ideal for space restricted areas. This module provides a Control Reliable interface between the FF-SYA Light Curtain and the machine control circuitry. A single fault does not prevent the normal stopping action from taking place but will prevent the next machine cycle to start until the fault is corrected. This is accomplished by the use of redundant circuitry, self-checking capability and positive guided safety relay outputs. These redundant safety relay outputs are rated for 6 amps to directly operate with the machine control actuators using 2 NO and 1 NC output contacts. These output contacts are also gold plated to ensure compatibility with very low current requirements (such as a monitoring circuit).

The FF-SRS5939 Module can be wired for either Automatic or Manual Restart modes of operation and also provides Final Switching Device (FSD) monitoring if interfaced with external switching devices. The FF-SRS5939 is equipped with LED indicators that provide diagnostic information and is equipped with removable wiring strips to make replacement fast and easy.
**FF-SRS5939**

- Dual Channel Interface Control Module - Electrical interface for Electrosensitive protective equipment

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

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>24 Vdc (-15 %, +15 %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage (A1/A2)</td>
<td>3.5 W</td>
</tr>
<tr>
<td>Power consumption</td>
<td>315 mA, time delayed</td>
</tr>
</tbody>
</table>

**Restart functions**

- Restart push-button input (S33/S34)
- Restart mode input (X1/X3)
- Restart time

For the connection of a N.O. contact, 0.1 to 1.5 s closing time, permanent short-circuit detection, 20 Vdc min. voltage (without pressing the push-button), 10 mA, 24 Vdc min. current, 470 Ω max. cable resistance.

For setting the manual or automatic restart mode, voltage presence 100 ms after the FSD inputs are energized (automatic restart) or push-button release (manual restart).

**FSD monitoring loop**

- FSD contacts input (Y1/Y2)
- FSD monitoring input (X1/X2)

For the connection in series of the FSDs N.C. contacts (FSDs reaction time: 250 ms), permanent short-circuit detection, 20 Vdc min. voltage, 30 mA/24 Vdc min. current, 150 Ω max. cable resistance.

For setting the FSD monitoring loop, voltage presence.

**ESPE inputs**

- Input current
- Input voltage

**Outputs**

- Contacts available: 2 N.O., 1 N.C. (2 safety relays with guided contacts)
- Response time: 15 ms max. (see timing diagrams)
- Start time at power up: 100 ms (automatic restart mode)
- Current range: 1 mA min., 6 A max. (see note 1)
- Voltage range: 0.1 Vac/dc min., 250 Vac/dc max.
- Switching capability per AC15 (EN 60947-5-1)

**Typical electrical life expectancy**

- Power factor = 1 at 230 Vac (see fig. 1, note 3)
- 1A : > 2.000.000 AC / > 400.000 DC ; 3A : > 600.000 AC / > 300.000 DC
- 5A : > 300.000 AC / > 200.000 DC ; 6A : > 200.000 AC / > 150.000 DC

**Typical power factor (see fig. 2, note 2 and 3)**

- Operating frequency
- External fuse rating
- Mechanical life

**Environmental specifications**

- Temperature range: Operation: 0 to 55°C/32 to 131°F / Storage: -20 to 70°C/-4 to 170°F, at 90 % humidity max.
- Sealing: Housing IP 40, Terminals IP 20
- Housing material: Thermoplastic
- Vibration resistance: Amplitude 0.35 mm/0.014 in., frequency 10 to 55 Hz
- Connection: Removable terminal strips, one ø2.5 mm² (14 AWG) or two ø1.5 mm² (16 AWG) stranded wires per terminal
- Quick install rail mounting EN 50022-35, 35 x 15 mm/1.38 x 0.59 in. size

**Ordering information**

- FF-SRS59392 (24 Vdc)
- Note 1: To ensure the 1 mA capability during the life-time of the contact, NEVER exceed 300 mA and 60 V.
- Note 2: Install arc suppression device across loads to avoid module contact arcing and ensure specified relay life expectancy.
- Note 3: Total operations = operations at power factor 1 multiplied by the limitation factor. If the power factor is 0.5 at 3A/230 Vac, the limitation factor is 0.70 and the number of operations is 500,000 x 0.70 = 350,000.

---

**Figure 1** - Contacts life for a 100 % resistive load (typical - note 1)

**Figure 2** - Limitation factor inductive loads - note 2: power factor < 1 (cos ϕ)
**Mounting dimensions**

- **Width:** 45 mm / 1.77 in
- **Height:** 74 mm / 2.91 in
- **Depth:** 121 mm / 4.76 in

**Removable terminal strips**

**Jumper links setting diagram**

**Module front panel**

**Automatic restart functional diagram (with Final Switching Devices monitoring)**

1. Normal operation: emergency stop condition is removed and the FSDs monitoring loop opens.
2. Normal operation: emergency stop condition occurs and the FSDs monitoring loop closes.
3. Normal operation: emergency stop condition is removed and the FSDs monitoring loop opens.
4. Failure on the FSDs: emergency stop condition occurs and the FSDs monitoring loop remains open.
5. Failure on the FSDs: emergency stop condition is removed but the machine cannot restart.

In the automatic restart mode, the Normally Open (N.O.) contacts (13/14, 23/24) will close and the Normally Closed (N.C.) contact (31/32) will open if the two input signals from the FF-SYA light curtain are present, provided these signals are coincident and the external relays reaction time is within the specification (if the Final Switching Devices monitoring loop is set). If the emergency stop condition occurs the N.O. contacts will open within the 15 ms response time and the normally closed contact will close.
Emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power. The module will not restart if the FSD monitoring loop remains permanently open, or remains closed for more than 250 ms or permanently.

**Manual restart functional diagram** (with Final Switching Devices monitoring)

1. Normal operation: emergency stop condition is removed and the FSDs monitoring loop opens after the push-button is pressed and released.
2. Normal operation: emergency stop condition occurs and the FSDs monitoring loop closes.
3. Normal operation: emergency stop condition is removed and the FSDs monitoring opens after the push-button is pressed and released.
4. Failure on the FSDs: emergency stop condition occurs and the FSDs monitoring loop remains open.
5. Failure on the FSDs: emergency stop condition is removed but the machine cannot restart after the push-button is pressed and released.

In the manual restart mode, the N.O. contacts (13/14, 23/24) will close and the N.C. contact (31/32) will open after the push-button is pressed and released, provided the two input signals are available and provided the Final Switching Devices monitoring loop is closed (if is set). If the emergency stop condition occurs the N.O. contacts will open within the 15 ms response time and the normally closed contact will close. This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

The module will not restart:
- if the push-button is actuated for more than 1.5 s, or if a permanent short-circuit of the restart push-button input occurs,
- if the FSD monitoring loop remains permanently open, or remains closed for more than 250 ms or permanently.

**Wiring diagram** (using 2 N.O. contacts): Manual restart with FSD monitoring

1. Always install arc suppressors across the coils of external safety relays (these arc suppressors are not necessary, if the FSDs relays K3 & K4 are supplied by the FF-SRE3081 extension module for which correct wiring is also indicated).
2. Use a 120 or 230 Vac electrically insulated push-button.
3. The module and the ESPE must be connected to the same 0 V.
   - ESPE: Electrosensitive Protective Equipment.
   - FSD: Final Switching Device.
4. Jumpered if the manual restart mode is not used.
5. Jumpered if the FSDs K3 and K4 are not used.
FF-SRM100P2 muting module
for safety light curtains

FEATURES
• Category 4 muting module as per the EN 954-1 European standard
• Meets the applicable parts of the US & Canadian regulations and standards ANSI/RIA/OSHA
• Response time: 5 ms
• 2 fail-safe static outputs to be connected to the machine control system
• Alarm static output to be connected to the machine secondary control element; maintains the muting module in a lock-out condition after an internal fault detection
• Static output for the muting lamp permanently monitored as requested by the IEC/EN 61496-1 standard
• Inputs for 2 or 4 auxiliary sensors used to start and interrupt the muting sequences
• Override facility to evacuate an object after it accidentally came to a stop in the protective equipment sensing field
• Integrated start and restart interlock facility preventing the automatic machine start after a man intrusion beyond muting sequences
• FSDs monitoring loop for the control of Final Switching Devices

TYPICAL APPLICATIONS
• Any machines automatically fed by a conveyor belt: palletizers and depalletizers, automotive transfer lines, packaging and wrapping machines
• Any machines where manual operations must be carried out beyond dangerous phases of the machine cycle: mechanical or hydraulic presses, press-brakes, welding robots

The FF-SRM module is an interface between a safety device (i.e. light curtain, laser scanner, mat...) and the control circuitry of a dangerous machine on which the muting of the protective equipment outputs is necessary at certain steps of the process. On a machine automatically fed by a conveyor, parts must often be fed through the detection field of the safety light curtain towards the dangerous zone without causing the machine to stop. Similarly, manual loading and unloading of a mechanical or hydraulic press may be required during the opening stroke of the press. In these applications, it is necessary to safely "mute" or deactivate the safety device during a controlled sequence. The FF-SRM100P2 module will accomplish this.

The FF-SRM module is a permanently self-checked electrical interface which complies with the requirements of the EN 954-1 European standard for Category 4 protective devices: any failure is immediately detected and prevents any muting sequence from being activated. Connected with any of the safety light curtains from the Honeywell range, the FF-SRM module reliably controls muting sequences.

When the protective equipment is not muted, the FF-SRM module output status are identical to the light curtain output status, and the intrusion of an object or a person in the light curtain detection field immediately stops the machine. The machine can only restart after pressing a restart push-button connected to the FF-SRM module terminals.

⚠️ WARNING

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 muting sequence is controlled by two or four sensors (such as photoelectric controls, limit switches or inductive proximity sensors) which reliably identify the events initiating and interrupting the muting sequence. When muting conditions are achieved, the FF-SRM module allows the machine to operate during the muting sequence without taking into account the signal delivered by the light curtain. Correct operation of the sensors is controlled at each muting sequence and any sensor failure prevents the muting from being performed.

When used in the "conveyor" mode of operation, two push-buttons allow the override of the light curtain if manufactured parts remain in the light curtain detection field during a muting sequence. Restart of the machine is then easily achieved.

A Final Switching Device monitoring loop is available for the control of the two relays commanded by the two fail-safe static outputs of the module. The module also integrates an alarm output (or "Secondary Switching Device - SSD") which switches off in case of internal failure. This SSD output can be connected to the machine secondary control element to shutdown the machine and performs a back-up safety function.

A white lamp informs the operator of each muting sequence. Correct operation of this lamp is monitored by the module in accordance with IEC/EN 61496-1 European standard, and any muting lamp failure prevents the muting form being performed. The muting module is equipped with additional static outputs providing remote information given by LEDs status indicators located on the module cover. These LEDs status indicators provide the operator with information on the output status, on a possible internal failure and when a manual restart of the module is necessary.

Applications

In the "conveyor" mode of operation, the muting solution operates as follows: the intrusion of an authorized object in the protective equipment sensing field is not taken into account at any time of the working cycle of a machine fed by a conveyor. When set in this mode, the FF-SRM muting module eases the integration of a safety light curtain on the following types of machines:

- Palletisers / depalletisers,
- Handling, wrapping and packaging machines,
- Robotic zones on a automotive transfer line,
- Automotive paint-shops.

In the "press" mode of operation, the muting solution operates as follows: the intrusion of an operator in the protective equipment sensing field is not taken into account during non dangerous phases of the machine working cycle. When set in this mode, the FF-SRM muting module eases the integration of a safety light curtain on the following types of machines:

- Work stations where the operator needs to load parts as soon as the tool starts rising such as on a mechanical or hydraulic presses,
- Work stations where the operator needs to carry out manual operations while the machine is working such as on a press-brakes,
- Dual work stations where the operator loads parts on one station while the robot works on the other station such as on welding robots.
FF-SRM

- Category 4 muting module as per the EN 954-1 European standard
- Meets the applicable parts of the US & Canadian regulations and standards ANSI/RIA/OSHA
- Suitable for machines fed by a conveyor or for machines with working cycle including manual operations

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

<table>
<thead>
<tr>
<th>Features</th>
<th>Power supply voltage</th>
<th>Power consumptions</th>
<th>Response time</th>
<th>Operating temperature</th>
<th>Relative humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 Vdc, ±15 %</td>
<td>6 W for the module and all inputs, 6 to 60 W for the module and all outputs</td>
<td>0.005 s</td>
<td>0 °C to 55 °C / 32 °F to 131 °F</td>
<td>25 to 75 %</td>
</tr>
<tr>
<td>Sealing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outputs</td>
<td>OSDDs (1)</td>
<td>For machine shutdown: 2 fail-safe static outputs (switching capacity: 0.5 A/24 Vdc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SSD (2)</td>
<td>For failure alarm: 1 static output tested at power up (switching capacity: 0.5 A/24 Vdc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Muting Lamp</td>
<td>For the muting lamp: 1 self-checked static output (switching capacity: 0.5 A / 24 Vdc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TEST</td>
<td>For testing the light curtain connection: 1 programable N.O./N.C. static output (switching capacity: 16 mA / 24 Vdc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inputs</td>
<td>OSSDs (3)</td>
<td>For the light curtain N.O. contacts: 2 inputs with optocoupler (consumption: 30 mA / 24 Vdc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SMs &amp; EMs (4)</td>
<td>For the sensors N.O/N.C. contacts: 4 inputs with optocoupler (consumption: 10 mA / 24 Vdc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P/Bs (5)</td>
<td>Push-button N.O. contacts: 2 inputs with optocoupler (consumption: 10 mA / 24 Vdc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RESTART</td>
<td>For the module restart and the FSDs monitoring (7): 1 input with optocoupler (50 mA current pic)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SSD MONITOR (6)</td>
<td>For the SSD monitoring: 1 input with optocoupler (consumption: 10 mA / 24 Vdc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LEDs status</td>
<td>OSDDs output status, restart condition muting sequence, unwanted condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connection</td>
<td>Removable terminal strips (2 x 1.5 mm² / AWG 16 wires per screw terminal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mounting</td>
<td>Omega rail DIN 50 0022-35 (35 mm x 15 mm / 1.38 in x 0.59 in)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dimensions</td>
<td>152 mm x 118.2 mm x 73.2 mm / 5.98 in x 4.65 in x 2.88 in (overall size)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weight</td>
<td>600 gr / 1.32 lb without packaging • 1.10 kg / 2.42 lbs with packaging</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Ordering information**

FF-SRM100P2

**Note**

Honeywell provides a wide range of sensors such as photoelectric controls, ultrasonic sensors, limit switches and inductive proximity sensors which can be used to control the muting sequences. Also refer to the enclosed components lists.

(1) Output Switching Devices  
(2) Secondary Switching Devices  
(3) Output Signal Switching Devices  
(4) Start Muting and End Muting Sensors  
(5) Override Push-Buttons  
(6) Secondary Switching Devices monitoring loop  
(7) Final Switching Devices monitoring loop
Description

Two through-scan or retro-polarised photoelectric controls SM1 & SM2 can be used to start and end the muting sequence (correct operation of these photoelectric controls is monitored by the muting module). The interruption of the photoelectric control beams starts the muting sequence while the release of the safety light curtain beams stops the muting sequence. This installation is recommended on applications where the entry and exit points of the material into the dangerous zone are the same. The whole muting sequence shall not last more than 60 minutes.

Wiring diagram

Example 1: Conveyor mode, two-direction muting
Application sketch

Timing diagram

- \( t < D_{\text{max}} \)
- \( 8 \text{ ms} < t < t_{\text{max}} \)
- \( t < 6 \text{ s max.} \)
- \( t < D_{\text{max}} \)

Muting module outputs (OSSDs)

Muting lamp

Max. timing between SMs sensors set on 1, 2, 4, or 8 s.

Dmax : maximum muting timing (programmable from 2, 4, 8 or 60 minutes).
Example 2: Conveyor mode, one-direction muting

Application sketch

Timing diagram

Description
Two sensors SM1 & SM2 are used to start the muting sequence, and two additional sensors EM1 & EM2 are used to stop it. These sensors may be inductive proximity sensors, photoelectric controls or limit switches (correct operation of these sensors is monitored by the muting module). This installation enables the muting of the protective equipment in one direction only. This installation is recommended on applications where entry and exit points of the material into the dangerous zone are different. The use of 4 sensors to perform a muting sequence provides a high level of safety. The whole muting sequence shall not last more than 60 minutes.

Wiring diagram
Example 3: Press mode, muting on a mechanical press

SM1 Start muting 1
SM2 Start muting 2
EM1 End muting 1
EM2 End muting 2

Application sketch
BDC (Bottom Dead Center) point at which the tool is closest to the die.
TDC (Top Dead Center) point at which the tool is furthest to the die.

Timing diagram

Description
Two limit switches SM1 & SM2 are used to start and stop a muting sequence. As soon as the press tool reaches its lowest position, the SM sensors are actuated by the rotation of the rotating disk cam and start the muting sequence (correct operation of these sensors is monitored by the module muting). The limit switches keep their position until the press tool reaches its uppermost position. The rotation of the rotating disk cam releases both limit switches and interrupt the muting sequence. The muting sequence must last 60 minutes maximum.

dmax.: maximum muting timing (programmable from 1, 2, 4 or 60 minutes.)
tmax.: maximum timing between SMs sensors set on 1, 2, 4 or 8 seconds.

Wiring diagram

Start Muting Sensor SM1
Start Muting Sensor SM2
Light curtain outputs (OSSDs)
Muting lamp
Muting module outputs (OSDs)

Muting module outputs (OSDs)

Muting

Module

Outputs

MUTING

Internal switch position

Press
mode

tmax/
dmax

Settings on delivery:
tmax = 1s, Dmax = 1 min.
TEST = NC contact
Example 4: Press mode, muting on a hydraulic press

**Application sketch**

BDC (Bottom Dead Center) point at which the tool is closest to the die.

