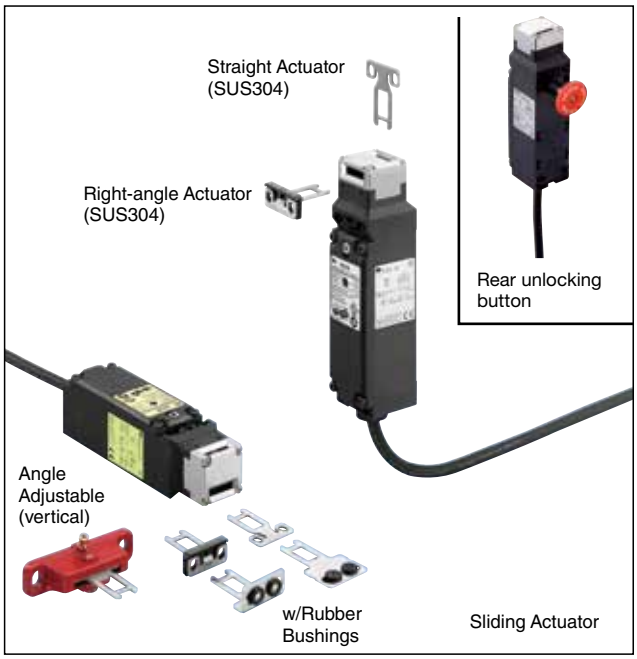
HS5E Miniature Interlock Switches with Solenoid

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

- Compact body. 35 × 40 × 146 mm.
- Rear unlocking button for emergency escape available. Also available is the rear unlocking button kit.
- A variety of circuits—dual safety circuit and four-circuit independent outputs available.
- Gold-plated contacts.
- Spring lock and solenoid lock are available.
- The head orientation can be rotated, allowing 8 different actuator entries.
- A metal entry slot ensures high durability.
- An actuator with rubber bushings alleviates the impact of actuator entry into the slot.
- The actuator retention force is 1400N minimum (GS-ET-19).
- Integral cable design minimizes wiring, preventing wiring mistakes.
- LED indicator indicates the solenoid status.
- Double insulation structure.



Spring Lock

- 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

- The actuator is locked when energized.
- The actuator is unlocked when de-energized.
- Flexible locking function can be achieved for an application where locking is not required and sudden stopping of machine must be prevented.

(not all models)

Specifications

Applicable Standards	ISO14119, IEC60947-5-1, EN60947-5-1 (TÜV approved), EN1088, GS-ET-19 (TÜV approved), UL508 (UL recognized), CSA C22.2 No. 14 (c-UL recognized), GB14048.5 (CCC approved), KS C IEC60947-5-1/S1-G-1/S2-E-4 (KOSHA approved)
	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 Between live metal parts: 100 MΩ minimum Between terminals of the same pole: 100 MΩ minimum
Electric Shock Protection	Class II (IEC61140)
Degree of Protection	IP67 (IEC60529)
Shock Resistance	Operating extremes: 100 m/s2 (10G) Damage limits: 1000 m/s2 (100G)
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 Actuator HS9Z-A51A/A52/A52A/A53/A55: 12 mm minimum
Direct Opening Force	80N minimum
Actuator Retention Force	1400N minimum (GS-ET-19) (See page 38 for actuator retention force.)
Operating Frequency	900 operations per hour
Rear Unlock Button Mechanical Durability	3000 operations minimum (HS5E-∗∗L)
Mechanical Durability	1,000,000 operations minimum (GS-ET-19)
Electrical Durability	100,000 operations minimum (operating frequency 900 operations per hour, load AC-12, 250V, 1A) 1,000,000 operations minimum (operating frequency 900 operations per hour, load 24V AC/DC. 100mA)
Conditional Short-circuit Current	50A (250V) (Use 250V/10A fast acting type fuse for short-circuit protection.)
Cable	UL2464 HS5E-V: AWG22 (12-core, 0.3 mm2/core) Others: AWG21(8-core: 0.5 mm2/core)
Cable Outside Diameter	ø7.6 mm
Weight (approx.)	400g (1m cable), 580g (3m cable), 770g (5m cable) . Add 20g for rear unlocking button.

