



Electromagnetic Safety Switch

Catalog Numbers 440G-EZS21STL05J, 440G-EZS21STL05H



Allen-Bradley

by ROCKWELL AUTOMATION

Guardmaster®

User Manual

Original Instructions

Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.



WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.

IMPORTANT Identifies information that is critical for successful application and understanding of the product.

These labels may also be on or inside the equipment to provide specific precautions.



SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.



BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.



ARC FLASH HAZARD: Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

The following icon may appear in the text of this document.



Identifies information that is useful and can help to make a process easier to do or easier to understand.

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About This Publication

This publication contains the information required during the lifecycle of the 440G-EZ electromagnetic safety switch.

This publication must be available to all people who work with the safety switch. The structure of this user manual is based on the lifecycle phases of the safety switch: Project planning, mounting, electrical installation, commissioning, operation, and maintenance.

Who Should Use This Publication

Use these operating instructions only if you are one of the following personnel:

- Project developer (planner, developer, designer)
- Installer
- Electrician
- Safety expert (such as a CE-authorized representative, compliance officer, and a person who tests and approves the application)
- Operator
- Maintenance

Terminology

This publication uses the following terms and abbreviations throughout. For definitions of terms not listed here, see publication [AG-7.1](#).

Term	Definition
Dangerous state	<p>A status of the machine or facility where people can be injured. Protective devices help prevent this risk if the machine is operated within its intended use.</p> <p>The figures in this document always show the dangerous state of the machine as the movement of a machine part. In practice, there are different dangerous states, such as:</p> <ul style="list-style-type: none"> • Machine movements • Electrical parts • Visible and invisible beam • A combination of multiple hazards

Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes.

Topic	Page
Updated Intended Use	7
Updated Locking Solenoid Control	16
Updated Mount Multiple Safety Switches	19
Updated Table 2 and Table 3	29
Updated Table 10	31

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

You can view or download publications at rok.auto/literature.

Resource	Description
440G-EZ Interlocking Safety Switch Installation Instructions, publication 440G-IN019	Provides installation information for 440G-EZ switches.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, rok.auto/certifications .	Provides declarations of conformity, certificates, and other certification details.

Safety Information



ATTENTION: Hazard due to lack of effectiveness of the protective device. If non-compliant, it is possible that the dangerous state of the machine cannot be stopped or stopped in a timely manner.

- Read this publication carefully and confirm that you understand the content fully before working with the device.
- Follow all safety notes in this publication.

Intended Use

The 440G-electromagnetic safety switch is suitable for monitoring the position of the guard doors. The magnetic locking function is designed for machinery or equipment where a production process is taking place, such as gluing or soldering. This safety switch helps prevent the inadvertent interruption of the production process.

The safety switch is a transponder safety switch with a locking function, which actuators control without contact, and is suitable for the following applications:

- Monitoring of movable physical guards
- Locking device for process protection

Only use the safety switch within the limits of the prescribed and specified technical data and operating conditions.

Incorrect use, improper modification of, or tampering with the safety switch invalidates any warranty from Rockwell Automation; in addition, any responsibility and liability of Rockwell Automation for damage and secondary damage that this action causes is excluded.

The safety switch is not suitable for the ambient conditions such as, but are not limited to, the following:

- Applications in which the dangerous state cannot be ended immediately (stopping time)
- Radioactivity (exception: Natural radioactivity)
- Vacuum or high pressure
- High UV load
- In the vicinity of low-frequency RFID devices
- In the vicinity of magnetic fields

**ATTENTION:** Improper use of the safety switch

If a voltage drop occurs, the locking device unlocks, regardless of whether the dangerous state of the machine has ended.

This safety switch has a simple electromagnetic locking device. There is no locking device monitoring.

- Do not use the safety switch as a safety locking device according to EN 14119.
- Do not use the safety switch in applications in which the dangerous state cannot be ended immediately (stopping/run-down time).

IMPORTANT Passing metal chips can impair the function of the safety switch.

Requirements for Qualified Personnel

Only qualified safety personnel can configure, mount, connect, commission, and service the safety switch.

Project Planning

For project planning, a person is considered competent when they have expertise and experience in the selection and use of protective devices on machines and is familiar with the relevant technical rules and national work safety regulations.

Mechanical Mounting, Electrical Installation, and Commissioning

A person is considered qualified for the task when they have the expertise and experience in the relevant field and is sufficiently familiar with the application of the protective device on the machine to be able to assess whether it is in an operationally safe state.

Operation and Maintenance

For operation and maintenance, a person is considered competent when they have the expertise and experience in the relevant field and is sufficiently familiar with the application of the protective device on the machine and the machine operator has instructed them in its operation.

Product Overview

Structure and Function

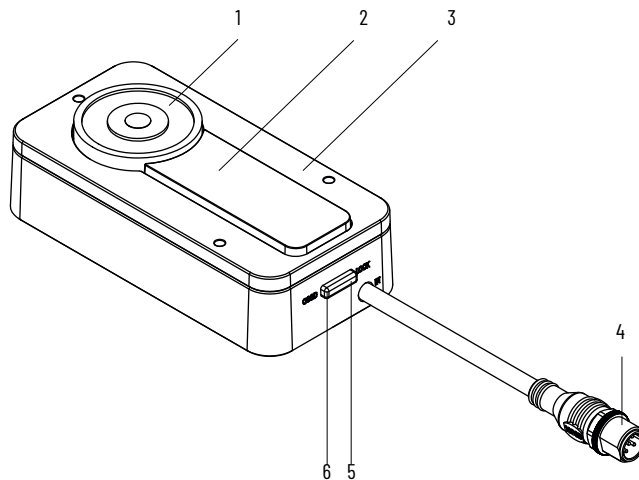
The safety switch is an interlocking device with a locking device, which consists of a non-contact sensor with locking solenoid, and a coded actuator. The actuator has a low coding level.