TDC (Top Dead Center) point at which the tool is furthest to the die.

**Timing diagram**

**Description**

A pair of sensors SM1 & SM2 is used to start the muting sequence, and another pair of sensors EM1 & EM2 is used to stop the muting sequence (correct operation of these sensors is monitored by the module muting). The sensors used to detect the tool position should be either limit switches or inductive proximity sensors.

The muting sequence must last 60 minutes maximum.

- \( d_{\text{max}} \): maximum muting timing (programmable from 1, 2, 4 or 60 minutes)
- \( t_{\text{max}} \): maximum timing between SMs sensors set on 1, 2, 4 or 8 seconds.

**Wiring diagram**
<table>
<thead>
<tr>
<th>Components</th>
<th>Typical supplies</th>
<th>Conveyor</th>
<th>Press</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESPE Protective equipment</td>
<td>Safety light curtain (1)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td></td>
<td>or Modular light curtain (1)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td></td>
<td>or Single safety beam or access control systems (1)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td></td>
<td>or Safety laser scanner (1)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Sensors (choose 2 to 4 sensors among the following)</td>
<td>Through-scan, LO/DQ, relay SPDT or static PNP/NPN (2)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Photoelectric control</td>
<td>Retro-polarized, LO/DQ, relay SPDT or static PNP/NPN (2)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td></td>
<td>Diffuse, LO/DQ, relay SPDT or static PNP/NPN (2)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Ultrasonic sensor</td>
<td>NO/NC contact, static PNP/NPN (3)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Limit switches</td>
<td>NO/NC limit switch (4) or (1)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Inductive proximity sensor</td>
<td>NO/NC contact, static PNP/NPN (5)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>FSD relays</td>
<td>2 safety relays with guided contacts</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>SSD relays</td>
<td>1 safety relay with guided contacts</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Arc suppressors</td>
<td>3 varistors 31 Vdc (recommended for cable length longer than 1 m)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Muting lamp</td>
<td>Colourless incandescent filament lamp</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Restart visual indicator</td>
<td>Yellow indicator</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>OSDs status visual indicators</td>
<td>Red and green indicators</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Restart push-button</td>
<td>Key selector switch (1 position with return movement)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Override push-button</td>
<td>Key selector switch (2 positions, 1 with return movement)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Guard only mode selector</td>
<td>Key selector switch (2 fixed positions)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Power supply 24 Vdc</td>
<td>Power supply (power greater than 120 W)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Power section switch</td>
<td>Selector switch (2 fixed positions)</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

(1) refer to the Honeywell Industrial Safety Products catalog
(2) refer to the Honeywell Photoelectric Products catalog
(3) refer to the Honeywell Ultrasonic Distance Sensors catalog
(4) refer to the Honeywell Switches catalog
(5) refer to the Honeywell Proximity Sensors catalog
or Honeywell Consolidated Sensors Catalog
**FEATURES**

- Category 4 muting module as per the EN 954-1 and EN 61496-1 European standards
- Meets the applicable parts of the US & Canadian regulations and standards ANSI/RIA/OSHA
- Multi-functional module programmable through internal selectors: muting functions, mutual exclusion mode
- Compatible with many type 2, type 3 or type 4 safety devices (safety light curtains, safety mats, safety switches) and muting sensors
- Works with safety devices and muting sensors with static outputs or relay outputs
- Inputs for 1 mutable safety device and 1 non-mutable safety device or up to 2 mutable safety devices
- Inputs for 2 or 4 sensors to start and end the muting sequence
- Uni-directional or bi-directional muting
- Max. muting time programmable in wide ranges (10 s to unlimited)
- Safety relay outputs: 3 NO
- Auxiliary static outputs for the muting lamp, diagnostic information and output relay status
- Response time: 25 ms
- Integrated start and restart interlock capability
- Monitored start push-button
- Test output for safety device testing
- External Device Monitoring (EDM) loop for the control of external contactors
- 45 mm / 1.77 in slim housing
- Detailed diagnostic information for easy troubleshooting via external and internal indicators
- LED indicators for relay status and diagnostic information

**TYPICAL APPLICATIONS**

- Conveyor lines, palletizers and depalletizers, automotive transfer lines
- Packaging and wrapping machines
- Machines where manual operations must be carried out outside of hazardous phases of the machine cycle: mechanical or hydraulic presses, press-brakes, welding robots, double transfer lines
- Hazardous areas being mutually accessed by material handling robots or operators carrying out manual operations (mutual exclusion mode)

---

**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.
Applications

**Muting** means that the safety outputs of a mutable safety device are “muted” during the non-hazardous portion of a machine cycle. In a conveyor fed machine area, for example, an object is allowed to enter the machine area even when intruding the sensing field of the mutable safety device. However, the machine must stop when an operator is intruding the sensing field of the safety device. In order to distinguish an operator from an object the muting module evaluates the validity of a muting sequence via auxiliary start and end muting sensors.

Common applications:
- Palletisers / depalletisers,
- Handling, wrapping and packaging machines,
- Robotic zones on automotive transfer lines,
- Automotive paint-shops.

**Muting** may also be used on workstations manually loaded or unloaded by an operator. The intrusion of an operator in the sensing field of the safety device is not taken into account during the non-hazardous portion of the machine cycle (e.g. the opening stroke of a press).

Common applications:
- Mechanical or hydraulic presses,
- Press brakes,
- Dual work stations where the operator loads parts on one station while a robot works on the other station.

**Mutual exclusion** may be used in hazardous areas that can be accessed by a machine (e.g. a handling robot) and an operator carrying out operations. The mutual exclusion principle consists in avoiding that the operator and the machine are entering or are located together inside the hazardous area at the same time. Every time the operator is leaving the hazardous area, he needs to acknowledge his exit with a push-button, allowing the handling robot to enter the area again.

Common applications:
- Palletisers
- Handling / Welding robots

Product description

The muting sequence is controlled by two or four sensors (like photoelectric sensors, limit switches or proximity sensors) and the muting module. The sensors must be installed so that only an object is able to validate a muting sequence but not a person.

When a start muting sequence is valid, the output relay contacts of the FF-SRM200P2 remain energised even if the protection field of the muted safety devices is intruded by an object. An external white muting lamp indicates that the safety device is actually muted. Correct operation of this lamp is monitored by the module in accordance with the IEC/EN 61496-1 European standard.

The following muting modes can be programmed using internal selectors of the FF-SRM200P2:
- Bi-directional or uni-directional muting,
- With 2 start muting sensors and up to 2 muted safety devices,
- With 4 start / end muting sensors and 1 muted safety device.

When a program for one muted and one non-muted safety device is selected, intruding the non-muted safety device will always de-energise the module’s safety relay outputs.

The maximum time for muting the connected safety devices is programmable in a wide range (10 s to unlimited) and can therefore be adapted to the application.

**External indicators** provide information on the relay output status, restart status, muting phase status and on diagnostics.

After power up of the module or after the intrusion of the safety device outside a valid muting sequence, the module can be restarted manually via a restart push-button.

When necessary, the connected safety devices can be tested using the test output of the FF-SRM200P2.

The inputs of the safety devices and the auxiliary sensors are floating allowing the connection of devices with static outputs (PNP or NPN) or relay outputs.

An External Device monitoring (EDM) loop is available in order to monitor external safety contactors driven by the safety relay outputs of the module.

**Trouble shooting** an application using the FF-SRM200P2 muting module is easy through internal and external diagnostic indicators. The connected muting lamp starts to flicker when an error has been detected.
### FF-SRM200P2 Muting module

#### SPECIFICATIONS

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal supply voltage (At(+) + At(-))</td>
<td>24 Vdc (±15 %, power line disturbance: max. 5 ms)</td>
</tr>
<tr>
<td>Nominal power consumption</td>
<td>4.1 W</td>
</tr>
<tr>
<td>Fuse protection</td>
<td>3 NO (13/14, 23/24, 33/34)</td>
</tr>
</tbody>
</table>

**Inputs**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety devices</td>
<td>1 or 2 redundant floating inputs with optocoupler (S1/S12, S13/S14) and (S2/S22, S23/S24)</td>
</tr>
<tr>
<td>Auxiliary sensors</td>
<td>2 or 4 floating inputs with optocoupler (S1/S22, S23/S24, S31/S32, S33/S34)</td>
</tr>
</tbody>
</table>

**Restart input type (S43/S44)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restart loop and External Device Monitoring (EDM)</td>
<td>Modes 20 to 79 (muting modes): 1 common input (S43/S44)</td>
</tr>
<tr>
<td></td>
<td>Modes 90 to 93 (mutual exclusion modes): 2 separate inputs (restart: S43/S44, EDM: S41/S42)</td>
</tr>
</tbody>
</table>

**Restart delay time**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual start</td>
<td>65 ms</td>
</tr>
<tr>
<td>16 Vdc at nominal voltage</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5 mA at nominal voltage</td>
<td></td>
</tr>
<tr>
<td>max. 2.5 s</td>
<td></td>
</tr>
<tr>
<td>max. 10 s</td>
<td></td>
</tr>
</tbody>
</table>

**Max. muting time (selector programmable)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 s, 20 s, 30 s, 1 min, 5 min, 10 mn, 30 mn, 1 h, 3 h, unlimited (&gt; 3 days)</td>
<td></td>
</tr>
</tbody>
</table>

**Safety outputs**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact type</td>
<td>Internally redundant positive guided safety relay contacts</td>
</tr>
<tr>
<td>Contact complement</td>
<td>3 NO (13/14, 23/24, 33/34)</td>
</tr>
<tr>
<td>Response time</td>
<td>25 ms (between safety device input and module relay outputs)</td>
</tr>
<tr>
<td>Power factor = 1 (see Note 1 and Figure 1)</td>
<td></td>
</tr>
<tr>
<td>Output Current (min. to max.)</td>
<td>1 mA to 5 A (see Note 1)</td>
</tr>
<tr>
<td>Output Voltage (min. to max.)</td>
<td>0.1 to 230 Vac/dc</td>
</tr>
</tbody>
</table>

**Typical Electrical Life Expectancy**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 A: 2 000 000 operations; 2 A: 1 000 000 operations; 5 A: 300 000 operations; 6 A: 200 000 operations</td>
<td></td>
</tr>
</tbody>
</table>

**Typical Power Factor (cos ϕ)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>0.45</td>
</tr>
<tr>
<td>0.5</td>
<td>0.70</td>
</tr>
<tr>
<td>0.7</td>
<td>0.85</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**Operating frequency**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200 switching cycles/h (max.)</td>
<td></td>
</tr>
<tr>
<td>6 A time delayed (max.)</td>
<td></td>
</tr>
</tbody>
</table>

**Mechanical life**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ten million switching operations</td>
<td></td>
</tr>
</tbody>
</table>

**Auxiliary outputs**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay status / test output</td>
<td>PNP static output (58) (23 Vdc / max. 100 mA)</td>
</tr>
<tr>
<td>Test output</td>
<td>Normally closed specifications (test active: 0 Vdc, test inactive: 24 Vdc)</td>
</tr>
<tr>
<td>Response of safety device on test signal</td>
<td>&lt; 200 ms</td>
</tr>
<tr>
<td>Power factor = 1 at 230 Vac (see Note 2 and Figure 1)</td>
<td></td>
</tr>
</tbody>
</table>

**Muting lamp / diagnostic output**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNP static output (48) (23 Vdc / max. 100 mA / min. 10 mA)</td>
<td></td>
</tr>
</tbody>
</table>

**General**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature range</td>
<td>0 °C to +50 °C / 32 °F to 122 °F</td>
</tr>
<tr>
<td>Sealing</td>
<td>Housing IP 40; Terminals IP 20</td>
</tr>
<tr>
<td>Housing material</td>
<td>Thermoplastic</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>Amplitude 0.35 mm; Frequency 10 to 55 Hz</td>
</tr>
</tbody>
</table>

**Connector connection (max.)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x 4 mm² solid [12 AWG], 1 x 2.5 mm² [14 AWG], 2 x 1.5 mm² [16 AWG] stranded wire with sleeve DIN 46288</td>
<td></td>
</tr>
</tbody>
</table>

**Connector attachment**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removable block terminals with M3.5 screws; wire contacts are enclosed to prevent electrical shock</td>
<td></td>
</tr>
</tbody>
</table>

**Mounting**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quick install rail mounting EN 50022-35, 35 mm x 15 mm / 1.38 in x 0.59 in. size</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>320 g / 0.70 lb</td>
</tr>
</tbody>
</table>

**ORDERING INFORMATION**

**FF-SRM200P2**

| Note 1: Contact damage: To ensure the 1 mA capability during the lifetime of the contact, never exceed 300 mA or 60 V. |

| Note 2: Install arc suppression devices across load to avoid module contact arcing and ensure specified relay life expectancy. |

| Note 3: Total operations = operations at power factor 1 multiplied by the limitation factor. |

**Example:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>U = 230 Vac</td>
<td>1 = 2 A, power factor cos ϕ = 0.7</td>
</tr>
<tr>
<td>Switching power P = U x I = 460 Vac</td>
<td></td>
</tr>
</tbody>
</table>

**FIG. 1 CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power factor = 1 (cos ϕ) (see Note 3)</td>
<td></td>
</tr>
</tbody>
</table>

**FIG. 2 LIMITATION FACTOR FOR INDUCTIVE LOADS**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power factor &lt; 1 (cos ϕ) (see Note 3)</td>
<td></td>
</tr>
</tbody>
</table>
Installation diagram

Mounting Dimensions
Width: 45 mm / 1.77 in; Height: 74 mm / 2.91 in; Depth: 121 mm / 4.76 in

Internal circuitry

Front panel

Removable terminal blocks

Run1/Run2: LED indicators system status (*ON* = ON, "flickering" = error)  
K1/K2: relay output status

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Mode setting
The operating modes of the FF-SRM200P2 module are set using 4 selectors located behind the removable front panel. 60 different programs are available allowing to adapt the muting mode and the max. muting time to the application.

The FF-SRM200P2 module has two redundant microprocessor channels. The mode setting of each channel is done by two selectors "A" and "B".

The position of the corresponding selector "A" or "B" for channel 1 and channel 2 must be identical (see example).

Example: Selecting mode "31"

<table>
<thead>
<tr>
<th>Selector</th>
<th>Channel 1</th>
<th>Channel 2</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot;</td>
<td>3</td>
<td>3</td>
<td>Muting with 2 auxiliary sensors</td>
</tr>
<tr>
<td>&quot;B&quot;</td>
<td>1</td>
<td>1</td>
<td>Maximum muting time: 20 s</td>
</tr>
</tbody>
</table>

MUTING MODES

<table>
<thead>
<tr>
<th>Safety device without test input</th>
<th>Inputs</th>
<th>Selector &quot;B&quot;: Max. muting time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not valid (Note (3))</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2 muting sensors SM1, SM2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 mutable safety device</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No or 1 non-mutable safety device</td>
<td></td>
</tr>
<tr>
<td>Note: (1)</td>
<td>Application examples: 1A, 1B, 3B</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2 muting sensors SM1, SM2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 or 2 mutable safety devices</td>
<td></td>
</tr>
<tr>
<td>Notes: (1), (4)</td>
<td>Application examples: 3A</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>2 start muting sensors SM1, SM2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 end muting sensors EM1, EM2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 mutable safety device</td>
<td></td>
</tr>
<tr>
<td>Note: (1)</td>
<td>Application examples: 2, 5</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>2 muting sensors SM1, SM2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 mutable safety device</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No or 1 non-mutable safety device</td>
<td></td>
</tr>
<tr>
<td>Test Input example</td>
<td>Note: (2)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>2 muting sensors SM1, SM2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 or 2 mutable safety devices</td>
<td></td>
</tr>
<tr>
<td>Notes: (1), (4)</td>
<td>Test Input example</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>2 start muting sensors SM1, SM2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 end muting sensors EM1, EM2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 mutable safety device</td>
<td></td>
</tr>
<tr>
<td>Note: (1)</td>
<td>Test Input example</td>
<td></td>
</tr>
</tbody>
</table>

Selector "A": Muting modes

Note (1): Activation of the mutable safety device(s) is (are) NOT necessary during muting sequence.
Note (2): Activation of the mutable safety device is necessary during muting sequence.
Note (3): If a not valid mode has been selected, fatal error 5 is displayed (see "Diagnostic Information" for details).
Note (4): The 2 mutable safety devices are muted simultaneously.
## MUTUAL EXCLUSION MODES

<table>
<thead>
<tr>
<th>Selector “A” Mutual exclusion</th>
<th>Inputs</th>
<th>Selector “B”: Test input and External Device Monitoring (EDM) functions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Robot detection</td>
<td>Operator detection</td>
</tr>
<tr>
<td>9 (S11/S12, S13/S14)</td>
<td>(S21/S22, S23/S24)</td>
<td>(S31/S32)</td>
</tr>
</tbody>
</table>

### Application example 1: Bi-directional muting on a conveyor

1A - Bi-directional muting with 2 muting sensors, 1 mutable and 1 non-mutable safety device

![Diagram](image1)

1B - Bi-directional muting with 4 muting sensors, 1 mutable and 1 non-mutable safety device

![Diagram](image2)

### Description

A conveyor is loading and unloading a hazardous zone protected by one or two safety devices (e.g. safety light curtain, safety key interlock switch). As the conveyor enters and exits the zone passing by the same point, the movement is bi-directional.

