

Safety Switches

Non-Contact Switches

Magnetically Coded



Description

With the increasing speed and complexity of applications a simple magnetic switch may be insufficient to meet the increased risks, therefore the design incorporates several magnetically sensitive elements which must be triggered in a particular sequence to operate correctly.

The sensor with its molded-in brackets and diminutive size, is extremely versatile and simple to install. For high-risk applications the control unit is used with a single sensor to give a high-integrity system. For other applications, multiple sensors (including mechanical switches) can be connected.

Features

- Non-contact actuation
- Magnetic coded sensing
- High tolerance to misalignment
- Designed for use with specified controllers

Specifications

|                                                                                                                                       | MC1                                                                                                                                                                                                                                                                                                                                              | MC2                                       |
|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Safety Ratings                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                  |                                           |
| Standards                                                                                                                             | EN954-1, ISO13849-1, IEC/EN60204-1, NFPA79, EN1088, ISO14119, IEC60947-5-1, IEC/EN60947-5-3, ANSI B11.19, AS4024.1                                                                                                                                                                                                                               |                                           |
| Safety Classification                                                                                                                 | Cat. 1 Device per EN 954-1; Dual channel interlocks suitable for Cat. 3 or 4 systems                                                                                                                                                                                                                                                             |                                           |
| Functional Safety Data *<br>Note: For up-to-date information, visit <a href="http://www.ab.com/Safety/">http://www.ab.com/Safety/</a> | B10d: > 2 x 10 <sup>6</sup> operations at min.<br>PFH <sub>D</sub> : > 3 x 10 <sup>-7</sup><br>MTTF <sub>d</sub> : > 385 years<br>Dual channel interlock may be suitable for performance levels PLe or PLd (according to ISO 13849-1:2006) and for use in SIL2 or SIL3 systems (according to IEC 62061) depending on application characteristics |                                           |
| Certifications                                                                                                                        | CE Marked for all applicable directives, cULus, and TÜV                                                                                                                                                                                                                                                                                          |                                           |
| Outputs (Guard Door Closed, Actuator in Place)                                                                                        |                                                                                                                                                                                                                                                                                                                                                  |                                           |
| Safety Outputs                                                                                                                        | 2 N.C. REEDS                                                                                                                                                                                                                                                                                                                                     | 2 N.C. Solid-State Relays                 |
| Auxiliary Outputs                                                                                                                     | —                                                                                                                                                                                                                                                                                                                                                | 1 x PNP, 0.2 A max.; Status: OFF (0V DC)  |
| Operating Characteristics                                                                                                             |                                                                                                                                                                                                                                                                                                                                                  |                                           |
| Operating Distance, Make [mm (in.)]                                                                                                   | 8 (0.3)                                                                                                                                                                                                                                                                                                                                          | 10 (0.39)                                 |
| Operating Distance, Break [mm (in.)]                                                                                                  | 15 (0.59)                                                                                                                                                                                                                                                                                                                                        | 25 (0.98)                                 |
| Misalignment Tolerance, Min                                                                                                           | See Misalignment Wire                                                                                                                                                                                                                                                                                                                            |                                           |
| Repeat Accuracy                                                                                                                       | 10% of Sensing Range                                                                                                                                                                                                                                                                                                                             |                                           |
| Output Current, Max.                                                                                                                  | 200 mA                                                                                                                                                                                                                                                                                                                                           | 200 mA                                    |
| Switching Current @ Voltage, Max.                                                                                                     | 24V DC @ 200 mA                                                                                                                                                                                                                                                                                                                                  | 24V DC @ 200 mA +10%/-15%                 |
| Operating Voltage/Power Supply                                                                                                        | —                                                                                                                                                                                                                                                                                                                                                | 24V DC, +10%/-15%/50 mA max./Class 2 SELV |
| Frequency of Operating Cycle                                                                                                          | 1 Hz                                                                                                                                                                                                                                                                                                                                             | 1 Hz                                      |
| Environmental                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                  |                                           |
| Enclosure Type Rating                                                                                                                 | IP67 (NEMA 6P)                                                                                                                                                                                                                                                                                                                                   | IP 69K                                    |
| Operating Temperature [C (F)]                                                                                                         | -10...+55° (+14...+131°)                                                                                                                                                                                                                                                                                                                         |                                           |
| Relative Humidity                                                                                                                     | 5...95%                                                                                                                                                                                                                                                                                                                                          |                                           |
| Shock                                                                                                                                 | IEC 68-2, 27, 30 g, 11 ms                                                                                                                                                                                                                                                                                                                        |                                           |
| Vibration                                                                                                                             | IEC 68-2-6, 10...55 Hz                                                                                                                                                                                                                                                                                                                           |                                           |
| Radio Frequency                                                                                                                       | IEC 61000-4-3, IEC 61000-4-6                                                                                                                                                                                                                                                                                                                     |                                           |
| Physical Characteristics                                                                                                              |                                                                                                                                                                                                                                                                                                                                                  |                                           |
| Housing Material                                                                                                                      | Molded ABS                                                                                                                                                                                                                                                                                                                                       | Ultrador                                  |
| Actuator Material                                                                                                                     | Molded ABS                                                                                                                                                                                                                                                                                                                                       | Ultrador                                  |
| Color                                                                                                                                 | Red                                                                                                                                                                                                                                                                                                                                              |                                           |

