

F3S-TGR-N_M / F3S-TGR-N_U

RFID Non-contact switches are designed to monitor hinge, sliding or removal guard doors.

- Based on RFID technology (code) and hall technology (distance check)
- The RFID-design covers two operation models with very high anti-tamper level:
 - M-types (Master coded): Any sensor works with any actuator (re-teach needed if exchange of actuator)
 - U-types (Unique coded): Each sensor and actuator use a unique code. This is a solution for applications that requires even a higher anti-tamper level
- Connect up to 20 switches in series
- LED supports easy diagnosis
- Compensation of mechanical tolerances
- Non-contact – no abrasion – no particles
- Operates with all OMRON safety controllers
- Suitable for CIP/SIP processes and high pressure cleaning due IP69K (pre-wired types)
- Conforms to safety categories up to PLe acc. EN ISO 13849-1



Model number structure

F3S-TGR-N□P□-21-□

1 2 3

1. Type:

L: Elongated Sensor
S: Small Sensor

2. Code:

M: Master Code
U: Unique Codes

3. Cable length/connection

05: 5 m Cable
10: 10 m Cable

M1J8: M12 male connector, 8 pin, fitted with 250 mm cable

Ordering information

Master coded: Any actuator will operate with any sensor (Teach process needed, if actuator will be changed: Power down - place actuator to sensor - power up).

Unique coded: Only one actuator fits to the code of the sensor (Replacement of only sensor OR actuator is not possible)

Elongated sensors

| Type | Cable connection | Contact configuration | Order code | |
|---|--------------------------------------|-----------------------|---------------------------|----------------------|
| | | | Master coded ¹ | Unique coded |
|  | 5 m pre-wired | 2NC/1NO | F3S-TGR-NLPM-21-05 | F3S-TGR-NLPU-21-05 |
| | 10 m pre-wired | | F3S-TGR-NLPM-21-10 | F3S-TGR-NLPU-21-10 |
| | M12, 8 pin, fitted with 250 mm cable | | F3S-TGR-NLPM-21-M1J8 | F3S-TGR-NLPU-21-M1J8 |

¹ Re-teach needed if exchange of actuator: Power down - replace the actuator and close the door or bring the new actuator close to the sensor - power up.

Small sensors

| Type | Cable connection | Contact configuration | Order code | |
|---|--------------------------------------|-----------------------|---------------------------|----------------------|
| | | | Master coded ¹ | Unique coded |
|  | 5 m pre-wired | 2NC/1NO | F3S-TGR-NSPM-21-05 | F3S-TGR-NSPU-21-05 |
| | 10 m pre-wired | | F3S-TGR-NSPM-21-10 | F3S-TGR-NSPU-21-10 |
| | M12, 8 pin, fitted with 250 mm cable | | F3S-TGR-NSPM-21-M1J8 | F3S-TGR-NSPU-21-M1J8 |

¹ Re-teach needed if exchange of actuator: Power down - replace the actuator and close the door or bring the new actuator close to the sensor - power up.

Accessories

| | | Order code |
|---|--|----------------------------|
| Cables 8-pin | 2 m | Y92E-M12PURSH8S2M-L |
| | 5 m | Y92E-M12PURSH8S5M-L |
| | 10 m | Y92E-M12PURSH8S10M-L |
| | 25 m | Y92E-M12PURSH8S25M-L |
| T-Connector connection cable | T-Connector for M12 connector | F39-TGR-NT |
| | 0.6 m, M12-8pin | Y92E-M12FSM12MSPURSH806M-L |
| | 2 m, M12-8pin | Y92E-M12FSM12MSPURSH82M-L |
| | 5 m, M12-8pin | Y92E-M12FSM12MSPURSH85M-L |
| | 10 m, M12-8pin | Y92E-M12FSM12MSPURSH810M-L |
| Actuators (only for master coded types) | for F3S-TGR-NLPM | F39-TGR-NLPM-A |
| | for F3S-TGR-NSPM | F39-TGR-NSPM-A |
| Mounting screws | Set of Torx safety screws (M4, 4 x 30 mm, 4 x 20 mm, 4 x 10 mm; incl. washers and Torx bit) | F39-TGR-N-SCREWS |