The muting system is composed of the following elements:

- the FF-SRM200P2 muting module,
- 1 mutable safety device (e.g. FF-SB safety light curtain ) detecting access through the opening for the conveyor,
- 1 non-mutable safety device (e.g. GK safety key interlock ) to monitor the safety door (“guard only”),
- example 1A: 2 auxiliary muting sensors SM1 and SM2 to start and end the muting sequence (crossed through scan or retro-reflective-polarised photoelectric sensors),
- example 1B: 4 auxiliary muting sensors SM1a, SM2a, SM1b and SM2b to start and end the muting sequence (e.g. limit switches, proximity sensors, through scan or retro-reflective-polarised photoelectric sensors).

The use of the second non-mutable safety device connectable to the same FF-SRM200P2 module is optional.

In order to start a muting sequence, the muting sensors SM1 and SM2 must be activated within a time frame of maximum 10 s. The muting sequence is stopped after de-activating the first of the two muting sensors.

In any case, the muting sequence will be interrupted after the maximum selected muting time has elapsed. If an object remains accidentally in the detection field of the muted safety device and the muting time has elapsed, an external Temporary Manual Muting (TMM, customer supplied) may be used to evacuate the detection field.
Muting

t>10 s

error 7:

error 5:


Note (B): Modes 50 to 69: muting using safety devices with test input:

Connect mutable safety device (not tested).

Connect non-mutable safety device (example 1B): connect SM1b and SM2b as shown in parallel to SM1a and SM2a.

Note (C): Bi-directional muting with 4 SM muting sensors (example 1B):

Note (D): Sensors contact type:

Note (E): External contactors:

Note (A): Connect mutable safety device to S11/S12 and S13/S14. Connect non-mutable safety device to S21/S22 and S23/S24. Signals between redundant safety device inputs S11 to S14 or S21 to S24 must be applied within a max. time of 2.5 s.

Modes 20 to 39: muting using safety devices without test input: unused safety device inputs must be connected to power: S21 and S23 to (dc-); S22 and S24 to (dc+).

Notes:

- The de-activation of the first muting sensor SM1 or SM2 will stop the muting sequence (only the falling signal edge is taken into account).
- All muting sensors SM1 and SM2 must remain activated during a muting sequence. In the case of 2 pairs of muting sensors at least one of each parallel sensor (SM1a or SM1b, SM2a or SM2b) must remain activated.
- The de-activation of the first muting sensor SM1 or SM2 will stop the muting sequence (only the falling signal edge is taken into account). In the case of 2 pairs of muting sensors, the de-activation of the first muting sensor group (SM1a / SM1b or SM2a / SM2b) will stop the muting sequence.
- The activation of only one sensor SM is ignored (see ⬤).
- The activation of the mutable safety device is not necessary during a muting sequence (except modes 50 to 59) (see ⬤).
- Muting sensors SM1 and SM2 must be inactive before starting a new muting sequence (see ⬤).
- The restart push-button must be pushed AND released within 3 s to start the module (see ⬤).
- Activating the non mutable safety device leads to the de-energisation of the safety relay outputs of the module.

Functional diagram

Supply voltage (A1/A2)

Mutable safety device(s):
(S11/S12, S13/S14)

SM1 or SM2

SM2 or SM1

Relays K1, K2

Relay status output (58)

Start P/B

Muting Lamp (48)

Notes:

- Maximum coincidence time between activation of muting sensors SM1 / SM2: 10 s (only the raising signal edge is taken into account).
- Muting sensors can be activated in any order (SM1 then SM2 or SM2 then SM1).
- All muting sensors SM1 and SM2 must remain activated during a muting sequence. In the case of 2 pairs of muting sensors at least one of each parallel sensor (SM1a or SM1b, SM2a or SM2b) must remain activated.
- The de-activation of the first muting sensor SM1 or SM2 will stop the muting sequence (only the falling signal edge is taken into account). In the case of 2 pairs of muting sensors, the de-activation of the first muting sensor group (SM1a / SM1b or SM2a / SM2b) will stop the muting sequence.
- tmax.: max. muting time programmable with the internal selector "B".
- The activation of only one sensor SM is ignored (see ⬤).
- The activation of the mutable safety device is not necessary during a muting sequence (except modes 50 to 59) (see ⬤).
- Muting sensors SM1 and SM2 must be inactive before starting a new muting sequence (see ⬤).
- The restart push-button must be pushed AND released within 3 s to start the module (see ⬤).
- Activating the non mutable safety device leads to the de-energisation of the safety relay outputs of the module.

Mode selector

Mode 20 to 29: muting with 2 muting sensors, 1 mutable and 1 non-mutable safety device (not tested).
Example: mode 21: max. muting time: 20 s.
Application example 2: Uni-directional muting with 1 mutable safety device and 4 muting sensors

Description

A conveyor is loading and unloading a hazardous zone protected by one mutable safety device (e.g. safety light curtain). As the conveyor enters and exits the zone at two different points, the movement is uni-directional.

The muting system is composed of the following elements:
- the FF-SRM200P2 muting module,
- 1 mutable safety device (e.g. FF-SYA safety light curtain) detecting access through the opening for the conveyor,
- 2 start muting sensors SM1, SM2 and 2 end muting sensors EM1, EM2 (e.g. limit switches, proximity sensors, through scan or retro-reflective-polarised photoelectric sensors).

In order to start a muting sequence, the muting sensors SM1 and SM2 must be activated within a time frame of maximum 10 s. The muting sequence is stopped after de-activating the first of the two end muting sensors EM1 or EM2.

In any case, the muting sequence will be interrupted after the maximum selected muting time has elapsed. If an object remains accidentally in the detection field of the muted safety device and the muting time has elapsed an external Temporary Manual Muting (TMM, customer supplied) may be used to evacuate the detection field.

Wiring diagram

Note (A): Signals between redundant safety device inputs S11 to S14 must be applied within a max. time of 2.5 s.
Note (B): Modes 70 to 79: muting using safety devices with test input: Terminal 58 is used as test output that must be connected to the test input of the safety device (refer to chapter "Test input").
Note (C): Sensors contact type: this could be voltage free dry contacts or static contacts. When using sensors with static outputs, use 1 PNP and 1 NPN sensor to allow cross fault detection between the input channels. Use sensors with open outputs when no object is detected.

Note (D): External contactors: When external contactors are used, connect one normally closed contact of each contactor (or the normally closed contact of the RF-SRE extension module) in series into the combined restart loop and External Device Monitoring (EDM) loop S43/S44. Install arc suppressors across the coils of external safety relays.
Functional diagram

- Supply voltage (A1/A2)
- Mutable Safety Device (S11/S12, S13/S14)
  - SM1 or SM2
  - SM2 or SM1
  - BM1 or BM2
  - BM2 or BM1
- Relays K1, K2
- Relay status output (58)
- Start P/B
- Muting lamp (48)
  - Restart
  - Muting
  - Incorrect muting cycle
  - Correct muting cycle
  - Error 8: (EM error)
  - Error 8: (EM error)

Notes:
- Maximum coincidence time between activation of muting sensors SM1 / SM2: 10 s (only the raising signal edge is taken into account).
- No timing constraints between EM1 / EM2.
- Muting sensors can be activated in any order within the pair (SM1 then SM2 or vice-versa, BM1 then BM2 or vice-versa).
- Once a valid muting sequence is started, both muting sensors SM1 and SM2 may be de-activated the muting sequence without stopping the muting sequence in progress.
- The de-activation of the first end muting sensor EM1 or EM2 will stop the muting sequence (only the falling signal edge is taking into account).
- tmax.: max. muting time programmable with the internal selector "B".
- The activation of only one sensor SM is ignored (see 
- The activation of the mutable safety device is not necessary during a muting sequence (except modes 50 to 59) (see 
- All SM and EM sensors must be inactive before starting a new muting sequence (see 
- The restart push-button must be pushed AND released within 3 s to start the module (see 
- Activating the not mutable safety device leads to the de-energisation of the safety relay output of the module.
Application example 3: Muting on a mechanical press

3A - Muting on a mechanical press with 2 muting sensors and 2 mutable safety devices

3B - Muting on a mechanical press with 2 muting sensors, 1 mutable and 1 non-mutable safety device

Description

On a mechanical press, the mutable safety device(s) (e.g., safety light curtain) can be muted as soon as the press tool reaches the bottom dead centre (BDC), allowing the operator to unload the press during the opening stroke without stopping the press movement. As soon as the press tool reaches the BDC, muting sensors SM1 and SM2 are activated by the rotating disk cam. A muting sequence will be started, when muting sensors SM1 and SM2 are activated within a time frame of 10 s.

The muting sensors must remain activated till the press tool initiates its closing stroke. When the first of the two muting sensors is de-activated by the rotating disk cam, the muting sequence will be stopped.

The muting system is composed of the following elements:
- the FF-SRM200P2 muting module,
- example 3A: up to 2 mutable safety devices (e.g., FF-SG safety light curtains),
- example 3B: 1 mutable (e.g., FF-SG safety light curtain) and up to 1 non-mutable safety device (e.g., GK safety key interlock) to monitor the safety door ("guard only"),
- 2 muting sensors SM1 and SM2 to start and end the muting sequence.

The use of the second mutable or non-mutable safety device connectable to the same FF-SRM200P2 module is optional.

In any case, the muting sequence will be interrupted after the maximum selected muting time has elapsed. If an object remains accidentally in the detection field of the muted safety device and the muting time has elapsed, an external Temporary Manual Muting (TMM, customer supplied) must be used to evacuate the detection field.

SM1: muting sensor 1
SM2: muting sensor 2

BDC (Bottom Dead Center): point at which the tool is closest to the die.

TDC (Top Dead Center): point at which the tool is furthest to the die.
Typical wiring diagram application example 3A

Mode selector

Note (A): Signals between redundant safety device inputs S11 to S14 or S21 to S24 must be applied within a max. time of 2.5 s.

Modes 20 to 39: muting using safety devices without test input: Unused safety device inputs must be connected to power: S21 and S23 to (dc-); S22 and S24 to (dc+).

Note (B): Modes 50 to 69: muting using safety devices with test input: Terminal 58 is used as test output that must be connected to the test input of each safety device (refer to chapter "Test input").

Modes 50 to 59 (only): 1 non-mutable and 1 mutable safety device AND safety devices with test input: the mutable safety device needs to be activated during the muting sequence.

Note (C): Sensors contact type: Safety switch contacts are preferred for press applications.

Note (D): External contactors: when external contactors are used, connect one normally closed contact of each contactor (or the normally closed contact of the FF-SRE extension module) in series into the combined restart loop and External Device Monitoring (EDM) loop S43/S44. Install arc suppressors across the coils of external safety relays.

Functional diagram

Supply voltage (A1/A2)

Mutable safety device(s)

SM1 or SM2

SM2 or SM1

Relays K1, K2

Relay status output (58)

Start P/B

Muting Lamp output (48)

Notes:

• Maximum coincidence time between activation of muting sensors SM1 / SM2: 10 s (only the raising signal edge is taken into account).

• Muting sensors can be activated in any order (SM1 then SM2 or SM2 then SM1).

• All muting sensors SM1 and SM2 must remain activated during a muting sequence.

• The de-activation of the first muting sensor SM1 or SM2 will stop the muting sequence (only the falling signal edge is taking into account).

• tmax.: max. muting time programmable with the internal selector "B".

• The activation of only one sensor SM is ignored (see 0).

• The activation of the mutable safety device is not necessary during a muting sequence (except for modes 50 to 59) (see 2).

• Muting sensors SM1 and SM2 must be inactive before starting a new muting sequence (see 3).

• The restart push-button must be pushed AND released within 3 s to start the module (see 8).

• Activating the not mutable safety device leads to the de-energisation of the safety relay output of the module.
Application example 4: Mutual exclusion function in a robot area

Mutual exclusion function with 2 safety devices and an enabling contact

Description

A robot and an operator regularly access the same hazardous area in order to carry out operations.

The mutual exclusion principle consists in:

- allowing the operator access to the hazardous area only when the robot is outside of it,
- allowing the robot access to the hazardous area only when the operator is outside of it and has acknowledged exiting the area.

The mutual exclusion system is composed of the following elements:

- the FF-SRM200P2 muting module,
- safety device 1 (e.g. FF-SYA safety light curtain 1) monitoring the access of the robot into the area,
- safety device 2 (e.g. FF-SYA safety light curtain 2) monitoring the access of the operator into the area,
- an optional safety device (e.g. safety switch) monitoring the robot position, before it is detected by safety light curtain 1,
- an acknowledge push-button located outside of the area.

The functional principle of the mutual exclusion consists in not allowing the activation of the safety devices for the operator and the robot at the same time. When the operator is entering the area activating safety light curtain 2, the access is memorised in the module. After leaving the area the operator needs to push the acknowledge push-button to confirm his exit. This push-button must be located outside the area with a clear view to the hazard.

If the robot activates safety light curtain 1 before the operator has pushed the acknowledge push-button, the hazard will be stopped through the safety relay outputs of the FF-SRM200P2 muting module.

The hazard will also be stopped if safety light curtain 1 is activated and the operator attempts to enter the area actuating safety light curtain 2.

In order to increase safety (especially when the operator is likely to work close to safety light curtain 1 (robot) without keeping the required safety distance), safety may be increased by installing an additional safety sensor (e.g. safety switch) to monitor and anticipate the robot position.

If used, both the auxiliary safety device AND the safety light curtain 1 must have their sensing fields free (= voltage is applied to the module inputs S11 to S14, S31 and S32), in order to allow the operator to enter the hazardous area. As soon as the robot is detected by AT LEAST ONE of the robots safety devices (light curtain 1 or additional safety switch), the operator is not allowed to enter the hazardous area without stopping the hazard.
Typical wiring diagram

Note (A): Signals between redundant safety device inputs S11 to S14 or S21 to S24 must be applied within a max. time of 2.5 s.

Note (B): Modes 92 and 93: mutual exclusion using safety devices with test input: Terminal 58 is used as test output that must be connected to the test input of each safety device (including auxiliary safety device, see chapter "Test input").

Note (C): Auxiliary safety device for robot position (use is application depending and optional):
- Modes 90 to 91: mutual exclusion using safety devices without test input: if used, connect the auxiliary safety device between (dc-) and 
S31 and S32 to (dc+). Unused robot position inputs must be connected to power: S31 to (dc-) and S32 to (dc+).
- Modes 92 to 93: mutual exclusion using safety devices with test input: terminal 58 is used as test output that must be connected to the test input of each safety device (including the auxiliary safety device, see chapter "Test input").

Note (D): External contactors: when external contactors are used, connect one normally closed contact of each contact (or the normally closed contact of the FF-SRE extension module) in series into the External Device Monitoring (EDM) loop S41/S42 and select the modes with EDM (modes 90 or 92). In these modes, the muting module also checks, whether the normally closed contacts of the external safety relays have opened max. 250 ms after energising the internal safety relays K1 and K2. Install arc suppressors across the coils of external safety relays.

Functional diagram

Supply voltage (A1/A2)
Start P/B (S43/S44)
Acknowledge P/B (S33/S34)
Safety device 1 (robot) (S12/S14)
Auxiliary sensor (S31/S32)
Safety device 2 (operator) (S22/S24)
Relays K1, K2

Notes:
- Safety device 1 (robot) and the auxiliary safety device for the robot position are permanently muted (allowing the robot to enter the hazardous area):
  1. If safety device 2 (operator) is not activated
  OR
  2. If safety device 2 has been activated, but the operator has pushed the acknowledge push-button, to confirm that he has left the hazardous area.
- The start push-button must be pushed AND released within 3 s. to energise the safety output contact of the module.
- The acknowledge push-button must be pushed for acknowledgment during less than 3 s. The module de-energises its safety output contacts, when the push-button is pushed longer than 3 s.
- Pushing the start push-button with one or both of the robot’s safety devices activated leads to the energisation of the module output contacts:
  1. If safety device 2 (operator) is not activated
  OR
  2. If safety device 2 has been activated, but the operator has pushed the acknowledge push-button, to confirm that he has left the hazardous area.

Modes 90 to 93: mutual exclusion.
Example: mode 93 (safety device without test input and with EDM).
OTHER EXAMPLES

The following application examples are detailed in the installation manual of the FF-SRM200P2 muting module.

Application example 5: Muting on a hydraulic press with 1 mutable safety device and 4 muting sensors

Description

On a hydraulic press, the safety device (e.g. safety light curtain) can be muted as soon as the press tool reaches the bottom dead centre (BDC), allowing the operator to unload the press during the opening stroke without stopping the movement of the press.

The muting system is composed of the following elements:

- the FF-SRM200P2 muting module,
- 1 mutable safety device (e.g. a safety light curtain)
- 2 start muting sensors and 2 end muting sensors (e.g. cam operated safety switches)

As soon as the press tool reaches the BDC, the start muting sensors SM1 and SM2 are activated. When activated within a time frame of maximum 10 s, a new muting sequence will be started. The end muting sensors EM1 and EM2 must get de-activated when the press tool starts its closing stroke. The muting sequence gets terminated as soon as the first of the end muting sensors is de-activated.

