

Safety Switches

Safety switches monitor doors, gates, and other movable physical guards that separate personnel from a hazard. They will send a signal to the machine control system if the guard has been opened, removed, or is out of position.

- Non-Contact Switches
- Hinge Switches
- Mechanical Switches
- Locking Switches


## 



## Non-Contact Switches

- Two piece design where sensor and actuator do not contact
- In-Series Diagnostics (ISD) provides users with data from each sensor in a cascade chain
- Cascade up to 32 sensors while achieving the highest level of safety
- Accommodating to misalignment
- IP69 solutions available
- Available with the highest level of tamper resistance



## Hinge Switches

- One piece sensor and actuator with hinge function
- Fast installation and set-up with repostionable safety switch point
- Stainless steel and IP69 available
- Matching hinges without sensing available for additional door support
- Available with up to $270^{\circ}$ safety switch point operation range



## Mechanical Switches

- Two piece design with mechanical operator feedback
- Flexible actuator options for misalignment
- Rotatable heads for flexible installation
- Mechanically coded actuators minimize tampering
- Up to 15 N latching force to reduce downtime due to vibrating doors



## Locking Switches

- Two piece design with up to 2000 N locking force for safety or process critical applications
- Flexible actuator option for misalignment
- Rotatable heads for flexible installation
- Mechanically coded actuators minimize tampering
- Up to 15 N latching force to position door prior to locking

| Sliding Guards |  |  |
| :--- | :--- | :--- | :--- | :--- |
| Small Doors <br> and Gates |  |  |
| Heavy Doors <br> and Large Gates |  |  |



Non-contact switch on a sliding door


Mechanical switch on large gate


Hinge switch on a door


Locking switches on large gate

## Selection Guide - Safety Switches

| Switch Technology | NON CONTACT |  |  |  | HINGE |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | SI-MAG | SI-RF Single Door | SI-RF <br> Cascade | SI-RF <br> Cascade and ISD | SI-HG63 | SI-HG80 |
|  | Magnetic | RFID | RFID | RFID | Mechanical | Mechanical |
| Environmental Rating | \|P67 | IP69 | IP69 | IP69 | IP67 IP69 (stainless steel) | IP65 |
| Tamper Resistance - Coding Level | Low | Low, High, Unique | Low, High, Unique | Low, High, Unique | Low | Low |
| Safety Rating (single sensor) | Ple/Cat 4 | Ple/Cat 4 | Ple/Cat 4 | Ple/Cat 4 | up to Ple/Cat 4* | Plc/Cat $3^{* *}$ |
| Housing | plastic | plastic | plastic | plastic | metal | metal |
| Assured On Sao / <br> Misalignment Tolerance (mm) | 3-5 | 10 | 10 | 10 |  |  |
| \# of Cascaded Sensors at Ple/Cat4 |  |  | 32 | 32 |  |  |
| Non-Contact | $\sqrt{ }$ | $\sqrt{ }$ | $\sqrt{ }$ | $V$ |  |  |
| Position Monitoring |  | $\sqrt{ }$ | $V$ | $\sqrt{ }$ |  |  |
| LED Status Indication |  | $\sqrt{ }$ |  | $\sqrt{ }$ |  |  |
| ISD <br> (In-Series Diagnostics) |  |  |  |  |  |  |
| Locking (1K to 2K N Force) |  |  |  |  |  |  |
| Latching (~10N Force) |  |  |  |  |  |  |

** Dual Switch Hinge model or applicable second safety switch added for Ple/Cat 4
** Ple/Cat 4 achieved with applicable second safety switch added


RFID Single

- Single door RFID non-contact gate/door sensing solution
- Resistant to high vibration and operations with metallic shavings




## RFID Cascade

- Multiple door RFID non-contact gate/door sensing solution
- 4-pin QD connections for cost-effective, simple, error-free installation
- Resistant to high vibration and operations with metallic shavings
- Connect up to 32 sensors in series while maintaining the highest level of safety

Actuators


Connectors and Cordsets

SI-RFA-TS
4 to 8 to 4 -pin T-Adapter for series connecting switches

SI-RFA-P
Termination plug
SI-RFA-TK
8 to 4 to 8 -pin T-Adapter for local reset button


MQDEC-4xxSS MQDEC-4xXSS
4-pin Male/Female M1 double-ended cable (straight to straight)

MQDEC-4xxRS
4-pin Male/Female M12
double-ended cable (right-angle to straight)

MQDC-4xx
4-pin female M12 to flying lead cable

USB-USBM-1
1M USB configuration cable for the SI-RFA-DM1
For more accessories and specific cable lengths visit our website www.bannerengineering.com


In-Series Diagnostics (ISD) makes it easy to access diagnostic data from devices in a safety system without special equipment or designated cabling. Users can troubleshoot machine safety systems, prevent system faults, and reduce equipment downtime. This innovative, next generation technology is exclusive to safety devices from Banner Engineering. For more information go to www.bannerengineering.com/isd


RFID Cascade with In-Series Diagnostics

## EtheriNet/IP

- Multiple door RFID non-contact gate/door sensing solution

- 4-pin QD connections for cost-effective, simple, error-free installation
- Resistant to high vibration and operations with metallic shavings
- Connect up to 32 sensors in series while maintaining the highest level of safety
- Door status and sensor health sent to PLC/HMI for simple trouble shooting