Control units

| | | Order code |
|-------------------------------------|--------|--|
| Safety relay units | G9SA | G9SA-301 G9SA-501 G9SA-321-T075 G9SA-321-T15 G9SA-321-T30 |
| | G9SB | G9SB-2002-C G9SB-2002-A G9SB-200-B G9SB-200-D G9SB-3012-A G9SB-301-B G9SB-3012-C G9SB-301-D |
| | G9SX | G9SX-BC202-R_ G9SX-AD322-T15-R_ G9SX-AD322-T150-R_ G9SX-ADA222-T15-R_ G9SX-ADA222-T150-R_ |
| Programmable standalone controllers | G9SP-N | G9SP-N10S G9SP-N10D G9SP-N20S |
| Programmable network controllers | NE1A | NE1A-SCPU01-V1 |

Specifications

Electrical Data

| | | | F3S-TGR-N_PM | F3S-TGR-N_PU | | |
|-----------------------------------|---|---|--|--------------|--|--|
| Technology | | | RFID (Code) and hall sensing (Distance check) | | | |
| Serial switching | | | up to 20 pcs. in series | | | |
| Code | | Master coded: Every switch same code ^{*1} | Unique coded: 32 × 10 ⁶ different codes | | | |
| Indicator | | | LED lighted - Indication of safety circuit closed - Door close LED dark - Indication of safety circuit opened - Door open | | | |
| Power supply | | | 24 VDC ±10% | | | |
| Power consumption | Max. | 30 mA @ 24 VDC | | | | |
| Minimum switched current | | | 10 VDC, 1 mA | | | |
| Rated insulating voltage | | | 250 VAC | | | |
| Insulation Resistance | | | 100 MΩ | | | |
| Output Types | Safety Channel 1 Safety Channel 2 Auxiliary Channel | NC NC NO | 200 mA, max. 24 VDC, Solid State | | | |
| Switching frequency | Max. | 1.0 Hz | | | | |
| Contact release time | | | <2 ms | | | |
| Actuator approach speed | Min. | 4 mm/s | | | | |
| | Max. | 1000 mm/s | | | | |
| Initial contact resistance | | | <500 mΩ | | | |

^{*1} Re-teach needed if exchange of actuator: Power down - replace the actuator and close the door or bring the new actuator close to the sensor - power up

Mechanical Data

| | | |
|---|-----------------------------|---|
| Body Material | | Polyester |
| Mounting Position (under attention to the precautions) | | Any direction |
| Recommended mounting gap | | 5 mm |
| Tolerance to misalignment | | 5 mm in any direction from 5 mm setting gap |
| Operating distance | OFF → ON (S _{ao}) | 10 mm |
| | ON → OFF (S _{ar}) | 20 mm |
| Temperature Range | | -25... +80°C |
| Enclosure Protection | Flying lead | IP69K |
| | M12 connector | IP67 |
| Cable material | Flying lead | PVC, 8 core, Ø 6 mm o.d. |
| | M12 connector | 250 mm, PVC, Ø 6 mm o.d. |
| Mounting Bolts | | 2 × M4 |
| Tightening Torque for Mounting Bolts | | 1 Nm |
| Shock Resistance (IEC 68-2-27) | | 11 ms, 30 g |
| Vibration Resistance (IEC 68-2-6) | | 10... 55 Hz, 1 mm |