In any case, the muting sequence will be interrupted after the maximum selected muting time has elapsed. If an object remains accidentally in the detection field of the muted safety device and the muting time has elapsed, an external Temporary Manual Muting (TMM, customer supplied) may be used to evacuate the detection field.
TEST INPUT EXAMPLE

Muting using one FF-SLG18/FF-SLG30 type 2 safety light curtain with test input (modes 50 to 69)

DANGER
IMPROPER SAFETY PRODUCT USE IN THE US
- Type 2 safety light curtains as defined by IEC/EN 61496-1 and IEC/EN 61496-2 do not meet US OSHA 1910.217, US ANSI B11.1, B11.2, B11.19 and B11.20 requirements. Although Type 2 safety products are acceptable for certain applications outside the US, they are not generally acceptable in the US due to current US regulations and standards.
- In the US, Type 2 safety light curtains may be used under limited circumstances as defined by the ANSI/R15.06-1999 standard. In Canada, IEC/EN 61496-1 and IEC/EN 61496-2 are recognised as product standards, however application standards do not typically allow Type 2 light curtain use.
- Do not use Type 2 safety products in the US if the applicable standard requires a control reliable solution. For Risk Assessment, refer to ANSI TR3 and ANSI/R15.06-1999 for the USA and the Ministry of Labour for Canada.

Consult with local safety agencies before installing a Type 2 safety light curtain product. Failure to comply with these instructions will result in death or serious injury.

When connecting type 2 safety devices to the FF-SRM200P2 muting module, the test function normally must be used to check the safety integrity of the safety device. However, the type 2 safety light curtains of the FF-SLG18 and FF-SLG30 Series are permanently self-checked internally making the use of the test input NOT compulsory and optional.

Safety devices compatible with the FF-SRM200P2 test output
- FF-SLG18 and FF-SLG30 type 2 safety light curtains (all models with the exception of FF-SLG18147B2 and FF-SLG30147B2)
- Safety switches (e.g. for safety door monitoring).

Modes with test
- Muting modes 50 to 79
- Mutual exclusion modes 92 to 93.

In these modes the output terminal 58 is used as test output and it must be connected to the test inputs of all connected safety devices, that are tested simultaneously.

A test signal is generated
- At each activation of the start push-button and each activation of the acknowledge push-button
- At each new and valid muting sequence (muting lamp light on).

Note (A): Connect test output terminal 58 to the test input of each FF-SLG18/FF-SLG30 emitter as shown in the wiring diagram above while respecting the polarity of the test input terminals (test input (+) = terminal 6, test input (-) = terminal 1).

Note (B): Unused safety device inputs must be connected to power and to the test output: S21 and S23 to (dc-); S22 and S24 to 58.

Modes 50 to 59 (only): 1 non-mutable and 1 mutable safety device AND safety devices with test input: the mutable safety device needs to be activated during the muting sequence.
**TEMPORARY MANUAL MUTING EXAMPLE**

Uni-directional muting with 1 mutable safety device and 4 muting sensors

An external Temporary Manual Muting (TMM) may be necessary, in order to evacuate an object (e.g. a palette with goods in a conveyor application) accidentally remaining in the detection field of a safety device.

The use of a TMM may be necessary in the following cases:
- An object remains in the detection field of a safety device.
- The selected maximum muting time has elapsed.
- Loss of power.
- An application error or a fatal error occurred on the module (e.g. muting lamp failure).

The external TMM system shall be composed by the following components (customer supplied):
- One dual contact key selector switch with two positions or two separate key selector switches with two positions (alternative: two-hand control).
- Two external safety contactors (with mechanically guided contacts and a normally closed EDM monitoring contact).
- The muting lamp (already connected to terminal 48 of the module).
## Diagnostic informations

Detailed diagnostic information for an easy troubleshooting of your muting application is available using the following indicators:

- **Internal indicators**: LED "RUN1" and "RUN2" located on the module front panel,
- **External indicators**: muting lamp connected to terminals 48.

In the case of a failure the indicators are indicating a flashing code. There exist two types of errors:

- **FATAL ERRORS** are only indicated by flashing internal LED's "RUN1" and/or "RUN2". The muting lamp connected to terminal 48 remains permanently off.

  The normally open safety contacts (13/14, 23/24, 33/34) are de-energised and the module needs to be reset by taking the power off and on after resolving the error cause.

- **APPLICATION AND INSTALLATION ERRORS** are indicated by flashing internal LED "RUN1" and the muting lamp connected to terminal 48. LED "RUN2" is permanently on.

  The normally open safety contacts (13/14, 23/24, 33/34) are de-energised, but the module can be restarted pushing the start push-button after resolving the error cause.

### FATAL ERRORS

<table>
<thead>
<tr>
<th>Error code</th>
<th>LED RUN 1</th>
<th>LED RUN 2</th>
<th>Muting lamp (48)</th>
<th>Error type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>☞</td>
<td>☞</td>
<td>☞</td>
<td>Internal module error</td>
</tr>
<tr>
<td>5</td>
<td>5 ☞ (1)</td>
<td>5 ☞ (1)</td>
<td>☞</td>
<td>Mode selector error</td>
</tr>
<tr>
<td>6</td>
<td>6 ☞</td>
<td>☞</td>
<td>☞</td>
<td>Under-voltage error</td>
</tr>
<tr>
<td></td>
<td>☞ 6 ☞</td>
<td></td>
<td>☞</td>
<td>Over-voltage error</td>
</tr>
<tr>
<td>7</td>
<td>7 ☞ (1)</td>
<td>7 ☞ (1)</td>
<td>☞</td>
<td>Input error</td>
</tr>
<tr>
<td>8</td>
<td>8 ☞ (1)</td>
<td>8 ☞ (1)</td>
<td>☞</td>
<td>Internal relay contact error</td>
</tr>
<tr>
<td>9-13</td>
<td>9-13 ☞ (1)</td>
<td>9-13 ☞ (1)</td>
<td>☞</td>
<td>Internal module error</td>
</tr>
</tbody>
</table>

### APPLICATION AND INSTALLATION ERRORS

<table>
<thead>
<tr>
<th>Error code</th>
<th>LED RUN 1</th>
<th>LED RUN 2</th>
<th>Muting lamp (48)</th>
<th>Error type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 ☞</td>
<td></td>
<td>1 ☞</td>
<td>Safety device error</td>
</tr>
<tr>
<td>2</td>
<td>2 ☞</td>
<td></td>
<td>2 ☞</td>
<td>Safety device activated (e.g. beam interruption of a safety device light curtain)</td>
</tr>
<tr>
<td>3</td>
<td>3 ☞</td>
<td></td>
<td>3 ☞</td>
<td>Restart P/B error, external device monitoring (EDM) error</td>
</tr>
<tr>
<td>4</td>
<td>4 ☞</td>
<td></td>
<td>4 ☞</td>
<td>External device monitoring (EDM) error (mutual exclusion mode only)</td>
</tr>
<tr>
<td>5</td>
<td>5 ☞</td>
<td></td>
<td>5 ☞</td>
<td>Safety device 1 (robot) error (mutual exclusion modes)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Max. muting time error (muting modes)</td>
</tr>
<tr>
<td>6</td>
<td>6 ☞</td>
<td></td>
<td>6 ☞</td>
<td>Muting lamp error (muting modes)</td>
</tr>
<tr>
<td>7</td>
<td>7 ☞</td>
<td></td>
<td>7 ☞</td>
<td>Robot position sensor error (mutual exclusion modes)</td>
</tr>
<tr>
<td>8</td>
<td>8 ☞</td>
<td></td>
<td>8 ☞</td>
<td>Start muting sensor (SM) error</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>End muting sensor (EM) error</td>
</tr>
</tbody>
</table>

Note (1): It is possible that:
- LED "RUN1" and "RUN2" are indicating different error codes or,
- only one LED "RUN1" or "RUN2" is indicating an error code and
  the second LED "RUN1" or "RUN2" is switched off.

\[\text{☞}: \text{switched off} \quad \text{n} \cdot \text{☞}: \text{n-times flashing} \quad \bullet: \text{switched on}\]
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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Sales and Service

Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact a nearby sales office or:

INTERNET: www.honeywell.com/sensing

Email: info.sc@honeywell.com
Type 2 muting interface
For personnel/material discrimination in dangerous zones

FEATURES
- Muting interface with safeguarding function based on a cyclic performance test
- Approved as a Type 2 safety control unit per IEC/EN 61496-1 when used with a light curtain from the FF-SLC range (FF-SLC35, FF-SLC55 or FF-SLC18)
- Replaces the FF-SLU100R2 control unit
- Input: 3 muting sensors: 2 start muting, 1 end muting (optional)
- Output: 2 safety relays with guided contacts (2 A / 125 Vac)
- Response time 0.015 s
- Supply voltage 24 Vdc

TYPICAL APPLICATIONS
- Automatic palletizing / depalletizing systems
- Material handling and storage systems
- Packaging and wrapping machines
- Assembly lines

The FF-SLM200R2 muting interface is a module designed to work with the light curtains from the FF-SLC range. It replaces the FF-SLU100R2 as the system's control unit to build a Type 2 electro-sensitive protective equipment (ESPE) in compliance with the International standard IEC/EN 61496-1. When combined with an FF-SLC light curtain and connected to specific muting sensors that complete the system for this type of application, the FF-SLM200R2 control unit provides an efficient solution to the problem of personnel/material discrimination at dangerous access points characterised by transit of pallets.

According to safety regulations, the muting function can be activated only if two signals are present. Muting sensors are therefore required, which provide the control unit with information (muting signals) regarding transit of the material "authorised to access the dangerous zone. The FF-SLM200R2 control unit manages the muting function using 2 or 3 inputs to which sensors with relay output or sensors with PNP static type output can be connected. In particular, switching must be of the DARK ON type.

The control unit activates and de-activates the muting function only with the correct muting sequence, characterised by a specific signal timing, at its inputs. To activate the muting function, the material that passes through the dangerous access point must be detected by both sensor 1 or sensor 2 (within four seconds). During the period in which the function is active, the FF-SLM200R2 control unit is in muting status, indicated externally by a white indicator light located close to the dangerous zone and which is permanently checked by the unit.

An end-muting sensor (sensor 3) can be used to check the distance between two consecutive pallets.

If the machine stops with the material in the area controlled by the light curtain, a manual operation is required to restart the system: the override function. This function, which sets the control unit to override status, must be carried out through simultaneous activation of two manual controls.

A 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.
FF-SLM Type 2 muting interface

- Type 2 according to IEC/EN 61496-1
- 3 inputs: 2 start muting, 1 end muting (optional)
- Replaces the FF-SLU100R2 control unit when used with FF-SLC light curtains

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

<table>
<thead>
<tr>
<th>Features</th>
<th>Power supply</th>
<th>Power consumption</th>
<th>Output relays</th>
<th>Self-diagnostic output</th>
<th>Muting sensors</th>
<th>Muting sensors output feature</th>
<th>Response time (1)</th>
<th>Minimum duration of the test command</th>
<th>Reset time from start of the test</th>
<th>Muting signal response time</th>
<th>Electrical connections (2)</th>
<th>Cable length (3)</th>
<th>Operating temperature</th>
<th>Sealing (housing)</th>
<th>Sealing (terminal blocks)</th>
<th>Mechanical mounting</th>
<th>Dimensions</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24 Vdc ± 20%</td>
<td>8 W</td>
<td>2 N.O. contacts 2 A, 125 Vac / 1 N.C. contact 2 A, 125 Vac</td>
<td>1 N.O. contact 0.5 A, 25 Vac - 60 Vdc / contact open in case of faulty operation</td>
<td>DARK ON, relay output 1 N.O. contact or PNP static output</td>
<td>100 mA, 24 Vdc</td>
<td>24 Vdc, 0.5…5 W</td>
<td>≤15 ms</td>
<td>10 ms</td>
<td>150 ms</td>
<td>300 ms</td>
<td>Terminal blocks</td>
<td>100 m max. / 328 ft max.</td>
<td>0 °C to 55 °C / 32 °F to 131 °F</td>
</tr>
</tbody>
</table>

Ordering information:
FF-SLM200R2

Notice:
(1) Output circuit de-energization delay in case of field interrupted.
(2) Use isolating plugs.
(3) We recommend shielded cable where the level of electrical disturbances is higher than the specified IEC 801-4 level IV.
(1) Test input: the safeguarding function of the system relies on the use of this input. This input enables the cyclic activation of the test and the reset of the system at power on or after each intrusion in the detection field (the contact should be maintained during 10 ms/test duration: 150 ms).

(2) FSD monitoring: the setting of this feedback control allows the monitoring of the external relays K1 and K2. In case of failure of one relay, the control unit remains in a stop condition until the failure cause is removed.

(3) Self-diagnostic output: this output provides an alarm signal when a drop of synchronism is detected between the two inner relays A and B (if the feedback connection is set, the alarm signal is also provided in case of drop of synchronism between the two external relays K1 and K2).

(4) All the ground terminals must be connected to the same potential.

Muting sensors and light curtain positioning

Safe zone

Dangerous zone

Conveyor movement
Mutting sensor positioning when using inductive sensors

Mutting sensor positioning when using photoelectric sensors

Corresponding connection diagram
Status tables

<table>
<thead>
<tr>
<th>FF-SLM200R2 control unit status</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUARD</td>
</tr>
<tr>
<td>__</td>
</tr>
<tr>
<td>__</td>
</tr>
</tbody>
</table>

FF-SLM200R2 output

- 14-19: __ __
- 15-18: __ __
- 16-17: __ __

Self-diagnostic output

- Relay K1
  - K1-1: __ __
  - K1-2: __ __
- Relay K2
  - K2-1: __ __
  - K2-2: __ __

Sensor status

<table>
<thead>
<tr>
<th>Sensor 1</th>
<th>Object presence</th>
<th>Object absence</th>
</tr>
</thead>
<tbody>
<tr>
<td>__ __</td>
<td>__ __</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensor 2</th>
<th>Object presence</th>
<th>Object absence</th>
</tr>
</thead>
<tbody>
<tr>
<td>__ __</td>
<td>__ __</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensor 3</th>
<th>Object presence</th>
<th>Object absence</th>
</tr>
</thead>
<tbody>
<tr>
<td>__ __</td>
<td>__ __</td>
<td></td>
</tr>
</tbody>
</table>

Control unit in MUTING status

<table>
<thead>
<tr>
<th>FF-SLM200R2 outputs</th>
<th>Area controlled free</th>
<th>Area controlled occupied</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-19</td>
<td>__ __</td>
<td></td>
</tr>
<tr>
<td>15-18</td>
<td>__ __</td>
<td></td>
</tr>
<tr>
<td>16-17</td>
<td>__ __</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relay K1</th>
<th>K1-1</th>
<th>__ __</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1-2</td>
<td>__ __</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relay K2</th>
<th>K2-1</th>
<th>__ __</th>
</tr>
</thead>
<tbody>
<tr>
<td>K2-2</td>
<td>__ __</td>
<td></td>
</tr>
</tbody>
</table>

Muting sequence

Note: The signals represent the voltage logical levels at the inputs of the control unit. TS1S2 is the time between detection of the material in transit by sensor 1 (or 2) and detection by sensor 2 (or 1). If TS1S2 is less than 4 seconds, the FF-SLM200R2 activates muting.

TP = 300ms is the response time of the control unit on switching of the muting signals. Delay time introduced by the unit to filter switching bounce-back. T3 is the moment of occupation of sensor 3. Interception may take place when the muting function is active or after de-activation of this.
## LED indicators

<table>
<thead>
<tr>
<th>LED N°</th>
<th>Colour</th>
<th>State</th>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Green</td>
<td>On</td>
<td>Barrier free FF-SLM200R2 output relays energised GUARD</td>
</tr>
<tr>
<td>2</td>
<td>Yellow</td>
<td>On</td>
<td>Barrier free FF-SLM200R2 output relays de-energised CLEAR</td>
</tr>
<tr>
<td>3</td>
<td>Red</td>
<td>On</td>
<td>Barrier occupied FF-SLM200R2 output relays de-energised BREAK</td>
</tr>
<tr>
<td>3</td>
<td>Red</td>
<td>Alternately</td>
<td>Failure of the external relays K1 and K2, FF-SLM200R2 output relays de-energised FAIL</td>
</tr>
<tr>
<td>4</td>
<td>Red</td>
<td>Flickering</td>
<td>FF-SLM200R2 output relays de-energised (FAIL K1-K2)</td>
</tr>
<tr>
<td>5</td>
<td>Yellow</td>
<td>On</td>
<td>Muting function, Sensor 1 occupied</td>
</tr>
<tr>
<td>6</td>
<td>Yellow</td>
<td>On</td>
<td>Muting function, Sensor 2 occupied</td>
</tr>
<tr>
<td>7</td>
<td>Yellow</td>
<td>On</td>
<td>Muting function, Sensor 3 occupied</td>
</tr>
<tr>
<td>3</td>
<td>Red</td>
<td>Flickering</td>
<td>Incorrect muting sequence FAIL MUTING</td>
</tr>
<tr>
<td>8</td>
<td>Red</td>
<td>On</td>
<td>FF-SLM200R2 output relays de-energised</td>
</tr>
<tr>
<td>1</td>
<td>Green</td>
<td>On</td>
<td>Muting function active MUTING</td>
</tr>
<tr>
<td>External indicator</td>
<td></td>
<td>On</td>
<td>FF-SLM200R2 output relays energised</td>
</tr>
</tbody>
</table>

---

**Diagram:**

![LED indicator diagram](image)
FF-SRL59022 multi-safety device relay module with PSDI

FEATURES
- Category 4 control module per EN 954-1
- Complies with IEC 61508 and EN 61496-1 European standards
- Meets the applicable parts of the US & Canadian regulations and standards
- Multi-functional module programmable through internal selectors: serial modes, Presence Sensing Device Initiation mode (PSDI or single / double intrusion)
- Compatible with many type 2, type 3 or type 4 safety devices with static outputs or relay outputs (safety light curtains, single beams, laser scanners, safety mats, safety switches)
- Safety relay outputs: 3 NO contacts
- Response time: 26 ms
- Integrated start and restart interlock facility
- Monitored start push-button
- Test output for safety device testing
- External Device Monitoring (EDM) loop for the control of external contactors
- 45 mm / 1.77 in slim housing
- Detailed diagnostic information for easy troubleshooting via external and internal indicators
- LED indicators for relay status and diagnostic information

SERIAL MODES
- Inputs for up to 3 safety devices

PRESENCE SENSING DEVICE INITIATION MODES (PSDI)
- Single and double intrusion applications
- Input for 1 safety light curtain
- Input for external key operated switch for selection of number of intrusions and intrusion time

TYPICAL APPLICATIONS
- Safeguarding of machines with up to 3 safety devices (serial modes: cascading, L-shape safe-guarding, with light curtains)
- Manual loading / unloading of presses requiring single or double Intrusion of the safety device (PSDI modes)
- Conveyor lines, transfer lines, robots
- Presses, press-brakes
- Rubber and plastic machines, woodworking machines
- Material handling, rotating working tables

The FF-SRL59022 is a programmable safety relay module offering various serial modes (L-shape protection) and Presence Sensing Device Initiation modes (PSDI with single / double intrusion) in one device.