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Ratings

Contact Ratings

Rated Insulation Voltage (Ui)			250V (between LED or solenoid and ground: 30V)		
Rated Thermal Current (Ith)			2.5A		
		Four-circuit Independent Output (HS5E-V)	Operating temp.: –25°C to 35°C (not included) 2.5A (1 or 2 circuits) 1.0A (3 or 4 circuits)	Operating temp.: 35°C to 50°C 1.0A (1 circuit) 0.5A (2 to 4 circuits)	
Rated Voltage (Ue)			30V	125V	250V
Rated Current (Ie)	AC	Resistive Load (AC-12)	–	2.5A	1.5A
		Inductive Load (AC-15)	–	1.5A	0.75A
	DC	Resistive Load (DC-12)	2.5A	1.1A	0.55A
		Inductive Load (DC-13)	2.3A	0.55A	0.27A

- Minimum applicable load (reference value): 3V AC/DC, 5 mA
  (Applicable range may vary with operating conditions and load types.)

TÜV rating: AC-15 250V/0.75A
DC-13 125V/0.22A
DC-13 30V/2.3A
UL/c-UL rating: 125V AC/1.5A Pilot Duty
125V DC/0.22A Pilot Duty
CCC rating: AC-15 250V/0.75A
DC-13 125V/0.22A
DC-13 30V/2.3A

Solenoid Unit

Locking Mechanism	Spring Lock	Solenoid Lock
Rated Operating Current	24V DC (100% duty cycle)	
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	

Indicator

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

Part No. Development

HS5E-A44L01-G

Circuit Code

	Main Circuit	Door Monitor Circuit	Lock 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
DD:	1NC + 1NC 1NC + 1NC		
VA:	—	1NC, 1NO	1NC, 1NO
VB:	—	1NC, 1NO	2NC
VC:	—	2NC	1NC, 1NO
VD:	—	2NC	2NC

Solenoid Unit Voltage/Lock Mechanism
4: 24V DC/Spring Lock
7Y: 24V DC/Solenoid Lock

Indicator Color
G: Green

Cable Length
01: 1m
03: 3m
05: 5m

Rear Unlocking Button
L: With rear unlocking button
Blank: Without rear unlocking button

LED Indicator Rated Voltage
4: 24V DC
0: Without indicator

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HS5E Miniature Interlock Switches with Solenoid