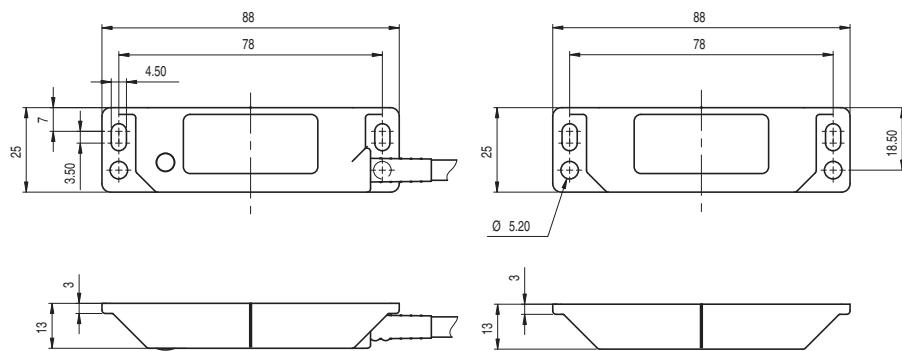
Reliability Data

| | |
|-----------------------------------|---|
| EN ISO 13849-1 | up to PLe depending upon system architecture |
| EN 62061 | up to SIL3 depending upon system architecture |
| PFHd | 4.77 × 10 ⁻¹⁰ |
| Proof test interval (Life) | 20 years |
| MTTFd | 1100 years |
| Diagnostic Coverage DC | 99% (high) |

Dimensions

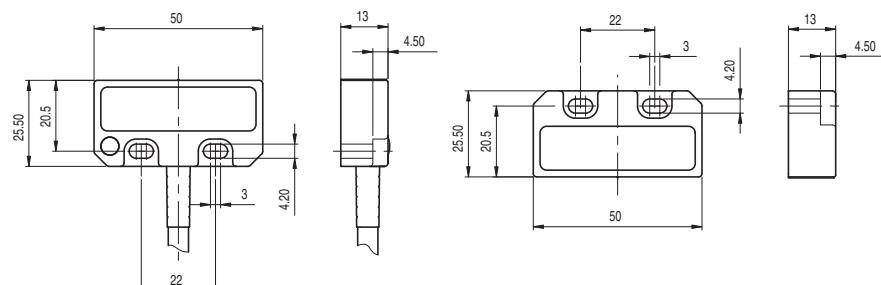
Elongated sensor (Sensor/Actuator)

F3S-TGR-NLPM
F3S-TGR-NLPU



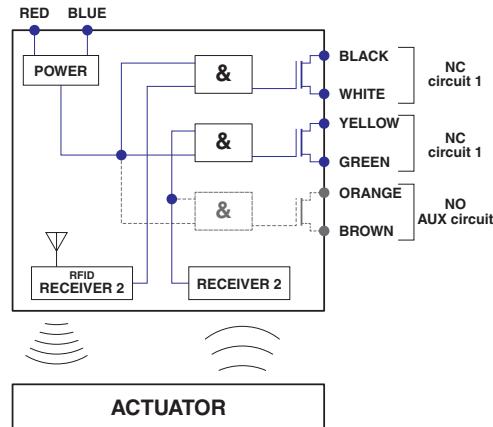
Small sensor (Sensor/Actuator)

F3S-TGR-NSPM
F3S-TGR-NSPU



Circuit Schematic

The RFID non-contact switches are working with both principles, based on RFID and hall technology. RFID provides an increase of anti tamper level, the integrated hall system monitors the distance between sensor and actuator.



Connection diagram

Cable version

| Wire | Signal |
|--------|-----------------|
| red | +24 VDC |
| blue | GND |
| black | NC Channel 1 |
| white | NC Channel 1 |
| yellow | NC Channel 2 |
| green | NC Channel 2 |
| brown | NO Aux. Channel |
| orange | NO Aux. Channel |

M1J8-Connector version (M12 male)

