SensaGuard 18 mm Barrels
(These instructions are only for the Series B Version.)


Installation must be in accordance with the following instructions and specifications and implemented by suitable competent personnel.
Adherence to the recommended maintenance instructions forms part of the warranty.
This unit is not to be used as a mechanical stop. Guard stops and guides must be fitted.
This device is intended to be part of the safety-related control system of a machine. Before installation, a risk assessment is performed to determine whether the specifications of this device are suitable for all foreseeable operational and environmental characteristics.

**ATTENTION:** This device must be provided with a 24V DC PELV or SELV power supply that conforms to the requirements of 414-3 of IEC 60364-4-41 where provisions have been taken. To confirm that, even if an internal fault, the voltage at the outgoing terminals cannot exceed 60V DC. Improper selection or installation of the devices affects the integrity of the safety systems.
Personal injury or death, property damage, or economic loss can result.
Comply with ISO 14119 including section, accessibility to the installation, arrangement, and mounting, possible substitute actuation, access to the escape release, motivation to defeat, and actuation mode.
Management controls, working procedures, training, and additional protective measures can be used to minimize the motivation to defeat and to manage the use and availability of spare actuators.
Comply with ISO 13857 and ISO 13855 for guard openings and minimum (safe) distances.
Comply with IEC 62061 or ISO 13849-1 and ISO 13849-2 for functional safety.
This product is intended for industrial/business application only. It is not intended to be used in residential applications as it may cause radio interference on other residential devices.

**ATTENTION:** Read this document and the documents that are listed in the Additional Resources section about installation, configuration, and operation of this equipment before you install. Users are required to familiarize themselves with installation and connection instructions and requirements of all applicable codes, laws, and standards.
In accordance with applicable codes of practice, suitably trained personnel are required to implement installation, adjustments, service initiation, use, assembly, disassembly, and maintenance.
If this equipment is used in a manner that the manufacturer does not specify, the protection that is provided by the equipment can be impaired.

**WARNING:** Do not defeat, tamper, remove, or bypass this unit. Severe injury to personnel could result.
Table 1 - Technical Specifications

<table>
<thead>
<tr>
<th>Attribute</th>
<th>18 mm Plastic Actuator</th>
<th>30 mm Plastic Actuator</th>
<th>18 mm Stainless Steel Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Safety Ratings</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standards</td>
<td>IEC 60947-5-3, Cat. 4 PLe per ISO 13849-1, Type 4 Interlocking Device as per ISO 14119 with either low (standard) or high (unique) coding, SIL CL3 per IEC 62061 and IEC 61508</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety Classification</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functional safety data</td>
<td>FTn = 1.3E-9 (Probability of dangerous failure per hour) T1 = 20 (Proof test interval)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certifications</td>
<td>CE marked for all applicable directives, c-UL-us (UL 508), and cTUV</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Operating Characteristics | | |
| Sensing distance, assured ON | 15 mm (0.59 in.) | 25 mm (0.98 in.) | 10 mm (0.39 in.) |
| Sensing distance, assured OFF | 25 mm (0.98 in.) | 35 mm (1.37 in.) | 20 mm (0.79 in.) |
| Operating voltage | 24V DC 10%~15% Class 2 SELV or PELV power supply | | |
| Response time (OFF) | 45 ms | | |
| Utilization category according to IEC 61800-5-2 | DC-12 and DC-13 | 24V | 200 mA |
| Frequency of Operating Cycle | 0.25 Hz | | |
| No-load supply current | < 50 mA | | |

| Outputs (OSSD) | | |
| Safe state | De-energized (2 x PNP, 0V), AUX energized (1 x PNP, 24V) | | |
| Run state | Energized (2 x PNP, 24V), AUX de-energized (1 x PNP, 0V) | | |
| Load current | 200 mA maximum | | |
| Voltage drop | < 1.5V | | |
| Switches connected in series | Unlimited. See Timing Diagram on page 6 for details. | | |

| Mechanical | | |
| Sensor case material | Polycarbonate | Stainless Steel 304 | | |
| Actuator case material | Polycarbonate | Stainless Steel 304 | | |

| Environmental | | |
| Operating temperature | -25...+70°C (-13...+158°F) | | |
| Operating humidity | 5...95% relative | | |
| Washdown rating | IP66, IP67, IP69K | | |
| Shock and vibration | IEC 60068-2-27 — 30 g (1.05 oz), 11 ms | | |
| | IEC 60068-2-6 — 10...55 Hz | | |