If the protective device closes, the actuator leads to the sensor. When the actuation field is reached, the actuator code reads out and is evaluated by RFID. If the code is valid, the safe output signal switching device (OSSD) switches.

If the locking solenoid has a power supply, the locking device is active.

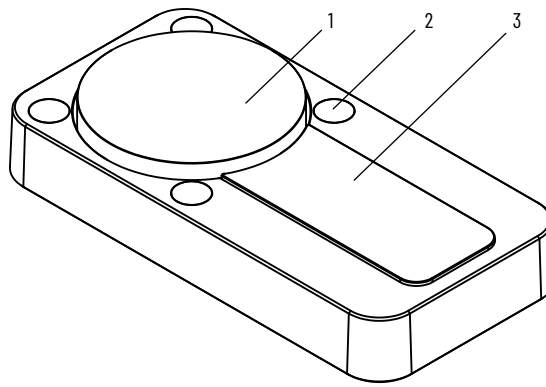
Product Features

Figure 1 - Sensor Overview



Item	Description
1	Locking solenoid
2	Sensor surface
3	Cover plate
4	Plug connector IN
5	LOCK status indicator
6	OSSD status indicator

Figure 2 - Actuator Overview



Item	Description
1	Anchor plate
2	Protective cap
3	Actuator surface

Product Models

The safety switch is available in different models. The following is an overview of the unique features of the models:

- One cable with M12 plug connector (5-pin)
- One cable with M12 plug connector (8-pin)

Locking Principle



ATTENTION: Hazard due to lack of effectiveness of the protective device. If a voltage drop occurs, the locking device unlocks regardless of whether the dangerous state of the machine is ended.

- Do not use the safety switch in applications where the dangerous state cannot be ended immediately (stopping/run-down time).

Power to Lock Principle

- Lock locking device: Voltage at locking device input
- Unlock locking function: No voltage at locking device input

If voltage is interrupted, the locking device unlocks and the protective device can open immediately.

The locking device is not monitored, which means that the safety switch does not check whether the anchor plate is applied to the solenoid.

Protective Functions

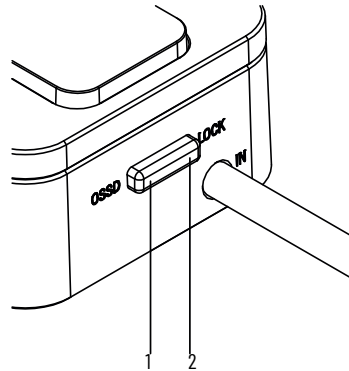
The safety switch has the following internal protective functions:

- Short-circuit protection at all outputs
- Cross-circuit monitoring at OSSDs
- Overload protection on OSSDs
- Supply voltage reverse polarity protection

Status Indicators

The safety switch displays important status information with the status indicators.

Figure 3 - Status Indicators



Item	Name	Color	Description
1	OSSD	Green/Red	Green when the OSSD pair is in the ON state. Red when the OSSD pair is in the OFF state. ⁽¹⁾
2	LOCK	Yellow	Turns ON when the magnet is supplied with voltage.

(1) When a load that is too high applies to the application diagnostic output, the red OSSD status indicator remains continuously ON. The actual switching behavior of the safety switch is not affected.

Notes:

Project Planning

Manufacturer of the Machine



ATTENTION: Failure to comply with the obligations of the manufacturer. Hazard due to lack of effectiveness of the protective device.

- Conduct a risk assessment before using the safety switch.
- Do not tamper with, open, or modify the components of the safety switch.
- Do not repair defective devices – they must be replaced instead.
- Confirm that switch-on commands, which bring about a dangerous state of the machine, are not enabled until the protective device is closed.
- Make sure that a stop command is triggered when the protective device is opened during the dangerous machine state.

The safety switches must not be defeated (such as jumpered contacts), rotated away, removed, or rendered ineffective in any other way. If necessary, put measures in place to reduce the possibilities for defeat.

Operating Entity of the Machine



ATTENTION: Failure to comply with the obligations of the operating entity. Hazard due to lack of effectiveness of the protective device.

- Modifications to the machine and modifications to the mechanical mounting of the safety switch necessitate a new risk assessment. The results of this risk assessment can require the operating entity of the machine to fulfill the obligations of the manufacturer.
 - Apart from during the procedures described in this document, the components of the safety switch must not be opened or modified.
 - Do not perform repair work on the components. Improper repair of the safety switch can lead to a loss of the protective function.
 - Verify that there is no bypassing by replacement actuators. Restrict access to actuators.
-

Assembly



ATTENTION: Bypassing the protective device. Hazard due to lack of effectiveness of the protective device.

Avoid incentives to manipulate the safety switch by taking at least one of the following measures:

- Cover the sensor and the actuator with additional equipment or protect them against access.
 - If possible, use permanent mounting methods for actuators (for example, glue, safety screws, or rivets).
-

Mounting Location

- Select the mounting location so that the sensor and actuator are accessible for maintenance work and are protected against damage.
- Select a mounting location for the sensor that is as far away from the door hinge as possible.
- If necessary, fit an additional stop for the moving protective device.

Distance

When several safety switches are mounted to the machine, they must be mounted at a minimum distance to one another, see [Mount Multiple Safety Switches on page 19](#).

Alignment

The safety switch can be mounted in any alignment. When mounted horizontally, the anchor plate with rotating bearings increases the manipulation protection. When mounted horizontally, if the movable physical guard triggers the actuator, the magnet holds the actuator. As the anchor plate has rotating bearings, the gravitational force rotates the actuator surface away from the sensor surface and the OSSDs go into the off state.

