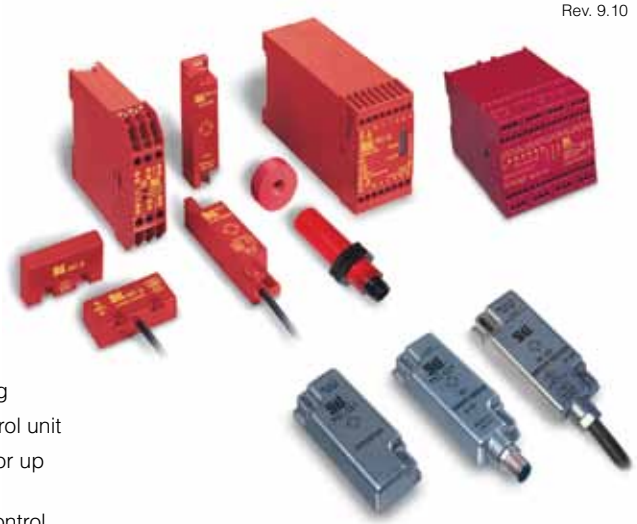
# MC-S Series

SpeedSPEC www.sti.com MC-S

Rev. 9.10

## Compact Coded Magnetic Safety Interlock Switch and Control Unit

- Dual channel, fully monitored system; meets Category 3 when single MC-S Series switch and control unit are used; MC-S6 meets Category 4
- External Device Monitoring (EDM) with automatic or manual reset
- NEMA 6 switch enclosures in plastic or stainless steel with connector satisfy most application requirements
- Magnetically coded switches are tamper resistant to common magnets
- Misalignment tolerance of (5 and 9 mm) reduces nuisance tripping
- A large number of switches may be used with a MC-S Series control unit
- MC-S6 control unit provides individual monitoring and indication for up to 6 switches and a N/O delayed output
- Mechanical interlock switches may be used with a MC-S Series control
- MC-S Series controls may replace a safety relay in some applications
- Auxiliary contacts available for individual guard door monitoring on MC-S switches

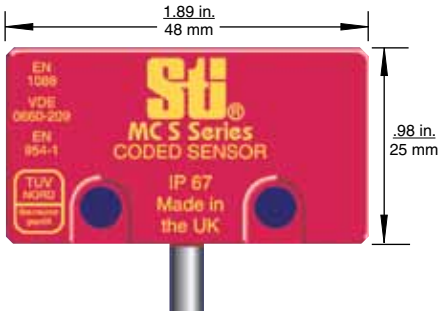


Conforms to EN954-1, EN1088, EN60204-1
UL and C-UL listed

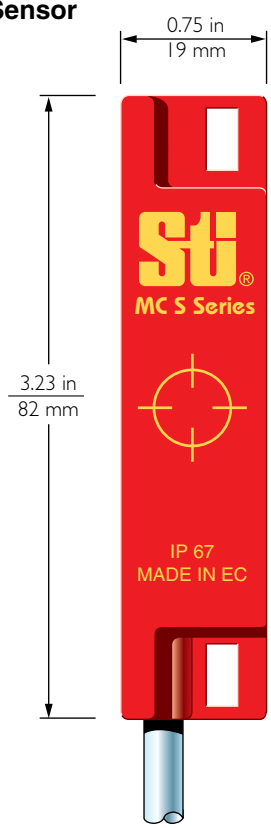
G

## Actual Size

### Type 1 Sensor




### Type 2 Sensor




## Description

The MC-S Series is a tamper resistant non-contact switch that operates with its own control unit. As a fully monitored dual channel system, a single MC-S Series switch and MC-S Series Control Units 1 or 2 combine to fulfill Category 3 requirements. Control Unit 6 with 2 to 6 MC-S switches fulfills Category 4 requirements for the 3 N/O outputs and Category 3 for the N/O delayed output.

The Control Units provide EDM (External Device Monitoring, also called MPCE monitoring) with an automatic or manual reset. This allows the Control Units to replace a safety relay in some applications.

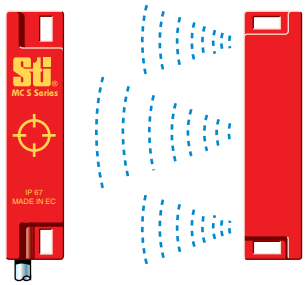
The NEMA 6 encapsulated design makes it ideal for harsh environments.