Standard

Lock Mechanism	Circuit Code	Contact Configuration	Indicator	Cable Length	Part No.
Spring Lock	A	Door Monitor (Actuator inserted) / Lock Monitor (Solenoid OFF) (+) A2 (–) A1 Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NO, Lock Monitor Circuit: 1NO Main Circuit: ⊖11 12 41 42 Monitor Circuit: 23 24 Monitor Circuit: 53 54	Without	1m	HS5E-A4001
				3m	HS5E-A4003
				5m	HS5E-A4005
			With	1m	HS5E-A4401-G
				3m	HS5E-A4403-G
				5m	HS5E-A4405-G
	B	Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NO, Lock Monitor Circuit: 1NC Main Circuit: ⊖11 12 41 42 Monitor Circuit: 23 24 Monitor Circuit: 51 52	Without	1m	HS5E-B4001
				3m	HS5E-B4003
				5m	HS5E-B4005
			With	1m	HS5E-B4401-G
				3m	HS5E-B4403-G
				5m	HS5E-B4405-G
	C	Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NC, Lock Monitor Circuit: 1NO Main Circuit: ⊖11 12 41 42 Monitor Circuit: ⊖21 22 Monitor Circuit: 53 54	Without	1m	HS5E-C4001
				3m	HS5E-C4003
				5m	HS5E-C4005
			With	1m	HS5E-C4401-G
				3m	HS5E-C4403-G
				5m	HS5E-C4405-G
	D	Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NC, Lock Monitor Circuit: 1NC Main Circuit: ⊖11 12 41 42 Monitor Circuit: ⊖21 22 Monitor Circuit: 51 52	Without	1m	HS5E-D4001
				3m	HS5E-D4003
				5m	HS5E-D4005
			With	1m	HS5E-D4401-G
				3m	HS5E-D4403-G
				5m	HS5E-D4405-G
	F	Main Circuit: 1NC+1NC, Door Monitor Circuit: 2NC Main Circuit: ⊖11 12 41 42 Monitor Circuit: ⊖21 22 Monitor Circuit: ⊖31 32	Without	1m	HS5E-F4001
				3m	HS5E-F4003
				5m	HS5E-F4005
			With	1m	HS5E-F4401-G
				3m	HS5E-F4403-G
				5m	HS5E-F4405-G
	G	Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NC, 1NO Main Circuit: ⊖11 12 41 42 Monitor Circuit: ⊖21 22 Monitor Circuit: 33 34	Without	1m	HS5E-G4001
				3m	HS5E-G4003
				5m	HS5E-G4005
			With	1m	HS5E-G4401-G
				3m	HS5E-G4403-G
				5m	HS5E-G4405-G
	H	Main Circuit: 1NC+1NC, Lock Monitor Circuit: 2NC Main Circuit: ⊖11 12 41 42 Monitor Circuit: 51 52 Monitor Circuit: 61 62	Without	1m	HS5E-H4001
				3m	HS5E-H4003
				5m	HS5E-H4005
			With	1m	HS5E-H4401-G
				3m	HS5E-H4403-G
				5m	HS5E-H4405-G
	J	Main Circuit: 1NC+1NC, Lock Monitor Circuit: 1NC, 1NO Main Circuit: ⊖11 12 41 42 Monitor Circuit: 51 52 Monitor Circuit: 63 64	Without	1m	HS5E-J4001
				3m	HS5E-J4003
				5m	HS5E-J4005
			With	1m	HS5E-J4401-G
				3m	HS5E-J4403-G
				5m	HS5E-J4405-G

- The contact configuration shows the status when the actuator is inserted and the switch is locked.
- The contact configuration shows the status when the indicator is installed.
- Actuators are not supplied with the interlock switch and must be ordered separately.