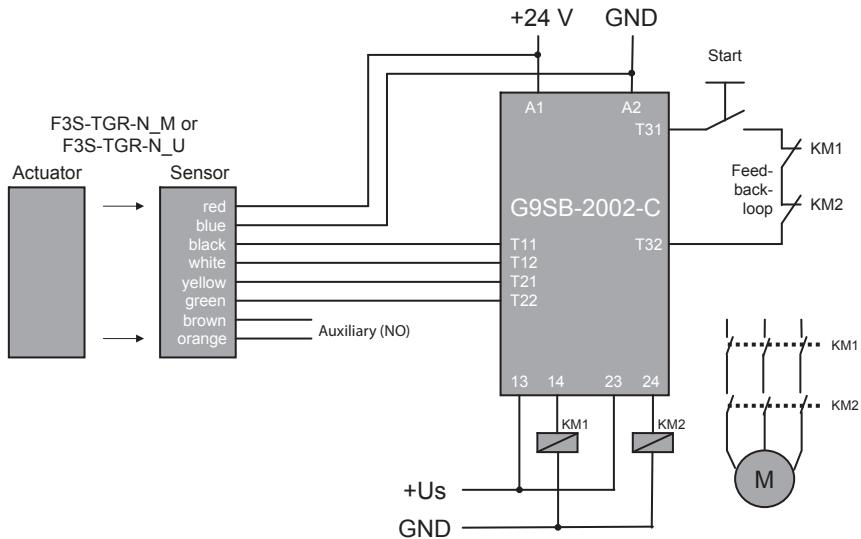
| Pin No. (male side) | Signal | Wire (Y92E-M12PURSH8S_M-L) |
|---------------------|-----------------|----------------------------|
| 2 | +24 VDC | Brown |
| 3 | GND | Green |
| 5 | NC Channel 1 | Blue |
| 7 | NC Channel 1 | White |
| 4 | NC Channel 2 | Yellow |
| 6 | NC Channel 2 | Pink |
| 5 | NO Aux. Channel | Grey |
| 8 | NO Aux. Channel | Red |

Wiring examples

G9SB

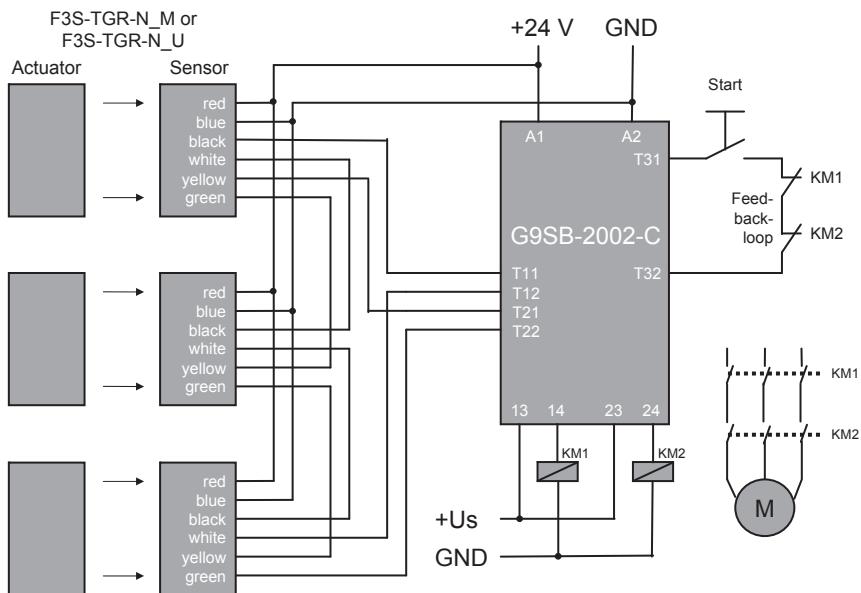
Single Sensor Application with G9SB-2002-C

(up to Safety PLe acc. EN ISO 13849-1)