Mounting Methods

The sensor can be mounted in the following ways:

- Surface mount: The sensor is mounted on the fixed part of the protective device (for example, the door frame).
- Flush mount: The sensor is mounted in the fixed part of the protective device (for example, the door frame). There must be a suitable recess in the mounting surface. The thickness of the mounting surface must be 1.5...3 mm (0.06...0.12 in.). For the recess dimensions for flush mounting, see [Figure 12 on page 32](#)

Electrical Control Integration

Switch-on commands that put the machine in a dangerous state can only be activated when the protective device is closed. When the machine goes into a dangerous state, a stop command must be triggered if the protective device is opened. Depending on the safety concept, a safety relay or a safety controller analyzes the signal.

The control that is connected and all devices responsible for safety must comply with the required Performance Level and the required category (for example, according to ISO 13849-1).

OSSDs

Safety switches with local inputs and outputs can be directly integrated into the machine controller.

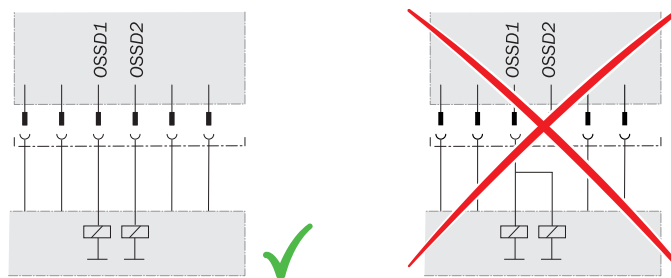


ATTENTION: Hazard due to lack of effectiveness of the protective device. If non-compliant, it is possible that the dangerous state of the machine cannot be stopped or not stopped in a timely manner.

- Verify that the following control and electrical requirements are met so the protective function can be fulfilled.

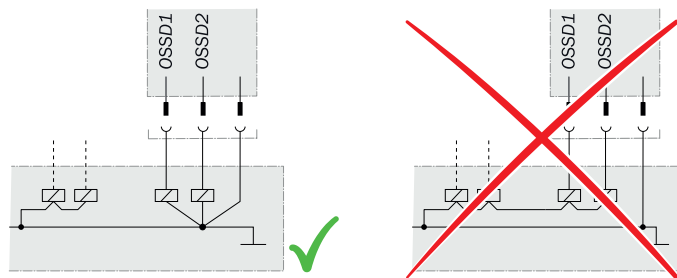
- The output signals from an OSSD pair must not be connected to each other.
- In the machine controller, both signals from an OSSD pair must be processed separately.

Figure 4 - Dual-channel and Isolated Connection of OSSD 1 and OSSD 2



- The machine must switch to the safe state at any time if at least one OSSD in an OSSD pair switches to the off state.
- Help prevent the formation of a potential difference between the load and the protective device. If you connect loads to the OSSDs (safety outputs) that then also switch if controlled with negative voltage (for example, electromechanical contactor without reverse polarity protection diode), you must connect the 0V connections of these loads and the connections of the corresponding protective device individually and directly to the same 0V terminal strip. If there is a fault, this way verifies that there can be no potential difference between the 0V connections of the loads and the connections of the corresponding protective device.

Figure 5 - No Potential Difference Between Load and Protective Device



ATTENTION: Hazard due to lack of effectiveness of the protective device. If non-compliant, it is possible that the dangerous state of the machine cannot be stopped or not stopped in a timely manner.

Downstream contactors must be positively guided and monitored depending on the applicable national regulations or the required reliability of the safety function.

- Make sure that downstream contactors are monitored (external device monitoring, EDM).

Requirements for the Electrical Control of the Machine

- Use the control without test pulses. The safety switch is self-testing.
- The safety switch tests the OSSDs at regular intervals. To conduct this test, it switches each OSSD briefly (for max 1 ms) to the off state and checks whether this channel is voltage-free during this time.
- Make sure that the control of the machine does not react to these test pulses and the machine does not switch off.
- The inputs of a connected evaluation unit must be positive-switching (PNP), as the two outputs of the safety switch send a level of the supply voltage in the switched on state.

The OSSDs are short-circuit protected to 24V DC and 0V. When the actuator is in the response range of the sensor, the OSSDs signal the on state with the high signal level (non-isolated). If the actuator is removed from the response range of the sensor or there is a device fault, the OSSDs signal the off state with the low signal level.

The safety switch complies with the regulations for electromagnetic compatibility (EMC) for the industrial sector (Radio Safety Class A). Radio interference cannot be ruled out when used in residential areas.



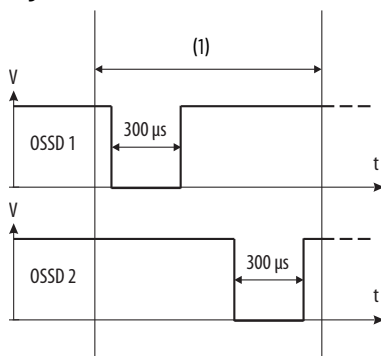
ATTENTION: Hazard due to lack of effectiveness of the protective device. If non-compliant, it is possible that the dangerous state of the machine cannot be stopped or not stopped in a timely manner.

- Verify that the following control and electrical requirements are met so the safety switch can fulfill its protective function.

- The external voltage supply of the safety switch must be able to withstand brief power failures of 20 ms as specified in IEC 60204-1.
- The power supply unit must provide safe isolation according to IEC 61140 (SELV/PELV). Suitable power supplies are available as accessories, contact your local Allen-Bradley distributor or Rockwell Automation sales office.

Course of the OSSD Test Over Time

Figure 6 - Course of the OSSD Test Over Time



(1) Usually every 40 ms. The interval is dynamic and can be smaller than 40 ms.

Locking Solenoid Control



ATTENTION: The monitoring of the door is rated PLe through the RFID safety switch portion of the device, however, the electromagnet function providing the locking force is not constantly monitored and therefore the locking force is not a safety-related function.