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Standard

Lock Mechanism	Circuit Code	Contact Configuration	Indicator	Cable Length	Part No.
Solenoid Lock	A	Door Monitor (Actuator inserted) / Lock Monitor (Solenoid ON) (+) A2 (–) A1 Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NO, Lock Monitor Circuit: 1NO Main Circuit: 11 12 41 42 Monitor Circuit: 23 24 Monitor Circuit: 53 54	Without	1m	HS5E-A7Y001
				3m	HS5E-A7Y003
				5m	HS5E-A7Y005
			With	1m	HS5E-A7Y401-G
				3m	HS5E-A7Y403-G
				5m	HS5E-A7Y405-G
	B	Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NO, Lock Monitor Circuit: 1NC Main Circuit: 11 12 41 42 Monitor Circuit: 23 24 Monitor Circuit: 51 52	Without	1m	HS5E-B7Y001
				3m	HS5E-B7Y003
				5m	HS5E-B7Y005
			With	1m	HS5E-B7Y401-G
				3m	HS5E-B7Y403-G
				5m	HS5E-B7Y405-G
	C	Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NC, Lock Monitor Circuit: 1NO Main Circuit: 11 12 41 42 Monitor Circuit: 21 22 Monitor Circuit: 53 54	Without	1m	HS5E-C7Y001
				3m	HS5E-C7Y003
				5m	HS5E-C7Y005
			With	1m	HS5E-C7Y401-G
				3m	HS5E-C7Y403-G
				5m	HS5E-C7Y405-G
	D	Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NC, Lock Monitor Circuit: 1NC Main Circuit: 11 12 41 42 Monitor Circuit: 21 22 Monitor Circuit: 51 52	Without	1m	HS5E-D7Y001
				3m	HS5E-D7Y003
				5m	HS5E-D7Y005
			With	1m	HS5E-D7Y401-G
				3m	HS5E-D7Y403-G
				5m	HS5E-D7Y405-G
	F	Main Circuit: 1NC+1NC, Door Monitor Circuit: 2NC Main Circuit: 11 12 41 42 Monitor Circuit: 21 22 Monitor Circuit: 31 32	Without	1m	HS5E-F7Y001
				3m	HS5E-F7Y003
				5m	HS5E-F7Y005
			With	1m	HS5E-F7Y401-G
				3m	HS5E-F7Y403-G
				5m	HS5E-F7Y405-G
	G	Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NC, 1NO Main Circuit: 11 12 41 42 Monitor Circuit: 21 22 Monitor Circuit: 33 34	Without	1m	HS5E-G7Y001
				3m	HS5E-G7Y003
				5m	HS5E-G7Y005
			With	1m	HS5E-G7Y401-G
				3m	HS5E-G7Y403-G
				5m	HS5E-G7Y405-G
	H	Main Circuit: 1NC+1NC, Lock Monitor Circuit: 2NC Main Circuit: 11 12 41 42 Monitor Circuit: 51 52 Monitor Circuit: 61 62	Without	1m	HS5E-H7Y001
				3m	HS5E-H7Y003
				5m	HS5E-H7Y005
			With	1m	HS5E-H7Y401-G
				3m	HS5E-H7Y403-G
				5m	HS5E-H7Y405-G
	J	Main Circuit: 1NC+1NC, Lock Monitor Circuit: 1NC, 1NO Main Circuit: 11 12 41 42 Monitor Circuit: 51 52 Monitor Circuit: 63 64	Without	1m	HS5E-J7Y001
				3m	HS5E-J7Y003
				5m	HS5E-J7Y005
			With	1m	HS5E-J7Y401-G
				3m	HS5E-J7Y403-G
				5m	HS5E-J7Y405-G

- The contact configuration shows the status when the actuator is inserted and the switch is locked.
- The contact configuration shows the status when the indicator is installed.
- Actuators are not supplied with the interlock switch and must be ordered separately.

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HS5E Miniature Interlock Switches with Solenoid

Rear Unlocking Button

Lock Mechanism	Circuit Code	Contact Configuration	Indicator	Cable Length	Part No.
Spring Lock	A	Door Monitor (Actuator inserted) / Lock Monitor (Solenoid OFF) (+) A2 (–) A1 Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NO, Lock Monitor Circuit: 1NO Main Circuit: ⊖11 12 41 42 Monitor Circuit: 23 24 Monitor Circuit: 53 54	With	1m	HS5E-A44L01-G
				3m	HS5E-A44L03-G
				5m	HS5E-A44L05-G
	C	Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NC, Lock Monitor Circuit: 1NO Main Circuit: ⊖11 12 41 42 Monitor Circuit: ⊖21 22 Monitor Circuit: 53 54		1m	HS5E-C44L01-G
				3m	HS5E-C44L03-G
				5m	HS5E-C44L05-G
	D	Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NC, Lock Monitor Circuit: 1NC Main Circuit: ⊖11 12 41 42 Monitor Circuit: ⊖21 22 Monitor Circuit: 51 52		1m	HS5E-D44L01-G
				3m	HS5E-D44L03-G
				5m	HS5E-D44L05-G
	F	Main Circuit: 1NC+1NC, Door Monitor Circuit: 2NC Main Circuit: ⊖11 12 41 42 Monitor Circuit: ⊖21 22 Monitor Circuit: ⊖31 32		1m	HS5E-F44L01-G
				3m	HS5E-F44L03-G
				5m	HS5E-F44L05-G
	G	Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NC, 1NO Main Circuit: ⊖11 12 41 42 Monitor Circuit: ⊖21 22 Monitor Circuit: 33 34		1m	HS5E-G44L01-G
				3m	HS5E-G44L03-G
				5m	HS5E-G44L05-G

- The contact configuration shows the status when the actuator is inserted and the switch is locked.
- Actuators are not supplied with the interlock switch and must be ordered separately.