The Control Units can be used with a large number of MC-S switches for applications with multiple guard doors. The Control Unit provides individual monitoring and LED indication for up to six MC-S switches. Mechanical switches and MC-S switches may be used together with a single MC-S Control Unit for applications requiring both non-contact and mechanical safety interlock switches.

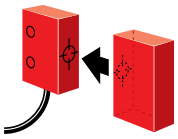
# Operation

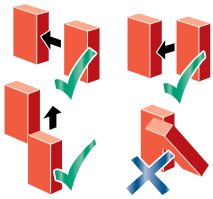
## Operating Principle

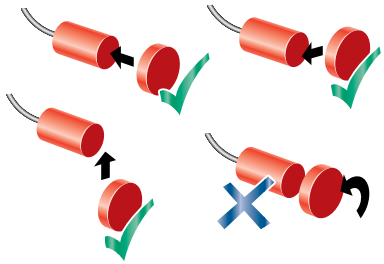
On presenting the actuator to the switch, the coded, high intensity magnetic field from the actuator causes the contacts to close. On removing the actuator (opening the door), the safety contacts open, isolating the machine.



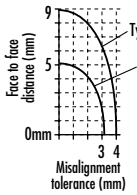

## Mounting Examples


Operation: target face to target face



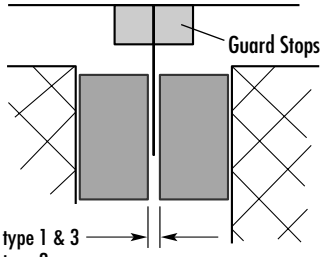


## Contact Arrangements




Misalignment Tolerance (when mounted on non- ferrous materials).

**NOTE:** ACTUATOR MUST NOT STRIKE SENSOR



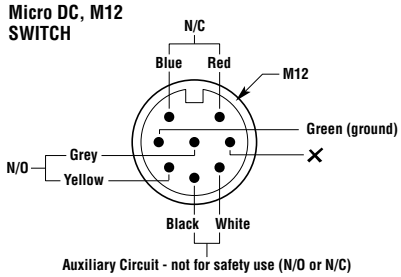

Recommended gap between sensor and actuator.

Universal Mounting Brackets can be used with this product. See accessories on www.sti.com

## Connector Configurations

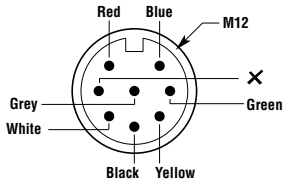
**MC-SS2 Stainless Steel**

**8-Pin Male, Micro DC, M12 SWITCH**

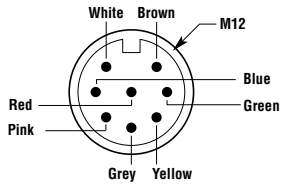



Auxiliary Circuit - not for safety use (N/O or N/C)