The locking solenoid is activated through the upstream control. There is no internal activation or deactivation of the locking solenoid through the safety switch. The locking device and locking force are not monitored. When the machine starts, the following sequence must be followed:

1. Check whether safety switch OSSDs are in the on state.
2. Supply the locking solenoid with power.
3. Start the machine.

Application Diagnostic Output

The application diagnostic output signal changes as soon as the actuator is moved into or out of the response range of the safety switch. That is, when the movable protective device is opened or closed. This output is not a safety output.

Table 1 - Switching Behavior of the Application Diagnostic Output

Actuator	Application Diagnostic Output
Actuator not in the response area, or safety switch in an error state	Off
Actuator in the response area	On

For more information, see [Specifications on page 29](#).

Thorough-check Concept

Appropriately qualified safety personnel must test the safety switch during commissioning, after modifications, and at regular intervals; see [Thorough-check Requirements on page 25](#).

Regular thorough checks serve to investigate the effectiveness of the safety switch and discover anomalies that result from modifications or external influences (such as damage or manipulation).

The manufacturer and operating entity must define the type and frequency of the thorough checks on the machine, based on the application conditions and the risk assessment. The process of defining the thorough checks must be documented in a traceable manner.

Regular Thorough Check Minimum Requirements

The following thorough checks must be conducted at least once a year:

- Protective function of the safety switch
- Switch housing for damage
- Switch cables for damage
- Safety switch for signs of misuse or manipulation
- Locking solenoid for correct function

Notes:

Installation

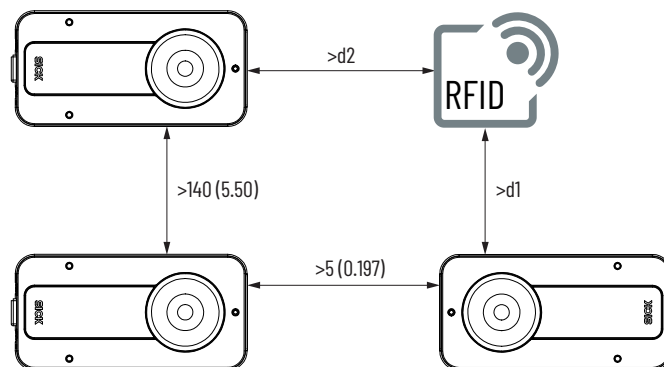
Mount Multiple Safety Switches

IMPORTANT When several of the 440G-EZ safety switches are mounted close to one another or near other RFID devices, you must adhere to the minimum distances shown in [Figure 7](#) to avoid mutual interference, which can affect the performance of these devices.

Spacing requirements are the minimum separation distances to prevent interference between the 440G-EZ safety switch and other RFID safety switches. The distances that are labeled as d_1 and d_2 are equal to or greater than the specified separation distances of the individual devices.

If another RFID device requires a greater separation distance than the distances that are specified by the 440G-EZ safety switches shown in [Figure 7](#), then adhere to those greater separation distances.

Figure 7 - Spacing Requirement [mm (in.)]



Mounting

The sensor can be mounted in the following ways:

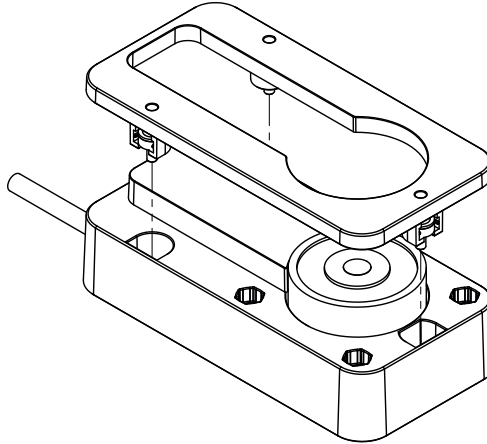
- Surface mount - The sensor is mounted on the fixed part of the protective device (for example, the door frame).
- Flush mount - The sensor is mounted in the fixed part of the protective device (for example, the door frame). There must be a suitable recess in the mounting surface. The thickness of the mounting surface must be between 1.5...3 mm (0.06...0.12 in.)

For recess dimensions for flush mounting, see [Figure 12 on page 32](#).

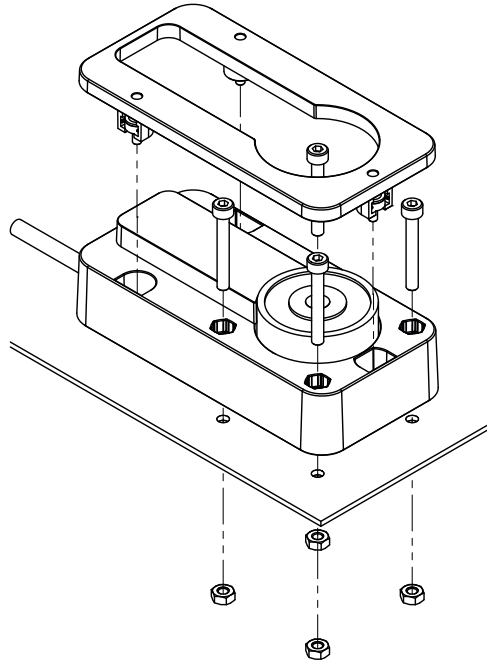
IMPORTANT Install the safety switch horizontally to help increase protection against manipulation.