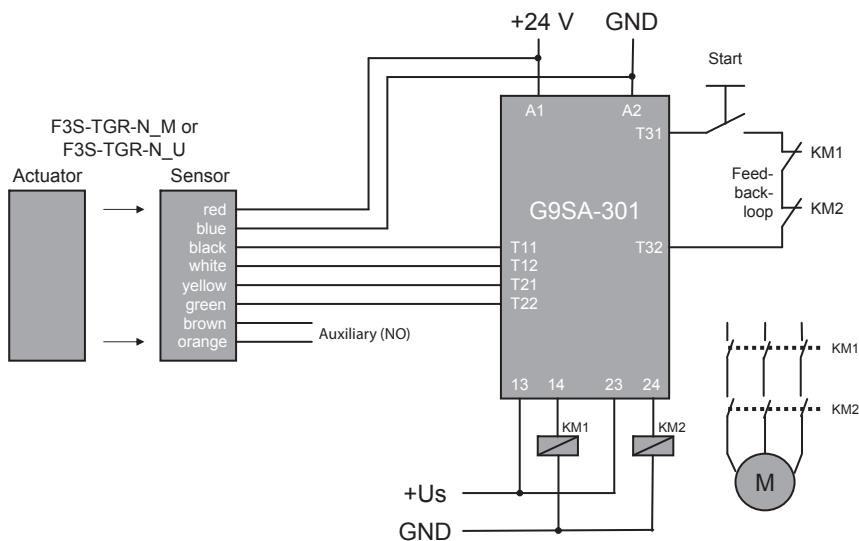
Series connection Application, up to 20 Sensors with G9SB-2002-C

(up to Safety PLd acc. EN ISO 13849-1)

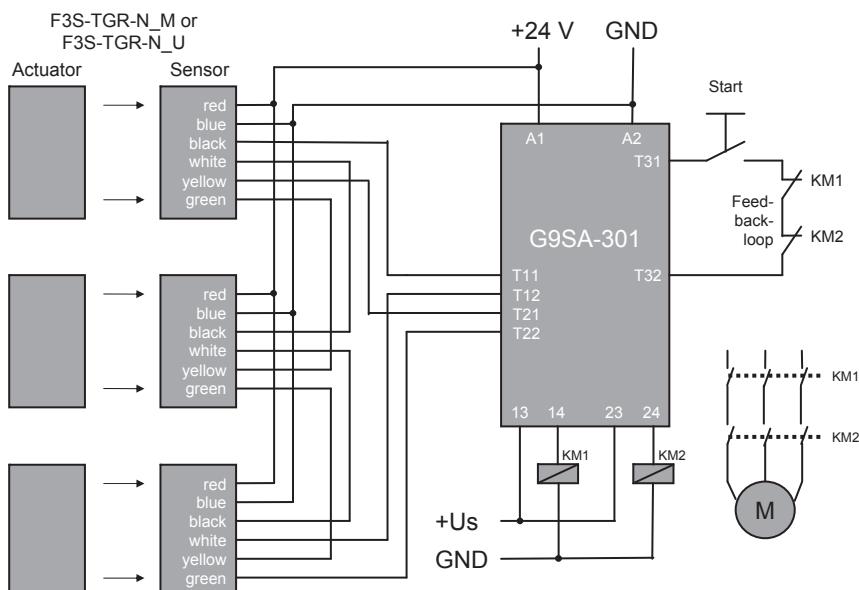


G9SA

Single Sensor Application with G9SA-301 (up to Safety PLc acc. EN ISO 13849-1)

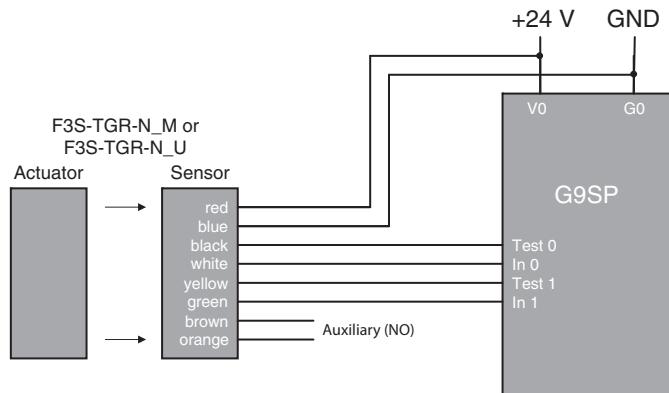


Series connection Application, up to 20 Sensors with G9SA-301 (up to Safety PLd acc. EN ISO 13849-1)