The FF-SRL59022 is permanently self-checked and complies with the requirements of the EN 954-1 European standard for Category 4 safety devices, IEC 61508 and EN 61496-1. Any internal failure is detected and leads to the de-energisation of its safety relay outputs.

If needed, the correct functioning of the connected safety devices may be monitored by the module through its test output. The FF-SRL59022 module offers an extensive diagnostic through indicator that allow for an easy troubleshooting of the application.

In the serial modes safety devices (e.g. light curtains, laser scanners, safety mats, safety switches, etc.) protecting a hazardous area can be connected to this module. In the serial modes up to three safety devices can be connected to the same module.

In the Presence Sensing Device Initiation modes (PSDI) or single intrusion / double intrusion modes, the FF-SRL59022 module simplifies a semi-automatic machine process requiring periodic manual interventions of an operator during the machine cycle. Typically, an operator needs to load or unload the machine intruding the connected safety light curtain once or twice. After the programmed number of intrusions have been performed, the machine restarts automatically.
**Product description and applications**

In the **serial modes** up to three safety devices can be monitored by a single FF-SRL59022 safety relay module. As soon as one of the connected safety device is actuated (e.g. an object is detected inside the sensing field of a safety light curtain), the normally open safety relays contacts (13/14, 23/24 and 33/34) of the module will open. Different start/restart modes can be set on the module independently for each safety device input. Depending on the mode settings, the module need to be started or restarted using the start push-button or it restarts automatically each time the safety device has been de-activated.

**External indicators** provide information on safety relay output status, restart status, intrusion phase status and diagnostics.

After power up of the module or after the intrusion of the safety device, the module can be restarted manually via a **restart push-button**.

When necessary, the connected safety devices can be tested using the **test** output of the FF-SRL59022.

**Common applications:**

- **L-shape safeguarding of presses with vertically and horizontally mounted light curtains for access detection and additional presence detection to avoid an operator being undetected in front of the machine.**

- **Safeguarding access to a hazardous area on two sides with one safety light curtain on each side and a third side access with a maintenance door monitored by 2 safety switches.**

In **single intrusion / double intrusion applications (Presence Sensing Device Initiation (PSDI) modes)**, an operator needs to intrude a safety light curtain once or twice during the non-hazardous portion of a machine cycle, in order to carry out manual operations on the machine.

A **machine contact** (e.g. a safety switch) monitors the machine cycle and authorizes the intrusions to take place during the non-hazardous phase only.

The **number of intrusions** (1 or 2) and the **maximum intrusion time** (15 s, 30 s) can be selected by the user using an external key switch, in order to adapt the settings to the machine process.

**Material loading and unloading operations** typically require 2 intrusions of the safety device, whereas **loading operations** require one intrusion only.

The module closes its normally closed safety relay contacts (13/14, 23/24 and 33/34) and the machine starts again automatically, after the selected number of intrusions have been performed during the max. allowed time.

**External indicators** provide information on safety relay output status, restart status, intrusion phase status and diagnostics.

After power up of the module or after the intrusion of the safety device, the module can be restarted manually via a **restart push-button**.

When necessary, the connected safety devices can be tested using the **test** output of the FF-SRL59022.

**Common applications:**

- **Loading and unloading of presses, carrousels, rotating plates, robot areas.**

**Troubleshooting** an application using the FF-SRL59022 module is easy through internal and external diagnostic indicators.
**SPECIFICATIONS**

**FF-SRL59022 multi-safety device relay module with PSDI**

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

<table>
<thead>
<tr>
<th>Nominal supply voltage (A1(+), A2(−))</th>
<th>24 Vdc (±15 %, power line disturbance: max. 5 ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal power consumption</td>
<td>4.1 W</td>
</tr>
<tr>
<td>Fuse protection</td>
<td>Internal PTC</td>
</tr>
<tr>
<td><strong>Inputs</strong></td>
<td></td>
</tr>
<tr>
<td>Safety devices</td>
<td>1, 2 or 3 redundant floating inputs with optocoupler (S11/S12, S13/S14, S21/S22, S23/S24, S31/S32, S33/S34)</td>
</tr>
<tr>
<td>Key switch selector inputs (PSDI modes)</td>
<td>3 floating inputs with optocoupler (S21/S22, S23/S24, S31/S32)</td>
</tr>
<tr>
<td>Machine contact input (PSDI modes)</td>
<td>1 floating input with optocoupler (S33/S34)</td>
</tr>
<tr>
<td>Restart input</td>
<td>Normally open (restart on push-button release within max. 3 s)</td>
</tr>
<tr>
<td><strong>External Device Monitoring (EDM) (S41/S42)</strong></td>
<td>Normally closed contacts (monitored opening time at restart: max. 230 ms)</td>
</tr>
<tr>
<td>Restart delay time</td>
<td>Manual start: 65 ms / Automatic start: 71 ms (cascading modes), 58 ms (PSDI modes)</td>
</tr>
<tr>
<td>Input voltage at S12, S14, S22, S24, S32, S34</td>
<td>23 Vdc at nominal voltage</td>
</tr>
<tr>
<td>Switching on min. voltage / off max. voltage</td>
<td>16 Vdc / 10 Vdc</td>
</tr>
<tr>
<td>at S12, S14, S22, S24, S32, S34, S44</td>
<td>4.5 mA at nominal voltage</td>
</tr>
<tr>
<td>Input current at S12, S14, S22, S24, S32, S34, S44</td>
<td>max. 2.5 s</td>
</tr>
<tr>
<td>Coincidence time between redundant safety device inputs</td>
<td>1 or 2 intrusions: 15 s or 30 s</td>
</tr>
<tr>
<td>(S12/S14), (S22/S24, S32/S34 cascading modes only)</td>
<td></td>
</tr>
<tr>
<td>Max. intrusion time (PSDI, key switch programmable)</td>
<td></td>
</tr>
<tr>
<td><strong>Safety outputs</strong></td>
<td></td>
</tr>
<tr>
<td>Contact type</td>
<td>Internally redundant positive guided safety relay contacts</td>
</tr>
<tr>
<td>Contact complement</td>
<td>3 NO (13/14, 23/24, 33/34)</td>
</tr>
<tr>
<td>Response time</td>
<td>26 ms (between safety device input and module relay outputs)</td>
</tr>
<tr>
<td><strong>Switching capability</strong></td>
<td>Power factor = 1 (see Note 1 and Figure 1)</td>
</tr>
<tr>
<td><strong>Output Current (min. to max.)</strong></td>
<td>1 mA to 5 A (see Note 1)</td>
</tr>
<tr>
<td><strong>Output Voltage (min. to max.)</strong></td>
<td>0.1 to 230 Vac/dc</td>
</tr>
<tr>
<td><strong>Typical Electrical Life Expectancy</strong></td>
<td>Power factor = 1 at 230 Vac (see Note 2 and Figure 1)</td>
</tr>
<tr>
<td><strong>Typical Power Factor (cos ϕ)</strong></td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td>0.45</td>
</tr>
<tr>
<td>0.5</td>
<td>0.70</td>
</tr>
<tr>
<td>0.7</td>
<td>0.85</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Operating frequency</strong></td>
<td>1200 switching cycles/h (max.)</td>
</tr>
<tr>
<td><strong>Fuse rating</strong></td>
<td>6 A time delayed (max.)</td>
</tr>
<tr>
<td><strong>Mechanical life</strong></td>
<td>Ten million switching operations</td>
</tr>
<tr>
<td><strong>Auxiliary outputs</strong></td>
<td>PNP static output (58) (23 Vdc/thermal current: max. 100 mA/peak current (max. 0.5 s): 400 mA)</td>
</tr>
<tr>
<td><strong>Relay status / test output</strong></td>
<td>Normally closed characteristics (test active: 0 Vdc, test inactive: 24 Vdc)</td>
</tr>
<tr>
<td><strong>Test output</strong></td>
<td>response of safety device on test signal &lt; 200 ms</td>
</tr>
<tr>
<td><strong>External indicator / diagnostic output</strong></td>
<td>PNP static output (48) (23 Vdc/thermal current: max. 100 mA/peak current (max. 0.5 s): 400 mA)</td>
</tr>
<tr>
<td><strong>General</strong></td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>0 °C to +50 °C / 32 °F to 122 °F</td>
</tr>
<tr>
<td><strong>Sealing</strong></td>
<td>Housing IP 40, Terminals IP 20</td>
</tr>
<tr>
<td><strong>Housing material</strong></td>
<td>Thermoplastic</td>
</tr>
<tr>
<td><strong>Vibration resistance</strong></td>
<td>Amplitude 0.35 mm; Frequency 10 to 55 Hz</td>
</tr>
<tr>
<td><strong>Connector connection (max.)</strong></td>
<td>1 x 4 mm² solid [12 AWG], 1 x 2.5 mm² [14 AWG], 2 x 1.5 mm² [16 AWG] stranded wire with sleeve DIN 46288</td>
</tr>
<tr>
<td><strong>Connector attachment</strong></td>
<td>Removable block terminals with M3.5 screws; wire contacts are enclosed to prevent electrical shock</td>
</tr>
<tr>
<td><strong>Mounting</strong></td>
<td>Quick install rail mounting EN 50022-35, 35 mm x 15 mm / 1.38 in x 0.59 in size</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>320 g / 0.70 lb</td>
</tr>
</tbody>
</table>

**ORDERING INFORMATION**

**FF-SRL59022**

**Note 1:** Contact damage: To ensure the 1 mA capability during the lifetime of the contact, never exceed 300 mA or 60 V.

**Note 2:** Install arc suppression devices across load to avoid module contact arcing and ensure specified relay life expectancy.

**Note 3:** Total operations = operations at power factor 1 multiplied by the limitation factor.

Example: U = 230 Vac, I = 2 A, power factor cos ϕ = 0.7
Switching power P = U x I = 460 Vac
Contact life (cos ϕ = 1, P = 460 Vac) = 1 000 000 operations (see Figure 1)
Limitation factor F (cos ϕ = 0.5) = 0.7 (see Figure 2)
Contact life (cos ϕ = 0.5, P = 460 Vac) = F x contact life (cos ϕ = 1, P = 460 Vac) = 700 000 operations.

**Figure 1 Contact life for 100% resistive load (typical)**

Power factor = 1 (cos ϕ)(see Note 3)

**Figure 2 Limitation factor for inductive loads**

Power factor < 1 (cos ϕ)(see Note 3)
### Installation diagram

- **Width**: 45 mm / 1.77 in
- **Height**: 74 mm / 2.91 in
- **Depth**: 121 mm / 4.76 in

### Mounting Dimensions

- **Width**: 45 mm / 1.77 in
- **Height**: 74 mm / 2.91 in
- **Depth**: 121 mm / 4.76 in

### Internal circuitry

- **Run 1**: A1+, A2+, S11(-), S13(+), S21(-), S23(+), S31(-), S33(+), S41(-), S43(+), A1+, K1
- **Run 2**: A1+, A2+, S11(+), S13(-), S21(+), S23(-), S31(+), S33(-), S41(+), S43(-), A1+

### Front panel

- **M1**: A1+ 48 S12 S14 S22 S24 S32 S34
- **S11**: A1+ 13 23 33
- **S12**: 48 14 24 34

### Removable terminal blocks

- **Run 1/Run 2**: LED indicators system status ("ON" = system running, "flickering" = error)
- **K1/K2**: relay output status

---

*Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com*
Mode setting

The operating modes of the FF-SRL59022 module are set using 4 selectors located behind the removable front panel. 28 different programs are available allowing to adapt the serial modes and the Presence Sensing Device Initiation (PSDI, single / double intrusion) modes to the application.

The FF-SRL59022 module has two redundant microprocessor channels. The mode setting of each channel is done by two selectors "A" and "B".

The position of the corresponding selector "A" or "B" for channel 1 and channel 2 must be identical (see example).

Example: Selecting mode "81"

<table>
<thead>
<tr>
<th>Selector</th>
<th>Channel 1</th>
<th>Channel 2</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot;</td>
<td>8</td>
<td>8</td>
<td>single / double intrusion mode</td>
</tr>
<tr>
<td>&quot;B&quot;</td>
<td>1</td>
<td>1</td>
<td>without EDM and without test input</td>
</tr>
</tbody>
</table>

SERIAL MODES

<table>
<thead>
<tr>
<th>Selector &quot;A&quot;: External Device Monitoring (EDM) modes</th>
<th>Safety Device Inputs</th>
<th>Safety device without test input</th>
<th>Selector &quot;B&quot;: Start and test input modes</th>
<th>Safety device with test input</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 with EDM (S11/S12, S13/S14)</td>
<td>SD1 start/restart interlock</td>
<td>SD1 automatic restart</td>
<td>SD1 automatic restart</td>
<td>SD1 start/restart interlock</td>
</tr>
<tr>
<td>1 without EDM (S21/S22, S23/S24)</td>
<td>SD2 start/restart interlock</td>
<td>SD2 automatic restart</td>
<td>SD2 automatic restart</td>
<td>SD2 start/restart interlock</td>
</tr>
<tr>
<td>0 with EDM (S31/S32, S33/S34)</td>
<td>SD3 start/restart interlock</td>
<td>SD3 automatic restart</td>
<td>SD3 automatic restart</td>
<td>SD3 start/restart interlock</td>
</tr>
</tbody>
</table>

Note:

Safety device (SD) in "start/restart interlock" means that the module must be restarted using the start push-button after activating and releasing this safety device.

Safety device (SD) is in "automatic restart" means that the module restarts again automatically after releasing all safety devices assigned to automatic start.

If a not valid mode has been selected, fatal error 5 is displayed (see chapter 'Diagnostic Information' for details).
Note:
The number of intrusions (1 or 2) and the maximum intrusion time (15 s or 30 s) can be selected by the operator using an external key selector connected to module inputs (S21/S22, S23/S24, S31/S32). For details, see application example 2.

LED indicators
The FF-SRL59022 module has 4 LED indicators: two green LED relay status indicators (K1, K2) and two yellow LED status indicator (Run 1, Run 2) on the front panel.

Relay outputs status (K1, K2)

<table>
<thead>
<tr>
<th>Internal relays are de-energized</th>
<th>Internal relays are energized</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO contacts are open</td>
<td>NO contacts are closed</td>
</tr>
<tr>
<td>NC contact is closed</td>
<td>NC contact is open</td>
</tr>
</tbody>
</table>

Diagnostic information (Run 1, Run 2)

<table>
<thead>
<tr>
<th>Run 1</th>
<th>Run 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>⬤</td>
<td>⬤</td>
</tr>
<tr>
<td>⬠</td>
<td>⬠</td>
</tr>
<tr>
<td>n</td>
<td>⬤</td>
</tr>
<tr>
<td>n</td>
<td>⬠</td>
</tr>
<tr>
<td>⬠</td>
<td></td>
</tr>
<tr>
<td>⬠</td>
<td>⬠</td>
</tr>
</tbody>
</table>

Flash frequency:
- Light off
- 1-times flashing (error)
- 2-times flashing (error)
- 3-times flashing (error)
- 4-times flashing (error)
- 5-times flashing (error)
- 6-times flashing (error)
- 7-times flashing (error)
- 8-times flashing (error)
- 9-times flashing (error)
- Flashing (0.66 Hz)
Application example 1: Serial modes

1A - Safeguarding with 2 FF-SYA safety light curtains and 1 maintenance door

1B - Safeguarding of double work station with 2 FF-SG safety light curtains

Description

Example 1A: An operator carries out manual operations on a machine work station safeguarded by light curtains and a maintenance door. When a gap between the vertical safety light curtain and the hazardous zone allows the operator to stand in between without being detected, an additional safety device for presence detection (e.g., a horizontal safety light curtain) shall be installed to ensure proper detection. An access through a door monitored by a safety switch is possible for maintenance or machine settings.

The serial mode system of this example is composed of the following elements:
- FF-SRL59022 safety relay module,
- 2 FF-SYA safety light curtains,
- 1 safety switch (e.g., GK Series).

Example 1B: Two operators carry out operations on the same machine work station through two different openings safeguarded by two safety light curtains.

The serial mode system of this example is composed of the following elements:
- FF-SRL59022 safety relay module,
- 2 FF-SG safety light curtains.

Depending on the selected start/restart mode for the three safety device inputs (see chapter "Mode setting"), the module may start/restart automatically or need to be started/restarted manually using the start push-button after the safety device has been released.