PLC


HMI



SC10-2roe

SI-RFA-DM1
for panel mount

## SC10 Safety Controller

- Safety Controller and ISD to PLC Gateway
- Free and intuitive PC configuration software
- Connects up to 64 ISD devices and has 6 available safe inputs for other devices
- Two independently controlled safety relay outputs with 6 Amps each

SD to IO-Link Module

- ISD to IO-Link Gateway
- Connect up to 32 ISD inputs
- Easily daisy-chain to a Safety Relay or Safety Controller


## Non-Contact - Magnetic Switches

- Cost-effective non contact solution minimizes device wear and tear,
even in applications with persistent use
- 3 to 5 mm misalignment tolerence
- A single magnetic pair can achieve up to Category 4/PLe safety rating
- Coded magnets minimize the potential for intentional defeat
- Available in cable or QD models




SI-MAGB3


## Hinge Switches

- Mounts at the axis of a swinging guard where the possibility of misalignment is at its lowest, minimizing the opportunity for nuisance trips
- Achieves Category 4/PLe safey rating with two switches deployed
- Once set, the switch point setting mechanism is fully concealed within the switch, preventing access and complicating any attempts to bypass safety functions
- Available in stainless steel, IP69-rated models that resist high-pressure, high-temperature washdown and similar challenges
- Hinge switches are similar in appearance to standard door hinges, making them completely inconspicuous once installed
- One piece device installs quickly with no need to align the switch and actuator


SI-HG63 stainless steel models shown



A $270^{\circ}$ range of motion ensures that movable guards can be opened when the hazard is in a safe state without interfering with the movement of personnel or equipment outside the protected area.

## Mechanical Switches

- Mechanical safety interlock switches consist of an actuator mounted to a movable machine guard aligned with a switch mounted to the machine. The actuator must be inserted into the switch for the machine to operate.
- Mechanically coded actuators use two independent operating elements, making it difficult to bypass safety functions
- A machine guard door will not easily open if the actuator is properly embedded into the switch, minimizing nuisance trips caused by machine vibration
- Operators can feel when the actuator has been fully inserted into the switch ensuring that the guard has been properly closed
- Achieves Category 4/PLe safey rating with two switches deployed on a guard
- IP65-rated safety devices that resist dust, dirt, and some exposure to water and similar environmental challenges


## Limit Switches

- Cost effective one piece sensor
- No actuator allows for fewer alignment issues
- Hideable making them more tamper-resistant
- Mechanically coded actuators use two independent operating elements to minimize intentional tampering or defeat
- Rotating head and top or side engagement allows for eight different actuator positions
- Design meets positive opening requirements for safety switches



* Available in 83 mm models only
** Available in 100 mm models only

* 90MF models $=$ Straight actuator with F contacts 90MFF models $=$ Flexible actuator with $F$ contacts
** Available with 75 M models only
- Locking safety switches include a machine mounted switch and a guard mounted actuator that prevent access to an area by remaining locked together until the hazardous motion has come to a complete stop.
- Rotating head requires little or no tools to adjust to one of four positions allowing for flexible positioning
- Can be used to prevent access to a hazard, ensure critical processes are not interrupted, or secure material and equipment from theft or tampering
- Mechanically coded actuators use two independent operating elements, making it difficult to bypass safety functions
- Once locked, a machine guard door will not open, eliminating an opportunity for nuisance trips, even if exposed to frequent impact or prolonged vibration
- Operators can feel when the switch and actuator have locked, ensuring that the guard has been properly closed
- IP67-rated safety devices that resist dust, dirt, and some exposure to water and similar environmental challenge

| Family | Solenoid Voltage | Lock/ Unlock | Contact Configuration | Actuator Type |
| :---: | :---: | :---: | :---: | :---: |
| SI-LS42 | DM | S | G |  |
| $\begin{aligned} & \text { SI-LS42 } \\ & \text { SI-QM100 } \end{aligned}$ | $\begin{aligned} & \text { DM }=24 \mathrm{~V} \mathrm{ac} / \mathrm{dc} \\ & \mathbf{W M}=110 \mathrm{~V} / 230 \mathrm{~V} \text { ac } \end{aligned}$ | S = Power to Unlock <br> M = Power to Lock |  | Blank = Rigid In-Line F = Flexible In-Line |
|  |  | Actuator $\begin{aligned} & \mathrm{G}=1 \mathrm{NO} / 1 \mathrm{NC} \\ & \mathrm{H}=2 \mathrm{NC} \\ & \mathrm{I}=2 \mathrm{NC} / 1 \mathrm{NO} \\ & \mathrm{~J}=3 \mathrm{NC} \end{aligned}$ | Solenoid <br> $1 \mathrm{NO} / 1 \mathrm{NC}$ <br> $1 \mathrm{NO} / 1 \mathrm{NC}$ <br> 1 NC <br> 1 NC |  |




| Model | Color |
| :--- | :--- |
| SI-K30LGRX7P | Green, Red |
| SI-K30LRX7P | Red |

SI-QM100.


Power to lock


## Selecting Controlers and Safety Relays

Industrial safety controllers and relays provide an interface between safety devices and the machines and processes those devices monitor for a complete and easy－to－use safety control solution．


Expandable input and output modules available