ATTENTION: Do not attempt to install this device unless the installation instructions have been studied and understood. This document acts as a guide for a typical installation and is available in additional languages at http://www.rockwellautomation.com/literature/.
• Actuator is supplied with sensor
• Indicator green: Door/guard closed, safety outputs active.
• Indicator red: Door/guard open, safety outputs off.
• Indicator flashes red: Unit failure. See Diagnostic — Unit Indicators on page 3.
• Indicator flashes green: Safety inputs off.

Mounting Information

Use non-removable screws, bolts, or nuts to mount the switch and actuator. Do not over torque the mounting hardware. Position the switch and actuator so they are aligned with each other.

Nut Torque Specification

Switch/Actuator: 2.20 N·m (19.5 in·lbs)
Typical Wiring Diagram

Table 3 - 8-pin Unit

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Wire Color</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>White</td>
<td>Auxiliary Output</td>
</tr>
<tr>
<td>2</td>
<td>Brown</td>
<td>24V DC</td>
</tr>
<tr>
<td>3</td>
<td>Green</td>
<td>— 1</td>
</tr>
<tr>
<td>4</td>
<td>Yellow</td>
<td>OSSD 2 Input</td>
</tr>
<tr>
<td>5</td>
<td>Gray</td>
<td>OSSD 1 Output</td>
</tr>
<tr>
<td>6</td>
<td>Pink</td>
<td>OSSD 2 Output</td>
</tr>
<tr>
<td>7</td>
<td>Blue</td>
<td>0V</td>
</tr>
<tr>
<td>8</td>
<td>Red</td>
<td>OSSD 1 Input</td>
</tr>
</tbody>
</table>

Recommended mating cable, 2 m (6.5 ft)—889D-F8AB-2. Replace the 2 with 5 (5 m [16.4 ft]) or 10 (10 m [32.8 ft]) for standard cable lengths.

1 Shield wire for Stainless Steel version.

Table 4 - 5-pin Unit

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Color</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brown</td>
<td>+24V</td>
</tr>
<tr>
<td>2</td>
<td>White</td>
<td>Safety OSSD 1 Output</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>0V</td>
</tr>
<tr>
<td>4</td>
<td>Black</td>
<td>Safety OSSD 2 Output</td>
</tr>
<tr>
<td>5</td>
<td>Gray</td>
<td>Auxiliary Output</td>
</tr>
</tbody>
</table>

The recommended cordset is 2 m (6.5 ft) - 889D-F5AC-2. For additional lengths, replace the 2 with 5 (5 m [16.4 ft]) or 10 (10 m [32.8 ft]) for standard cable lengths.

IMPORTANT If you do not require the auxiliary signal, a 4-pin cordset (889D-F4AC-2) can be used.

The recommended patchcord for use with ArmorBlock® Guard Safety I/O is 2 m (6.5 ft) - 889D-F4ACDM-2. Replace the 2 with 0M3 (0.3 m [0.98 ft]), 1 (1 m [3.28 ft]), 5 (5 m [16.4 ft]), or 10 (10 m [32.8 ft]) for standard cable lengths.

IMPORTANT Do not use a 5-pin patchcord with the ArmorBlock I/O.

Commissioning (Unique Coded Units) — Power the Sensor

Connect the sensor to 24V DC (see Typical Wiring Diagram on page 4 for help).

IMPORTANT The unique coded sensor is shipped from the factory unprogrammed and must be taught a unique coded actuator, see Teaching the Actuator (Ability to Learn an Additional Actuator).

A unique coded actuator can only learn a unique coded actuator and cannot learn a standard coded actuator.

A standard coded sensor does not work with a unique coded actuator.