Mount the Sensor

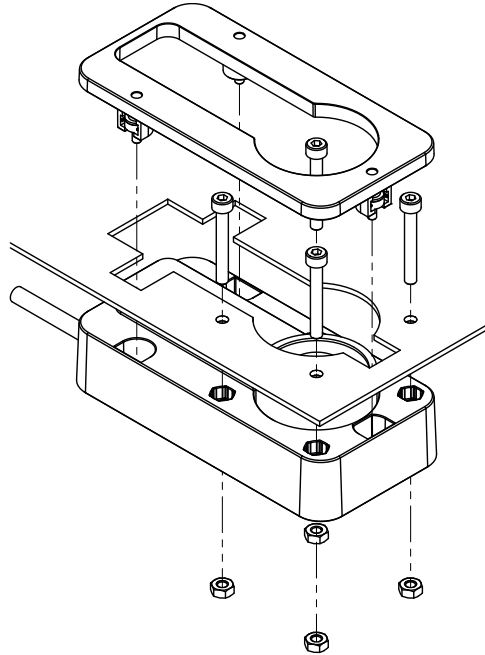
1. Unscrew the mounting screw [hexagon socket, 2 mm (0.08 in.)] and remove the cover plate.



2. Mount the sensor on the fixed part of the protective device with 4 x M4 screws. Secure the sensor with four nuts.
 - For surface mounts: Mount the sensor on the fixed part of the protective device. The screws can be set in the front or the back.



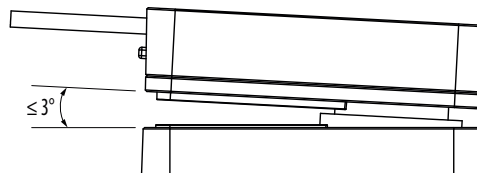
- For flush mount: Mount the sensor in the fixed part of the protective device.



3. Set the cover plate on the sensor.
4. Tighten the mounting screws to 1 N•m (8.85 lb•in).

Mount the Actuator

1. Align the actuator to the mounted sensor.
2. Mount the actuator on the moving part of the protective device (for example, the door) with 4 x M4 screws. Tightening torque: 1 N•m (8.85 lb•in). Use disposable screws, if possible.
 - The maximum angle between the sensor and the actuator is 3° when the protective device is closed.



3. Cover the drill holes of the actuator with protective caps.

Notes:

Wiring

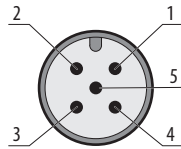
Notes on cULus

For use according to the requirements of UL 508, the following conditions must also be met:

- Voltage supply Uv sensor secured with 2 A fuse
- Voltage supply Uv magnet secured with 2 A fuse

Device Connection (M12, 5-pin)

Figure 8 - Device Connection Pin Assignment (Plug Connector, M12, 5-pin, A-coded)



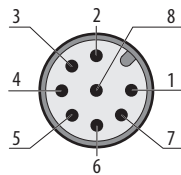
Pin	Wire Color ⁽¹⁾	Designation	Description
1	Brown	+24V DC	Safety switch voltage supply
2	White	OSSD 1	OSSD 1 output
3	Blue	0V	0V DC voltage supply
4	Black	OSSD 2	OSSD 2 output
5	Gray	Magnet	Magnet activation 24V DC

(1) Applies to the extension cables recommended as accessories.

IMPORTANT Pay attention to the tightness of the plug connector.

Device Connection (M12, 8-pin)

Figure 9 - Device Connection Pin Assignment (Plug Connector, M12, 8-pin, A-coded)



Pin	Wire Color ⁽¹⁾	Designation	Description
1	White	Aux	Application diagnostic output (not safe)
2	Brown	+24V DC	Safety switch voltage supply
3	Green	Magnet	Magnet activation 24V DC
4	Yellow	In 2	OSSD 2 input ⁽²⁾
5	Gray	OSSD 1	OSSD 1 output
6	Pink	OSSD 2	OSSD 2 output
7	Blue	0V	0V DC voltage supply
8	Red	In 1	OSSD 1 input ⁽²⁾

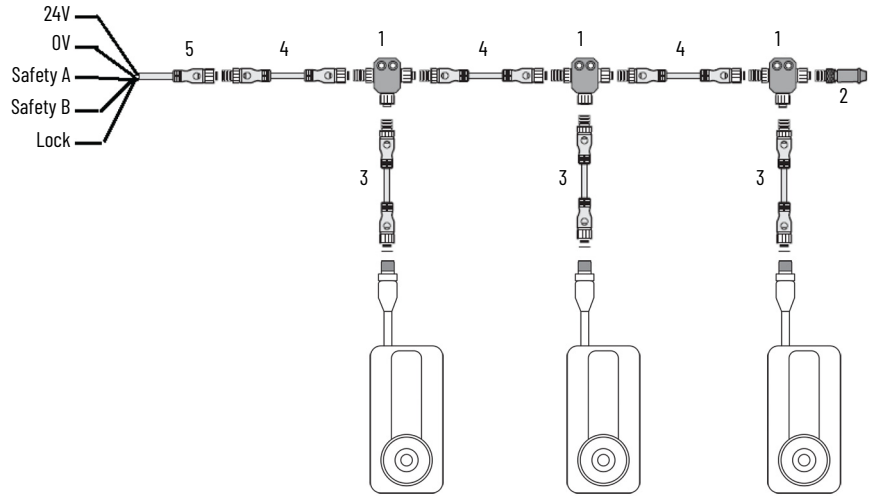
(1) Applies to the extension cables recommended as accessories.

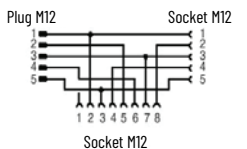
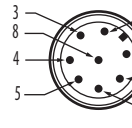

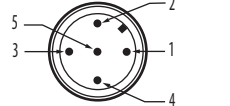
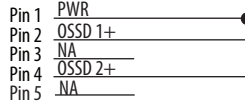

(2) When used as an individual safety switch or as the first safety switch in a cascade apply 24V DC.

IMPORTANT Pay attention to the tightness of the plug connector.

