SensaGuard™
Integrated Latch
Unique Coded
Installation Instructions

Certifications

IMPORTANT:
SAVE THESE INSTRUCTIONS FOR FUTURE USE

Note: Refer to Technical Specifications for Certification information and ratings.
Installation Instructions

Installation must be in accordance with the following steps and stated specifications and should be carried out by suitable competent personnel.

Adherence to the recommended maintenance instructions forms part of the warranty.

This switch has an integrated latch and guard stop for use on lightweight guard doors.

This device is intended to be part of the safety related control system of a machine. Before installation, a risk assessment should be performed to determine whether the specifications of this device are suitable for all foreseeable operational and environmental characteristics of the machine to which it is to be fitted. Refer to Technical Specifications for Certification information and ratings.

ATTENTION: The presence of spare actuators compromise the integrity of the safety systems. Personal injury or death, property damage or economic loss can result. Appropriate management controls, working procedures and alternative protective measures should be introduced to control their use and availability.

Technical Specification

Safety Ratings

<table>
<thead>
<tr>
<th>Standards</th>
<th>IEC60947-5-3, IEC61508, ISO 13849-1 Cat. 4 Per ISO 13849-1, SIL CL3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Classification</td>
<td>PFHD: 1.12 x 10⁻⁹</td>
</tr>
<tr>
<td>Functional Safety Data</td>
<td>Dual channel interlock may be suitable for use in application up to PLe (according to ISO 13849-1) and for use up to SIL3 systems (according to IEC 62061) depending on application characteristics.</td>
</tr>
<tr>
<td>Certifications</td>
<td>CE marked for all applicable directives, cULus (UL 508), and TUv</td>
</tr>
</tbody>
</table>

Operating Characteristics

| Sensing Distance, Assured ON | 4 mm |
| Sensing Distance, Assured OFF | 25 mm |
| Maximum output current (all outputs) | 200 mA |
| Input Current | 50 mA (no load supply current) |
| Operational Current, Min. | < 1 mA DC |
| Off-state Current | < 0.5 mA DC |
| Maximum # of switches, connected in series | Unlimited. See unit response time section |
| Operating Voltage | 24V DC +10% to -15% Class 2 SELV power supply |
| Utilization category according to IEC 60947-5-2 | DC-12 & DC-13 |
| Ue | 24V |
| le | 200mA |
| Frequency of operating cycle | 0.25 Hz |
| Response Time (Off) | 60 ms |
| Case Material | Grilamid |
| Actuator Material | Grilamid / PBT |

Outputs (Guard door closed, Actuator in place)

| Outputs (Guard door closed, Actuator in place) | Status |
| Safety | 2 x PNP, 0.2 A max. ON (+24vdc) |
| Auxiliary | 1 x PNP, 0.2 A max. OFF (0vdc) |

Environmental

<table>
<thead>
<tr>
<th>Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
</tr>
<tr>
<td>Operating Humidity</td>
</tr>
<tr>
<td>Washdown rating</td>
</tr>
<tr>
<td>Shock &amp; Vibration</td>
</tr>
<tr>
<td>Radio Frequency</td>
</tr>
</tbody>
</table>
Protection
- Short-Circuit Protection: Incorporated
- Current limitation: Incorporated
- Overload Protection: Incorporated
- False Pulse Protection: Incorporated
- Transient Noise Protection: Incorporated
- Reverse Polarity Protection: Incorporated
- Overvoltage protection: Incorporated
- Thermal shutdown/restart: Incorporated
- Electrical Life: $10 \times 10^6$

Mode of Operation
Status indicators:
- "Status/Diag" LED illuminates Green - Door/Guard closed, safety outputs active.
- "Status/Diag" LED illuminates Red - Door/Guard open, safety outputs off.
- "Status/Diag" LED flashes Red or Green - Unit failure. See Diagnostic section below.

