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[HS9Z-SP51](#)

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# HS5E

## Safety Door Lock Switches

**Four-contact safety switch with solenoid interlock.  
Ideal for use on small doors within limited space.**



# Solenoid type safety switch with four contacts. Compact Body.

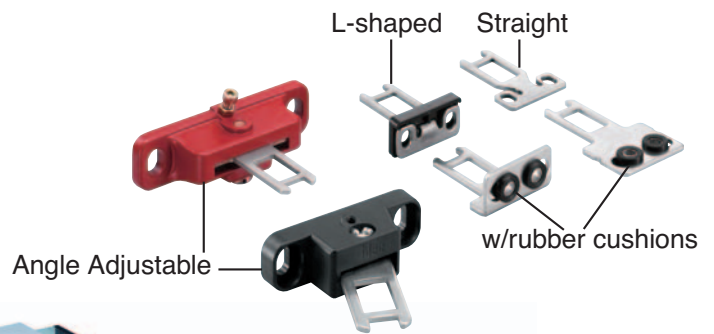
Ideal for small or special-shape doors with limited mounting space.

## Robust and Durable Metal Head

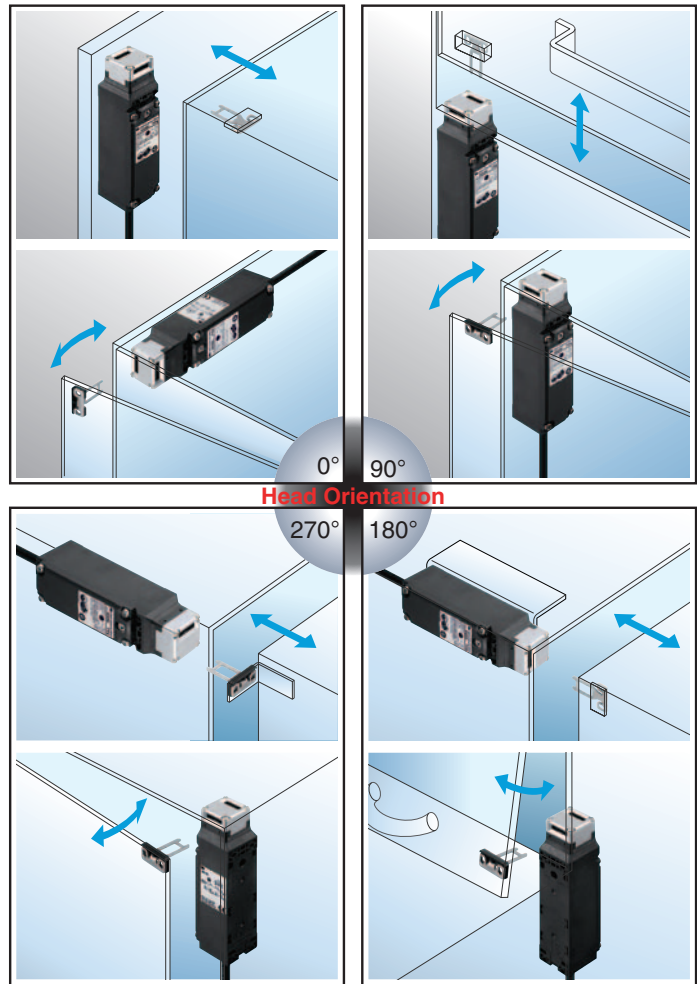
A metal head with two actuator entry slots provides robustness and durability for applications with rattling doors or doors of unusual shapes.

## 6 Actuators in 3 Types

An actuator can be selected to suit door shapes and application. Actuators with rubber cushions are ideal for rattling doors, and angle adjustable actuators are suitable for hinged doors.



The metal head can be rotated (0°, 90°, 180°, 270°), accommodating 8 different directions of actuator entry.



### Integral Molded Wiring Cable

Cable connection type prevents accidents caused by wiring mistakes, saving wiring and labor.

### RoHS Compliant

EU Directive 2002/95/EC compliant.  
Free from lead, cadmium, mercury, hexavalent chromium, PBB, and PBDE.

### Manual Unlock

In the event of power failure or maintenance, the safety door lock switch can be unlocked manually using the manual unlocking key.



### Pilot Light

A pilot light on the front indicates whether the solenoid is energized.

### Slim! 35-mm Wide

The safety door lock switch can be mounted on a 40-mm-wide aluminum frame using a HS9Z-SP51 mounting plate accessory.

# HS5E Safety Door Lock Switches

**Small safety switch with four poles and solenoid.  
Ideal for applications in small spaces.**

- Compact body. 35 × 40 × 146 mm.
- Four-pole internal switches.
- Gold-plated contacts.
- Spring lock and solenoid lock types are available.
- The head orientation can be rotated, allowing 8 different actuator entries.
- A metal entry slot ensures the high durability.
- An actuator with rubber cushions alleviates the impact of actuator entry into the slot.
- The locking strength is 1000N minimum (GS-ET-19).
- Integral cable design minimizes wiring, preventing wiring mistakes.
- LED pilot light indicates the solenoid status.
- RoHS directive compliant.
- Degree of protection: IP67 (IEC60529)
- NC contacts are of direct opening action (IEC/EN60947-5-1).
- Proprietary actuators prevent unauthorized opening (ISO14119, EN1088).
- Double insulation structure.

## Spring Lock Type

- Automatically locks the actuator without power applied to the solenoid.
- After the machine stops, unlocking is completed by the solenoid, providing high safety features.
- Manual unlocking is possible in the event of power failure or maintenance.

## Solenoid Lock Type

- The actuator is locked when energized.
- The actuator is unlocked when de-energized.

## Ratings

### • Contact Ratings

|  |    |  |      |       |      |
|--|----|--|------|-------|------|
| Rated Insulation Voltage (Ui) (Note 1) |    | 250V (between LED or solenoid and ground: 30V) |      |       |      |
| Rated Thermal Current (Ith)            |    | 2.5A   |      |       |      |
| Rated Voltage (Ue)                     |    | 30V  | 125V | 250V  |      |
| Rated Current (Ie) (Note 2)            | AC | Resistive load (AC-12)                         | —    | 2A    |      |
|  |    | Inductive Load (AC-15)                         | —    | 1A    |      |
|  | DC | Resistive load (DC-12)                         | 2A   | 0.4A  | 0.2A |
|  |    | Inductive Load (DC-13)                         | 1A   | 0.22A | 0.1A |

• Minimum applicable load (reference value): 3V AC/DC, 5 mA

Note 1: UL rating: 125V

Note 2: TUV, BG rating: AC-15, 0.5A/250V, DC-13, 0.22A/125V

UL, c-UL rating: Pilot duty AC 0.5A/125V, Pilot duty DC 0.22A/125V

### • Solenoid

| Locking Mechanism                     | Spring Lock Type                      | Solenoid Lock Type |
|---------------------------------------|---------------------------------------|--------------------|
| Rated Voltage                         | 24V DC                                |                    |
| Rated Current                         | 266 mA (initial value)                |                    |
| Coil Resistance                       | 90Ω (at 20°C)                         |                    |
| Pickup Voltage                        | Rated voltage × 85% maximum (at 20°C) |                    |
| Dropout Voltage                       | Rated voltage × 10% minimum (at 20°C) |                    |
| Maximum Continuous Applicable Voltage | Rated voltage × 110%                  |                    |
| Maximum Continuous Applicable Time    | Continuous                            |                    |
| Insulation Class                      | Class F                               |                    |

### • Pilot Light

|               |        |
|---------------|--------|
| Rated Voltage | 24V DC |
| Rated Current | 10 mA  |
| Light Source  | LED    |
| Light Color   | Green  |



## Specifications

|   |  |  |
|---|--|--|
| Applicable Standards                                | ISO14119   | IEC60947-5-1                           |
|   | EN60947-5-1 (TUV approval)   | EN1088 (TUV approval)                  |
| Operating Temperature                               | GS-ET-19 (BG approval)   | UL508 (UL recognized)                  |
|   | CSA C22.2, No. 14 (c-UL recognized)  |  |
| IEC60204-1/EN60204-1 (applicable standards for use) |  |  |
| Operating Temperature                               | -25 to 50°C (no freezing)  |  |
| Relative Humidity                                   | 45 to 85% (no condensation)  |  |
| Storage Temperature                                 | -40 to +80°C (no freezing)   |  |
| Pollution Degree                                    | 3  |  |
| Impulse Withstand Voltage                           | 2.5 kV (between LED, solenoid and grounding: 0.5 kV)   |  |
| Insulation Resistance (500V DC megger)              | Between live and dead metal parts:   | 100 MΩ minimum                         |
|   | Between live metal part and ground:  | 100 MΩ minimum                         |
| Electric Shock Protection                           | Between live metal parts:  | 100 MΩ minimum                         |
|   | Between terminals of the same pole:  | 100 MΩ minimum                         |
| Degree of Protection                                | IP67 (IEC60529)  |  |
| Shock Resistance                                    | Operating extremes:  | 100 m/s <sup>2</sup>                   |
|   | Damage limits:   | 1000 m/s <sup>2</sup>                  |
| Vibration Resistance                                | Operating extremes:  | 10 to 55 Hz, amplitude 0.35 mm minimum |
|   | Damage limits:   | 30 Hz, amplitude 1.5 mm minimum        |
| Actuator Operating Speed                            | 0.05 to 1.0 m/s  |  |
| Direct Opening Travel                               | Actuator HS9Z-A51: 11 mm minimum<br>Actuator HS9Z-A51A/A52/A52A/A53/A55: 12 mm minimum         |  |
| Direct Opening Force                                | 80N minimum  |  |
| Tensile Strength when Locked                        | 1000N minimum (GS-ET-19)   |  |
| Operating Frequency                                 | 900 operations per hour  |  |
| Mechanical Life                                     | 1,000,000 operations minimum (GS-ET-19)  |  |
| Electrical Life                                     | 100,000 operations minimum (operating frequency 900 operations per hour, load AC-12, 250V, 1A) |  |
| Conditional Short-circuit Current                   | 50A (250V) (Use 250V/10A fast acting type fuse for short-circuit protection.)                  |  |
| Cable   | UL2464, No. 21 AWG<br>(8-core: 0.5 mm <sup>2</sup> or equivalent/core)                         |  |
| Cable Diameter                                      | ø7.6 mm  |  |
| Weight (approx.)                                    | 400g (HS5E-***01)  |  |