Connect Safety Switches with T-connectors

The following connection system components facilitate connection.



Item	Connection	Cat. No.
1	Safety-wired Splitter/T-Port	898D-438Y-D8
	  	
2	Safety-wired Shorting Plug	898D-418U-DM
	  	
3	8-pin Device Patchcords	Cat. No. ⁽¹⁾
	1 m (3.3 ft)	889D-F8ABDM-1
	2 m (6.6 ft)	889D-F8ABDM-2
	5 m (16.4 ft)	889D-F8ABDM-5
	10 m (32.8 ft)	889D-F8ABDM-10
4	5-pin Patchcords	Cat. No. ⁽¹⁾
	1 m (3.3 ft)	889D-F5ACDM-1
	2 m (6.6 ft)	889D-F5ACDM-2
	5 m (16.4 ft)	889D-F5ACDM-5
	10 m (32.8 ft)	889D-F5ACDM-10
5	5-pin Cordsets	Cat. No. ⁽¹⁾
	2 m (6.6 ft)	889D-F5AC-2
	5 m (16.4 ft)	889D-F5AC-5
	10 m (32.8 ft)	889D-F5AC-10

(1) Add the letter S to the catalog numbers for stainless-steel connectors (example: 889DS-F5AC-1).

Commissioning



ATTENTION: Hazard due to lack of effectiveness of the protective device. If non-compliant, it is possible that the dangerous state of the machine cannot be stopped or not stopped in a timely manner.

- Before commissioning the machine, have qualified safety personnel check and release it.
- Verify that the time for the safety requirement (closing the protective device again) is longer than the response time.

Switch On

The device initializes after it is switched on. OSSDs are switched off in the meantime. The OSSD light-emitting diode lights up after initialization.

Thorough-check Requirements

The protective device and its application must be thoroughly checked in the following situations:

- Before commissioning.
- After changes to the configuration or the safety function.
- After changes to the mounting, the alignment, or the electrical connection.
- After exceptional events, such as after a manipulation has been detected, after modification of the machine, or after replacing components.

The thorough check verifies the following:

- All relevant regulations are complied with and the protective device is active for all operating modes of the machine.
- The documentation corresponds to the state of the machine, including the protective device.

Qualified safety personnel or specially qualified and authorized personnel must conduct the thorough checks and must document results in a traceable manner.

IMPORTANT

- Check whether the protective device of the machine is effective in all operating modes in which the machine can be set.
 - Verify that operating personnel have been instructed in the function of the protective device before starting work on the machine. The machine operator has overall responsibility for the instruction, which qualified personnel must conduct.
-

Notes:

Maintenance and Troubleshooting

Maintenance

Clean the Switch

-
- IMPORTANT**
- Do not use aggressive cleaning agents (such as isopropanol or spirit).
 - Do not use any substances that hinder the wetting properties of lacquers.
 - We recommend anti-static cleaning agents.
-

Regular Thorough Check

The safety switch must be checked regularly. The manufacturer and the operating entity of the machine defines the type and frequency of thorough checks, see [Thorough-check Concept on page 17](#).

The regular thorough checks serve to investigate the effectiveness of the safety switch and detect any ineffectiveness due to modifications or external influences (for example, damage or manipulation).

-
- IMPORTANT** Conduct the thorough checks according to the instructions from the manufacturer and the machine user.
-

Troubleshooting



ATTENTION: Hazard due to lack of effectiveness of the protective device. If non-compliant, it is possible that the dangerous state of the machine cannot be stopped or not stopped in a timely manner.

- Immediately shut down the machine if the behavior of the machine cannot be clearly identified.
 - Immediately shut down the machine if a machine fault cannot be determined or safely rectified.
 - Secure the machine so that it cannot switch on unintentionally.
-



ATTENTION: Hazard due to the unexpected starting of the machine. When any work is taking place, use the protective device to secure the machine or to verify that the machine is not switched on unintentionally.



ATTENTION: Hazard due to lack of effectiveness of the protective device. If non-compliant, it is possible that the dangerous state of the machine cannot be stopped or not stopped in a timely manner.

- Do not repair device components.
 - Do not modify or manipulate device components.
 - Apart from during the procedures described in this document, the device components must not be opened.
-

IMPORTANT If you cannot remedy the fault with the help of the information that is provided in this chapter, contact your local Allen-Bradley distributor or Rockwell Automation sales office.

Perform one of the following steps when an error occurs:

- Check the voltage supply.
- Check the cables.
- Check alignment of safety switch and actuator.
- Check ambient conditions (for example, interfering RFID frequencies or magnetic fields, distances to other safety switches).

IMPORTANT If a safety switch has a fault in a cascade with an end connector, the OSSDs of all safety switches between the safe evaluation unit and the safety switch concerned switch into the off state.

Specifications

Technical Data

Table 2 - Features

Attribute	440G-EZS2ISTL05J, 440G-EZS2ISTL05H
Assured switch-ON distance	4 mm (0.16 in.)
Typical switch on distance S_0	15 mm (0.59 in.)
Assured switch-OFF distance	35 mm (1.38 in.)
Max actuation frequency	0.5 Hz
Locking force	500 N (112.4 lbf)
Magnetic retaining force when not supplied with power	25 N (5.6 lbf)
Alignment tolerance for locking device	
Vertical	5 mm (0.2 in.)
Horizontal	5 mm (0.2 in.)
Aperture angle	3°

Table 3 - Safety

Attribute	440G-EZS2ISTL05J, 440G-EZS2ISTL05H
Standards	EN IEC 60947-5-3, IEC 61508, EN ISO 13849-1, EN ISO 14119, UL 508, IEC 60947-5-1, IEC 62061 ⁽¹⁾
Certifications	cULus Listed (UL 508), TÜV Certified, CE Marked for all applicable EU directives, UKCA Marked for all applicable regulations, C-Tick