**8-Pin Female, Micro DC, M12 INCLUDED CABLE**

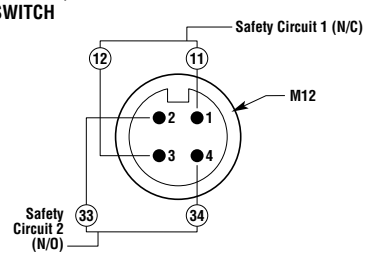



**8-Pin Female, Micro DC, M12 ACCESSORY CABLE 44512-0620**

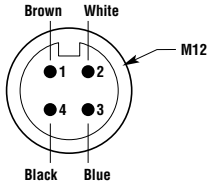



**MC-S3**

**4-Pin Male, Micro DC, M12 SWITCH**




**4-Pin Female, Micro DC, M12 ACCESSORY CABLE 44512-0600**



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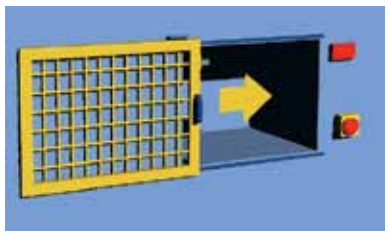
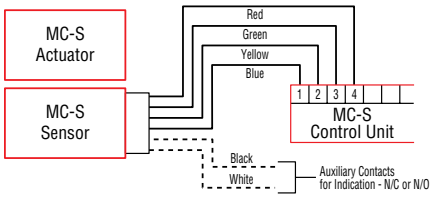
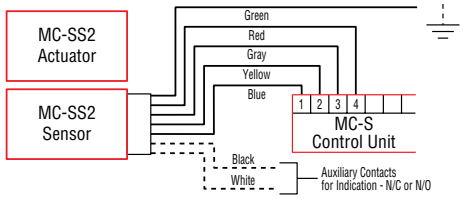
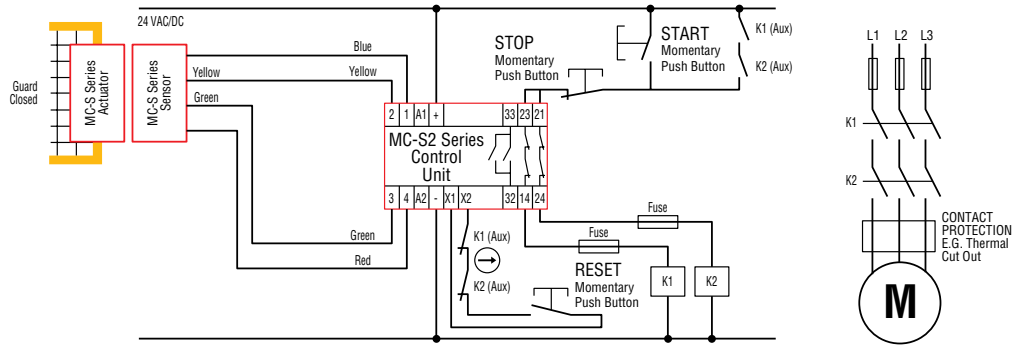
## Applications

Typical applications are on sliding guard doors or swinging guard doors.

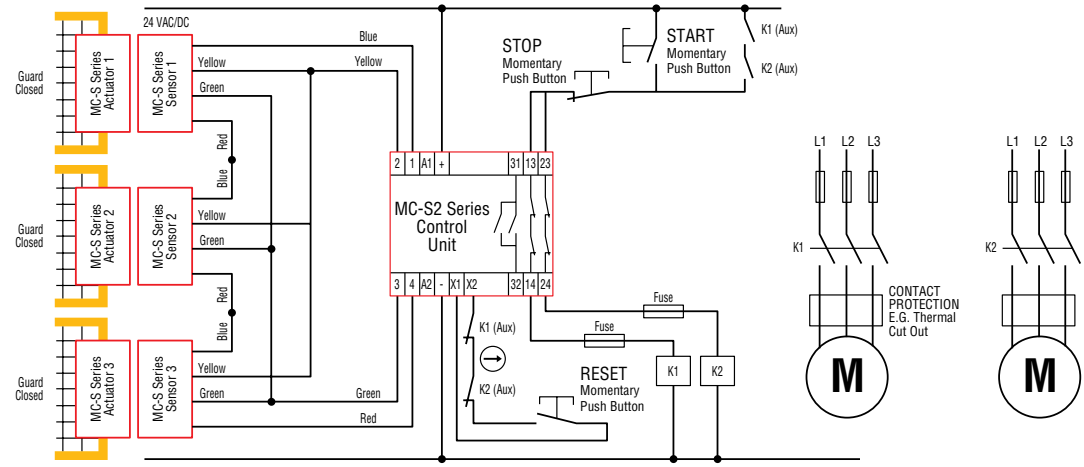





Single sensor and two contactors with manual reset and EDM (External Device Monitoring). Machine will start when guard is closed, auxiliary contacts at K1 and K2 are closed (i.e. both contactors are off), reset button is pressed and then start button is pressed.




Three sensors and two contactors with manual reset and EDM (External Device Monitoring). Machine will start when all guards are closed, reset button is pressed and then start button is pressed. NOTE: The use of multiple sensors connected to a single control unit is only suitable in applications where each guard door is always opened and then shut individually. Otherwise some single faults may not be detected and unintentional lockout reset may occur if two or more guard doors are open at the same time.