# HS5E Safety Door Lock Switches

## Types

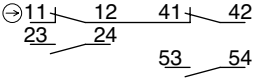
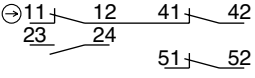
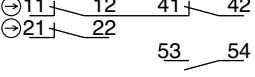
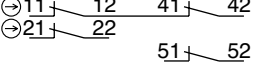
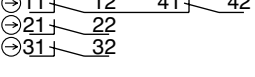
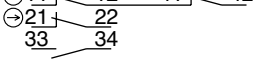
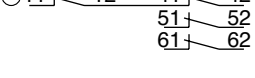
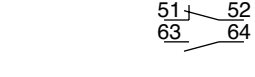
### • Safety Door Lock Switch

| Lock Mechanism | Circuit Number  | Contact Arrangement   | Pilot Light | Cable Length | Type No.     |
|----------------|---|---|-------------|--------------|--------------|
| Spring Lock    | A   | Main Circuit: 1NC+1NC, Monitor Circuit: 1NO, 1NO<br><br>Main Circuit: $\ominus 11 \text{---} 12 \text{---} 41 \text{---} 42$<br>Monitor Circuit: $23 \text{---} 24 \text{---} 53 \text{---} 54$         | Without     | 1 m          | HS5E-A4001   |
|                |   |   |             | 3 m          | HS5E-A4003   |
|                |   |   |             | 5 m          | HS5E-A4005   |
|                |   |   | With        | 1 m          | HS5E-A4401-G |
|                |   |   |             | 3 m          | HS5E-A4403-G |
|                |   |   |             | 5 m          | HS5E-A4405-G |
|                | B   | Main Circuit: 1NC+1NC, Monitor Circuit: 1NO, 1NC<br><br>Main Circuit: $\ominus 11 \text{---} 12 \text{---} 41 \text{---} 42$<br>Monitor Circuit: $23 \text{---} 24 \text{---} 51 \text{---} 52$         | Without     | 1 m          | HS5E-B4001   |
|                |   |   |             | 3 m          | HS5E-B4003   |
|                |   |   |             | 5 m          | HS5E-B4005   |
|                |   |   | With        | 1 m          | HS5E-B4401-G |
|                |   |   |             | 3 m          | HS5E-B4403-G |
|                |   |   |             | 5 m          | HS5E-B4405-G |
|                | C   | Main Circuit: 1NC+1NC, Monitor Circuit: 1NC, 1NO<br><br>Main Circuit: $\ominus 11 \text{---} 12 \text{---} 41 \text{---} 42$<br>Monitor Circuit: $\ominus 21 \text{---} 22 \text{---} 53 \text{---} 54$ | Without     | 1 m          | HS5E-C4001   |
|                |   |   |             | 3 m          | HS5E-C4003   |
|                |   |   |             | 5 m          | HS5E-C4005   |
|                |   |   | With        | 1 m          | HS5E-C4401-G |
|                |   |   |             | 3 m          | HS5E-C4403-G |
|                |   |   |             | 5 m          | HS5E-C4405-G |
|                | D   | Main Circuit: 1NC+1NC, Monitor Circuit: 1NC, 1NC<br><br>Main Circuit: $\ominus 11 \text{---} 12 \text{---} 41 \text{---} 42$<br>Monitor Circuit: $\ominus 21 \text{---} 22 \text{---} 51 \text{---} 52$ | Without     | 1 m          | HS5E-D4001   |
|                |   |   |             | 3 m          | HS5E-D4003   |
|                |   |   |             | 5 m          | HS5E-D4005   |
|                |   |   | With        | 1 m          | HS5E-D4401-G |
|                |   |   |             | 3 m          | HS5E-D4403-G |
|                |   |   |             | 5 m          | HS5E-D4405-G |
| F              | Main Circuit: 1NC+1NC, Monitor Circuit: 2NC<br><br>Main Circuit: $\ominus 11 \text{---} 12 \text{---} 41 \text{---} 42$<br>Monitor Circuit: $\ominus 21 \text{---} 22 \text{---} 31 \text{---} 32$      | Without   | 1 m         | HS5E-F4001   |              |
|                |   |   | 3 m         | HS5E-F4003   |              |
|                |   |   | 5 m         | HS5E-F4005   |              |
|                |   | With  | 1 m         | HS5E-F4401-G |              |
|                |   |   | 3 m         | HS5E-F4403-G |              |
|                |   |   | 5 m         | HS5E-F4405-G |              |
| G              | Main Circuit: 1NC+1NC, Monitor Circuit: 1NC, 1NO<br><br>Main Circuit: $\ominus 11 \text{---} 12 \text{---} 41 \text{---} 42$<br>Monitor Circuit: $\ominus 21 \text{---} 22 \text{---} 33 \text{---} 34$ | Without   | 1 m         | HS5E-G4001   |              |
|                |   |   | 3 m         | HS5E-G4003   |              |
|                |   |   | 5 m         | HS5E-G4005   |              |
|                |   | With  | 1 m         | HS5E-G4401-G |              |
|                |   |   | 3 m         | HS5E-G4403-G |              |
|                |   |   | 5 m         | HS5E-G4405-G |              |
| H              | Main Circuit: 1NC+1NC, Monitor Circuit: 2NC<br><br>Main Circuit: $\ominus 11 \text{---} 12 \text{---} 41 \text{---} 42$<br>Monitor Circuit: $51 \text{---} 52 \text{---} 61 \text{---} 62$              | Without   | 1 m         | HS5E-H4001   |              |
|                |   |   | 3 m         | HS5E-H4003   |              |
|                |   |   | 5 m         | HS5E-H4005   |              |
|                |   | With  | 1 m         | HS5E-H4401-G |              |
|                |   |   | 3 m         | HS5E-H4403-G |              |
|                |   |   | 5 m         | HS5E-H4405-G |              |
| J              | Main Circuit: 1NC+1NC, Monitor Circuit: 1NC, 1NO<br><br>Main Circuit: $\ominus 11 \text{---} 12 \text{---} 41 \text{---} 42$<br>Monitor Circuit: $51 \text{---} 52 \text{---} 63 \text{---} 64$         | Without   | 1 m         | HS5E-J4001   |              |
|                |   |   | 3 m         | HS5E-J4003   |              |
|                |   |   | 5 m         | HS5E-J4005   |              |
|                |   | With  | 1 m         | HS5E-J4401-G |              |
|                |   |   | 3 m         | HS5E-J4403-G |              |
|                |   |   | 5 m         | HS5E-J4405-G |              |

• Actuators are not supplied with the safety switch and must be ordered separately.