Safety Ratings per EN ISO 13849-1, IEC 61508, and EN IEC 62061

	PL	Maximum SIL	PFH _d	Category	Proof Test Interval
Guard Door Sensing ⁽²⁾	PLe	3	1.50x10 ⁻⁸	4	20 years
Performance Level	PLe (ISO 13849-1) ⁽³⁾				
Category	4 (ISO 13849)				
Safety integrity level	SIL 3 (EN 61508)				
SIL claim limit	SIL CL 3 (EN 62061)				
PFH (average frequency of a dangerous failure per hour)	1.5 x 10 ⁻⁸ at 40 °C (104 °F) and 1000 m (3280.8 ft) above sea level				
T _M (mission time)	20 years (ISO 13849-1)				
Type	Type 4 (ISO 14119)				
Coding level	Low coding level (ISO 14119)				
Safe state when a fault occurs	At least one OSSD is in the OFF state				

(1) Suitable for use in 62061 SIL 3 applications

(2) The safety rated OSSD outputs of the device monitoring the guard closed.

(3) In a cascade, the Performance Level for the cascade as a whole depends on the number and type of devices in the cascade. PLe is only possible in cascades with a maximum of six devices.

Table 4 - System Connection of Variant with 1 x M12 Plug Connector, 5-pin

Attribute	440G-EZS21STL05J, 440G-EZS21STL05H
Voltage supply Local inputs and outputs	Plug, M12, 5-pin, A-coded (common plug connector for voltage supply and outputs)
Length of connecting cable	150 mm (5.91 in.)

Table 5 - System Connection of Variant with 1 x M12 Plug Connector, 8-pin

Attribute	440G-EZS21STL05J, 440G-EZS21STL05H
Voltage supply Local inputs and outputs	Plug, M12, 8-pin, A-coded (common plug connector for voltage supply and inputs and outputs)
Length of connecting cable	150 mm (5.91 in.)

Table 6 - Electrical

Attribute	440G-EZS21STL05J, 440G-EZS21STL05H
OSSD pairs	1
Rated impulse withstand voltage U_{imp}	1500V
Pollution degree	3 (external, according to EN 60947-1)
Power-up delay (after supply voltage applied) ⁽¹⁾	2.5 s
Supply voltage when an individual safety switch is connected	
Supply voltage V_v sensor	24V DC (19.2...28.8V) Class 2 supply
Supply voltage V_v magnet	24V DC (19.2...28.8V) Class 2 supply
Supply voltage when a cascade is connected	
Supply voltage V_v sensor	24V DC (22.8...28.8V) Class 2 supply
Supply voltage V_v magnet	24V DC (21.6...28.8V) Class 2 supply
Muting time when the supply voltage is interrupted	4 ms
Rated insulation voltage U_i	32V DC
Cable capacitance	400 nF (for Out A and Out B)
Device fuse	0.6...1 A
Current consumption at 24V	
Locking device deactivated	50 mA
Locking device active	350 mA
Protection class	III (EN 61140/IEC 61140)
Response time ⁽²⁾	≤50 ms ⁽³⁾
Release time ⁽⁴⁾	≤100 ms ⁽³⁾
Risk time ⁽⁵⁾	≤100 ms ⁽³⁾

(1) Once the supply voltage has been switched on, the OSSDs are in the OFF state during the time delay before availability. The time that is specified applies to one sensor; in a cascade, 0.1 s must be added per sensor.

(2) Response time for moving the OSSDs into the OFF state when the actuator is removed from the response area or when the OSSD input signals go into the OFF state.

(3) In a cascade, the value is multiplied by the number of safety switches in the cascade.

(4) Response time for moving the OSSDs into the ON state when the sensor detects the actuator and the OSSD input signals are in the ON state.

(5) The risk time is the time that is required to detect internal and external faults. External errors affect the OSSDs (short-circuit to an OSSD and cross-circuit between the two OSSDs). At least one of the two OSSDs is safely switched off during the risk time.

Table 7 - Mechanical Data

Attribute	440G-EZS21STL05J, 440G-EZS21STL05H
Dimensions (W x H x D)	
Safety switch	120 x 60 x 38.5 mm (4.72 x 2.36 x 1.52 in.)
Actuator	120 x 60 x 20.5 mm (4.72 x 2.36 x 0.81 in.)
Material	
Sensor housing	Anodized aluminum
Actuator housing	Fiber-glass-reinforced PVC
Anchor plate	Nickel-plated steel
Weight	
Safety switch	510 g (18 oz)
Actuator	210 g (7.41 oz)

Table 8 - Inputs

Attribute	440G-EZS21STL05J, 440G-EZS21STL05H
Rated voltage	24V DC
ON state	≤5 mA
OFF state	0 mA
ON state	19.2...28.8V DC
OFF state	0...2V DC

Table 9 - Outputs

Attribute	440G-EZS21STL05J, 440G-EZS21STL05H
2 OSSDs (Out 1 and Out 2)	2 x PNP, max 100 mA, short-circuit protected and overload-proof
1 Application diagnostic output (Aux)	25 mA max ⁽¹⁾ , short-circuit protected (resistive load)
Switching voltage (all outputs)	
ON state	19.2...28.8V DC
OFF state	0...2V DC
Switching current (OSSDs)	
ON state	≤100 mA
OFF state	≤500 μA
Test pulse duration (OSSDs)	300 μs

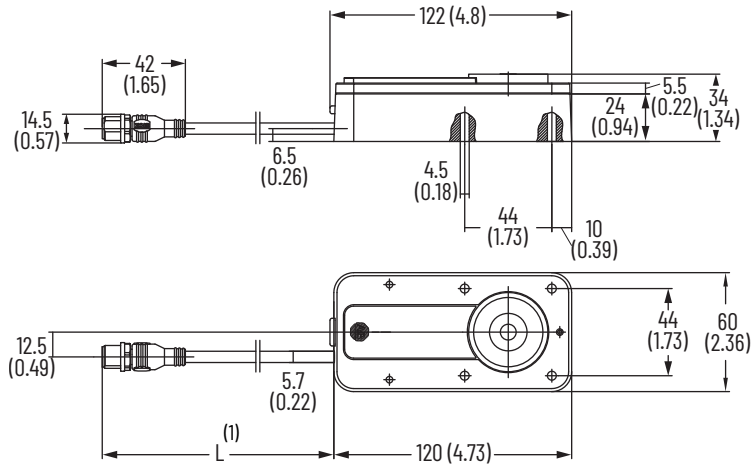
(1) A higher load affects the behavior of the status indicators, see [Status Indicators on page 11](#).