In these examples, the module inputs for safety light curtain 1 and safety light curtain 2 are assigned to "automatic start/restart mode" and those for safety device 3 (safety switch, example 1A only) are assigned to "start/restart interlock mode". This means, that the module closes its normally open safety relay outputs (13/14, 23/24, 33/34) automatically, as soon as both safety light curtains have been released. However, the start push-button needs to be pushed, after the maintenance door has been opened and closed.
Wiring diagram application example 1A

Note (A): Signals between redundant safety device inputs S11 to S14 or S21 to S24 or S31 to S34 must be applied within a max. time of 2.5 s.

Modes 00 to 03 and 10 to 13: safety devices without test input: unused safety device inputs must be connected to power: S11, S13, S21, S23, S31, S33 to (dc-); S12, S14, S22, S24, S32, S34 to (dc+).

Note (B): Modes 05 to 08 and 15 to 18: safety devices with test input: terminal 58 is used as test output that must be connected to the test input of each safety device. Unused safety device inputs must be connected to power and to the test output: S11, S13, S21, S23, S31, S33 to (dc-); S12, S14, S22, S24, S32, S34 to 58 (refer to chapter "Test input").

Note (C): A start push-button needs to be connected for all modes (even if all safety devices are assigned to automatic start/restart modes), in order to reset an error (e.g. a safety device in automatic mode is activated at power-up, the start push-button is pushed with a safety device activated).

Mode selector

Mode “02”: safety devices 1 and 2 in automatic restart mode, safety device 3 in start/restart interlock mode, with EDM.
**Application example 2: Presence Sensing Device Initiation (PSDI with single / double intrusion)**

**Description**

An operator carries out manual loading / unloading operations on a machine work station (e.g. a hydraulic press or a rotating working table) safeguarded by a safety light curtain. Therefore, the operator needs to intrude the safety light curtain once or twice during the non-hazardous portion of a machine cycle. The machine restarts automatically after the programmed number of intrusions have been effectuated. This allows the operator to work continuously.

A PSDI system is composed of the following elements:

- the FF-SRL59022 safety relay module,
- a safety light curtain (e.g. FF-SB safety light curtain),
- a safety switch as machine contact,
- an external key operated selector for setting of
  - number of intrusions (1 or 2) and
  - maximum intrusion time (15 s or 30 s),
- an external indicator (connected to terminal 48) for safety relay outputs status (on/off), waiting for start push-button status (slow flickering), waiting for intrusion status (quick flickering).

**Notes:**

**Safety device(s) in start/restart interlock mode**

The module must be started / restarted using the the start push-button:

- at power-up, if at least one safety device is in start/restart interlock mode (see ①)
- after activation of a safety device in start/restart interlock mode (see ②)
- if an error has been detected or if the test of a safety device has failed

**Safety device(s) in automatic start/restart mode**

The module starts/restarts automatically:

- at power-up, if all safety devices are in automatic start mode and released
- after activation and release of the last safety device in automatic start/restart mode, if no safety device in start/restart mode has been activated or if no safety device in start/restart interlock mode is existing (see ②).

**DANGER**

**IMPROPER PSDI USE IN NORTH AMERICA**

Presence Sensing Device Initiation (PSDI) is NOT allowed for use with some applications in North America. Do not use PSDI in North America if the applicable standard(s) prohibit its use. Consult with local safety agencies before installing a PSDI capability.

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

---

**Functional diagram**

![Functional diagram with supply voltage, start push-button, safety device, relays, and lamp output](image)

**Notes:**

<table>
<thead>
<tr>
<th>Supply voltage (A1/A2)</th>
<th>Start P/B (S43/S44)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety device (automatic restart mode)</td>
<td>Safety device (start/restart interlock mode)</td>
</tr>
<tr>
<td>Relays K1,K2 (13/14,23/24,33/34)</td>
<td>Lamp output (48)</td>
</tr>
<tr>
<td>③: waiting for start/restart</td>
<td>②: Error 2: (safety device activated)</td>
</tr>
<tr>
<td>②: Error 2: (safety device start/restart activated)</td>
<td>①: switched off, n: flashing (0,66 Hz)</td>
</tr>
<tr>
<td>n: n-times flashing (error), ④: switched on</td>
<td></td>
</tr>
</tbody>
</table>

- at power-up, if at least one safety device is in start/restart interlock mode (see ①)
- after activation of a safety device in start/restart interlock mode (see ②)
- if an error has been detected or if the test of a safety device has failed

**Application example 2:**

- **On a hydraulic press**
- **On a rotating working table**

---

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Normal working sequence

A successful start sequence must have been performed before, in order to validate the settings for the number of intrusions and the max. intrusion time (refer to the installation manual for details).

A safety switch (machine contact) is used to monitor the machine cycle. The machine contact must be installed, so that it closes (and opens again) when the non-hazardous portion of the machine cycle has been reached. Then, the normally open safety contacts 13/14, 23/24 and 33/34 will open, disabling the machine. A quick flickering external indicator invites the operator to carry out the selected number of intrusions within the selected max. intrusion time. The module closes its safety contacts restarting the machine process automatically.

The module opens its normally open safety relay contacts (13/14, 23/24 and 33/34) stopping the hazard, when
- the maximum number of intrusions has been exceeded OR,
- the selected max. intrusion time has elapsed OR,
- an intrusion has been made during the hazardous portion of the machine cycle.

In these cases, the module needs to be restarted manually using the start push-button.

Notes:
- The restart push-button must be pushed AND released within 3 s to start / restart the module.
- The normally open machine contact needs to close for at least 100 ms with the safety relay outputs (13/14, 23/24, 33/34) closed, in order to detect the non-hazardous-phase of the machine cycle and authorize the intrusions to take place. Normally open machine contact closures of less than 100 ms are ignored by the module.
- The FF-SRL59022 will open its safety relay contacts and a PSDI error will be displayed (see chapter ‘Diagnostic Information), if
  - an incorrect number of intrusions has been performed,
  - the max. muting time has elapsed,
  - intrusions have been made without the machine contact has detected the non-hazardous phase,
  - no or a not successful start sequence has been performed at power up or after changing the position of the key selector for the intrusions.
Mode selector

Mode 80:
PSDI for safety light curtains without test input and with External Device Monitoring (EDM).

Wiring diagram

Note (A): Signals between redundant safety device inputs S11 to S14 must be applied within a max. time of 2.5 s.
Note (B): Modes 82 to 83: PSDI using safety devices with test input: terminal 58 is used as test output that must be connected to the test input of the safety device (refer to chapter "Test input").
Note (C): Safety device and machine contact type: this can be voltage free dry contacts or static outputs.
Note (D): External contactors: when external contactors are used, connect one normally closed contact of each contactor (or the normally closed contact of the FF-SRE extension module) in series into the External Device Monitoring (EDM) loop S43/S44. Install arc suppressors across the coils of external safety relays.
Note (E): External key selector: The position of the external key selector for the selection of the number of intrusions and the max. intrusion time can be changed at any moment of the working cycle. However, the changes are only taken into account, when the machine is stopped (normally open safety relay contacts 13/14, 23/24, 33/3 are open). A successful start sequence must be performed then in order to validate the changes.

External key selector

<table>
<thead>
<tr>
<th>Key selector position</th>
<th>Modes</th>
<th>Max. intrusion time</th>
<th>Number of intrusions</th>
<th>Max. intrusion time</th>
<th>Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S21/S22, S31/S32</td>
<td>S23/S24, S33/S34</td>
<td>S11/S12, S13/14</td>
<td>S33/S34, S41/S42</td>
<td>S43/S44</td>
</tr>
<tr>
<td>0</td>
<td>Guard only (0 intrusion)</td>
<td>not applicable</td>
<td>0</td>
<td>0 or 1</td>
<td>Safety device, Machine contact, EDM loop, Start P/B</td>
</tr>
<tr>
<td>1</td>
<td>1 intrusion</td>
<td>30 seconds</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1 intrusion</td>
<td>15 seconds</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2 intrusions</td>
<td>15 seconds</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>2 intrusions</td>
<td>30 seconds</td>
<td>1</td>
<td>0 or 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>30 seconds</td>
<td>1</td>
<td>0 or 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not valid</td>
<td>not applicable</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

0: contact opened
1: contact closed
When connecting type 2 safety devices to the FF-SRL59022 module, the test function normally must be used to check the safety integrity of the safety device. However, the type 2 safety light curtains of the FF-SLG18 and FF-SLG30 Series are permanently self-checked internally making the use of the test input NOT compulsory and optional.

**Safety devices compatible with the FF-SRL59022 test output**
- FF-SLG18 and FF-SLG30 type 2 safety light curtains (all models with the exception of FF-SLG18147B2 and FF-SLG30147B2)
- Safety switches (e.g. for safety door monitoring).

**Modes with test**
- Serial modes 05 to 08 and 15 to 18.
- PSDI modes 82 to 83.

In these modes the output terminal 58 is used as test output and it must be connected to the test inputs of all connected safety devices, that are tested simultaneously.

A test signal is generated before each activation of the internal safety relays K1, K2 (safety contacts 13/14, 23/24, 33/34).

**DANGER**

**IMPROPER SAFETY PRODUCT USE IN THE US**
- Type 2 safety light curtains as defined by IEC/EN 61496-1 and IEC/EN 61496-2 do **not meet** US OSHA 1910.217, US ANSI B11.1, B11.2, B11.19 and B11.20 requirements. Although Type 2 safety products are acceptable for certain applications outside the US, they are not generally acceptable in the US due to current US regulations and standards.
- In the US, Type 2 safety light curtains may be used under limited circumstances as defined by the ANSI/R15.06-1999 standard. In Canada, IEC/EN 61496-1 and IEC/EN 61496-2 are recognised as product standards, however application standards do not typically allow Type 2 light curtain use.
- Do not use Type 2 safety products in the US if the applicable standard requires a control reliable solution. For Risk Assessment, refer to ANSI TR3 and ANSI/R15.06-1999 for the USA and the Ministry of Labour for Canada.
- Consult with local safety agencies before installing a Type 2 safety light curtain product.

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

---

**TEST INPUT EXAMPLE**

Serial mode using one FF-SLG18/FF-SLG30 type 2 safety light curtain with test input and two safety switches

**Note (A):** Connect test output terminal 58 to the test input of each FF-SLG18/FF-SLG30 emitter as shown in the wiring diagram above while respecting the polarity of the test input terminals (test input (+) = terminal 6, test input (-) = terminal 1).

**Note (B):** Unused safety device inputs must be connected to power and to the test output: S31 and S33 to (dc-); S32 and S34 to 58.
Diagnostic informations

Detailed diagnostic information for an easy troubleshooting of your application is available using the following indicators:
- internal indicators: LED "RUN1" and "RUN2" located on the module front panel,
- external indicators connected to terminal 48.

In the case of a failure the indicators are indicating a flashing code. There exist two types of errors:
- **FATAL ERRORS** are indicated by flashing internal LED's “RUN1” and/or “RUN2”. The external indicator (48) remains permanently off. The normally open safety contacts (13/14, 23/24, 33/34) are de-energised and the module needs to be reset by taking the power off and on after resolving the error cause.
- **APPLICATION AND INSTALLATION ERRORS** are indicated by flashing internal LED “RUN1” and the external indicator (48). LED “RUN2” is permanently on. The normally open safety contacts (13/14, 23/24, 33/34) are de-energised, but the module can be restarted pushing the start push-button after resolving the error cause.

### FATAL ERRORS

<table>
<thead>
<tr>
<th>Error code</th>
<th>LED RUN 1</th>
<th>LED RUN 2</th>
<th>External indicator (48)</th>
<th>Error type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td>Internal module error, no power</td>
</tr>
<tr>
<td>5</td>
<td>5 (1)</td>
<td></td>
<td></td>
<td>Mode selector error</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>Under-voltage error</td>
</tr>
<tr>
<td>7</td>
<td>7 (1)</td>
<td></td>
<td></td>
<td>Over-voltage error</td>
</tr>
<tr>
<td>8</td>
<td>8 (1)</td>
<td></td>
<td></td>
<td>Internal relay error</td>
</tr>
<tr>
<td>9-13</td>
<td>9-13 (1)</td>
<td></td>
<td></td>
<td>Internal module error</td>
</tr>
</tbody>
</table>

Note (1): It is possible that
- LED "RUN1" and "RUN2" are indicating different error codes or,
- only one LED "RUN1" or "RUN2" is indicating an error code and the second LED "RUN1" or "RUN2" is switched off.

### APPLICATION AND INSTALLATION ERRORS

<table>
<thead>
<tr>
<th>Error code</th>
<th>LED RUN 1</th>
<th>LED RUN 2</th>
<th>External indicator (48)</th>
<th>Error type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>Safety device error</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>Safety device activated (e.g. beam interruption of a safety device light curtain)</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>Restart P/B error</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>External device monitoring (EDM) error</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>Intrusion error (PSDI modes)</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>Machine contact error (PSDI modes)</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td>Key switch selector error (PSDI modes)</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>Not allowed position of key switch selector error (PSDI modes)</td>
</tr>
</tbody>
</table>

\[\text{\textbullet} : \text{switched off} \quad \text{n\times}: \text{n-times flashing} \quad \text{\textbullet} : \text{switched on}\]
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.

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Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact a nearby sales office or:

INTERNET: www.honeywell.com/sensing
E-mail: info.sc@honeywell.com
**FEATURES**

- Complies with EU Directive for machines 98/37/EC, IEC/EN 60204, DIN VDE 0113, EN 954-1
- Supply voltage: 24 Vdc
- Dual input compatible with Honeywell Electrosensitive Protective Equipment with static safety outputs (FF-SYA, FF-SLG and FF-SG Series)
- Dual input compatible with safety devices with relay outputs, e-stop push-buttons and safety switches
- Two cross-monitored relays with guided contacts (internally redundant): three NO contacts and one NC contact
- Switching current from 1 mA to 6 A (gold plated 5 µm contacts allow low current)
- Response time: 15 ms
- Selectable automatic or manual restart modes (with permanent short-circuit detection)
- Selectable Final Switching Device monitoring loop for the control of external relays or contactors
- LED indicators for power inputs and outputs status, and restart condition
- Removable terminal strips for ease of maintenance
- 45 mm / 1.77 in width housing

The FF-SRL59192 Dual Channel Relay Module is designed to be used with Honeywell Electrosensitive Protective Equipments (ESPE) with static safety outputs, e-stops push-buttons or safety switches in emergency stop circuits when danger to personnel or machinery is present. Its slim 45 mm / 1.77 in width housing is ideal for space restricted areas. When correctly installed, this module provides a Control Reliable interface between the safety device and the machine control circuitry. A single fault does not prevent the normal stopping action from taking place but will prevent the next machine cycle to start until the fault is corrected. This is accomplished by the use of redundant circuitry, self-checking capability and positive guided safety relay outputs. These redundant safety relay outputs are rated for 6 amps to directly operate with the machine control actuators using 3 NO and 1 NC output contacts. These 3 NO output contacts are internally redundant (two contacts in series) allowing to control up to 3 separate single channels. In addition, the contacts are gold plated to ensure compatibility with very low current loads (such as PLC inputs).

The FF-SRL59192 Module can be wired for either Automatic or Manual Restart modes of operation and also provides Final Switching Device (FSD) monitoring if interfaced with external relaying devices. The FF-SRL59192 is equipped with LED indicators that provide diagnostic information and has removable wiring strips to make replacement fast and easy.

**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.
**FF-SRL59192 Dual Channel Relay Module**

### SPECIFICATIONS

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

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>Nominal voltage</th>
<th>24 Vdc (± 15 %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal power consumption</td>
<td></td>
<td>2.3 W</td>
</tr>
<tr>
<td>Fuse protection</td>
<td>Internal PTC</td>
<td></td>
</tr>
<tr>
<td>Restart input</td>
<td>Restart delay time</td>
<td>Manual start mode: 25 ms; Automatic start mode: 250 ms</td>
</tr>
<tr>
<td>Emergency stop inputs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input voltage at S11</td>
<td>22.5 Vdc at nominal voltage (provided by Relay Module)</td>
<td></td>
</tr>
<tr>
<td>Switching on min./max. voltage at S12 and S32</td>
<td>19 Vdc / 27.6 Vdc</td>
<td></td>
</tr>
<tr>
<td>Switching off min. voltage at S12 and S32</td>
<td>7 Vdc</td>
<td></td>
</tr>
<tr>
<td>Input current at S12 / S32</td>
<td>35 mA / 55 mA at nominal voltage</td>
<td></td>
</tr>
<tr>
<td>Relay outputs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relay type</td>
<td>Safety relay with positive-guided contacts (internally redundant)</td>
<td></td>
</tr>
<tr>
<td>Safety contacts</td>
<td>3 NO, 1 NC</td>
<td></td>
</tr>
<tr>
<td>Switching capability</td>
<td>Power factor = 1 (see Note 1 and Fig. 1)</td>
<td></td>
</tr>
<tr>
<td>Current range (min. to max.)</td>
<td>1 mA to 6 A (see Note 1)</td>
<td></td>
</tr>
<tr>
<td>Voltage range (min. to max.)</td>
<td>0.1 to 250 Vac/dc</td>
<td></td>
</tr>
<tr>
<td>Typical Electrical Life Expectancy</td>
<td>Power factor = 1 at 230 Vac (see Note 2 and Fig. 1)</td>
<td></td>
</tr>
<tr>
<td>Typical Power Factor (cos $\phi$)</td>
<td>1 A: 2 000 000 operations; 2 A: 1 000 000 operations; 4 A: 300 000 operations; 6 A: 200 000 operations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Limitation Factor (see Note 3 and Fig. 2)</td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td>0.45</td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td>0.7</td>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Operating frequency</td>
<td>1200 switching cycles/h (max)</td>
<td></td>
</tr>
<tr>
<td>Fuse rating</td>
<td>6 A time delayed (max)</td>
<td></td>
</tr>
<tr>
<td>Mechanical life</td>
<td>Ten million switching operations</td>
<td></td>
</tr>
<tr>
<td>General</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>-15 °C to + 55 °C (5 °F to 131 °F)</td>
<td></td>
</tr>
<tr>
<td>Sealing</td>
<td>Housing IP 40; Terminals IP 20</td>
<td></td>
</tr>
<tr>
<td>Housing material</td>
<td>Thermoplastic</td>
<td></td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>Amplitude 0.35 mm; Frequency 10 to 55 Hz</td>
<td></td>
</tr>
<tr>
<td>Connector connection (max.)</td>
<td>1 x 4 mm² solid [12 AWG], 1 x 2.5 mm² [14 AWG], 2 x 1.5 mm² [16 AWG] stranded wire with sleeve DIN 46288</td>
<td></td>
</tr>
<tr>
<td>Connector attachment</td>
<td>Removable block terminals with M3.5 screws; wire contacts are enclosed to prevent electrical shock</td>
<td></td>
</tr>
<tr>
<td>Mounting</td>
<td>Quick install rail mounting EN 50022-35, 35 mm x 15 mm / 1.38 in x 0.59 in. size</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>470 g / 1.02 lb</td>
<td></td>
</tr>
</tbody>
</table>

**ORDERING INFORMATION**

**FF-SRL59192**

2: 24 Vdc

**Figure 1**

**CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)**

Power factor = 1 (cos $\phi$)(see Note 3)

![Graph](image1.png)

**Figure 2**

**LIMITATION FACTOR FOR INDUCTIVE LOADS**

Power factor < 1 (cos $\phi$)(see Note 3)

![Graph](image2.png)

**Note 1:** Contact damage: To ensure the 1 mA capability during the lifetime of the contact, never exceed 300 mA or 60 V

**Note 2:** Install arc suppression devices across load to avoid module contact arcing and ensure specified relay life expectancy.