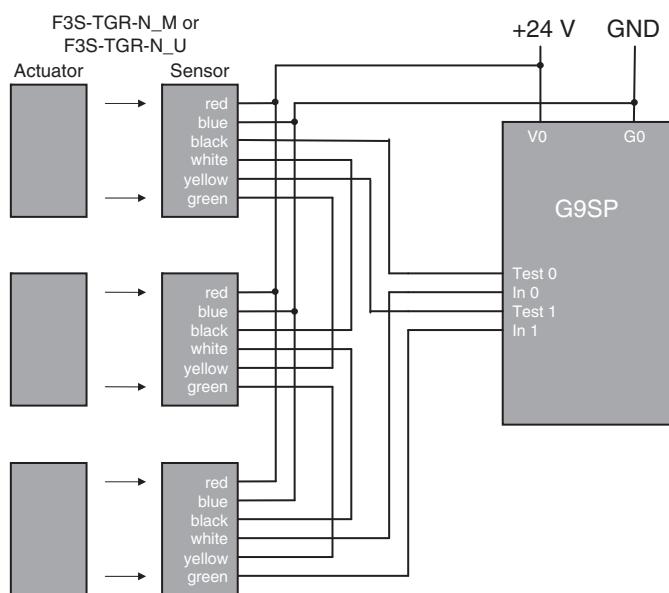


G9SP

Single Sensor Application with G9SP (up to Safety PLe acc. EN ISO 13849-1)



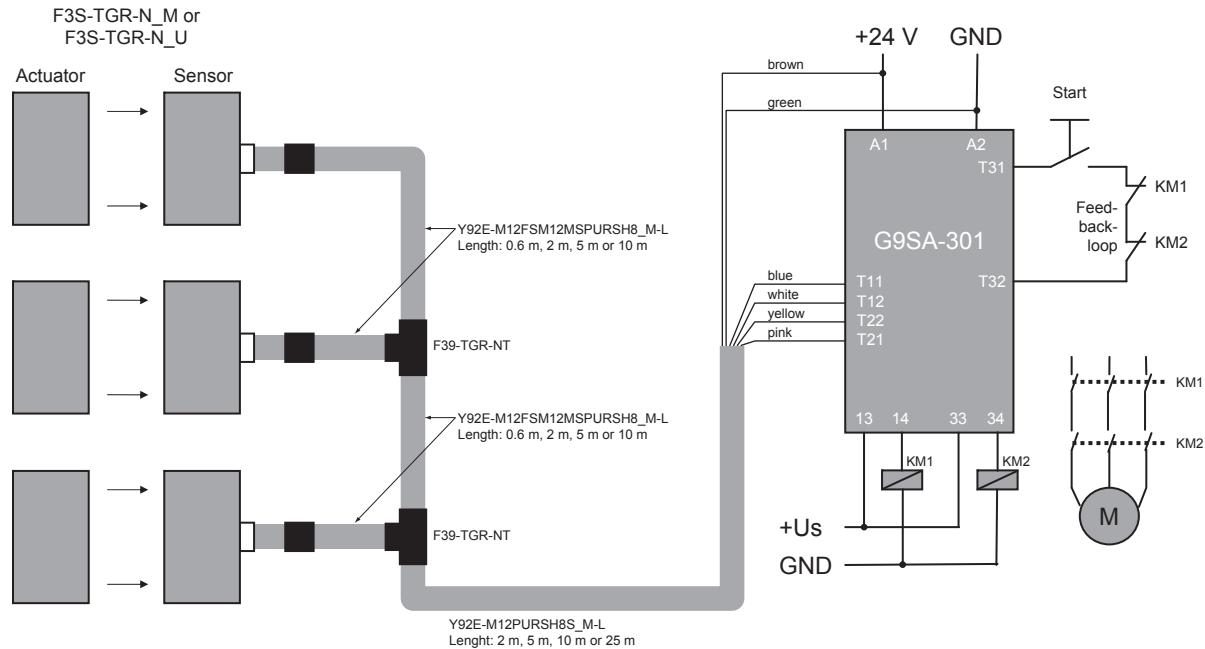
Series connection Application, up to 20 Sensors with G9SP (up to Safety PLd acc. EN ISO 13849-1)



T-Connector and Connection Cable

Series connection with up to 20 pcs. for example with G9SA-301

(up to Safety PLd acc. EN ISO 13849-1)



Safety Precautions

WARNING

Be sure to turn OFF the power before performing wiring. Do not touch charge parts (e.g., terminals) while power is ON. Doing so may result in electric shock.



