# 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

- Noncontact 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 contacts suitable for Cat. 3 or 4 systems | |
| Functional Safety Data<br>**Note**: For up-to-date information, visit *http://www.ab.com/Safety/* | B10d = > 2 x $10^6$ operations at min.<br>$PFH_D$ = > 3 x $10^7$<br>MTTFd = > 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 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 | IP 67 (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

❄ The safety contacts are described as normally closed (N.C.) i.e., with the guard closed, actuator in place (where relevant) and the machine able to be started.

## Product Selection

| Type | Operating Voltage/Input Current | Safety Outputs | Auxiliary Outputs | LED Indicator | Connection | Cat. No. |
|---|---|---|---|---|---|---|
| MC1 | — | 2 N.C. REEDS | — | No | 6 in Pigtail, 4-Pin Micro (M12) | 440N-Z2NRS1C |
| | | | | | 3 m Cable | 440N-Z2NRS1A |
| | | | | | 10 m Cable | 440N-Z2NRS1B |
| MC2 | 24V DC, +10%/-15%/50 mA max. | 2 N.C. Solid-State Relays | 1 PNP, 0.2 A max. Status Off (0V DC) | Yes | 6 in Pigtail, 8-Pin Micro (M12) | 440N-Z21W1PH |
| | | | | | 3 m Cable | 440N-Z21W1PA |
| | | | | | 10 m Cable | 440N-Z21W1PB |

## Recommended Logic Interfaces

| Description | Safety Outputs | Auxiliary Outputs | Terminals | Reset Type | Power Supply | Cat. Page No. | Cat. No. |
|---|---|---|---|---|---|---|---|
| **Single-Function Safety Relays for 2 N.C. Contact Switch** | | | | | | | |
| MSR127RP | 3 N.O. | 1 N.C. | Removable (Screw) | Monitored Manual | 24V AC/DC | 5-24 | 440R-N23135 |
| MSR127TP | 3 N.O. | 1 N.C. | Removable (Screw) | Auto./Manual | 24V AC/DC | 5-24 | 440R-N23132 |
| **Modular Safety Relays** | | | | | | | |
| MSR210P Base 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 | 5-74 | 440R-H23176 |
| MSR220P Input Module | — | — | Removable | — | 24V DC | 5-78 | 440R-H23178 |
| MSR310P Base | MSR300 Series Output Modules | 3 PNP Solid State | Removable | Auto./Manual Monitored Manual | 24V DC | 5-94 | 440R-W23219 |
| MSR320P Input Module | — | 2 PNP Solid State | Removable | — | 24V DC from the base unit | 5-98 | 440R-W23218 |

**Note**: For additional Safety Relays connectivity, see the Logic section of this catalog.
For additional Safety I/O connectivity, see the Safety I/O section of this catalog.
For Application and wiring diagrams, see the Applications section of this catalog.

## Connection Systems

| Description | Connection to Distribution Box 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-4‡LT-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.
**Note**: For additional information, see the Safety Connection System section of this catalog.

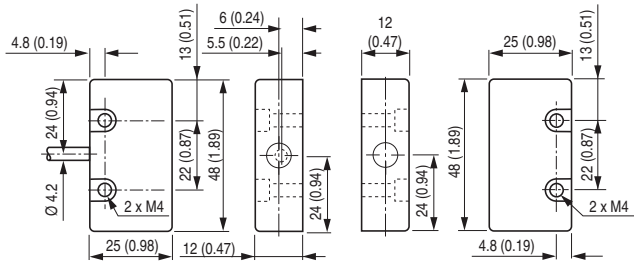
## Accessories

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

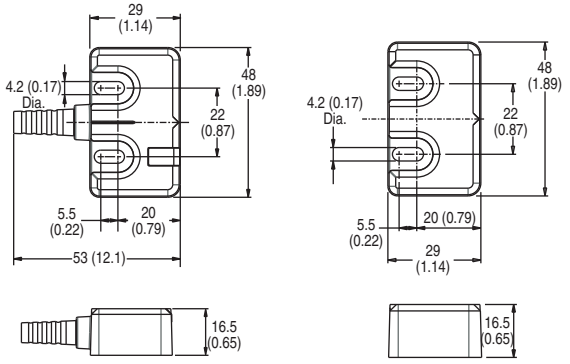
## Approximate Dimensions—mm (inches)