# HS5E Safety Door Lock Switches

## • Safety Door Lock Switch

| Lock Mechanism | Circuit Number  | Contact Arrangement  | Pilot Light | Cable Length  | Type No.      |
|----------------|---|--|-------------|---------------|---------------|
| Solenoid Lock  | A   | Main Circuit: 1NC+1NC, Monitor Circuit: 1NO, 1NO<br><br>Main Circuit: <br>Monitor Circuit:<br>Monitor Circuit:  | Without     | 1 m           | HS5E-A7Y001   |
|                |   |  |             | 3 m           | HS5E-A7Y003   |
|                |   |  |             | 5 m           | HS5E-A7Y005   |
|                |   |  | With        | 1 m           | HS5E-A7Y401-G |
|                |   |  |             | 3 m           | HS5E-A7Y403-G |
|                |   |  |             | 5 m           | HS5E-A7Y405-G |
|                | B   | Main Circuit: 1NC+1NC, Monitor Circuit: 1NO, 1NC<br><br>Main Circuit: <br>Monitor Circuit:<br>Monitor Circuit:  | Without     | 1 m           | HS5E-B7Y001   |
|                |   |  |             | 3 m           | HS5E-B7Y003   |
|                |   |  |             | 5 m           | HS5E-B7Y005   |
|                |   |  | With        | 1 m           | HS5E-B7Y401-G |
|                |   |  |             | 3 m           | HS5E-B7Y403-G |
|                |   |  |             | 5 m           | HS5E-B7Y405-G |
|                | C   | Main Circuit: 1NC+1NC, Monitor Circuit: 1NC, 1NO<br><br>Main Circuit: <br>Monitor Circuit:<br>Monitor Circuit:  | Without     | 1 m           | HS5E-C7Y001   |
|                |   |  |             | 3 m           | HS5E-C7Y003   |
|                |   |  |             | 5 m           | HS5E-C7Y005   |
|                |   |  | With        | 1 m           | HS5E-C7Y401-G |
|                |   |  |             | 3 m           | HS5E-C7Y403-G |
|                |   |  |             | 5 m           | HS5E-C7Y405-G |
|                | D   | Main Circuit: 1NC+1NC, Monitor Circuit: 1NC, 1NC<br><br>Main Circuit: <br>Monitor Circuit:<br>Monitor Circuit: | Without     | 1 m           | HS5E-D7Y001   |
|                |   |  |             | 3 m           | HS5E-D7Y003   |
|                |   |  |             | 5 m           | HS5E-D7Y005   |
|                |   |  | With        | 1 m           | HS5E-D7Y401-G |
|                |   |  |             | 3 m           | HS5E-D7Y403-G |
|                |   |  |             | 5 m           | HS5E-D7Y405-G |
|                | F   | Main Circuit: 1NC+1NC, Monitor Circuit: 2NC<br><br>Main Circuit: <br>Monitor Circuit:<br>Monitor Circuit:     | Without     | 1 m           | HS5E-F7Y001   |
|                |   |  |             | 3 m           | HS5E-F7Y003   |
|                |   |  |             | 5 m           | HS5E-F7Y005   |
|                |   |  | With        | 1 m           | HS5E-F7Y401-G |
|                |   |  |             | 3 m           | HS5E-F7Y403-G |
|                |   |  |             | 5 m           | HS5E-F7Y405-G |
| G              | Main Circuit: 1NC+1NC, Monitor Circuit: 1NC, 1NO<br><br>Main Circuit: <br>Monitor Circuit:<br>Monitor Circuit: | Without  | 1 m         | HS5E-G7Y001   |               |
|                |   |  | 3 m         | HS5E-G7Y003   |               |
|                |   |  | 5 m         | HS5E-G7Y005   |               |
|                |   | With   | 1 m         | HS5E-G7Y401-G |               |
|                |   |  | 3 m         | HS5E-G7Y403-G |               |
|                |   |  | 5 m         | HS5E-G7Y405-G |               |
| H              | Main Circuit: 1NC+1NC, Monitor Circuit: 2NC<br><br>Main Circuit: <br>Monitor Circuit:<br>Monitor Circuit:      | Without  | 1 m         | HS5E-H7Y001   |               |
|                |   |  | 3 m         | HS5E-H7Y003   |               |
|                |   |  | 5 m         | HS5E-H7Y005   |               |
|                |   | With   | 1 m         | HS5E-H7Y401-G |               |
|                |   |  | 3 m         | HS5E-H7Y403-G |               |
|                |   |  | 5 m         | HS5E-H7Y405-G |               |
| J              | Main Circuit: 1NC+1NC, Monitor Circuit: 1NC, 1NO<br><br>Main Circuit: <br>Monitor Circuit:<br>Monitor Circuit: | Without  | 1 m         | HS5E-J7Y001   |               |
|                |   |  | 3 m         | HS5E-J7Y003   |               |
|                |   |  | 5 m         | HS5E-J7Y005   |               |
|                |   | With   | 1 m         | HS5E-J7Y401-G |               |
|                |   |  | 3 m         | HS5E-J7Y403-G |               |
|                |   |  | 5 m         | HS5E-J7Y405-G |               |

• Actuators are not supplied with the safety switch and must be ordered separately.

# HS5E Safety Door Lock Switches

## • Actuators

| Description   | Type No.  |
|---|-----------|
| Straight  | HS9Z-A51  |
| Straight w/rubber cushions  | HS9Z-A51A |
| L-shaped  | HS9Z-A52  |
| L-shaped w/rubber cushions  | HS9Z-A52A |
| Angle Adjustable (vertical)<br>(for hinged doors) (Note 1)            | HS9Z-A53  |
| Angle Adjustable (vertical/horizontal)<br>(for hinged doors) (Note 2) | HA9Z-A55  |

Note 1: The actuator tensile strength is 1000N minimum.

Note 2: The actuator tensile strength is 500N minimum. When tensile strength of 1000N or more is required, use HS9Z-A53.

## Type No. Development

**HS5E - A 4 4 01 - G**

### Circuit Code

| Main Circuit | Monitor Circuit |
|--------------|-----------------|
| A: 1NC+1NC   | 1NO, 1NO        |
| B: 1NC+1NC   | 1NO, 1NC        |
| C: 1NC+1NC   | 1NC, 1NO        |
| D: 1NC+1NC   | 1NC, 1NC        |
| F: 1NC+1NC   | 2NC             |
| G: 1NC+1NC   | 1NC, 1NO        |
| H: 1NC+1NC   | 2NC             |
| J: 1NC+1NC   | 1NC, 1NO        |

### Pilot Light Color

G: Green

### Cable Length

01: 1m

03: 3m

05: 5m

### Pilot Light Voltage

4: 24V DC

0: Without pilot light

### Solenoid Voltage/ Lock Mechanism

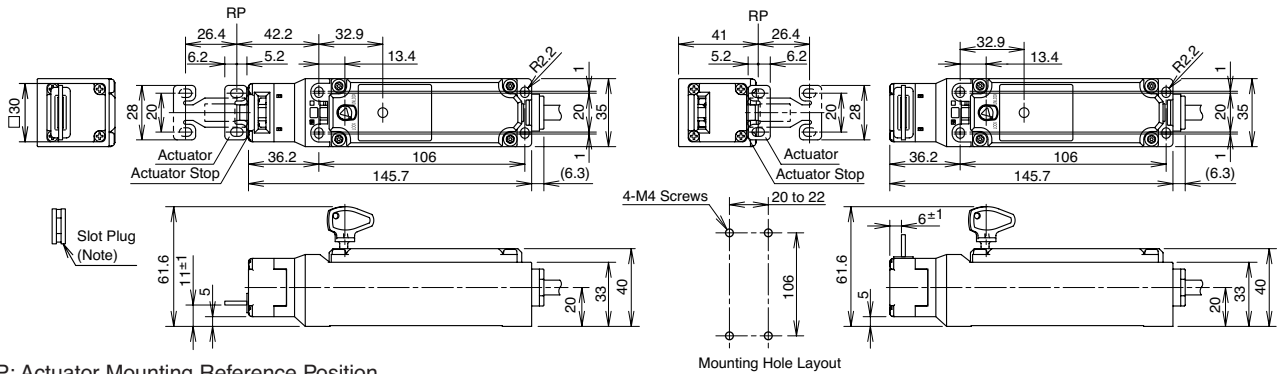
4: 24V DC/Spring Lock

7Y: 24V DC/Solenoid Lock

## Dimensions and Mounting Hole Layouts

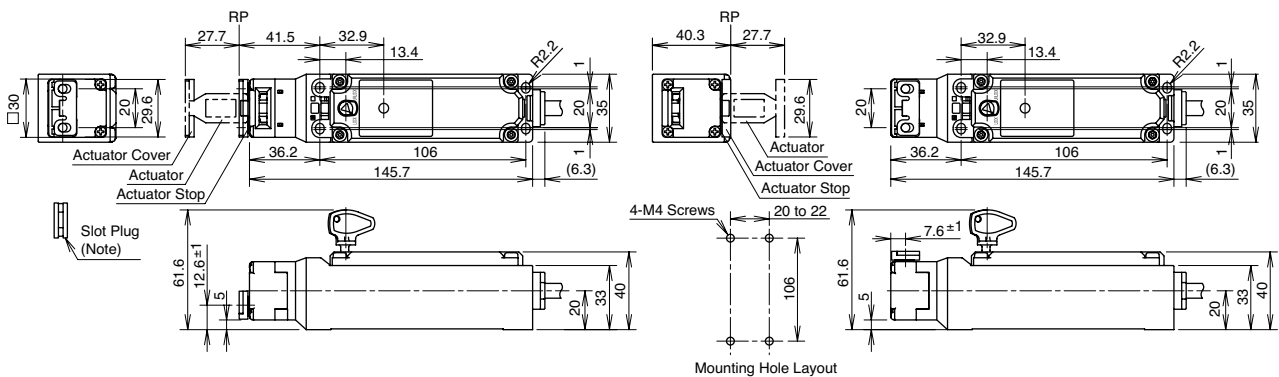
### HS5E-\*\*4\*-G Type (w/pilot light)

#### Horizontal Mounting/Straight Actuator (HS9Z-A51)



RP: Actuator Mounting Reference Position

#### Vertical Mounting/L-shaped Actuator (HS9Z-A52)



Note: Plug the unused actuator entry slot using the slot plug supplied with the switch.

All dimensions in mm.

