HS5B Series Miniature Interlock Switch

HS5B

Key features include:

- **30mm x 30mm x 91mm Compact Housing**
- **Available with 2 Contact Configurations (1NO + 1NC or 2NC)**
- **Flexible Installation: By turning the head of the switch to the desired angle, the actuator can be accessed from 5 directions.**
- **Plastic Housing: Light weight**
- **Direct Opening Action: Opening the door forces the contacts to disconnect even if the contacts are welded. (IEC60947-5-1)**
- **Degree of Protection: IP67 (IEC60529)**

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TÜV PRODUCT SERVICE Bauart geprüft

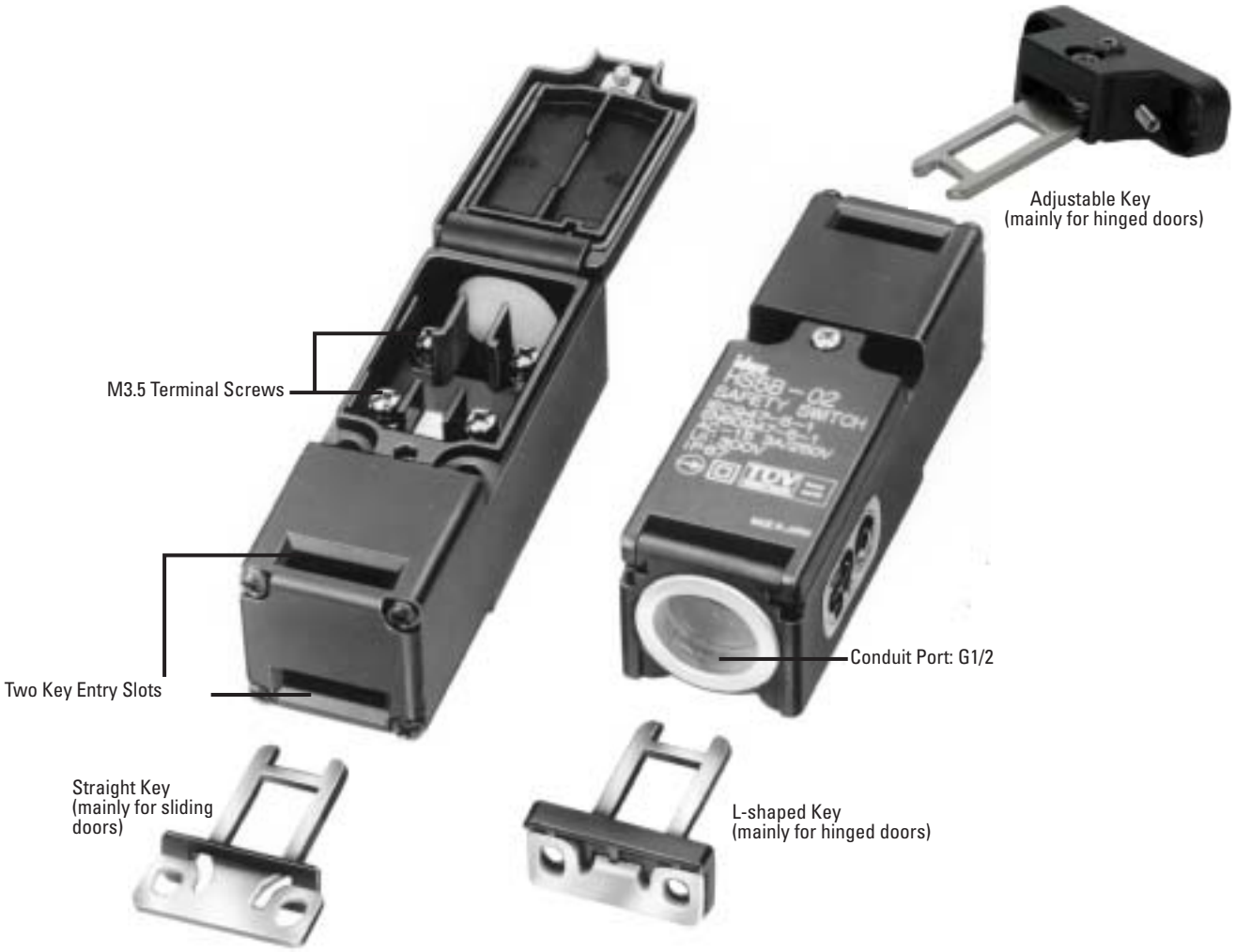
EN1088
EN60947-5-1
IEC60947-5-1

GS-ET-15
BG standard in Germany

Direct Opening

Double Insulation

HS5B Series Functionality



Specifications

Specifications						
Conforming to Standards			EN1088, IEC60947-5-1, EN60947-5-1, GS-ET-15			
Operating Temperature			–20 to +70°C (no freezing)			
Storage Temperature			–40 to +80°C			
Operating Humidity			85% RH maximum (no condensation)			
Altitude			2,000m maximum			
Rated Insulation Voltage (Ui)			300V			
Impulse Withstand Voltage (Uimp)			4 kV			
Insulation Resistance			100 MΩ minimum (500V DC megger)			
Electric Shock Protection Class			Class II (IEC61140)			
Pollution Degree			3 (IEC60664-1)			
Degree of Protection			IP67 (IEC60529)			
Vibration Resistance	**Operating Extremes**		10 to 55 Hz, amplitude 0.5 mm			
	Damage Limits		60 m/sec^2 (approx. 6G)			
Shock Resistance			1,000 m/sec^2 (approx. 100G)			