Table 10 - Environment

Attribute	440G-EZS21STL05J, 440G-EZS21STL05H
Enclosure rating	IP67, IP69K (IEC 60529)
Ambient operating temperature	-20...+55 °C (-4...+131 °F)
Storage temperature	-25...+70 °C (-13...+158 °F)
Relative humidity	50% at 70 °C (158 °F) (IEC 60947-5-2)
Vibration resistance	1 mm/10...55 Hz (IEC 60068-2-6)
Shock resistance	30 g, 11 ms (IEC 60068-2-27)
EMC	In accordance with IEC 61326-3-1, IEC 60947-5-2, IEC 60947-5-3, and EN 300330 V2.1.1
Minimum distance between two safety switches	Depending on alignment, see Mount Multiple Safety Switches on page 19 .

Approximate Dimensions

Figure 10 - 440G-EZ Sensor with 1 x M12 Plug [mm (in.)]



(1) L = 150±2 mm (5.91±0.79 in.)

Figure 11 - 440G-EZ Sensor Actuator [mm (in.)]

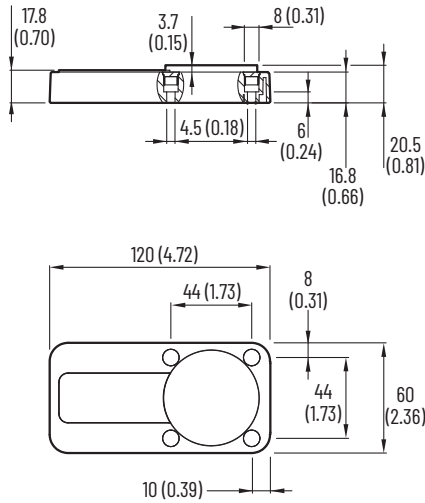
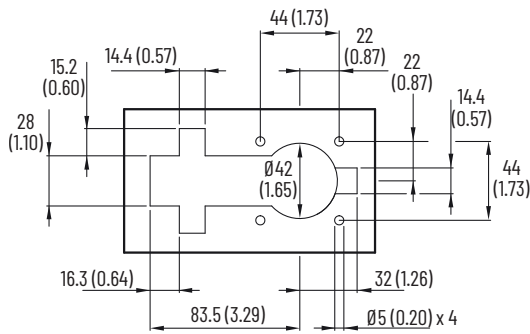


Figure 12 - Flush Mount [mm (in.)]



Order Information

Package Contents

- Safety switch
- Actuator
- Four protective caps
- Safety note
- Mounting instructions

Order Information

Table 11 - 440G-EZ Product Selection

Sensor Connection Type	Cat. No.
Electromagnetic switch Cable with 5-pin M12 connector	440G-EZS21STL05J
Electromagnetic switch Cable with 8-pin M12 connector	440G-EZS21STL05H

Notes:

Replacement Parts/Accessories

Replacement Parts

Description	Cat. No.
Actuator	440G-EMAS

Accessories

Table 12 - DC Micro (M12) Cables

Description	Cat. No.
8-pin cordset – socket, straight	889D-F8AB-x ⁽¹⁾
8-pin patchcord – socket, straight	889D-F8ABDM-x ⁽²⁾
5-pin cordset – socket, straight	889D-F5AC-x ⁽¹⁾
5-pin patchcord – socket, straight	889D-F5ACDM-x ⁽²⁾

(1) x = 2 [2 m (6.6 ft)], 5 [5 m (16.4 ft)], or 10 [10 m (32.8 ft)] for standard cable lengths.

(2) x = 1 [1 m (3.3 ft)], 2 [2 m (6.6 ft)], 3 [3 m (9.8 ft)], 5 [5 m (16.4 ft)], or 10 [10 m (32.8 ft)] for standard cable lengths

Notes:

Declaration of Conformity (DoC)

CE Conformity

Rockwell Automation declares that the products that are shown in this document conform with the provisions of the following EU directives (including all applicable amendments): Machinery Directive and RoHS Directive; and that the respective standards and/or technical specifications have been used as a basis for this declaration.

For a comprehensive CE certificate visit: rok.auto/certifications

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Rockwell Automation declares that the products that are shown in this document conform with the provisions of the following UKCA regulations (including all applicable amendments): Supply of Machinery (Safety) Regulations (2008 No. 1597) and Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations (2012 No. 3032); and that the respective standards and/or technical specifications have been used as a basis for this declaration.

For a comprehensive UKCA certificate visit: rok.auto/certifications

Notes:

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, and product notification updates.	rok.auto/support
Knowledgebase	Access Knowledgebase articles.	rok.auto/knowledgebase
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	rok.auto/pcdc

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Waste Electrical and Electronic Equipment (WEEE)







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

Rockwell Automation maintains current product environmental compliance information on its website at rok.auto/pec.

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Publication 440G-UM003E-EN-P - May 2025

Supersedes Publication 440G-UM003D-EN-P - October 2024

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