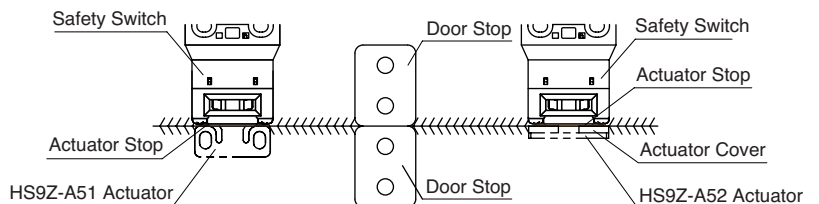
## • Actuator Mounting Reference Position

As shown in the figure on the right, the mounting reference position of the actuator when inserted in the safety switch is:

HS9Z-A51: The actuator lightly touches the actuator stop placed on the safety switch.

HS9Z-A52: The actuator cover lightly touches the actuator stop placed on the safety switch.

After mounting the actuator, remove the actuator stop from the safety switch.



# HS5E Safety Door Lock Switches

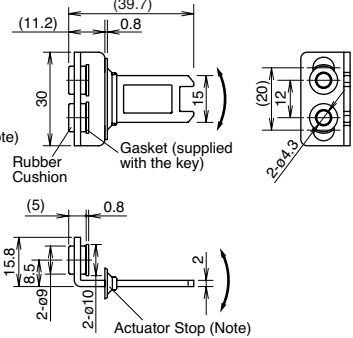
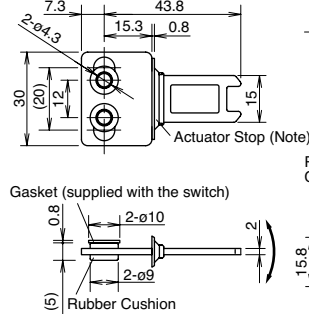
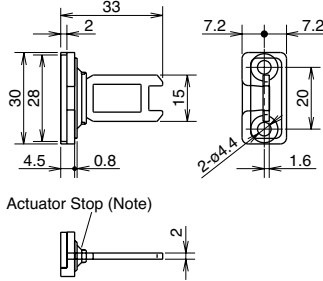
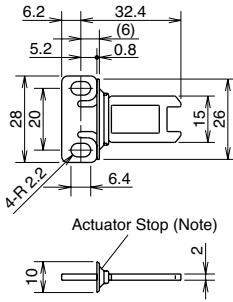
## Actuator Dimensions

### Straight Type (HS9Z-A51)

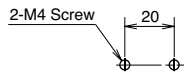
### L-shaped Type (HS9Z-A52)

### Straight Type (HS9Z-A51A) w/rubber cushion

### L-shaped Type (HS9Z-A52A) w/rubber cushion



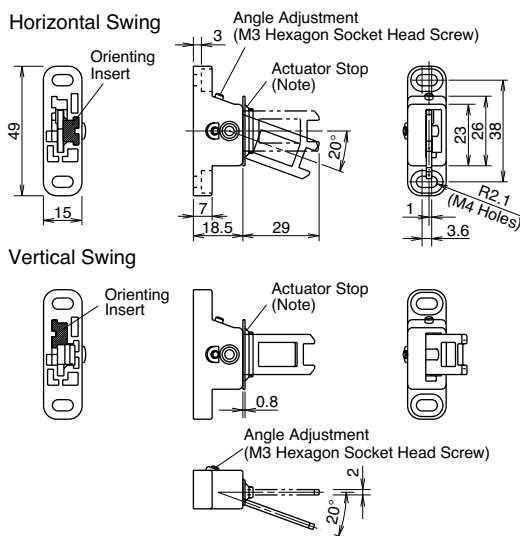
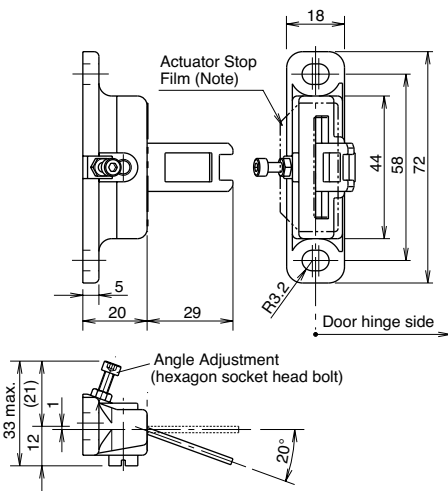
#### • Actuator Mounting Hole Layout (Straight, L-shaped)



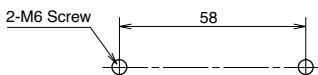
- The mounting center distance is set to 12 mm at factory. When 20-mm distance is required, adjust the distance by moving the rubber cushions.
- The actuator has flexibility to the direction indicated by the arrows. When 20-mm distance is selected, the actuator swings vertically.

### Angle Adjustable (vertical) Type (HS9Z-A53)

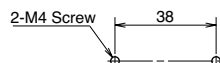
### Angle Adjustable (vertical/horizontal) Type (HS9Z-A55)



#### • Actuator Mounting Holes (vertical operation type)



#### • Actuator Mounting Layout (horizontal/vertical swing)



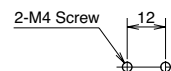
Note: The actuator stop film and actuator stop are supplied with the actuator and used when adjusting the actuator position. Remove after the actuator position is determined.

#### • Actuator Orientation

The orientation of actuator swing (horizontal/vertical) can be changed using the orienting insert (white plastic) installed on the back of the actuator. Do not lose the orienting insert, otherwise the actuator will not operate properly.

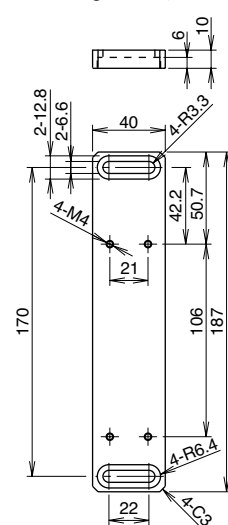
#### • Actuator Mounting Hole Layout

Straight type (with rubber cushions)  
L-shaped type (with rubber cushions)



Note: Mounting centers can be widened to 20 mm by moving the rubber cushions.

#### • Mounting Plate (HS9Z-SP51)



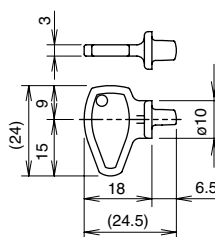
Material: Anodized A6063  
Weight: Approx. 180g

#### • Accessories

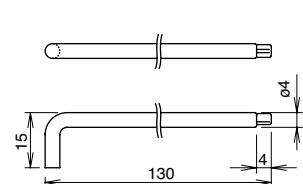
| Description                  | Type No.  |
|------------------------------|-----------|
| Mounting Plate               | HS9Z-SP51 |
| Manual Unlocking Key (metal) | HS9Z-T3   |

Package Quantity: 1

#### • Manual Unlocking Key (plastic, supplied with the switch)



#### • Manual Unlocking Key (HS9Z-T3) (metal)



All dimensions in mm.