**Note 3:** Total operations = operations at power factor 1 multiplied by the limitation factor. If the power factor is 0.5 at 230 Vac, 2 A (1 000 000 operations), the limitation factor is 0.70. The number of total operations is: 1000000 x 0.70 = 700 000.
INSTALLATION DIAGRAM

INTERNAL CIRCUITTRY

MOUNTING DIMENSIONS
Width: 45 mm/1.77 in ; Height: 84 mm/3.30 in;
Depth: 118 mm/4.64 in

INTERNAL CIRCUITRY

FUNCTIONAL DIAGRAM

SETTING OF START MODE AND FSD MONITORING MODE

<table>
<thead>
<tr>
<th></th>
<th>Jumper between S13/S14</th>
<th>Start push-button between S11/S34</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual (without FSD monitoring)</td>
<td>Not connected</td>
<td></td>
</tr>
<tr>
<td>Automatic (without FSD monitoring)</td>
<td>Connected</td>
<td></td>
</tr>
<tr>
<td>Manual (with FSD monitoring)</td>
<td>Not connected</td>
<td></td>
</tr>
<tr>
<td>Automatic (with FSD monitoring)</td>
<td>Connected, FSD*</td>
<td></td>
</tr>
</tbody>
</table>

*FSD: NC contacts of external safety contactors or an extension module of the FF-SRE Series.
APPLICATION EXAMPLES:

1/ Manual restart mode with FSD monitoring: Connection of a FF-SYA safety light curtain (cross-fault monitoring by the safety light curtain)

In the manual restart mode, the NO contacts (13/14, 23/24, 33/34) will close and the NC contact 41/42 will open after the push-button is pressed and released, provided the two input signals (E1, E2) are available and provided the Final Switching Device (FSD) monitoring loop is closed (when using external safety contactors). If an emergency stop condition occurs the NO contacts will open within the 15 ms response time and the NC contact will close. This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to stop dangerous motion and/or remove power.

When correctly installed, the module will not restart:
- if the push-button is actuated for more than 1.5 s or if a permanent short-circuit of the restart push-button input occurs,
- if the FSD monitoring loop remains permanently open (failure of an external contactor).

2/ Automatic restart mode with FSD monitoring: Connection of a FF-SYA safety light curtain (cross-fault monitoring by the safety light curtain)
3/ Manual restart: Connection of an emergency stop push-button

**APPLICATION NOTES**

**NOTE (A): Start modes**

*Manual start mode:* Insert start push-button between S11/S34; no jumper must be set between S13/S14.

*Automatic start mode:* Insert jumper between S13/S14. The start push-button between S11/S34 is omitted.

**NOTE (B): External contactors**

If contact reinforcement via external safety contactors (or the FF-SRE Extension module) is necessary, their proper operation must be monitored looping their normally closed contacts into the restart loop (manual start mode: S11/S34; automatic start mode: S13/S14).

Install arc suppressors across the coils of external relays (these arc suppressors are not necessary, if the FSDs relays K3 and K4 are supplied by one of the FF-SRE extension modules).

**NOTE (C): Dual channel safety devices**

*Application example 1/ and 2/: Safety light curtains with static safety outputs (FF-SYA, FF-SG or FF-SLG Series) may be connected. Cross-fault is not monitored by the FF-SRL59192.

*Application example 3/: Safety devices with relay outputs (e.g. FF-SB, FF-LS, FF-SM, FF-SE), emergency stop push-buttons or safety switches may be connected. Cross-fault is monitored by the FF-SRL59192.
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**FF-SRL6025 Dual Channel Relay Module for safety devices with safety static outputs**

**FEATURES**
- Complies with EU Directive for machines 98/37/EC
- Meets the applicable parts of the US & Canadian regulations and standards ANSI/RIA/OSHA
- Category 4 as per the EN 954-1 European standard
- Dual channel input
- Output: three NO contacts and one NC contact
- Switching current from 10 mA to 5 A
- Automatic start or manual start modes
- Detection of blocked start push-button
- Selectable cross-fault detection in emergency stop control circuit
- LED indicates power and the status of both internal relays
- Very high mechanical and electrical lifetime
- Overvoltage and short-circuit protection
- Slim housing 22.5 mm / 0.89 in width

**TYPICAL APPLICATIONS**
- Emergency-stop circuits on machines
- Monitoring of safety devices with safety static outputs, like the safety light curtains of the series
  - FF-SYA
  - FF-SG18, FF-SG30
  - FF-SLG18, FF-SLG30

The FF-SRL6025 module is designed to be used with safety devices with safety static outputs when danger to personnel or machinery is present. This safety control module provides an emergency stop signal to the machine control circuitry.

FF-SRL6025 helps to create a control reliable safety solution by providing redundancy and self-checking circuitry.

This device offers two channel inputs and two internal safety relay outputs with positive-guided contacts. This ensures redundancy in its inputs and outputs.

The slim housing of only 22.5 mm (0.89 in.) width allows this safety control module to fit into almost every cabinet or even helps to reduce the overall cabinet size.

Other features include high current capability, an automatic start and manual start mode and external relays monitoring.

**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.
**FF-SRL6025 Dual channel Relay Module**

### SPECIFICATIONS

- **Dual channel Emergency Stop circuits**

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<thead>
<tr>
<th>Input</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage</td>
<td>24 Vdc (−10 %, +10 %)</td>
</tr>
<tr>
<td>Nominal power consumption</td>
<td>1.3 W</td>
</tr>
<tr>
<td>Nominal voltage at S11</td>
<td>22 Vdc (provided by control module)</td>
</tr>
<tr>
<td>Input current between S11/S12 and S21/S22</td>
<td>20 mA</td>
</tr>
<tr>
<td>Minimum voltage at S12</td>
<td>20 Vdc when activated</td>
</tr>
<tr>
<td>Start time</td>
<td>Manual START function: 40 ms (falling signal edge)</td>
</tr>
<tr>
<td></td>
<td>Automatic START function: 300 ms</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact complement</td>
<td>3 NO contacts, 1 NC contact</td>
</tr>
<tr>
<td>Response time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Opening of inputs (S11/12; S21/22): 20 ms</td>
</tr>
<tr>
<td></td>
<td>Opening in supply circuit (24 Vac/dc(+)/A1): 25 ms</td>
</tr>
<tr>
<td>Contact type</td>
<td>Safety relay, positive-guided</td>
</tr>
<tr>
<td>Current Range (min. to max.)</td>
<td>10 mA to 5 A</td>
</tr>
<tr>
<td>Voltage Range (min. to max.)</td>
<td>0.1 to 250 Vac</td>
</tr>
<tr>
<td>Switching Capability per AC15 (EN 60947-5-1)</td>
<td>NO contacts: 3 A / 230 Vac; NC contact: 2 A / 230 Vac</td>
</tr>
<tr>
<td>Typical Electrical Life Expectancy</td>
<td>Power factor = 1 at 230 Vac (See Note 1)</td>
</tr>
<tr>
<td>0.5 A</td>
<td>5.500.000 operations</td>
</tr>
<tr>
<td>1 A</td>
<td>2,000,000 operations</td>
</tr>
<tr>
<td>2 A</td>
<td>1,000,000 operations</td>
</tr>
<tr>
<td>5 A</td>
<td>250,000 operations</td>
</tr>
<tr>
<td>Typical Power Factor (cos ( \phi ))</td>
<td>Limitation Factor (See Note 2)</td>
</tr>
<tr>
<td>0.3</td>
<td>0.45</td>
</tr>
<tr>
<td>0.5</td>
<td>0.7</td>
</tr>
<tr>
<td>0.7</td>
<td>0.85</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Operating frequency</td>
<td>1200 switching cycles/hour (max.)</td>
</tr>
<tr>
<td>Output contact fuse rating</td>
<td>Time delay 6 A (max.)</td>
</tr>
<tr>
<td>Mechanical life</td>
<td>Twenty million switching operations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Temperature range</td>
<td>-15 °C to +55 °C / 5 °F to 131 °F at 90% humidity (max.)</td>
</tr>
<tr>
<td>Housing: IP 40</td>
<td></td>
</tr>
<tr>
<td>Terminals: IP 20</td>
<td></td>
</tr>
<tr>
<td>Housing material</td>
<td>Thermoplastic</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>Amplitude 0.35 mm; Frequency 10 to 55 Hz (per IEC/EN 60068-2-6)</td>
</tr>
<tr>
<td>Wire/conductor connection</td>
<td>Solid wire: 1 x 4 mm² [12 AWG] or 2 x 2.5 mm² [14 AWG]</td>
</tr>
<tr>
<td></td>
<td>Stranded wire with sleeve: 1 x 2.5 mm² [14 AWG] or 2 x 1.5 mm² (max.) [16 AWG]</td>
</tr>
<tr>
<td>Wire/conductor attachment</td>
<td>M3.5 screw terminals</td>
</tr>
<tr>
<td>Mounting</td>
<td>Quick install rail mounting IEC/EN 60715, width: 35 mm / 1.38 in</td>
</tr>
<tr>
<td>Weight</td>
<td>220 g / 0.49 lb</td>
</tr>
</tbody>
</table>

### ORDERING INFORMATION

**FF-SRL6025**

2 = 24 Vdc (only)

**Note 1:** Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

**Note 2:** Total operations = operations (power factor 1) x limitation factor \( F \).

Example:

- \( U = 230 \text{ Vac}, I = 1 \text{ A}, \text{ power factor } \cos \phi = 0.5 \)
- Switching power \( P = U \times I = 230 \text{ VA} \)
- Contact life (\( \cos \phi = 1 \), \( P = 230 \text{ VA} \)) = 2,000,000 operations
- Limitation factor \( F (\cos \phi = 0.5) = 0.7 \)
- Contact life (\( \cos \phi = 0.5, P = 230 \text{ VA} \)) = \( F \times \) contact life (\( \cos \phi = 1, P = 230 \text{ VA} \)) = 2,000,000 x 0.7 = 1,400,000 operations.

### CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

(Power factor (cos \( \phi \)) = 1, see Note 1)

### LIMITATION FACTOR \( F \) FOR INDUCTIVE LOADS

(Power factor (cos \( \phi \)) < 1, see Note 2)
The FF-SRL6025 module is designed to be used with safety light curtains with PNP safety static outputs (e.g. FF-SYA, FF-SYB, FF-SG, FF-SLG18, FF-SLG30).

If the safety device is actuated, the emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to stop the hazard and to remove power.

In the manual start mode, a push-button needs to be pushed and released, to energise the internal safety relays K1 and K2. In the automatic start mode, the internal safety relays K1 and K2 energise automatically.

Both relays K1 and K2 must be energized to have the normally open contacts 13/14, 23/24 and 33/34 in a closed position.

Line fault Detection on Start push-button
If the start push-button is closed before voltage is applied to S12 and S22 the safety contacts of the module cannot close. This additional feature ensures the detection of a line fault via the start push-button or a blocked start push-button. In case of a push-button failure the module can not be restarted.

The FF-SRL6025 emergency stop module contains two internal switches (S1 and S2) for the mode settings. To access to these switches, remove the front panel using a screwdriver.

Switch S1 is used to select an operating mode for cross fault detection between the two inputs.
When connecting safety light curtains with PNP static safety outputs (e.g. FF-SYA, FF-SYB, FF-SG, FF-SLG18, FF-SLG30), leave the switch S1 on position "without cross-fault detection” (factory setting), as cross-faults are detected by the light curtain.

Switch S2 is used to select the start /restart modes. In the manual start /restart mode, a start push-button needs to be pushed and released to energise the safety relay contacts. In the automatic start mode, the safety relay contacts energise automatically, after releasing the connected safety device.
APPLICATION EXAMPLES

CONNECTION OF AN FF-SYA TYPE 4 SAFETY LIGHT CURTAIN
(WITHOUT CROSS-FAULT MONITORING BY THE MODULE, WITH EXTERNAL CONTACTORS)

FUNCTIONAL DESCRIPTION
The FF-SRL6025 safety control module is designed to be used with safety devices with static safety outputs (e.g. FF-SYA, FF-SYB, FF-SG, FF-SLG18 or FF-SLG30 safety light curtains.

In the case of an emergency stop condition, the safety device is actuated and opens its normally closed contacts connected to the dual input channels S11/S12 and S21/S22. The internal safety relays K1 and K2 de-energise, indicated by the turned off LED indicators K1 and K2. The normally open safety relay contacts (13/14, 23/24, 33/34) will open and the normally closed contact (41/42) will close. The emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to stop the hazard and remove the electrical power. When removing the emergency stop condition, the normally closed safety device contacts close again and the module is ready to be restarted.

Two start / restart modes can be set: In the manual start mode, a push-button needs to be pushed and released, to energise the internal safety relays K1 and K2 and to illuminate LED indicators K1 and K2. The normally open safety contacts (13/14, 23/24, 33/34) will close and the normally closed contact (41/42) will open, allowing the machine to operate. In the automatic start mode, the internal safety relays K1 and K2 energise automatically.

APPLICATION NOTES
Note (A): Manual start mode: Insert start push-button between S33/S34 and select internal switch S2 as illustrated above.
Automatic start mode: Insert jumper between S33/S34 and select internal switch S2 to automatic start mode.
Note (B): External contactors
The proper operation of external safety contactors and FF-SRE extension modules must be monitored by using the External Device Monitoring (EDM) function of the FF-SRL6025 module. In order to do so, connect one normally closed contact of each safety contactor (or the FF-SRE Extension module) into the start loop.
Warranty and remedy

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Safety Control Modules

Safety control modules are used to interface safety devices such as safety light curtains, safety mats, safety laser scanners, safety switches, Hall-effect sensors etc. in a safe and reliable manner. The machine safety is not limited to the use of safety sensors alone, but especially relies on the correct design of the safety interface.

The weakest part in the safety chain will determine the overall safety category.

Providing an interface between safety sensors and machine control circuitry is a critical and important part of a control reliable safety solution. Using safety control modules will help you in this task.

Please refer to the compatibility table page 221, in order to determine which safety device may be connected to which safety control module.
Emergency Stop modules are designed to be used in emergency stop circuits when danger to personnel or machinery is present.

An emergency stop circuit is made up of one actuator part (Emergency Stop push-button or another safety device) and one control part (emergency stop module). The emergency stop module serves as a logical control unit in an emergency stop circuit. If the safety device is actuated, the emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

An emergency stop module accepts input from safety devices such as:
- Emergency stop push-buttons
- Electrosensitive Protective Equipment (ESPE) with relay outputs (according IEC/EN 61496 parts 1 & 2),
- Safety mats with relay outputs
- Safety limit switches

Based on the number of safety device input channels, two types of Emergency stop modules are available:
- Single channel Emergency Stop modules (for interfaces up to Category 2 per EN 954-1)
- Dual channel Emergency Stop modules (for interfaces up to Category 4 per EN 954-1, control reliable per OSHA & ANSI).

The safety category per EN 954-1 ("Safety related parts of control circuits"), which can be achieved in safety control interfaces, is partly depending on the type of Emergency Stop module used.

→ Single channel Emergency Stop modules:

This kind of Emergency stop module offers a single channel input only and are designed to be connected to safety devices with a single channel output. However, there is no redundancy in a single channel input and cross faults in the emergency stop input circuits cannot be detected. Moreover the detection of a line fault at the start push-button or of a blocked start push-button is not available on this kind of module. These faults may lead to a dangerous situation and safety may not be maintained.

*Single channel Emergency stop modules are suitable for interfaces up to Category 2 per EN 954-1.*

The following safety devices can be connected to single channel emergency stop modules:
- Single channel emergency stop push-buttons
- Safety limit switches

If a single channel Emergency stop module does not provide the level of safety required, use one of the dual channel safety control modules.
Dual channel Emergency Stop modules:

Emergency stop modules with two channel input are designed to be connected to safety devices with two channel outputs.