Mounting Information
Do not over torque the mounting hardware.
Position the switch and actuator so they are aligned with each other.
Mount the switch and actuator to removable guard, door or gate.
Recommended fastener size - M6

Nut Torque Specification
Switch/Actuator: 2.20 N·M (19.5 in·lbs)

Minimum Distance Between Sensors

![Diagram showing the minimum distance between sensors](Image)
Dimensions - mm (inches)
Mounting Information

LATCH FORCE SETTING

LOW
MEDIUM
HIGH

15N Typical

M6 T30 NYLOC NUTS
440N-ASDB

Sliding Door

Hinged Door

COVER PLATE (OPTIONAL)
Technical Data

*Sensing Zone*

*Both pole pieces must be in contact with striker plate*
SensaGuard™ Installation Instructions

Diagnostic

Unit Indicators (per IEC 60073)

<table>
<thead>
<tr>
<th>Status/Diag LED</th>
<th>State</th>
<th>Status</th>
<th>Troubleshooting</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>Off</td>
<td>Not Powered</td>
<td>NA</td>
</tr>
<tr>
<td>Red</td>
<td>Red</td>
<td>Not Safe, OSSD not active</td>
<td>NA</td>
</tr>
<tr>
<td>Green</td>
<td>Green</td>
<td>Safe, OSSD active</td>
<td>NA</td>
</tr>
<tr>
<td>Green flash</td>
<td>Green</td>
<td>Power up test or OSSD inputs not valid</td>
<td>Check 24V DC or OSSD inputs (yellow and red wire)</td>
</tr>
<tr>
<td>Red flash</td>
<td>Red</td>
<td>1 Hz Flash OSSD Fault</td>
<td>OSSD fault — check OSSD outputs are not shorted to GND, 24V DC or each other. Cycle power.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 Hz Flash Recoverable / Non-recoverable Fault</td>
<td></td>
</tr>
</tbody>
</table>

Typical Wiring Diagram

<table>
<thead>
<tr>
<th>Description</th>
<th>Plastic</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-Pin Micro (M12)</td>
<td></td>
</tr>
<tr>
<td>Grey</td>
<td>Safety A</td>
</tr>
<tr>
<td>Red</td>
<td>Safety A+</td>
</tr>
<tr>
<td>Pink</td>
<td>Safety B</td>
</tr>
<tr>
<td>Yellow</td>
<td>Safety B+</td>
</tr>
<tr>
<td>White</td>
<td>Aux A</td>
</tr>
<tr>
<td>Brown</td>
<td>24V DC+</td>
</tr>
<tr>
<td>Blue</td>
<td>0V</td>
</tr>
<tr>
<td>Green</td>
<td>N/A</td>
</tr>
</tbody>
</table>

* Replace symbol with 2 (2m), 5 (5m) or 10 (10m) for standard cable lengths.

Note: Refer to Technical Specifications for Certification information and ratings.
Commissioning

Power the Sensor
Connect the sensor to 24Vdc. See "Typical Wiring Diagram" section for help.

Note:
The sensor "Status/Diag" LED will begin to blink Green eight times then repeat, indicating that the sensor has not yet learned an actuator.

The sensor can be commissioned to either have the ability to learn another actuator or be locked for a one time learn only. See 'Teaching in the actuator' section.

Teaching in the actuator (Ability to learn an additional actuator)

Note:
The sensor can learn a new actuator up to eight times. The "Status/Diag" LED will blink the number of actuators left that an sensor can learn at end of learning cycle.

Initially teaching in the actuator
The sensor will automatically start the learning process as soon as an actuator is brought into the sensing range.

| Important! |
The actuator must not be removed from the sensing field during the learning procedure.

Learning Sequence
1. Target present: "Status/Diag" LED blinking Green 1Hz rate
2. Verifying actuator: "Status/Diag" LED blinking Green/RED 1Hz rate (15sec)
3. Program Sensor: "Status/Diag" LED blinking Green/RED 4Hz rate (15sec)
4. Program Complete: "Status/Diag" LED blinking Green (# of learns left) (15 sec)
5. Ready state: "Status/Diag" LED solid Green
6. Learn is complete

Note:
A sensor can be locked so it can not learn another actuator; see teaching in the actuator (one time learn only) section.

Teaching in the actuator (One time learn only; Unit locked)

Initially teaching in the actuator
The sensor will automatically start the learning process as soon as an actuator is brought into the sensing range.