# HS5E Safety Door Lock Switches

## • Solenoid Lock Type

| Safety Switch Status         | Status 1  | Status 2   | Status 3   | Status 4  | Unlocking using Manual Unlock Actuator |  |   |             |             |             |             |             |             |             |             |             |             |
|------------------------------|---|--|--|---|--|--|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                              | <ul style="list-style-type: none"> <li>Door closed</li> <li>Machine ready to operate</li> <li>Solenoid energized</li> </ul> | <ul style="list-style-type: none"> <li>Door closed</li> <li>Machine cannot be operated</li> <li>Solenoid de-energized</li> </ul> | <ul style="list-style-type: none"> <li>Door open</li> <li>Machine cannot be operated</li> <li>Solenoid de-energized</li> </ul> | <ul style="list-style-type: none"> <li>Door open</li> <li>Machine cannot be operated</li> <li>Solenoid energized</li> </ul> |  | <ul style="list-style-type: none"> <li>Door closed</li> <li>Machine cannot be operated</li> <li>Solenoid de-energized</li> </ul> |   |             |             |             |             |             |             |             |             |             |             |
| Door Status                  |   |  |  |   |  |  |   |             |             |             |             |             |             |             |             |             |             |
| Circuit Diagram (HS5E-A7Y)   |   |  |  |   |  |  |   |             |             |             |             |             |             |             |             |             |             |
| Door                         | Closed (locked)   | Closed (unlocked)  | Open   | Open  | Closed (unlocked)                      |  |   |             |             |             |             |             |             |             |             |             |             |
| Type No. and Circuit Diagram | <b>HS5E-A7Y</b><br><br>Main Circuit: 11-12, 41-42<br>Monitor Circuit: 23-24, 53-54  | Main Circuit 11-42<br>ON (closed)  | Monitor Circuit (door open) 23-24<br>OFF (open)  | Monitor Circuit (unlocked) 53-54<br>OFF (open)  | Main Circuit 11-42<br>OFF (open)       | Monitor Circuit (door open) 23-24<br>ON (closed)   | Monitor Circuit (unlocked) 53-54<br>ON (closed)   | OFF (open)  | OFF (open)  | ON (closed) | ON (closed) | ON (closed) | OFF (open)  | OFF (open)  | ON (closed) | ON (closed) |             |
|                              | <b>HS5E-B7Y</b><br><br>Main Circuit: 11-12, 41-42<br>Monitor Circuit: 23-24, 51-52  | Main Circuit 11-42<br>ON (closed)  | Monitor Circuit (door open) 23-24<br>OFF (open)  | Monitor Circuit (locked) 51-52<br>ON (closed)   | Main Circuit 11-42<br>OFF (open)       | Monitor Circuit (door open) 23-24<br>ON (closed)   | Monitor Circuit (locked) 51-52<br>OFF (open)      | OFF (open)  | OFF (open)  | ON (closed) | ON (closed) | OFF (open)  | OFF (open)  | OFF (open)  | OFF (open)  | OFF (open)  | OFF (open)  |
|                              | <b>HS5E-C7Y</b><br><br>Main Circuit: 11-12, 41-42<br>Monitor Circuit: 21-22, 53-54  | Main Circuit 11-42<br>ON (closed)  | Monitor Circuit (door closed) 21-22<br>ON (closed)   | Monitor Circuit (unlocked) 53-54<br>OFF (open)  | Main Circuit 11-42<br>OFF (open)       | Monitor Circuit (door closed) 21-22<br>ON (closed)   | Monitor Circuit (unlocked) 53-54<br>ON (closed)   | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
|                              | <b>HS5E-D7Y</b><br><br>Main Circuit: 11-12, 41-42<br>Monitor Circuit: 21-22, 51-52  | Main Circuit 11-42<br>ON (closed)  | Monitor Circuit (door closed) 21-22<br>ON (closed)   | Monitor Circuit (locked) 51-52<br>ON (closed)   | Main Circuit 11-42<br>OFF (open)       | Monitor Circuit (door closed) 21-22<br>ON (closed)   | Monitor Circuit (locked) 51-52<br>OFF (open)      | OFF (open)  | OFF (open)  | ON (closed) | ON (closed) | OFF (open)  | OFF (open)  | OFF (open)  | OFF (open)  | ON (closed) | ON (closed) |
|                              | <b>HS5E-F7Y</b><br><br>Main Circuit: 11-12, 41-42<br>Monitor Circuit: 21-22, 31-32  | Main Circuit 11-42<br>ON (closed)  | Monitor Circuit (door closed) 21-22<br>ON (closed)   | Monitor Circuit (door closed) 31-32<br>ON (closed)  | Main Circuit 11-42<br>OFF (open)       | Monitor Circuit (door closed) 21-22<br>ON (closed)   | Monitor Circuit (door closed) 31-32<br>OFF (open) | OFF (open)  | OFF (open)  | ON (closed) | ON (closed) | OFF (open)  | OFF (open)  | OFF (open)  | OFF (open)  | ON (closed) | ON (closed) |
|                              | <b>HS5E-G7Y</b><br><br>Main Circuit: 11-12, 41-42<br>Monitor Circuit: 21-22, 33-34  | Main Circuit 11-42<br>ON (closed)  | Monitor Circuit (door closed) 21-22<br>ON (closed)   | Monitor Circuit (door open) 33-34<br>OFF (open)   | Main Circuit 11-42<br>OFF (open)       | Monitor Circuit (door closed) 21-22<br>ON (closed)   | Monitor Circuit (door open) 33-34<br>ON (closed)  | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
|                              | <b>HS5E-H7Y</b><br><br>Main Circuit: 11-12, 41-42<br>Monitor Circuit: 51-52, 61-62  | Main Circuit 11-42<br>ON (closed)  | Monitor Circuit (locked) 51-52<br>ON (closed)  | Monitor Circuit (locked) 61-62<br>ON (closed)   | Main Circuit 11-42<br>OFF (open)       | Monitor Circuit (locked) 51-52<br>OFF (open)   | Monitor Circuit (locked) 61-62<br>OFF (open)      | OFF (open)  | OFF (open)  | OFF (open)  | OFF (open)  | OFF (open)  | OFF (open)  | OFF (open)  | OFF (open)  | OFF (open)  | OFF (open)  |
|                              | <b>HS5E-J7Y</b><br><br>Main Circuit: 11-12, 41-42<br>Monitor Circuit: 51-52, 63-64  | Main Circuit 11-42<br>ON (closed)  | Monitor Circuit (locked) 51-52<br>ON (closed)  | Monitor Circuit (unlocked) 63-64<br>OFF (open)  | Main Circuit 11-42<br>OFF (open)       | Monitor Circuit (locked) 51-52<br>OFF (open)   | Monitor Circuit (unlocked) 63-64<br>ON (closed)   | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
|                              | Solenoid Power A1-A2 (all types)  | ON (energized)   | OFF (de-energized)   | OFF (de-energized)  | ON (energized) (Note 2)                | OFF (de-energized) (Note 1) (Note 2)   |   |             |             |             |             |             |             |             |             |             |             |

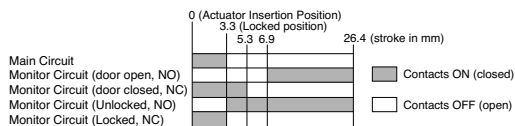
Main circuit: Connected to the control circuit of machine drive part, sending the interlock signals to the protective door.

Monitor circuit: Sends ON/OFF signals of main circuit and monitoring signals of open/closed status of protective door.

Note 1: Do not attempt manual unlocking when the solenoid is energized.

Note 2: Do not energize the solenoid for a long time while the door is open or when the door is unlocked manually.

## Operation Characteristics (reference)



- The operation characteristics are of the HS9Z-A51 actuator. For other actuator types, add 1.3 mm.
- The operation characteristics show the contact status when the actuator enters the entry slot of a safety switch.

## Safety Precautions

- In order to avoid electric shock or fire, turn the power off before installation, removal, wire connection, maintenance, or inspection of the switch.
- If relays are used in the circuit between the safety switch and the load, consider the danger and use safety relays, since welded or sticking contacts of standard relays may invalidate the functions of the safety switch. Perform risk assessment and establish a safety circuit which satisfies the requirement of the safety category.
- Do not place a PLC in the circuit between the safety switch and the load. Safety security can be endangered in the event of a malfunction of the PLC.
- Do not disassemble or modify the switch, otherwise a breakdown or an accident may occur.
- Do not install the actuator in the location where the human body may come in contact. Otherwise injury may occur.
- Solenoid lock type is locked when energized, and unlocked when de-energized. When energization is interrupted due to wire disconnection or other failures, the safety switch may be unlocked causing possible danger to the operators. Solenoid lock type must not be used in applications where locking is strictly required for safety. Perform risk assessment and determine whether solenoid lock type is appropriate.
- When changing the head orientation, disconnect the cable and turn the manual unlock to the UNLOCK position in advance. If the head orientation is changed when the cable is connected and the manual unlock is in the LOCK position, machines may start to operate, causing danger to the operators.

## Instructions

- Regardless of door types, do not use the safety switch as a door stop. Install a mechanical door stop at the end of the door to protect the safety switch against excessive force.
- Do not apply excessive shock to the switch when opening or closing the door.
- A shock to the door exceeding 1,000 m/s<sup>2</sup> (approx. 100G) may cause the contacts of the switch to chatter, and a malfunction of the switch may occur.
- Prevent foreign objects such as dust and liquids from entering the switch while connecting a conduit or wiring.
- If the operating atmosphere is contaminated, use a protective cover to prevent the entry of foreign objects into the switch through the actuator entry slots.
- Entry of a considerable amount of foreign objects into the switch may affect the mechanism of the switch and cause a breakdown.
- Plug the unused actuator entry slot using the slot plug supplied with the safety switch.
- Do not store the switches in a dusty, humid, or organic-gas atmosphere.
- Use proprietary actuators only. When other actuators are used, the switch may be damaged.
- Do not open the lid of the switch. Loosening the screws may cause damage to the switch.
- The locking strength is rated at 1000N. Do not apply a load higher than the rated value. When a higher load is expected, provide an additional system consisting of another safety switch without lock (such as the HS5B safety switch) or a sensor to detect door opening and stop the machine.
- Regardless of door types, do not use the safety switch as a door lock. Install a separate lock using a latch or other measures.
- While the solenoid is energized, the switch temperature rises approximately 40°C above the ambient temperature (to approximately 90°C while the ambient temperature is 50°C). Do not touch to prevent burns. If cables come into contact with the switch, use heat-resistant cables.
- Although the HS9Z-A51A and HS9Z-A52A actuators (w/rubber cushions) alleviate the shock when the actuator enters the slot on the safety switch, make sure that excessive shocks are not applied. When the rubber cushions are deformed or cracked, replace with new ones.

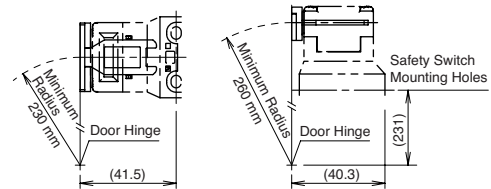
## Minimum Radius of Hinged Door

- When using the safety switch for a hinged door, refer to the minimum radius of doors shown below. For the doors with small minimum radius, use angle adjustable actuators (HS9Z-A53 or HS9Z-A55).

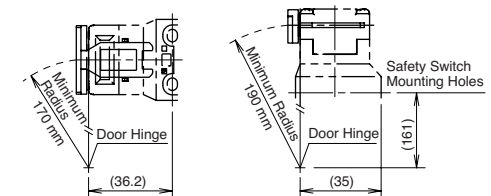
Note: Because deviation or dislocation of hinged door may occur in actual applications, make sure of the correct operation before installation.