Actuator Operating Speed			1 m/sec maximum			
Positive Opening Travel			8 mm minimum			
Positive Opening Force			60N minimum			
Thermal Current (Ith)			10A			
Rated Operating Current (Ie)		Rated operating voltage (Ue)		30V	125V	250V
		AC	Resistive load (AC12)	10A	10A	6A
			Inductive load (AC15)	10A	5A	3A
		DC	Resistive load (DC12)	8A	2.2A	1.1A
			Inductive load (DC13)	4A	1.1A	0.6A
Operating Frequency			900 operations/hour			
Mechanical Life			1,000,000 operations			
Electrical Life			100,000 operations (rated load)			
Conditional Short-circuit Current			100A (IEC60947-5-1)			
Recommended Short Circuit Protection			250V, 10A fuse (Type D01 based on IEC60269-1, 60269-2)			
Weight			Approx. 80g			

Ordering Information

HS5B - 11 B

Contact Configuration
(11: 1NO-1NC, 02: 2NC)

B1

Safety Products

Part Numbers

Part Numbers: Body

Part Number	Contact Configuration	Conduit Port
HS5B-11B	1NO-1NC	G1/2
HS5B-02B	2NC	

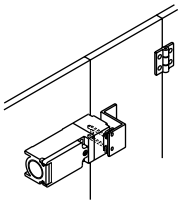
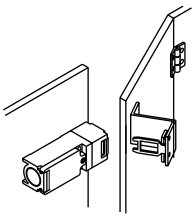
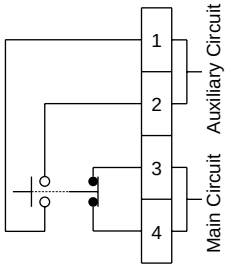
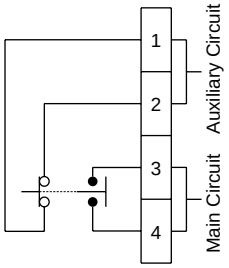
The key is not included with the switch and must be ordered separately.

Part Numbers: Key

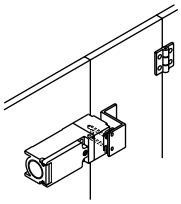
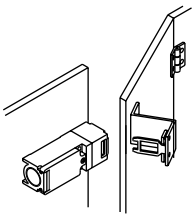
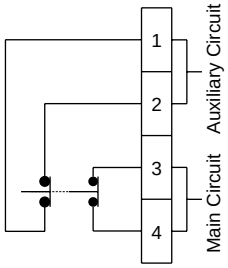
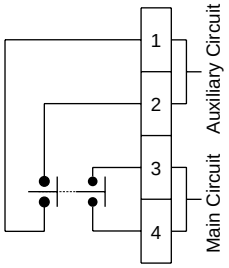
Part Number	Shape
HS9Z-A51	Straight (Mainly for sliding doors)
HS9Z-A52	L-shaped (Mainly for hinged doors)
HS9Z-A55	flexible adjustable key