*Dimensions are not intended to be used for installation purposes.*

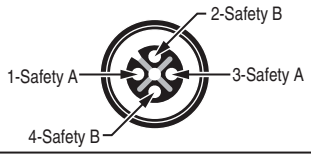
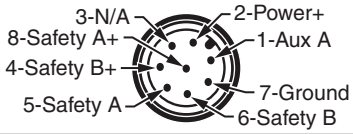
MC1




MC2



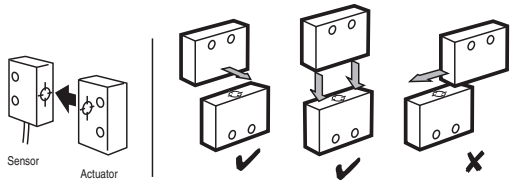

## Typical Wiring Diagrams

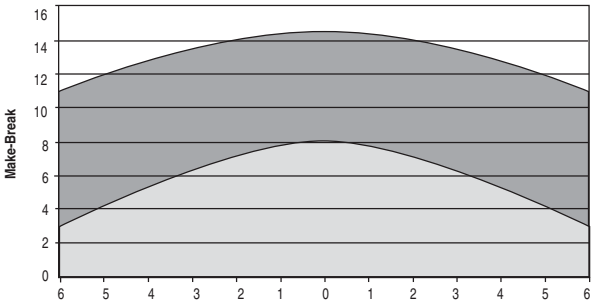
| Description | | MC1<br>2 N.C. | MC2<br>2 N.C. + 1 N.O. |
|---|---|---|---|
| 4-Pin Micro (M12) | |  | — |
| 8-Pin Micro (M12) | | — |  |
| Cordset 889D-F4AC-∗ or Cable Version | Brown | Safety A | — |
| | Blue | | |
| | White | Safety B | — |
| | Black | | |
| 8-Pin Cordset 889D-F8AB-∗ or Cable Version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

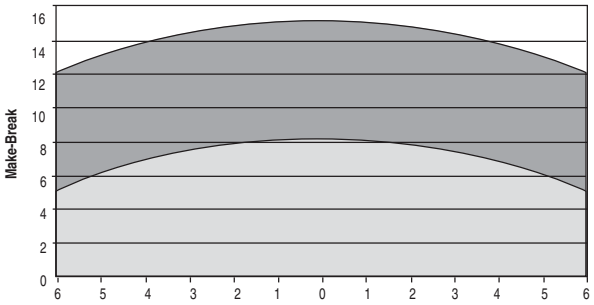
∗ Replace symbol with 2 (2 m), 5 (5 m) or 10 (10 m) for standard cable lengths.

## Sensing & Misalignment Curve

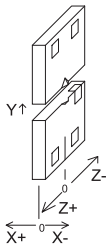
**MC1**

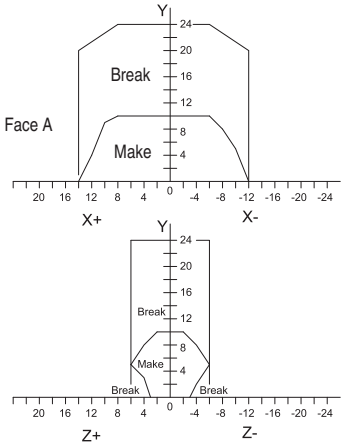


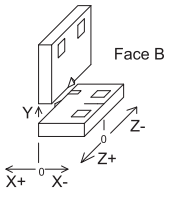



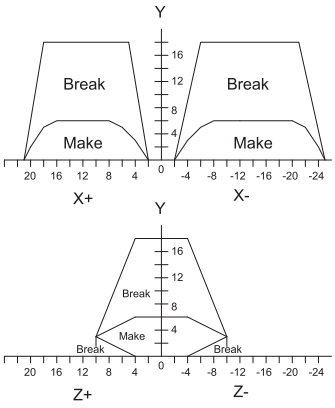




**MC2**




MC2 Application Wiring Example