## Specifications

| Electrical | MC-S Series Control Units | MC-S Series Switches |
|---|---|---|
| Power Supply: | 24 VAC/DC ± 10% - Control 1<br>24 VDC ± 10% or 24/110/220 VAC - Control 2 & 6 | — |
| Power Consumption: | < 2 VA Control 1; < 4 VA - Control 2 & 6 | — |
| Safety Inputs: | 1 N/O + 1 N/C for controls 1 & 2 (x6 for Control 6) | — |
| Max Input Resistance: | Red/Blue - 200 Ω; Green/Yellow - 150 Ω | — |
| Min. Approach Speed: | Typically 10-17 mm/sec. | |
| Safety Contacts: | — | 1 N/C + 1 N/O |
| Auxiliary Contacts: | — | 1 N/C or 1 N/O |
| Auxiliary Contact Rating: | — | 100 mA, 24 VDC and 230 VAC |
| Relay Outputs: | 1 N/O + 1 Semi Aux. - Control 1<br>2 N/O + 1 N/C Aux. - Control 2 | Control 6 Delayed Output (0.6-30 s)<br>3 N/O + 1 N/O Delayed, 1 N/C Aux. - Control 6 |
| Auxiliary Contact of Controls: | 100 mA, 24 VDC and 230 VAC - Control 1<br>2 A, 24 VDC and 230 VAC - Control 2 and 6 | — |
| N/C Operating Distance: | — | On = 5 mm; Off = 11 mm Type 1 and Type 3<br>On = 9 mm; Off = 12 mm Type 2<br>On = 10 mm; Off = 13 mm Type 2 stainless |
| Max Switched AC: | 4 A/250 VAC | 100 mA/230 VAC |
| Max Switched DC: | 2 A/30 VDC | 100 mA/24 VDC |
| Min Switched Current/Voltage: | 10 mA/10 V AC/DC | — |
| Impulse Withstand Voltage: | 2500 V | — |
| Max Drop-Out Time: | 25 m/sec | — |
| Max Output Fuse: | 5 A quick acting on AC, 3 A quick acting on DC<br>(3 A quick acting on AC/DC Control 6) | — |
| Reset Mode: | Automatic/Manual | — |
| External Device Monitoring: | N/C loop between x1 and x2 | — |
| **Mechanical** | | |
| Mounting: | 35 mm (1.38 in.) DIN Rail | 4 x M4 screws, M18 x 1 mm pitch for MC-S3 |
| Case Material: | Polycarbonate | ABS plastic - Type 1 & 2; nylon - Type 3;<br>stainless steel - Type 2 stainless |
| Max Wire Size: | 2 x 1 mm (20 AWG) stranded<br>2 x 1.5 mm (15 AWG) solid | Pre-wired cable to 10 m MC-S1, S2,<br>Connector MC-SS2, MC-S3 |
| Weight: | 147 g (5.2 oz.) - Control 1, 590 g (21 oz.) - Control 2,<br>990 g (35 oz.) - Control 6 | 100 g (3.5 oz.) plastic, 600 g (1-lb. 5-oz.) steel |
| Color: | Red | Red or Stainless steel |
| Indication: | LED 1: Green = Output Closed<br>LED 2: Red = Power On Controls 1 & 2<br>LED 2: Green = Power on Control 6 | —<br>— |
| Mechanical Life: | 1 x $10^6$ | 1 x $10^6$ |
| **Environmental** | | |
| Protection: | IP40 (NEMA 1) | IP67 (NEMA 6); (IP68 for stainless) |
| Operating Temperature: | -10 to 55°C (14 to 131°F) | -10 to 55°C (14 to 131°F) Plastic<br>-25 to 125°C (-13 to 257°F) Stainless |
| Humidity: | 90% RH at 50°C (122°F) | 90% RH at 50°C (122°F) |
| **Compliance** | | |
| Standards: | EN954-1, EN1088, EN60204-1 | |
| Approvals/Listings: | CE marked for all applicable directives, UL and C-UL | |

Specifications are subject to change without notice.

Note:The safety contacts of the Omron STI switches are described as normally closed (N/C) i.e., with the guard closed, actuator in place, and the machine able to be started.