Learning Sequence
1. Target present: "Status/Diag" LED blinking Green 1Hz rate
2. Verifying actuator: "Status/Diag" LED blinking Green/RED 1Hz rate (15sec)
3. Program Sensor: "Status/Diag" LED blinking Green/RED 4Hz rate (15sec)
4. Program Locking: "Status/Diag" LED blinking Green (# of learn left) (15 sec)
During the Program Locking Stage, perform the following steps:

1. Remove the actuator from the sensing field, until the "Status/Diag" LED changes to solid Red.
2. Replace the actuator back into the sensing field and the "Status/Diag" LED will continue blinking Green (# of learns left).

**Note:** The program locking sequence must be completed within the 15 second program locking window.

5. Ready state: "Status/Diag" LED solid Green
6. Learn is complete

**Learning a new actuator:**

To learn a replacement actuator, bring the actuator to be taught into the sensing range of the safety switch.

The learn sequence is same as the sequence for commissioning the first actuator.

A sensor can not re-learn a previously learned actuator or a standard SensaGuard actuator.

**Unique Coded Diagnostic:**

Error codes for learning process - Repeat until unit is power cycled

<table>
<thead>
<tr>
<th>Status/Diag LED - Flashes (4Hz)</th>
<th>Error Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>OSSD inputs not valid</td>
</tr>
<tr>
<td>Red-Red-Red-Green</td>
<td>Can not learn a standard SensaGuard Actuator</td>
</tr>
<tr>
<td>Red-Red-Red-Green-Green</td>
<td>Actuator already learned</td>
</tr>
<tr>
<td>Red-Red-Red-Green-Green-Green</td>
<td>Bad RFID; Target moved out of range</td>
</tr>
<tr>
<td>Red-Red-Red-Green-Green-Green-Green</td>
<td>Exceeded learning 8 actuators</td>
</tr>
<tr>
<td>Red-Red-Red-Green-Green-Green-Green-Green</td>
<td>Unit locked: Can not learn another actuator</td>
</tr>
</tbody>
</table>
Troubleshooting

Series Circuit

Actuator 1

Switch 1

Actuator 2

Switch 2

Actuator 3

Switch 3

Actuator 4

Switch 4

Actuator 5

Switch 5

+24V

-24V

+0V

-0V

Note: Refer to Technical Specifications for Certification information and ratings.
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Unit Response Time (does not include safety relay response time)

- Yel
- Red
- White
- Gray
- Pink
- Blue
- 24V DC Power Supply
- 1606

Sensor 1

Sensor 2

Sensor 3

Actuator 1

Actuator 2

Actuator 3

Initial Conditions:
- All actuators are in sensing distance.

Actuator 1 is moved out of sensing range.
- Sensor 2 drops the 24 volts (red and yellow) from Sensor 1 OSSD outputs.
- Green LED flashes.
- Sensor 3 drops the 24 volts (red and yellow) from Sensor 2 OSSD outputs.
- Green LED flashes.

Actuator 1 is out of sensing range.
- Actuator 2 and 3 are in sensing range.

Actuator 1 is moved into sensing range.
- Sensor 1 OSSD outputs are energized.
- Sensor 2 OSSD inputs (red and yellow) transition to 24V DC from Sensor 1 OSSD outputs.
- Sensor 2 OSSD outputs are energized.

Actuator 1 is out of sensing range.
- Actuator 2 and 3 are in sensing range.

OFF
ON
Application Wiring Examples

Note: Refer to Technical Specifications for Certification information and ratings.
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Notes
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List of recommended relays

MSR126, MSR127, MSR123, MSR124, MSR131, MSR138, MSR211, MSR121, MSR200 Family (Except MSR210), MSR300 Family, SmartGuard, 1791 DS DeviceNet™ Safety I/O.

Relay must have light curtain inputs.

Maintenance

Every month.
Check the correct operation of the switching circuit. Also check for signs of abuse or tampering. Inspect the switch casing for damage. Inspect the magnet poles and clean off any dirt or debris.

Repair

If there is any malfunction or damage, no attempts at repair should be made. The unit should be replaced before machine operation is allowed.

Declaration of Conformity

This is to declare that the products shown on this document conforms with the Essential Health and Safety Requirements (EHSR’s) of the European Machinery Directive 2006/42/EC. These products also conform to EN 60947-5-3, EN 1088, EN ISO 12100, EN 60204-1 and have Third Party Approval.

For a comprehensive certificate please visit: www.ab.com/safety.