\* Usable for ISO 13849-1:2006 and IEC 62061. Data other than B10d is based on:

- Usage rate of 1op/10 mins., 24 hrs/day, 360 days/year, representing 51840 operations per year
- Mission time/Proof test interval of 38 years

## Product Selection

| Type | Operating Voltage/Input Current | Safety Outputs            | Auxiliary Outputs                        | Status Indicator | Connection        | Cat. No.     |
|------|---------------------------------|---------------------------|------------------------------------------|------------------|-------------------|--------------|
| MC1  | —                               | 2 N.C. REEDS              | —                                        | No               | —                 | 440N-Z2NRS1C |
|      |                                 |                           |                                          |                  | —                 | 440N-Z2NRS1A |
|      |                                 |                           |                                          |                  | 10 m Cable        | 440N-Z2NRS1B |
| MC2  | 24V DC, +10%/-15%/50 mA max.    | 2 N.C. Solid-State Relays | 1 x PNP, 0.2 A max.; Status: OFF (0V DC) | Yes              | 8-Pin Micro (M12) | 440N-Z21W1PH |
|      |                                 |                           |                                          |                  | —                 | 440N-Z21W1PA |
|      |                                 |                           |                                          |                  | —                 | 440N-Z21W1PB |

## Recommended Logic Interfaces

| Description                                                    | Safety Outputs               | Auxiliary Outputs            | Terminals         | Reset Type                       | Power Supply              | Cat. Page No. | Cat. No.    |
|----------------------------------------------------------------|------------------------------|------------------------------|-------------------|----------------------------------|---------------------------|---------------|-------------|
| <b>Single-Function Safety Relays for 2 N.C. Contact Switch</b> |                              |                              |                   |                                  |                           |               |             |
| MSR127RP                                                       | 3 N.O.                       | 1 N.C.                       | Removable (Screw) | Monitored Manual                 | 24V AC/DC                 | 5-26          | 440R-N23135 |
| MSR127TP                                                       | 3 N.O.                       | 1 N.C.                       | Removable (Screw) | Auto./Manual                     | 24V AC/DC                 | 5-26          | 440R-N23132 |
| <b>Modular Safety Relays</b>                                   |                              |                              |                   |                                  |                           |               |             |
| MSR210P Base<br>2 N.C. only                                    | 2 N.O.                       | 1 N.C. and 2 PNP Solid State | Removable         | Auto./Manual or Monitored Manual | 24V DC from the base unit | 5-82          | 440R-H23176 |
| MSR220P Input Module                                           | —                            | —                            | Removable         | —                                | 24V DC                    | 5-86          | 440R-H23178 |
| MSR310P Base                                                   | MSR300 Series Output Modules | 3 PNP Solid State            | Removable         | Auto./Manual Monitored Manual    | 24V DC                    | 5-102         | 440R-W23219 |
| MSR320P Input Module                                           | —                            | 2 PNP Solid State            | Removable         | —                                | 24V DC from the base unit | 5-106         | 440R-W23218 |

**Note:** For additional Safety Relays connectivity, see page 5-12.  
 For additional Safety I/O and Safety PLC connectivity, see page 5-116.  
 For application and wiring diagrams, see page 10-1.

## Connection Systems

| Description      | Connection to Distribution Box<br>4-Pin Micro (M12) | 8-Pin Micro (M12) |
|------------------|-----------------------------------------------------|-------------------|
|                  | 2 N.C.                                              | 2 N.C. & 1 N.O.   |
| Cordset          | 889D-F4AC-*                                         | 889D-F8AB-*       |
| Patchcord        | 889D-F4ACDM-*                                       | 889D-F8ABDM-*     |
| Distribution Box | 898D-4LT-DM4                                        | —                 |
| Shorting Plug    | 898D-41LU-DM                                        | —                 |
| T-Port           | 898D-43LY-D4                                        | —                 |

\* Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.  
 \* Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.  
 ‡ Replace symbol with 4 or 8 for number of ports.  
**Note:** For additional information, see the page 7-1.

## Accessories

| Description        | Cat. No.    |
|--------------------|-------------|
| MC1 Spare Actuator | 440N-A17233 |
| MC2 Spare Actuator | 440N-A32114 |