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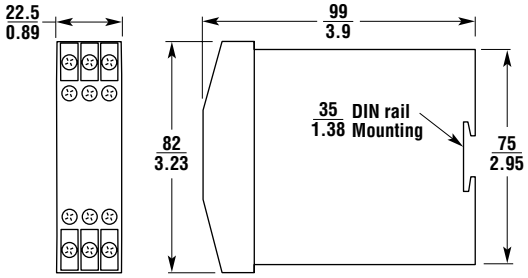
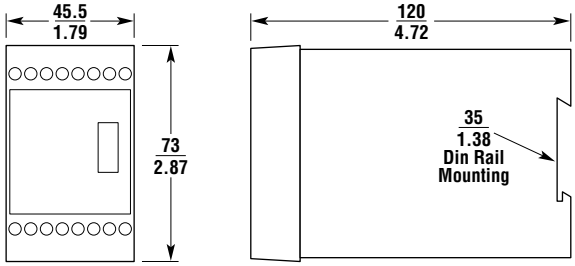
## Dimensions

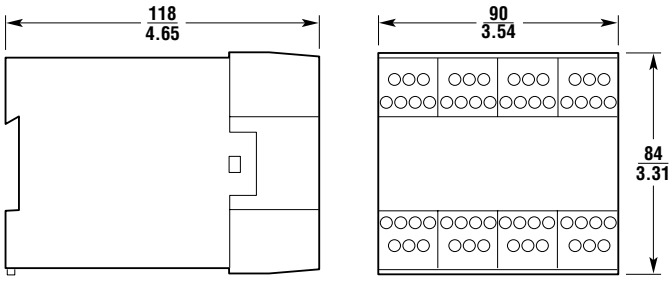
(mm/in.)