Do not allow the actuator to come close to the switch with the door open. Doing so may cause machinery to start operating and may result in injury.



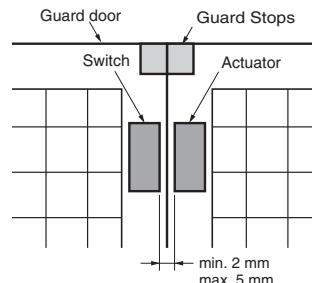
Keep actuators (magnets) away from magnetically sensitive equipment like PC harddisks, floppy disks etc. The magnetic field of the magnet will damage existing data.



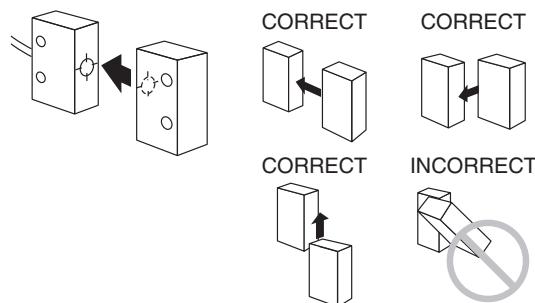
Guard Stops

CAUTION

Use guard stops in the way shown below to ensure that the switch and actuator do not make contact when the guard door is closed.

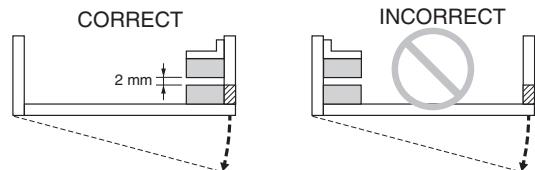


Mounting Direction



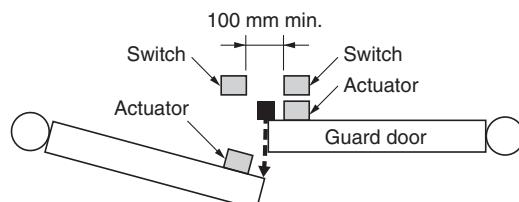
Using for Hinged Doors

On hinged doors, install the Sensor at an opening edge as shown below.



Mutual Interference

If the switch and actuator are mounted in parallel, be sure to separate them by at least 100 mm, as shown below.



Application Precautions

- Do not use the product in locations subject to explosive or flammable gases.
- Do not use load currents exceeding the rated value.
- Be sure to wire each conductor correctly.
- Be sure to confirm correct operation after completing mounting and adjustment.
- Do not drop or attempt to disassemble the product.
- Be sure to use the correct combination of switch and actuator.
- Use a power supply of the specified voltage. Do not use power supplies with large ripples or power supplies that intermittently generate incorrect voltages.
- Capacitors are consumable and require regular maintenance and inspection.

Installation Locations

Do not install the product in the following locations. Doing so may result in product failure or malfunction.

- Locations subject to direct sunlight
- Locations subject to humidity levels outside the range 35% to 85% or subject to condensation due to extreme temperature changes
- Locations subject to corrosive or flammable gases
- Locations subject to shocks or vibration in excess of the product ratings
- Locations subject to dust (including iron dust) or salts

Take appropriate and sufficient countermeasures when using the product in the following locations.

- Locations subject to static electricity or other forms of noise
- Locations subject to possible exposure to radioactivity
- Locations subject to power supply lines
- It is advisable to mount the switches on non ferrous materials. The presence of ferrous material can effect switching sensitivity.

Solvents

Ensure that solvents, such as alcohol, thinner, trichloroethane, or gasoline do not adhere to the product. Solvents may cause markings to fade and components to deteriorate.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.