### HS9Z-A52 Actuator

- When the center of the hinged door is on the extension line of the

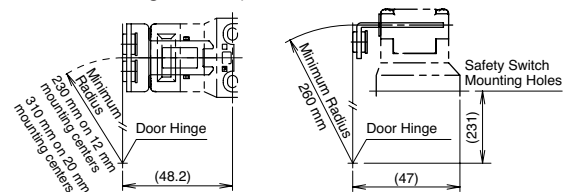


- When the center of the hinged door is on the extension line of the contact surface of actuator and safety switch.

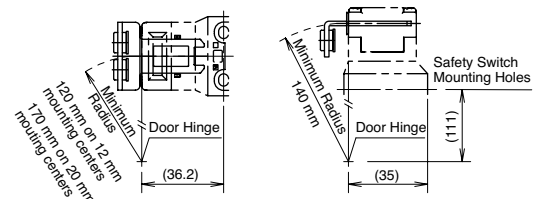


### HS9Z-A52A Actuator (w/rubber cushions)

- When the center of the hinged door is on the extension line of the actuator mounting surface.)



- When the center of the hinged door is on the extension line of the contact surface of actuator and safety switch.



# HS5E Safety Door Lock Switches

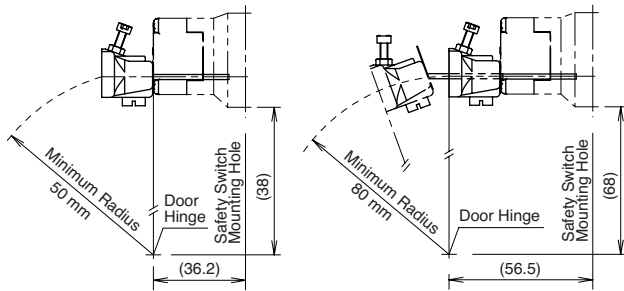
## Instructions

### Actuator Angle Adjustment

- Using the angle adjustment screw, the actuator angle can be adjusted (refer to the dimensional drawing). Adjustable angle: 0 to 20°
- The larger the adjusted angle of the actuator, the smaller the applicable radius of the door opening.
- After installing the actuator, open the door. Then adjust the actuator so that its edge can be inserted properly into the actuator entry slot of the safety switch.
- After adjusting the actuator angle, apply Loctite to the adjustment screw so that the screw will not move.

### When using the HS9Z-A53 Angle Adjustable (vertical) Actuator

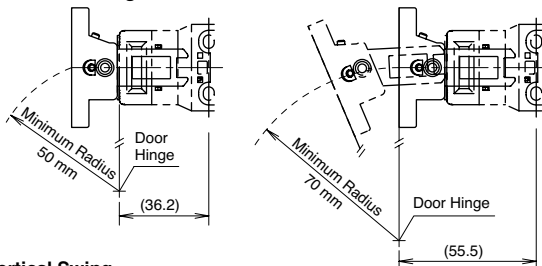
- When the center of the hinged door is on the extension line of the contact surface of actuator and safety switch: 50 mm
- When the center of the hinged door is on the extension line of the actuator mounting surface: 80 mm



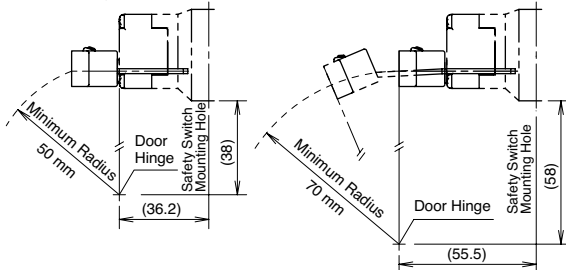
### When using the HS9Z-A55 Angle Adjustable (vertical/horizontal) Actuator

- When the center of the hinged door is on the extension line of the contact surface of actuator and safety switch: 50 mm
- When the center of the hinged door is on the extension line of the actuator mounting surface: 70 mm

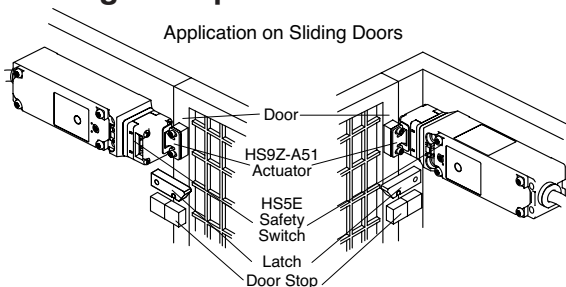
#### Horizontal Swing



#### Vertical Swing

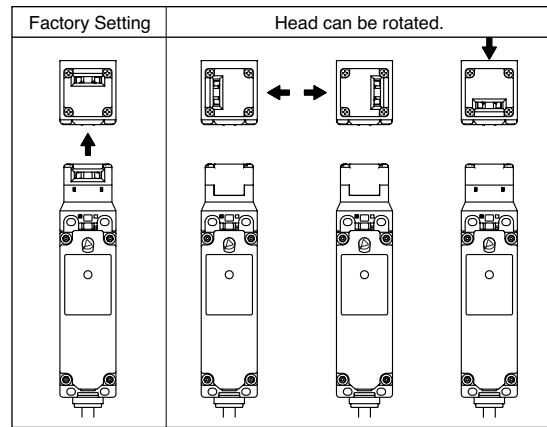


## Mounting Examples



### Rotating the Head

The head of the HS5E can be rotated by removing the four screws from the corners of the HS5E head and reinstalling the head in the desired orientation. Before wiring the HS5E, replace the head if necessary. Before replacing the head, turn the manual unlock to the UNLOCK position using the manual unlock key. When reinstalling the head, make sure that no foreign object enters the safety switch. Tighten the screws tightly, without leaving space between the head and body, otherwise the safety switch may malfunction. Recommended tightening torque: 1.0 ±0.1 N·m



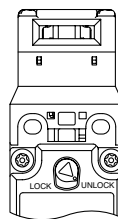
### For Manual Unlocking

#### Spring lock type

The HS5E allows manual unlocking of the actuator to pre-check proper door operation before wiring or turning power on, as well as for emergency use such as a power failure.

#### Solenoid lock type

The safety switch can be unlocked manually in emergency, such as when the switch cannot be unlocked after de-energizing the solenoid.



- When locking or unlocking the safety switch manually, turn the key fully using the proprietary manual unlocking key supplied with the switch.
- Using the safety switch with the key not fully turned (less than 90°) may cause damage to the switch or operation failures (when manually unlocked, the switch will keep the main circuit disconnected and the door unlocked).
- Do not apply excessive force to the manual unlock part, otherwise the manual unlock part will become damaged.
- Do not leave the manual unlocking key attached to the switch during operation. This is dangerous because the switch can always be unlocked while the machine is in operation.



Manual Unlocking Key  
(supplied with the switch)

## Instructions

### Safety Precautions

Before manually unlocking the safety switch, make sure that the machine has come to a complete stop. Manual unlocking during operation may unlock the switch before the machine stops, and the function of safety switch with solenoid is lost. While the solenoid is energized, do not unlock the switch manually (solenoid lock type).

### Recommended Tightening Torque of Mounting Screws

- Safety Switch: 2.0 ± 0.2 N·m (four M4 screws)

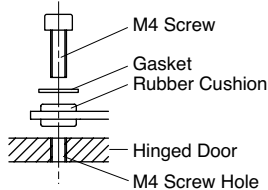
#### Actuators

- HS9Z-A51: 2.0 ± 0.2 N·m (two M4 screws)
- HS9Z-A52: 1.0 ± 0.2 N·m (two M4 Phillips screws)
- HS9Z-A51A/A52A: 1.0 to 1.5 N·m (two M4 screws)
- HS9Z-A53: 5.0 ± 0.5 N·m (two M6 screws)
- HS9Z-A55: 1.0 ± 1.5 N·m (two M4 screws)

- The above recommended tightening torques of the mounting screws are the values confirmed with hex socket head bolts. When other screws are used and tightened to a smaller torque, make sure that the screws do not become loose after mounting.
- Mounting bolts must be provided by the users.
- To avoid unauthorized or unintended removal of the safety switch and the actuator, it is recommended that the safety switch and the actuator are installed in an unremovable manner, for example using special screws or welding the screws.
- When installing the HS9Z-A51A and HS9Z-A52A actuators, use the gasket (supplied with the actuator) on the hinged door, and mount tightly using two M4 screws.

Mounting centers:

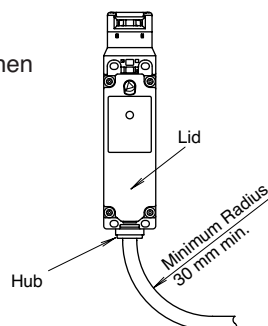
12 mm (factory setting), adjustable to 20 mm



Note: Choose mounting centers 12 mm or 20 mm.

### Cables

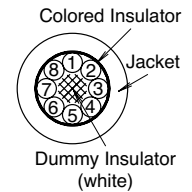
- Do not fasten or loosen the hub at the bottom of the safety switch.
- When bending the cable during wiring, make sure that the cable radius is kept at 30 mm minimum.
- When wiring, make sure that water or oil does not enter the cable.
- Do not open the lid of the safety switch. Otherwise the safety switch will be damaged.
- Solenoid has polarity. Be sure of the correct polarity when wiring.