The unique coded sensor, “Status/Diag” indicator, begins to blink green eight times then repeats, which indicates that the sensor has not yet learned an actuator.

The unique coded sensor can be locked so it cannot learn another actuator, see Teaching the Unique Actuator (One Time Learn Only; Unit Locked) on page 5.

Teaching the Actuator (Ability to Learn an Additional Actuator)

Quick Start

1. Power up the sensor and bring an actuator into the sensing range.
2. Leave the actuator in the sensing field for two minutes or longer.
3. Learn is complete.

IMPORTANT The sensor can learn a new actuator up to eight times. The Status/Diag” indicator blinks the number of actuators left that a sensor can learn.

The sensor automatically starts the learning process as soon as an actuator is brought into the sensing range.

Learning Sequence

1. Target present “Status/Diag” indicator blinking green 2 Hz rate (15 s)
2. Verifying actuator “Status/Diag” indicator blinking green/red 1 Hz rate (15 s)
3. Program sensor “Status/Diag” indicator blinking green/red 2 Hz rate (15 s)
4. Program complete “Status/Diag” indicator blinking green 2 Hz rate (# of learns remaining) (15 s)
5. Ready state “Status/Diag” indicator solid green
6. Learn is completed
Teaching the Unique Actuator (One Time Learn Only; Unit Locked)

Initially Teaching in the Actuator

The sensor automatically starts the learning process as soon as an actuator is brought into the sensing range.

Learning Sequence

1. Target present  "Status/Diag" indicator blinking green 2 Hz rate (15 s)
2. Verifying actuator "Status/Diag" indicator blinking green/red 1 Hz rate (15 s)
3. Program sensor  "Status/Diag" indicator blinking green/red 2 Hz rate (15 s)
4. Program Locking  "Status/Diag" indicator blinking green 2 Hz rate (# of learns remaining) (15 s)
5. Remove the actuator from the sensing field  "Status/Diag" indicator changes to solid red
6. Replace the actuator back into the sensing field  "Status/Diag" indicator continues blinking green 2 Hz rate (number of learns remaining), this action triggers the lock function.
7. Ready state  "Status/Diag" indicator solid green
8. Learn is completed  Sensor is locked and cannot learn another actuator.

Learning a New Actuator (Unique Coded Actuator Only)

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

The learn sequence is the same as the sequence for teaching the actuator (ability to learn an additional actuator).

A sensor cannot relearn a previously learned actuator or a standard SensaGuard™ actuator.

The sensor only recognizes the most recently learned actuator.

Unique Coded Diagnostic

Error codes for learning process. Power cycle to clear fault.

<table>
<thead>
<tr>
<th>Status/Diag Indicator—Flashes (2 Hz)</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>Cannot 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 that is moved out of range</td>
</tr>
<tr>
<td>Red-Red-Red-Green-Green-Green-Green</td>
<td>Exceeded learning eight actuators</td>
</tr>
<tr>
<td>Red-Red-Red-Green-Green-Green-Green-Green</td>
<td>Unit locked: Cannot learn another actuator</td>
</tr>
</tbody>
</table>

OSSD Test Pulses

<table>
<thead>
<tr>
<th>Time (µs)</th>
<th>Periodicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>450</td>
<td>Pink Wire</td>
</tr>
<tr>
<td>0</td>
<td>Gray Wire</td>
</tr>
</tbody>
</table>

Individual Pulses

Test pulses appear on each OSSD output. These pulses are approximately every 45 ms. The times that are shown are approximate and depend on the processing of the safety-related status.
Response Time: Safety Outputs Turn OFF
Initial Conditions: All actuators are in sensing distance.

Actuator 1 is moved out of sensing range.

Sensor 1 OSSD outputs (gray and pink) turn OFF. Sensor 1 indicator turns solid red.

Sensor 2 OSSD outputs (gray and pink) turn OFF. Sensor 2 indicator flashes green.

Sensor 3 OSSD outputs (gray and pink) turn OFF. Sensor 3 indicator flashes green.