Application Examples and Circuit Diagrams

HS5B-11B (1NO-1NC)

	Status 1	Status 2
Door/ Switch Status	• Door Closed • Machine ready to operate	• Door opened • Machine cannot be started
Door		
Circuit Diagram		
Main Circuit	3-4: Closed	3-4: Open
Aux. Circuit	1-2: Open	1-2: Closed

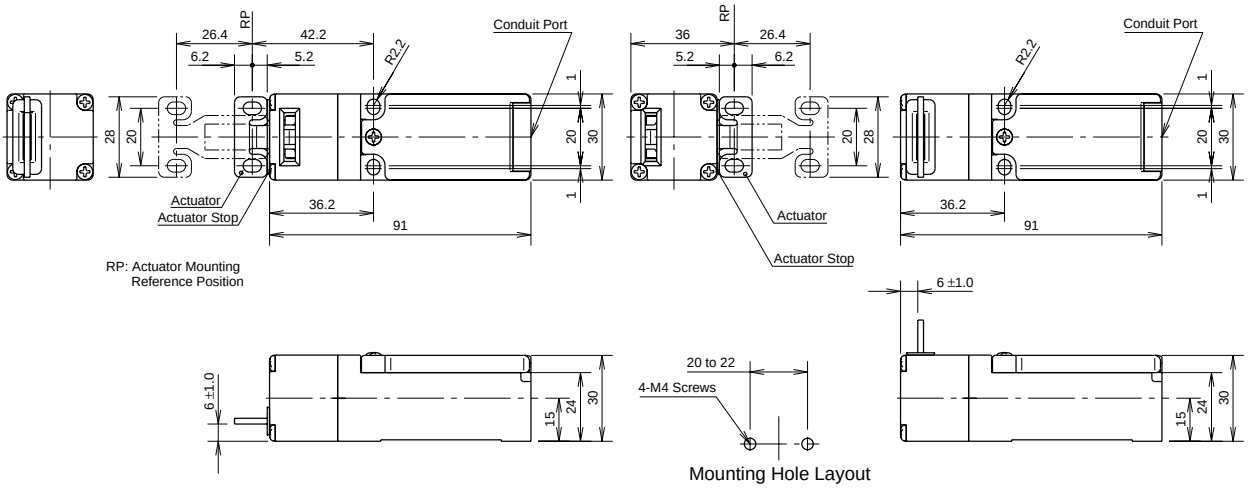
HS5B-02B (2NC)

	Status 1	Status 2
Door/ Switch Status	• Door Closed • Machine ready to operate	• Door opened • Machine cannot be started
Door		
Circuit Diagram		
Main Circuit	3-4: Closed	3-4: Open
Aux. Circuit	1-2: Closed	1-2: Open

1. *Main Circuit: used to enable the machine to start only when the main circuit is closed.*
2. *Auxiliary Circuit: used to indicate whether the machine circuit or door is open or closed.*