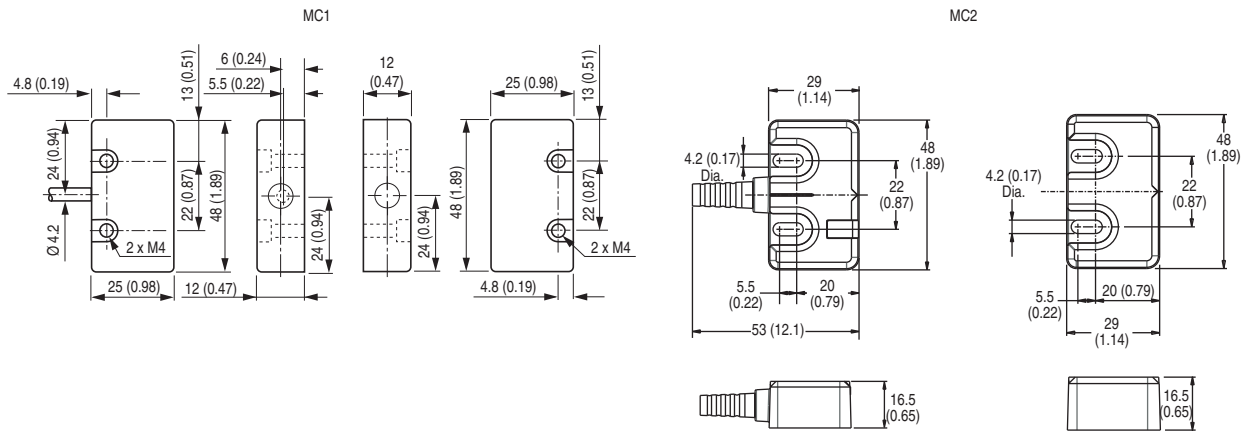
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Approximate Dimensions

Dimensions are shown in mm (in.). Dimensions are not intended to be used for installation purposes.



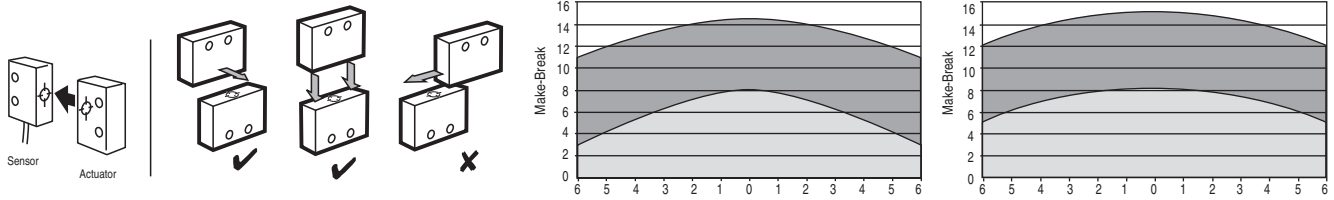
Typical Wiring Diagrams

| Description                                |        | MC1      | MC2             |
|--------------------------------------------|--------|----------|-----------------|
|                                            |        | 2 N.C.   | 2 N.C. + 1 N.O. |
| 4-Pin Micro (M12)                          |        |          | —               |
| 8-Pin Micro (M12)                          |        | —        |                 |
| Cordset 889D-F4AC-* or Cable Version       | Brown  | Safety A | —               |
|                                            | Blue   |          |                 |
|                                            | White  | Safety B | —               |
|                                            | Black  |          |                 |
| 8-Pin Cordset 889D-F8AB-* or Cable Version | Grey   | —        | Safety A        |
|                                            | Red    |          | Safety A        |
|                                            | Pink   |          | Safety B        |
|                                            | Yellow |          | Safety B        |
|                                            | White  |          | Aux             |
|                                            | Brown  |          | 24V DC +        |
|                                            | Blue   |          | Gnd             |
|                                            | Green  |          | NA              |

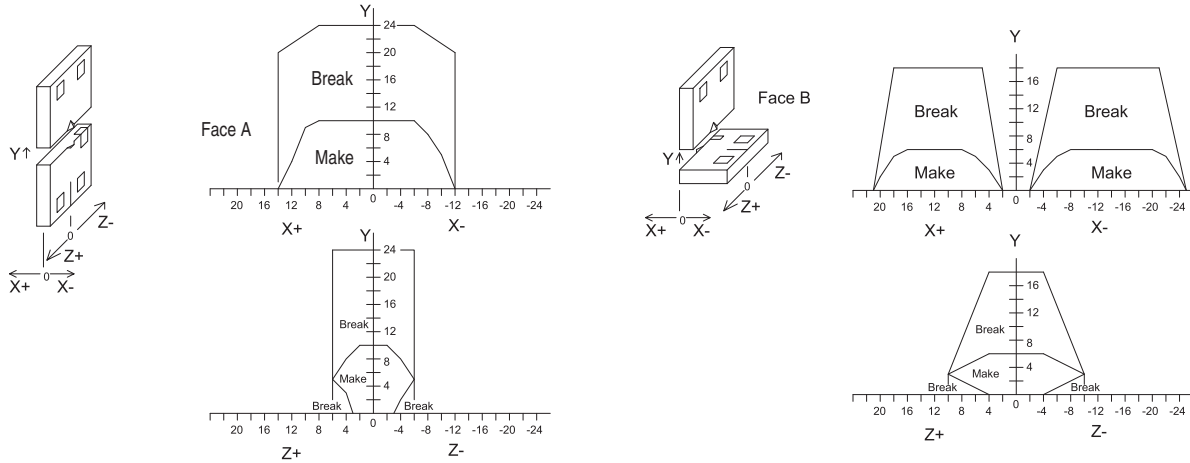
\* Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.

## Sensing & Misalignment Curve

### MC1



### MC2



### MC2 Application Wiring Example