Response Time: Safety Outputs Turn ON
Initial Conditions: Actuator 1 is out of sensing range. Sensor 1 indicator is solid red. Actuators 2 and 3 are in sensing range. Sensor 2 and 3 indicators flash green.

Actuator 1 is moved into sensing range.

Sensor 2 OSSD inputs (red and yellow) transition to 24V DC from Sensor 1 OSSD outputs. Sensor 1 indicator turns solid green.

Sensor 3 OSSD inputs (red and yellow) transition to 24V DC from Sensor 2 OSSD outputs. Sensor 2 indicator turns solid green.

Sensor 3 OSSD outputs (gray and pink) are energized. Sensor 3 indicator turns solid green.
Troubleshooting — Series Circuit

Actuator 1 is in the sensing range.
Switch 1 is functioning properly. OSSDs are energized to 24V.
Green indicator is ON.

Actuator 2 is in sensing range.
Switch 2 is functioning properly.
OSSDs are energized to 24V.
Green indicator is ON.

Actuator 3 is in sensing range.
Switch 3 has a fault. See Diagnostic table — red indicator is flashing.

Actuator 4 is in the sensing range.
Switch 4 is functioning properly. OSSDs are energized to 24V.
Green indicator is ON.

Actuator 5 is in the sensing range.
Switch 5 is functioning properly. OSSD inputs are 0V.
OSSDs are de-energized to 0V.
Green indicator is flashing to indicate that OSSD inputs are not 24V.
Application Wiring Examples

Wiring to MSR127 Safety Relay

**IMPORTANT** The light curtain must be last (the furthest from MSR127).

MSR127RP with one sensor, monitored manual reset, drives 100S or 700S safety relays.

MSR127RP with one sensor, automatic reset, drives 100S or 700S safety relays.

MSR127RP with one sensor, monitored manual reset, driving 100S or 700S safety relays.

MSR127RP with two sensors and 1 440L light curtain in series, monitored manual reset, driving 100S or 700S safety relays.
Guardmaster® SI or DI Safety Relay Wiring

[Diagram showing wiring connections for Guardmaster® SI or DI Safety Relay]

- +24V DC
- 8890-FSAC-5
- Brown, Blue, Gray, White, Black
- Logic
- Gate
- Open
- 24V Ground
- Reset
- K1, K2
Guardmaster® SI or DI Safety Relay Wiring

**IMPORTANT**
The green wire is connected to the housing of the stainless steel SensaGuard only; it has no connection for plastic SensaGuard.

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CR30 Software Configurable Relay Wiring

+24V DC

889D-F8AB-S 889D-FSAC-S

Green Safety Reset Brown White Gray

Blue Gate Open

Yellow Gate Open

Red

889D-F8AB-S

100S or 700S or 700HPS Contactors and Relays

K1 K2

24V Ground

Safety Monitoring

Logic Level A

Logic Level B

Safety Output

Input 2

Immediate On/Off

Feedback SMF 3
Reset Type: Manual
Reset Input: SMF 4

SafetyGuard_1

SafetyGuard_2

Feasible_1

Feasible_3

Feasible_4

Advanced Settings

Advanced Settings

Advanced Settings

Advanced Settings

Advanced Settings

Advanced Settings

Advanced Settings

Advanced Settings

Advanced Settings

Advanced Settings
1734 POINT Guard I/O™ Wiring

[Diagram showing wiring connections for SensaGuard 18 mm Barrels]
SensaGuard 18 mm Barrels

1732DS/ES ArmorBlock® Guard Safety I/O Wiring

The screen shots below show the input and output configuration for the 1732ES.
Notes:
Notes:
# Rockwell Automation Support

Use the following resources to access support information.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Dial Codes</td>
<td>Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.</td>
<td><a href="http://www.rockwellautomation.com/global/support/direct-dial.page">http://www.rockwellautomation.com/global/support/direct-dial.page</a></td>
</tr>
</tbody>
</table>

## Documentation Feedback


## Waste Electrical and Electronic Equipment (WEEE)

At the end of life, this equipment should be collected separately from any unsorted municipal waste.