Dimensions

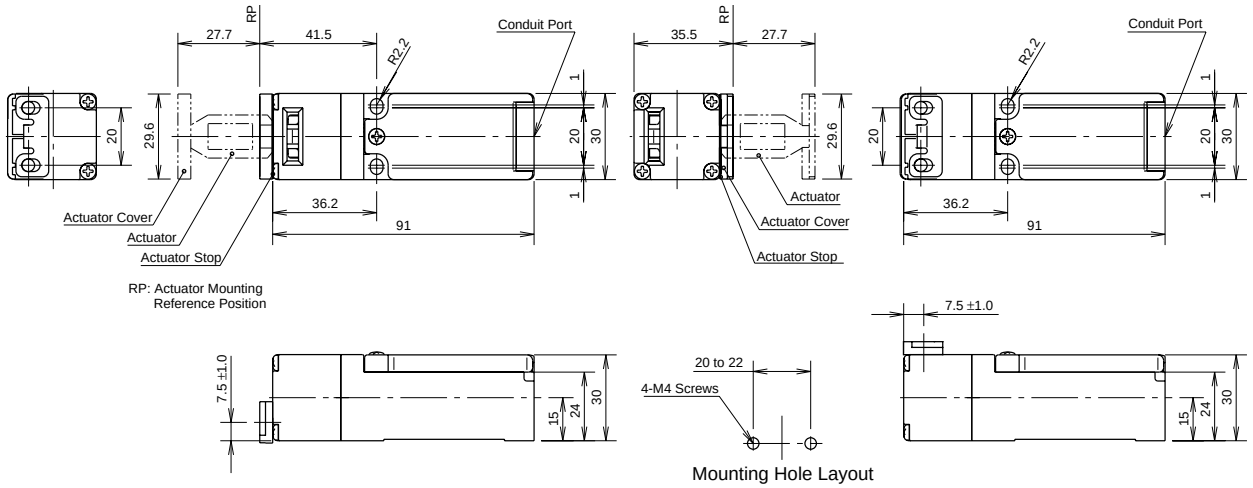
HS5B - using the straight key (HS9Z-A51)



All dimensions in mm.

Dimensions con't

HS5B – using the L-shaped key (HS9Z-A52)

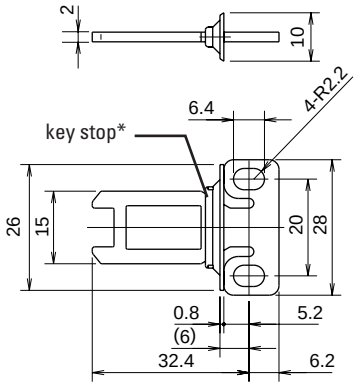


All dimensions in mm.

Accessories

Straight Key (mainly for sliding doors)

weight: 8g

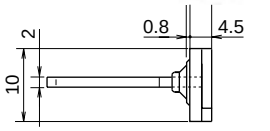


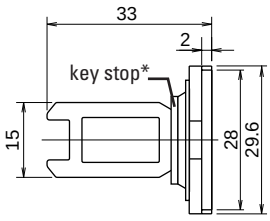
After installing the key, remove the key stop.

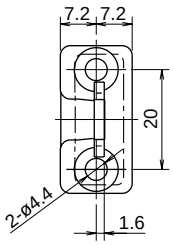
Accessories con't

L-Shaped Key (mainly for hinged doors)

weight: 8g





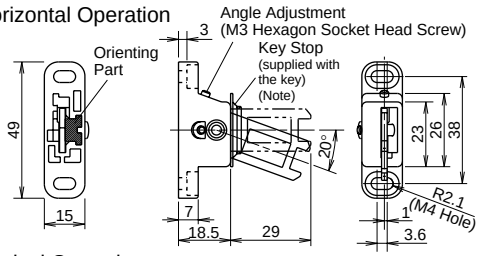


After installing the key, remove the key stop.

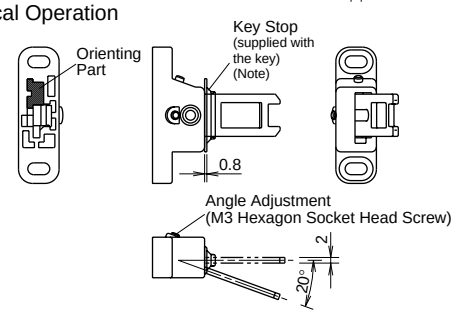
All dimensions in mm.

Adjustable Key

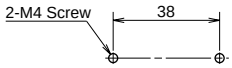
Horizontal Operation



Vertical Operation



- Key Mounting Layout (horizontal/vertical operation)