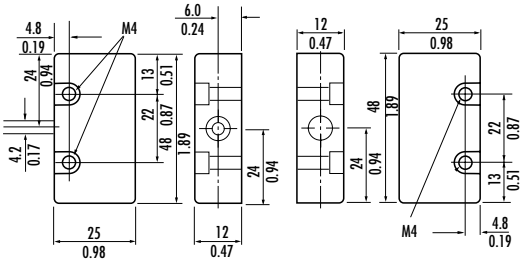

Control Unit 1




Control Unit 2

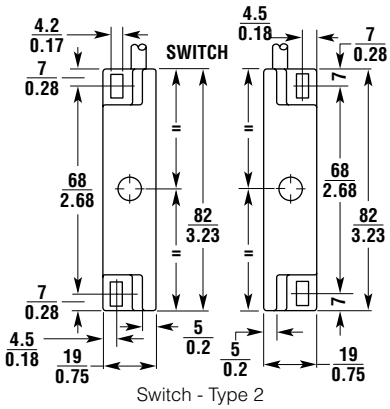



Control Unit 6

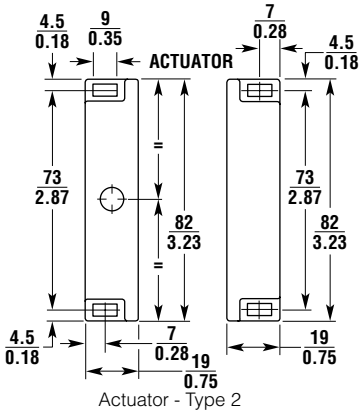



Switch - Type 1

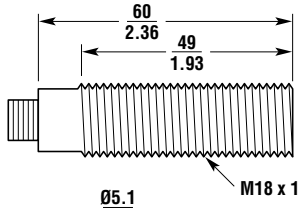
Actuator - Type 1



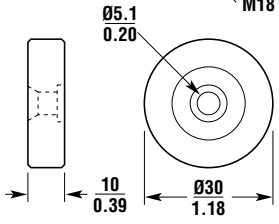

Switch - Type 2



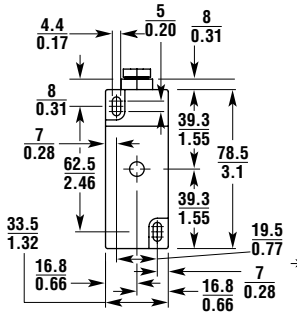

Actuator - Type 2



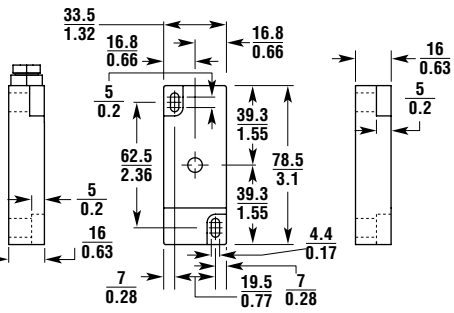

Switch - Type 3




Actuator - Type 3




Switch - Type 2
Stainless steel




Actuator - Type 2
Stainless steel

## Ordering

| Model | Contacts | Wiring Entry | Part No. |
|---|---|---|---|
| **CONTROL UNITS** | | | |
| **Unit 1** | | | |
| MC-S1 Control (24VAC/DC) (1 switch input) | 1 N/O + 1 N/C Semi Aux. | | 44531-0010 |
| **Unit 2** | | | |
| MC-S2 Control (24VAC/DC + 110/220VAC) (1 switch input) | 2 N/O + 1 N/C Aux. | | 44531-0020 |
| **Unit 6** | | | |
| MC-S6 Control (24VAC/DC + 110/220VAC) (6 switch inputs) | 3 N/O + 1 N/O Delayed, 1 N/C Aux. | | 44531-0040 |
| **PLASTIC CASE SWITCHES** | | | |
| **Type 1** | | | |
| MC-S1PC3 Switch & Actuator | 1 N/C + 1 N/O | 3 m cable | 44531-0100 |
| MC-S1PC10 Switch & Actuator | 1 N/C + 1 N/O | 10 m cable | 44531-0110 |
| MC-S1XCPC3 Switch & Actuator w/ signal contacts | 2 N/C + 1 N/O (N/C Aux. Contact) | 3 m cable | 44531-0150 |
| MC-S1XOPC3 Switch & Actuator w/ signal contacts | 1 N/C + 2 N/O (N/O Aux. Contact) | 3 m cable | 44531-0155 |
| MC-S1XCPC10 Switch & Actuator w/ signal contacts | 2 N/C + 1 N/O (N/C Aux. Contact) | 10 m cable | 44531-0160 |
| MC-S1XOPC10 Switch & Actuator w/signal contacts | 1 N/C + 2 N/O (N/O Aux. Contact) | 10 m cable | 44531-0165 |
| **Type 2** | | | |
| MC-S2PC3 Switch & Actuator | 1 N/C + 1 N/O | 3 m cable | 44531-0200 |
| MC-S2PC10 Switch & Actuator | 1 N/C + 1 N/O | 10 m cable | 44531-0210 |
| MC-S2XCPC3 Switch & Actuator w/ signal contacts | 2 N/C + 1 N/O (N/C Aux. Contact) | 3 m cable | 44531-0250 |
| MC-S2XOPC3 Switch & Actuator w/signal contacts | 1 N/C + 2 N/O (N/O Aux. Contact) | 3 m cable | 44531-0255 |
| MC-S2XCPC10 Switch & Actuator w/signal contacts | 2 N/C + 1 N/O (N/C Aux. Contact) | 10 m cable | 44531-0260 |
| MC-S2XOPC10 | 1 N/C + 2 N/O (N/O Aux. Contact) | 10 m cable | 44531-0265 |
| **Type 3** | | | |
| MC-S3PCC Switch & Actuator | 1 N/C + 1 N/O | connector | 44531-0300 |
| **STAINLESS STEEL CASE SWITCHES** | | | |
| MC-SS2XOSCC5 | 1 N/C + 2 N/O (N/O Aux. Contact) | connector + 5 m cable | 44531-0450 |
| MC-SS2XCSCC5 | 2 N/C + 1 N/O (N/C Aux. Contact) | connector + 5 m cable | 44531-0455 |
| MC-SS2X0SC6 | 1 N/C + 2 N/O (N/O Aux. Contact) | 6 m cable | 44531-0460 |
| MC-SS2XCSC6 | 2 N/C + 1 N/O (N/C Aux. Contact) | 6 m cable | 44531-0465 |
| Spare MC-S Type 1 Actuator, Plastic | | | 44531-0710 |
| Spare MC-S Type 2 Actuator, Plastic | | | 44531-0720 |
| Spare MC-S Type 3 Actuator, Plastic | | | 44531-0730 |
| Spare MC-SS2 Actuator, Stainless Steel | | | 44531-0740 |

Universal Mounting Brackets can be used with this product. See accessories on www.sti.com





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• Power Supplies

**Safety**
• Laser Scanners • Safety Mats • Edges and Bumpers • Programmable Safety Controllers • Light Curtains • Safety Relays • Safety Interlock Switches

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