### Wire Identification

- Wires can be identified by the color and white line printed on the wire.

| No. | Insulator Color | No. | Insulator Color |
|-----|-----------------|-----|-----------------|
| 1   | white           | 5   | brown/white     |
| 2   | black           | 6   | orange          |
| 3   | brown           | 7   | blue/white      |
| 4   | blue            | 8   | orange/white    |



### Terminal Number Identification

- When wiring, identify the terminal number of each contact by the color of insulator.
- The following table shows the identification of terminal numbers.

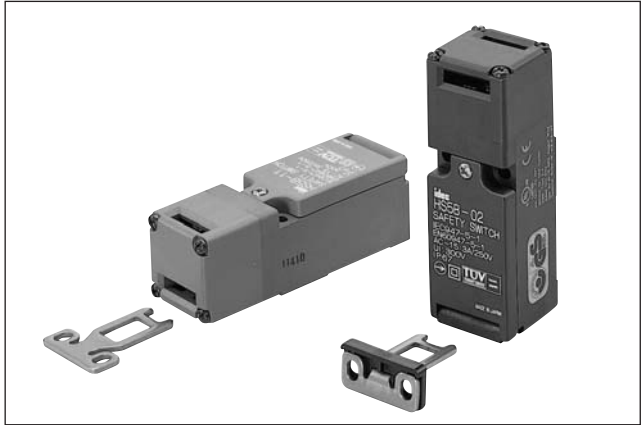
| Type   | Circuit Diagram                              |                             |
|--------|--|-----------------------------|
|        |  |                             |
| HS5E-A | Main Circuit: Blue 11 → 12                   | 41 → 42 Blue/White          |
|        | Monitor Circuit: Orange 23 → 24 Orange/White | Brown 53 → 54 Brown/White   |
| HS5E-B | Main Circuit: Blue 11 → 12                   | 41 → 42 Blue/White          |
|        | Monitor Circuit: Orange 23 → 24 Orange/White | Brown 51 → 52 Brown/White   |
| HS5E-C | Main Circuit: Blue 11 → 12                   | 41 → 42 Blue/White          |
|        | Monitor Circuit: Orange 21 → 22 Orange/White | Brown 53 → 54 Brown/White   |
| HS5E-D | Main Circuit: Blue 11 → 12                   | 41 → 42 Blue/White          |
|        | Monitor Circuit: Orange 21 → 22 Orange/White | Brown 51 → 52 Brown/White   |
| HS5E-F | Main Circuit: Blue 11 → 12                   | 41 → 42 Blue/White          |
|        | Monitor Circuit: Orange 21 → 22 Orange/White | Brown 31 → 32 Brown/White   |
| HS5E-G | Main Circuit: Blue 11 → 12                   | 41 → 42 Blue/White          |
|        | Monitor Circuit: Orange 21 → 22 Orange/White | Brown 33 → 34 Brown/White   |
| HS5E-H | Main Circuit: Blue 11 → 12                   | 41 → 42 Blue/White          |
|        | Monitor Circuit: Brown 51 → 52 Brown/White   | Orange 61 → 62 Orange/White |
| HS5E-J | Main Circuit: Blue 11 → 12                   | 41 → 42 Blue/White          |
|        | Monitor Circuit: Brown 51 → 52 Brown/White   | Orange 63 → 64 Orange/White |

- When wiring, cut unnecessary wires such as the dummy insulator (white) and unused wires to avoid incorrect wiring.

# HS5B Miniature Safety Switches

**Limit-switch style without lock: Compact and lightweight.**  
**Head size is the same as the HS5E. Actuators are interchangeable.**

- 30 × 30 × 91 mm compact housing.
- Flexible installation. By turning the head of the switch to the desired angle, the actuator can be inserted from 8 directions.
- Degree of protection: IP67 (IEC60529)
- NC contacts feature direct opening action (IEC/EN60947-5-1).
- Proprietary actuators prevent unauthorized operation. (ISO14119, EN1088)



## Specifications and Ratings

### Types

#### • Safety Switch

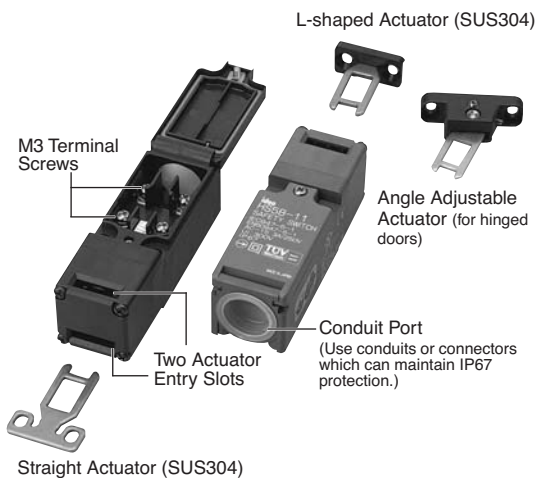
| Circuit Diagram | Conduit Port Size | Type No.  |
|-----------------|-------------------|-----------|
| <br>1NC-1NO     | G1/2              | HS5B-11B  |
|                 | PG13.5            | HS5B-11NP |
| <br>2NC         | G1/2              | HS5B-02B  |
|                 | PG13.5            | HS5B-02NP |

Package quantity: 1

#### • Actuators

| Description   | Type No.  |
|---|-----------|
| Straight  | HS9Z-A51  |
| Straight w/rubber cushion                                 | HS9Z-A51A |
| L-shaped  | HS9Z-A52  |
| L-shaped w/rubber cushion                                 | HS9Z-A52A |
| Angle Adjustable (vertical/horizontal) (for hinged doors) | HS9Z-A55  |

Package quantity: 1



#### • Contact Ratings

| Rated Insulation Voltage (Ui) |    | 300V                   |      |      |      |
|-------------------------------|----|------------------------|------|------|------|
| Rated Current (Ith)           |    | 10A                    |      |      |      |
| Rated Voltage (Ue)            |    | 30V                    | 125V | 250V |      |
| Rated Current (Ie)            | AC | Resistive load (AC-12) | 10A  | 2A   | 6A   |
|                               |    | Inductive Load (AC-15) | 10A  | 1A   | 3A   |
|                               | DC | Resistive load (DC-12) | 8A   | 2.2A | 1.1A |
|                               |    | Inductive Load (DC-13) | 4A   | 1.1A | 0.6A |

- Minimum applicable load (reference): 3V AC/DC, 5mA
- Ratings approved by safety standards/A300: AC-15 3A/250V

### Specifications

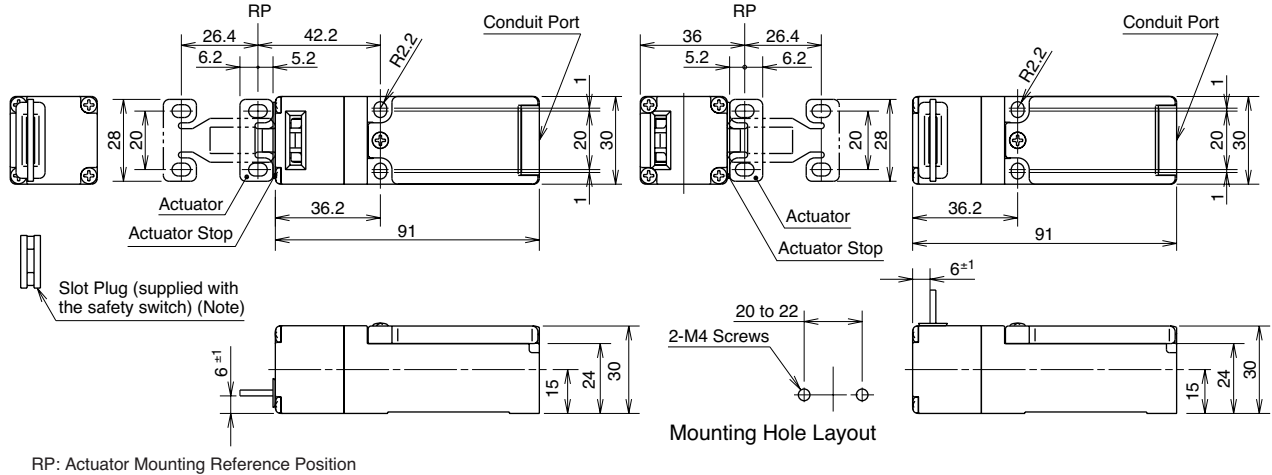
|  |  |  |
|--|--|--|
| Applicable Standards                   | ISO14119<br>IEC60947-5-1<br>GS-ET-19 (BG approval)<br>CSA C22.2, NO. 14(c-UL listed)                           | EN1088 (TUV approval)<br>EN60947-5-1 (TUV approval)<br>UL508 (UL listed) |
| Applicable Directive                   | IEC60204-1/EN60204-1 (applicable standards for use)  |  |
| Operating Temperature                  | 73/23/EEC (Low Voltage Directive)  |  |
| Relative Humidity                      | -20 to 70°C (no freezing)  |  |
| Storage Temperature                    | 45 to 85% (no condensation)  |  |
| Pollution Degree                       | -40 to +80°C (no freezing)   |  |
| Impulse Withstand Voltage              | 3  |  |
| Insulation Resistance (500V DC megger) | 4 kV   |  |
| Electric Shock Protection Class        | Between live and dead metal parts: 100 MΩ minimum<br>Between terminals of different poles: 100 MΩ minimum      |  |
| Degree of Protection                   | Class II (IEC61140)  |  |
| Shock Resistance                       | IP67 (IEC60529)  |  |
| Vibration Resistance                   | Damage limits: 1000 m/s <sup>2</sup> (100G)  |  |
| Actuator Operating Speed               | Operating extremes:<br>10 to 55 Hz, amplitude 0.5 mm minimum<br>Damage limits: 30 Hz, amplitude 1.5 mm minimum |  |
| Direct Opening Travel                  | 0.05 to 1.0 m/s  |  |
| Direct Opening Force                   | 8 mm minimum   |  |
| Operating Frequency                    | 60N minimum  |  |
| Mechanical Life                        | 900 operations per hour  |  |
| Electrical Life                        | 1,000,000 operations minimum (GS-ET-15)  |  |
| Conditional Short-circuit Current      | 100,000 operations minimum (operating frequency 900 operations per hour, load AC-12, 250V, 6A)                 |  |
| Housing Color                          | 100A (250V) (Use 250V/10A fast acting type fuse for short circuit protection.)                                 |  |
| Weight (approx.)                       | 80g  |  |