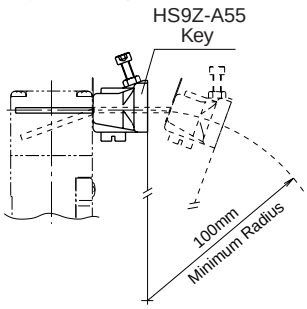
Accessories con't

Key Angle Adjustment

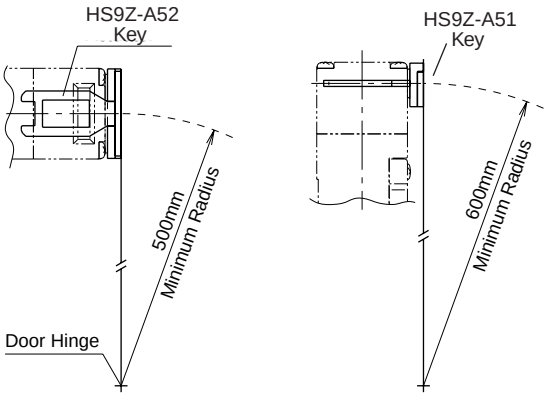
- Using the screw (M3 hex socket head screw), the actuator angle can be adjusted (refer to the dimensional drawing). Adjustable angle: (0˚) to 20˚
- The larger the adjusted angle of the actuator, the smaller the applicable radius of the door opening.
- After installing the actuator, open the door. Then adjust the actuator so that its edge can be inserted properly into the entry slot of the safety switch.
- Recommended tightening torque: 0.8 N-m (approx. 8.0 kgf-cm)
- After adjusting the actuator angle, apply loctite or the like to the adjustment screw so as to prevent its loosening.

Comparison between Adjustable and Non-adjustable Keys

Adjustable Key HS9Z-A55



Non-adjustable Key HS9Z-A52



Interlock Switch Safety Precautions

- In order to avoid electric shock or a 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 degrees of the danger and use safety relays, since welded or sticking contacts of standard relays may invalidate the functions of the safety switch.
- Do not place a PLC in the circuit between the safety switch and the load. The safety security can be endangered in the event of a malfunction of the PLC.
- Do not disassemble or modify the switch. It may cause a breakdown or an accident.

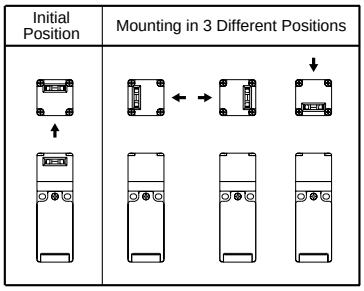
Operation Precautions - for all series

- 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 an excessive shock to the switch when opening or closing the door.
- A shock to the door exceeding 1,000 m/sec^2 (approx. 100G) may cause the contacts of the switch to chatter, and a malfunction of the switch may occur.
- For connection of wires, unscrew the cover. Unnecessary loosening of other screws may cause a malfunction of the switch.
- 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.
- Do not store the switches in a dusty, humid, or organic-gas atmosphere.

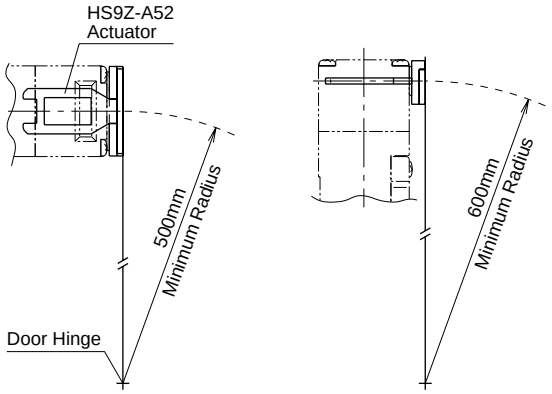
HS5B Precautions

For Rotating Head Directions

- The head of the HS5B can be rotated in 90° increments after removing the 4 screws on the corners of the head. Prevent entry of foreign objects into the switch during removal of the head. Tighten these screws with torque designated in the instruction sheet. Improper torque may cause errors.



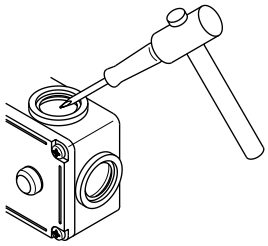
Minimum Radius of Hinged Doors



HS2B Precautions

Wire Connection

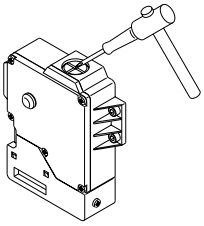
- The HS2B has 3 conduit ports, which are closed as a part of the molded switch housing.
- Make an opening for wire connection by breaking one of the conduit-port knockouts on the switch housing using a screwdriver.
- When breaking the conduit port, take care not to damage the contact block or other parts inside the switch.
- Cracks or burrs on the conduit entry may deteriorate the housing protection against water.
- When changing to another conduit port, close the unused opening with an optional plug (Type No. HS9Z-P1).