These two channels being powered with a different potential, any cross faults in the input loop will be detected and not allow to restart the module.

A line fault at the start push-button or a blocked start-button will be detected and the module cannot be restarted: If the Start push-button is already closed before energizing the inputs, it is impossible to energize the output contacts. If a line fault in the start push-button occurs after the machine starts, it will be detected at the next cycle and the output contact will not be energized.

Dual channel Emergency stop modules are suitable to be used for interfaces up to Category 4 per EN 954-1 and meet control reliability per OSHA & ANSI.

It is possible to connect safety devices such as
- Emergency stop push-buttons
- Electrosensitive protective equipment ESPE with relay outputs (following IEC/EN 61496 parts 1 & 2)
- Safety mats with relay outputs
- Safety limit switches

Two-hand safety module

Two-hand safety control systems ensure protection against hand injury due to dangerous movements of machines.

A two-hand safety control system is made up of two parts:
- A control board with two hand control devices
- A two-hand safety module (or command circuit) connected to the control board

The two-hand safety device must be activated simultaneously with both hands in order to make the two hand safety module close his outputs. The two hand safety module is relaying the output signal to the machine control circuit, allowing the machine to work.

The two-hand safety device must be located outside the dangerous area, so that the operator cannot reach the dangerous area before the machine has completely stopped. Releasing of one or both of the two hand device gives an immediate stop command of the machine. If only one two hand device has been released, the machine can only be restarted after releasing the other device and reactivation of both devices.
Different types of two-hand controls (Type per EN 574: Two-hand controls)

<table>
<thead>
<tr>
<th>Features</th>
<th>Type I</th>
<th>Type II</th>
<th>Type IIIA</th>
<th>Type III B</th>
<th>Type III C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of both hands to initiate cycle</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Both two hand devices need to be activated during the whole dangerous cycle</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Relation between input/output signal</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Release of one or both two hand devices stops the dangerous movement</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Hazardous operation</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Tamper resistant</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Release of both two hand devices for restart</td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Synchronous action (0.5 s max. between signals)</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

Steps to ensure maintain of safety functions:

- Well tried components following Cat.1 per EN 954-1: ● ● ● ● ●
- Single fault detection following Cat.3 per EN 954-1: ● ● ● ● ●
- Permanent self check Cat.4 per EN 954-1: ● ● ● ● ●
- Category according EN 954-1: 1 3 1 3 4

Restart the output signal: releasing of one or both safety devices will stop the dangerous movement. Restart is only possible after both safety devices have been released.

Safety on single fault: After a fault, the two-hand system must neither become a one hand system, nor lead to hazardous start. Faults are not all detected and their accumulation can lead to the loss of the safety function.

Automatic self-check: The system will detect the first fault in the circuit and will stop the dangerous movement. Faults will be detected before they could lead to the loss of the safety function.

Safety door monitors

Mechanical doors prevent the access to dangerous zones. These doors are designed to limit or block the access to hazardous motion of machinery.

They can be equipped with locking or interlocking devices, usually limit switches, micro switches or any other sensors.

When the locking device is triggered by means of moving the protective door, 2 types of information are created:

- **Door open**: The locking device triggers a stop command.
- **Door closed**: The locking device allows machine restart, but will not trigger the restart by itself.

**EN 60204 9.3.1**

**Closing the protective door shall not initiate a movement or an operation that could create a dangerous situation.**

Low safety level (Category 1 or 2 per EN 954-1)
The safety standards require a locking device made up of only one mechanical position switch, triggered in positive mode and with positive opening contact.
High safety level (Category 3 or 4 per EN 954-1)
The safety standard demands a locking device made up of two mechanical
position switches, usually working in opposite mode (see figure aside):
• One switch with normally closed contacts triggered by the door
  according to the positive mode
• One switch with normally open contacts triggered by the door
  according to the negative mode.

Extension module

The Extension Module provides contact multiplication for safety control modules or other safety devices
offering the external relay (FSD) monitoring capability.
The correct operation of the FF-SRE3081 is monitored by the FSD loop of the main safety device.

Time delay modules

The time delay modules may be used together with emergency stop modules. The emergency
stop module will immediately signal the emergency stop condition to the machine control
circuity.
The time delay module can be used to keep some non-safety related machinery operating for a
short period of time to avoid an unsafe condition or simplify the machine run-down & start-up
cycle. This is referred to as a Category 1 emergency stop per EN 418.

Typical Applications:
• Allowing the opening of a safety door after an elapsed time
• Signals a brake to stop the dangerous movement
• Disconnection of main power from the safety interface circuit after stopping the dangerous movement

Standstill monitors

The Standstill monitor module is detecting the stopping of single or three phase
asynchronous motors by measuring the back e.m.f. generated in the stator of the motor.
They are often used in conjunction with solenoid key operated switches to latch a door
until the dangerous movement has stopped.
Moreover, a broken wire in the measuring circuit can also be detected (by means of DC
current injection).

Typical applications:
• Stopped motor monitor for three or single phase asynchronous motors
• Used to unlock a door guarding a rotating machine only when the movement is stopped
• Used to apply an emergency brake

Notice: If the stopping time of the machinery is unpredictable, the use of a time delay module is not advisable.
Use the standstill monitor module in order to determine the exact stopping moment.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference</td>
<td>FF-SRS5924</td>
<td>FF-SRS5934</td>
<td>FF-SRS5925</td>
<td>FF-SRS5935</td>
<td>FF-SRS5988</td>
<td>FF-SR25980</td>
<td>FF-SRD5985</td>
<td>FF-SRE3081</td>
</tr>
<tr>
<td>Approvals</td>
<td>BG UL/CSA</td>
<td>BG UL/CSA (pending)</td>
<td>BG UL/CSA</td>
<td>BG UL/CSA (pending)</td>
<td>BG UL/CSA</td>
<td>BG UL/CSA</td>
<td>BG UL/CSA</td>
<td>BG UL/CSA</td>
</tr>
<tr>
<td>Safety Interfaces up to Category … (per EN 954-1)</td>
<td>2 (1)</td>
<td>4 (2)</td>
<td>4 (1)</td>
<td>4 (2)</td>
<td>1</td>
<td>4 (2)</td>
<td>1 or 2</td>
<td>1</td>
</tr>
<tr>
<td>Input Channels</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Volumes</td>
<td>24 Vdc</td>
<td>24 Vdc</td>
<td>24 Vac/dc</td>
<td>24 Vdc</td>
<td>24 Vdc</td>
<td>24 Vdc</td>
<td>24 Vdc</td>
<td>24 Vdc</td>
</tr>
<tr>
<td>Safety Contacts</td>
<td>3 NO</td>
<td>2 NO</td>
<td>2 NO</td>
<td>6 NO</td>
<td>2 NO</td>
<td>2 NO</td>
<td>7 NO</td>
<td>1 NO</td>
</tr>
<tr>
<td>Auxiliary Contacts</td>
<td>1 NC</td>
<td>-</td>
<td>1 NC</td>
<td>1 NC</td>
<td>1 NC</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Switching Current</td>
<td>10 mA to 4 A</td>
<td>10 mA to 10 A</td>
<td>1 mA to 7 A</td>
<td>1 mA to 10 A</td>
<td>1 mA to 6 A</td>
<td>1 mA to 10 A</td>
<td>1 mA to 10 A</td>
<td>1 mA to 10 A</td>
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<tr>
<td>Response Time</td>
<td>35 ms</td>
<td>35 ms</td>
<td>15 ms</td>
<td>25 ms</td>
<td>15 ms</td>
<td>30 ms</td>
<td>30 ms</td>
<td>15 ms</td>
</tr>
<tr>
<td>Simultaneity of two Input Signals</td>
<td>-</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>&lt; 30 ms</td>
<td>&lt; 300 ms</td>
<td>1 s</td>
<td>-</td>
</tr>
<tr>
<td>Cross fault detection between Input Channels</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>FSD-Monitoring</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Monitoring of Start Push-button</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>Automatic start only</td>
<td>-</td>
</tr>
<tr>
<td>Removable Terminal Strips</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Width</td>
<td>22.5 mm / 0.89 in</td>
<td>45 mm / 1.77 in</td>
<td>22.5 mm / 0.89 in</td>
<td>45 mm / 1.77 in</td>
<td>100 mm / 3.93 in</td>
<td>45 mm / 1.77 in</td>
<td>45 mm / 1.77 in</td>
<td>100 mm / 3.93 in</td>
</tr>
</tbody>
</table>

(1) The safety category depends on the category of the main safety control module.
(2) A higher safety category may be reached (depending on the interface).
(3) Cross faults between the inputs of the FF-SRS5939 will be detected by the fail safe static outputs of the FF-SYA safety light curtain.
(4) Depends on the connection of the FF-SRE.
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
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<td>FF-SRS5925</td>
<td>FF-SRS5935</td>
<td>FF-SRS5988</td>
<td>FF-SRS5939</td>
<td>FF-SR25980</td>
<td>FF-SRD5985</td>
<td>FF-SRE3081</td>
<td>FF-SRT</td>
<td>FF-SR05936</td>
</tr>
<tr>
<td>Safety Interfaces up to Category 2 (per EN 954-1)</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>4(1)</td>
<td>1(2)</td>
<td>1(2)</td>
</tr>
<tr>
<td>FF-SYA: Type 4 Light Curtains</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>FF-SB, FF-LS: Type 4 Light Curtains</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>FF-SLC: Type 2 Light Curtains</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>FF-SM: Safety Mat</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>FF-SE: Safety Laser Scanner</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>GMK, GQ: Key operated Safety Switches</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>GKR/L: Solenoid Key Operated Safety Switches</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<td>●</td>
</tr>
<tr>
<td>GSS: Global Safety Switch, 24CE/924CE: Miniature Safety Switch</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>40FY: Hall Effect Sensors</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>FF-SRE3081: Extension Module</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>FF-SRT: Time Delay Module</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>FF-SR05936: Standstill Monitor Module</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

- Interconnection possible
- (1) The safety category depends on the category of the main safety control module
- (2) A higher safety category may be reached (depending on the interface)
- (3) Except the FF-SB12ER02C-S2 (no FSD-loop)
Use of electrosensitive protective equipment: What you must know...

Part 1 of standard IEC / EN 61496:

- Increase resistance to failure
- Need to detect breakdowns

- Cyclical control
  - Opening of one NO contact linked to the machine's controls
- Dynamic self-control
  - Opening of 2 NO contacts linked to the machine's controls

Detection of the breakdown

**MODERATE TO LOW RISK:**
- Type 2

**HIGH RISK:**
- Type 4

Part 2 of standard IEC / EN 61496:

Some requirements specific to the technology used by the sensor for the detection of human body parts are covered by either another standard (like EN 1760-1 for safety mats) or by another part of standard IEC/EN 61496 (laser scanners will be covered by: pr IEC / EN 61496-3).

This is the case for all protective equipment using optoelectronic devices for the detection of human body parts.

The second part of standard IEC/EN 61496 defines the characteristics specific to optoelectronic devices, composed of emitters and receivers detecting the interruption of an optic signal generated by the device itself. Light curtains and multiple individual beams are part of this equipment and are referred to as “active optoelectronic protective devices” (AOPD).

Resolution:

The resolution of an optoelectronic protective device is defined as being the minimum diameter of the object always detected in any location within the controlled field.

Honeywell defines it as the sum of the center-to-center distances between 2 consecutive beams and the diameter of the optics used at transmission and reception.

Thus, the resolution of the Honeywell safety light curtains does not depend on the distance between the transmitter and the receiver, nor on environmental pollution, but only on the geometry of the sensors.

**Angles of aperture and reflective surfaces:**

Optics used on optoelectronic devices define a cone within which beams are emitted by emitters and received by receivers.

This cone has an aperture angle \( \alpha \), formed between the optical axis and the beams located on the edge of the optic cone.

The presence of reflective surfaces between the sensing field...
and the dangerous zone can bring about false reflections of the beams farthest from the optical axis and thus delay the detection of an object entering the dangerous zone.

\[ L \times \tan(\alpha) \leq 262 \text{ mm} \]

where \( L \) is the distance between the emitter and the receiver.

In order to limit any risk posed by this, standard IEC/EN 61496 - 2 voluntarily limits the angle of aperture of the optoelectronic devices within the following values:

**For Type 2 equipment:**

The angle of aperture \( \alpha \) cannot exceed 5° in relationship to the optical angle for any distance between emitter and receiver greater than 3 m. For distances between 0.5 m and 3 m, the angle of aperture must obey the rule:

\[ L \times \tan(\alpha) \leq 262 \text{ mm} \]

where \( L \) is the distance between the emitter and the receiver.

**For Type 4 equipment:**

The angle of aperture \( \alpha \) cannot exceed 2.5° in relationship to the optical angle for any distance between transmitter and receiver greater than 3 m. For distances between 0.5 m and 3 m, the angle of aperture must obey the rule:

\[ L \times \tan(\alpha) \leq 131 \text{ mm} \]

where \( L \) is the distance between the transmitter and the receiver.

In addition to the design requirement, there is an installation requirement. The minimum distance for installing an optoelectronic protective device in relation to a reflective surface can be determined from the following table:
General rules for installation

The selection of a safety solution is not limited to the simple selection of equipment according to the estimated level of safety, the type of machine to protect or the cost of installation. Some rules about installation will help you choose.

Three primary rules:

1 - Your machines can stop only after a certain length of time and the proposed safety equipment has a response time that you must take into account, even if it is small. You will thus be required to put your equipment at a minimum "safety distance".

Standard EN 999 supplies the formulae to calculate this distance.

2 - You may be required to add additional protective devices in order to prevent individuals from entering the "non-detection zone". Between the detection zone covered by sensors and the dangerous zone, there may be sufficient space to let an arm through, for example. These devices are regulated by standards EN 294, EN 811 and ANSI B11.19.

Observe a sufficient safety distance:

The distance between the safety equipment and the dangerous zone is an inviolable safety element. If no type C standard specific to the machine exists, standard EN 999 is applicable.

This standard supplies the necessary elements to compute the minimum distance to be respected between the equipment and the machine.

The formula takes the following general form:

\[ S = K(\ t_1 + t_2 ) + C \]

- S: Minimum safety distance between the detection field and the dangerous zone (in mm)
- K: Approach speed of the parts of the human body directly exposed (in mm/sec). Depending on the type of approach and the type of protective device used, K takes 2 values: 1.6 or 2 mm/msec.
- t1: Response time of the protective equipment (in sec)
- t2: Time necessary for the machine to stop the dangerous motion (in sec)
- C: Safety zone depending on the sensing ability of the protective equipment (in mm)

The EN 999 standard supplies the values for the K and C parameters for each of the three groups of safety devices being considered.

Installation examples

Penetration in danger zone over the barrier
Penetration in danger zone under the barrier
Penetration between the barrier and the danger zone
Mechanical protective on the back and sides
C is computed as a function of \( R \) (resolution of the equipment) and is therefore a function of each type of equipment and type of approach. Thus, depending on the case, \( C \) takes the following values:

- For light curtains with resolution \( 14 \text{ mm} \leq R \leq 40 \text{ mm} \):
  \[ C = 8 \times (R-14), \text{ in normal approach, and for an approach angle greater than or equal to 30°} \]

- For light curtains with resolution \( R > 40 \text{ mm} \):
  \[ C = 850, \text{ in normal approach, and for an approach angle greater than or equal to 30°} \]

- For systems with single beams:
  \[ C = 1200 \]

- For safety floors, barriers or for multiple individual beams, with a parallel approach or floors:
  \[ C = 1200 \times 0.4 \times H, \text{ with } H \text{ being the height of the detection plane from the ground (in mm)} \]

- For two-hand controls:
  \[ C = 250 \]

- For safety laser scanners:
  \[ C = (1200 - 0.4 \times H) \times E, \text{ with } E \text{ being the additional error margin and } H \text{ the height of the detection plane from the ground (in mm)} \]

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

<table>
<thead>
<tr>
<th>European EN 999 standard</th>
<th>( R \leq 40 )</th>
<th>( R &gt; 40 )</th>
<th>Single beam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perpendicular approach</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( S \geq 2000 \times (t_1 + t_2) + 8 \times (R-14) ) with ( S \geq 100 )</td>
<td>( S \geq 1600 \times (t_1 + t_2) + 850, \text{ with } H_u \geq 900 ) ( H_l \leq 300 \text{ m} )</td>
<td>( S \geq 1600 \times (t_1 + t_2) + 1200 )</td>
<td></td>
</tr>
<tr>
<td>If ( S \geq 500 ), then use: ( S \geq 1600 \times (t_1 + t_2) + 8 \times (R-14) ) with ( S \geq 500 )</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **Parallel approach** |               |               |             |
| \( S \geq 1600 \times (t_1 + t_2) + (1200 - 0.4 \times H), \text{ with } H \leq 875 \text{ or} \) \( S \geq 1600 \times (t_1 + t_2) + 850, \text{ with } 875 \leq H \leq 1000 \) \( \text{ with } H \geq 15 \times (R-50) \text{ where } R \text{ is the light curtain resolution} \) | | |

| **Angled approach** |               |               |             |
| If \( \alpha \geq 30° \), then use one of the formula given for a perpendicular approach, with \( H_u \geq 900 \text{ and } H_l \leq 300 \text{ if } R > 40 \) | | |
| If \( \alpha \leq 30° \), then use one of the formula given for a parallel approach, with \( H_u \leq 1000 \text{ and } H \geq 15 \times (R-50) \text{ where } R \text{ is the light curtain resolution} \) | | |