# HS5B Miniature Safety Switches

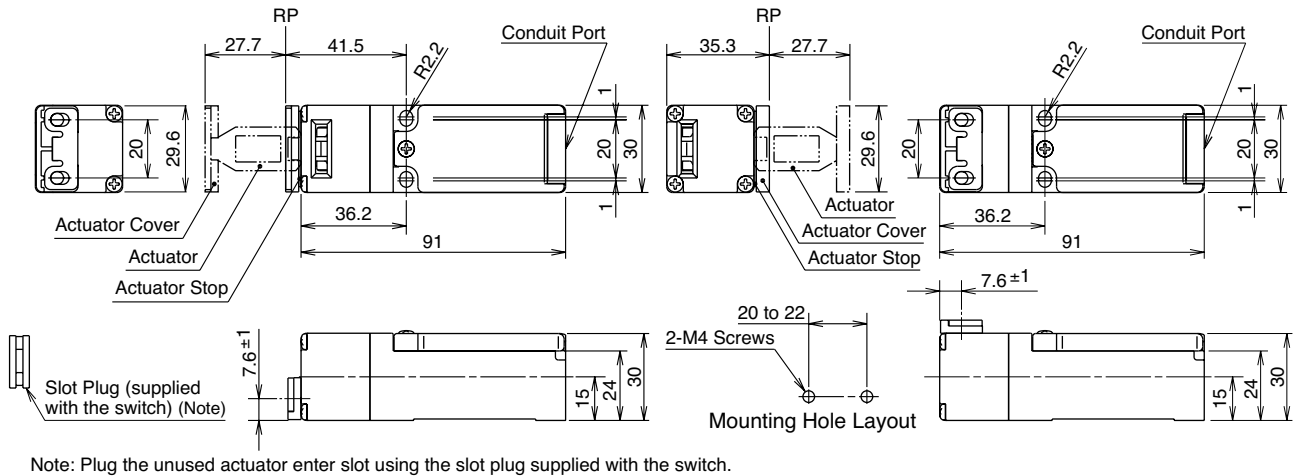
## Dimensions and Mounting Hole Layouts

### • HS5B Safety Switch

#### Using the HS9Z-A51 Straight Actuator (horizontal mounting)



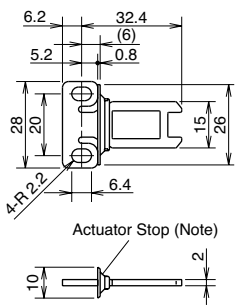
#### Using the HS9Z-A52 L-shaped Actuator (vertical mounting)



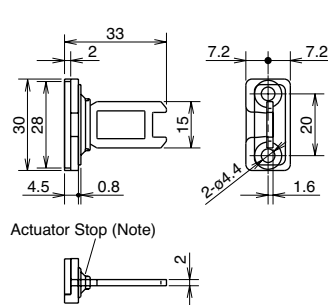
Note: Plug the unused actuator enter slot using the slot plug supplied with the switch.

### • Actuators

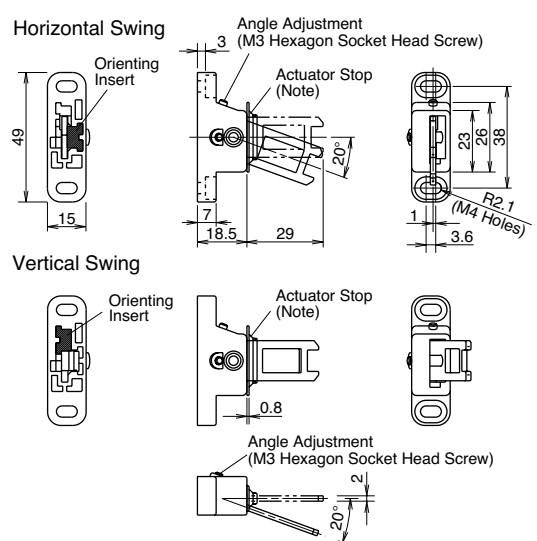
#### Straight (HS9Z-A51)



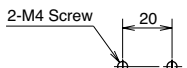
#### L-shaped (HS9Z-A52)



#### Angle Adjustable (HS9Z-A55)



#### • Actuator Mounting Hole Layout (Straight, L-shaped)

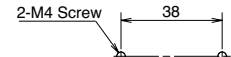


Note: The actuator stop is supplied with the actuator and used when adjusting the actuator position. Remove after the actuator position is determined.

#### • Actuator Orientation

The orientation of actuator swing (horizontal/vertical) can be changed using the orienting insert (white plastic) installed on the back of the actuator. Do not lose the orienting insert, otherwise the actuator will not swing properly.

#### • Actuator Mounting Layout (horizontal/vertical swing)



All dimensions in mm.

# HS1E Safety Door Lock Switch with Solenoid Interlock

**Lightweight safety switch in plastic housing, providing high locking strength.**

- Basic unit and solenoid unit in one housing
- Lightweight plastic housing
- All terminal screws are M3.5, allowing easy wiring.
- Spring lock and solenoid lock types are available.
- Equipped with two actuator entry slots.
- Double insulation structure

## Locking Strength 2000N

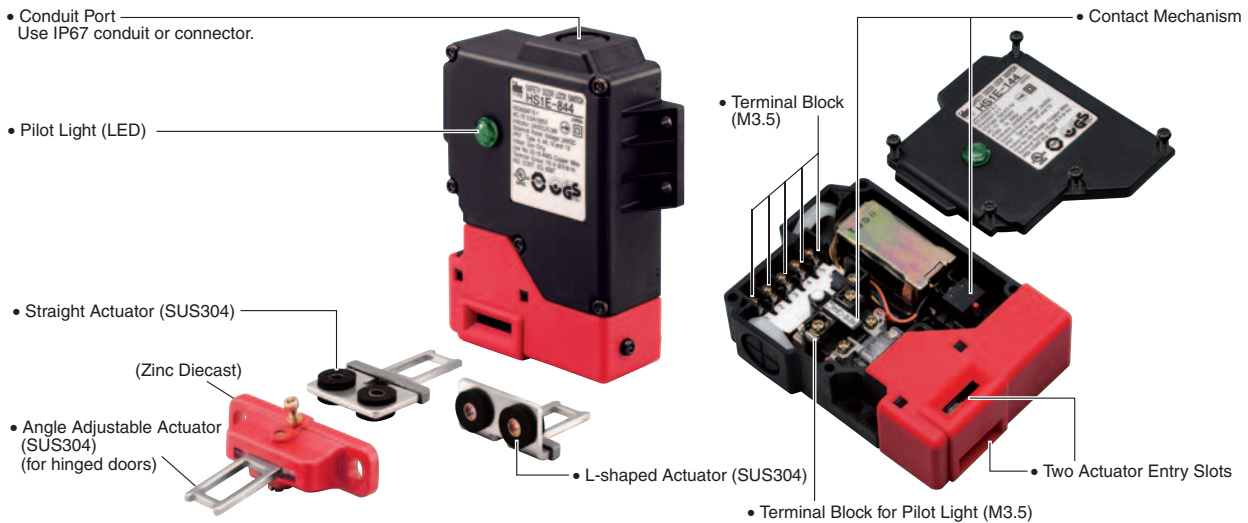
- Ideal locking mechanism and robust actuators for large doors.
- Accommodation of actuator entry slots to rattling doors is enhanced.

## Spring Lock Type

- Automatically locks the actuator without power applied to the solenoid.
- After the machine stops, unlocking is completed by the solenoid, providing high safety features.
- Manual unlocking is possible in the event of power failure or maintenance.

## Solenoid Lock Type

- The actuator is locked when energized.
- The actuator is unlocked when de-energized.



Specifications and other descriptions in this catalog are subject to change without notice.



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