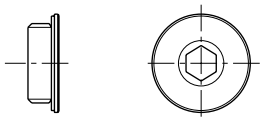


HS1E Precautions

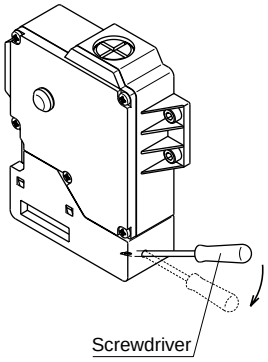
Wire Connection

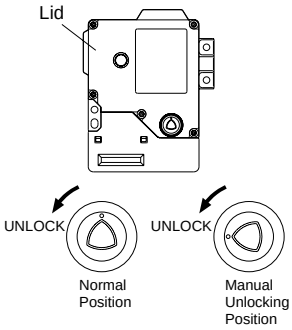
- Make an opening for wire connection by breaking one of the conduit-port knockouts on the switch housing using a screwdriver.
- Before breaking the knockout, temporarily remove the connector-fixing lock nut from the switch.
- When breaking the knockout, take care not to damage the contact block or other parts inside the switch.
- Cracks or burrs on the conduit entry may deteriorate the housing protection.
- When changing to the other conduit port, close the unused opening with an optional plug (accessory).





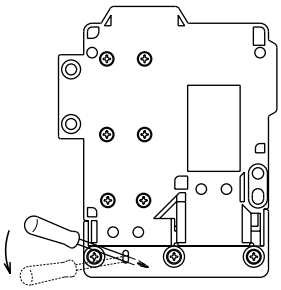
1. This unlocking method is intended for an escape from a machine when a person is locked in. For access to the unlocking entry, an access hole should be opened on the mounting panel. When opening the hole, apply proper protection against water or other foreign objects.
2. Caution: After the unlocking operation, put the screw back into the unlocking entry for safety.





Manual Unlocking

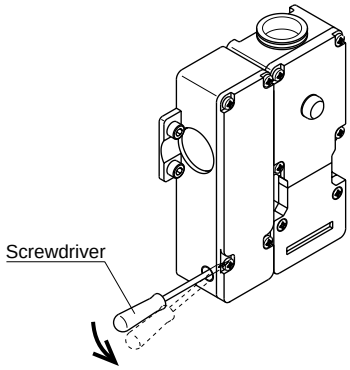
- Remove the screw located on the unlocking entry at the side of the switch using the key wrench included with the switch. Then insert a small screwdriver into the switch to push the lever inside of the switch toward the indicator until the actuator is unlocked (refer to the diagram on the right).
- Insert a small screwdriver into the elliptical hole on the back of the switch, then push the lever inside of the switch toward the indicator until the key is unlocked (refer to the diagram on the right).



HS1C Precautions

- Regardless of door type, do not use the safety switch as a locking device. Install a locking device independently, for example, using a metal latch (also applicable to Type HS1E).
- The safety switch cover can be only removed with the special key wrench supplied with the switch or with the optional screwdriver (applicable to HS1B and HS1E).
- Remove the screw located on the unlocking entry at the side of the switch using the key wrench included with the switch. Then insert a small screwdriver into the switch to push the lever inside of the switch toward the indicator until the actuator is unlocked (refer to the diagram on the right).

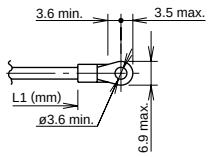
Caution: After the unlocking operation, put the screw back into the unlocking entry for safety.



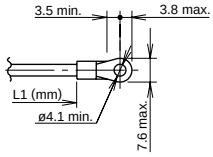
Operation Precautions

Applicable Crimping Terminals

- (Refer to the Crimping Terminal 1 or 2 shown in the drawing below.)
- HS1C
  Terminals No. 1 to 6: Use solid or stranded wires only (crimping terminals not applicable).
  Terminals No. 7 and 8: Crimping Terminal 1
  Ground Terminal: Crimping Terminal 2
- HS1B
  Ground Terminal: Crimping Terminal 2
  Other Terminals: Crimping Terminal 1
  HS2B, HS5B, and HS1E
  Crimping Terminal 1

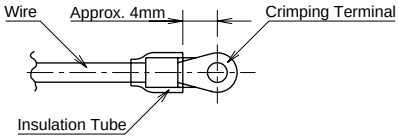


Crimping Terminal 1



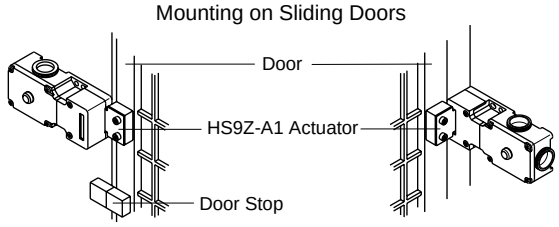
Crimping Terminal 2

Use an insulation tube on the crimping terminal.

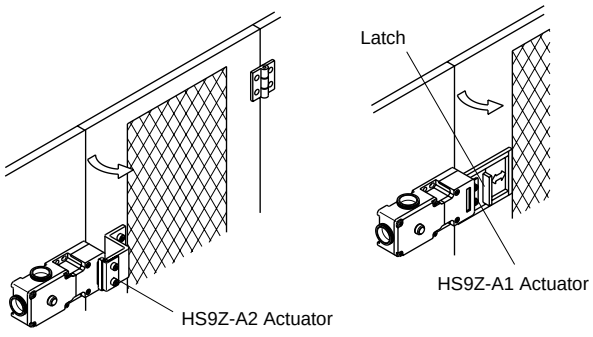


Installation Examples (see the diagrams below)

Mounting on Sliding Doors

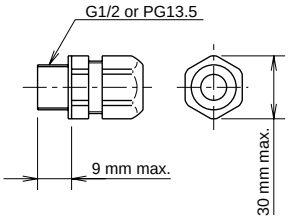


Mounting on Hinged Doors



Applicable Connectors (As shown below)

- Use connectors which maintain the IP67 protection.
- Applicable Connector Dimensions
- Flex Conduit: VF03 (Japan Flex) www.nipolex.co.jp
- Steel Connector (G1/2): ALC-103
  (PF13.5): RBC-103PG13.5



Recommended Screw Tightening Torque

- HS1C: 5.0±0.5 N-m (approx. 50±5 kgf-cm)
  (4 or 6 pcs of M5 hex socket head cap screws)
- HS1B: 5.0±0.5 N-m (approx. 50±5 kgf-cm)
  (2 or 4 pcs. of M5 hex socket head cap screws)
- HS2B: 5.0±0.5 N-m (approx. 50±5 kgf-cm)
  (2 pcs of M5 hex socket head cap screws)
- HS5B: 4.0±0.4 N-m (approx. 40±4 kgf-cm)
  (2 pcs of M4 hex socket head cap screws)
- HS1E: 5.0±0.5 N-m (approx. 50±5 kgf-cm)
  (4 or 6 pcs of M5 hex socket head cap screws)
- Key (HS9Z-A1/A2)
  5.0±0.5 N-m (approx. 50±5 kgf·cm)
- (2 pcs. of M6 hex socket head cap screws)
  Key (HS9Z-A51/A52)
- 2.0±0.2 N-m (approx. 20±2 kgf·cm)
  (2 pcs of M4 hex socket head cap screws)
- 1.0±0.2 N-m (approx. 10±2 kgf·cm)
  (2 pcs of M4 Phillips screws)

The screws are supplied by the user.

Applicable Wire Size

- HS1C: 0.5 to 0.75 mm2 (Terminals No.1, 2, 5 to 8)
  1.0 to 1.25 mm2 (Terminals No.3, 4, and grounding terminal)
- HS5B: 0.5 to 1.25 mm2
- HS1E: 0.5 to 1.25 mm2