Dual Safety Circuit

Lock Mechanism	Circuit Code	Contact Configuration	Indicator	Cable Length	Part No.
Spring Lock	DD	Door Monitor (Actuator inserted) / Lock Monitor (Solenoid OFF) (+) A2 (–) A1 Main Circuit: 1NC+1NC 1NC+1NC Main Circuit ①: ⊖11 12 41 42 Main Circuit ②: ⊖21 22 51 52	With	1m	HS5E-DD4401-G
				3m	HS5E-DD4403-G
				5m	HS5E-DD4405-G

- The contact configuration shows the status when the actuator is inserted and the switch is locked.
- Actuators are not supplied with the interlock switch and must be ordered separately.

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Four-circuit Independent Output

Lock Mechanism	Circuit Code	Contact Configuration	Indicator	Cable Length	Part No.
Spring Lock	VA	Door Monitor (Actuator inserted) / Lock Monitor (Solenoid OFF) (+) A2 (–) A1 Door Monitor Circuit: 1NC, 1NO, Lock Monitor Circuit: 1NC, 1NO Monitor Circuit: ⊖ 11 12 41 42 Monitor Circuit: 23 24 Monitor Circuit: 53 54	With	1m	HS5E-VA4401-G
				3m	HS5E-VA4403-G
				5m	HS5E-VA4405-G
	VB	Door Monitor Circuit: 1NC, 1NO, Lock Monitor Circuit: 2NC Monitor Circuit: ⊖ 11 12 41 42 Monitor Circuit: 23 24 Monitor Circuit: 51 52		1m	HS5E-VB4401-G
				3m	HS5E-VB4403-G
				5m	HS5E-VB4405-G
	VC	Door Monitor Circuit: 2NC, Lock Monitor Circuit: 1NC, 1NO Monitor Circuit: ⊖ 11 12 41 42 Monitor Circuit: ⊖ 21 22 Monitor Circuit: 53 54		1m	HS5E-VC4401-G
				3m	HS5E-VC4403-G
				5m	HS5E-VC4405-G
	VD	Door Monitor Circuit: 2NC, Lock Monitor Circuit: 2NC Monitor Circuit: ⊖ 11 12 41 42 Monitor Circuit: ⊖ 21 22 Monitor Circuit: 51 52		1m	HS5E-VD4401-G
				3m	HS5E-VD4403-G
				5m	HS5E-VD4405-G
Solenoid Lock	VA	Door Monitor (Actuator inserted) / Lock Monitor (Solenoid ON) (+) A2 (–) A1 Door Monitor Circuit: 1NC, 1NO, Lock Monitor Circuit: 1NC, 1NO Monitor Circuit: ⊖ 11 12 41 42 Monitor Circuit: 23 24 Monitor Circuit: 53 54	With	1m	HS5E-VA7Y401-G
				3m	HS5E-VA7Y403-G
				5m	HS5E-VA7Y405-G
	VB	Door Monitor Circuit: 1NC, 1NO, Lock Monitor Circuit: 2NC Monitor Circuit: ⊖ 11 12 41 42 Monitor Circuit: 23 24 Monitor Circuit: 51 52		1m	HS5E-VB7Y401-G
				3m	HS5E-VB7Y403-G
				5m	HS5E-VB7Y405-G
	VC	Door Monitor Circuit: 2NC, Lock Monitor Circuit: 1NC, 1NO Monitor Circuit: ⊖ 11 12 41 42 Monitor Circuit: ⊖ 21 22 Monitor Circuit: 53 54		1m	HS5E-VC7Y401-G
				3m	HS5E-VC7Y403-G
				5m	HS5E-VC7Y405-G
	VD	Door Monitor Circuit: 2NC, Lock Monitor Circuit: 2NC Monitor Circuit: ⊖ 11 12 41 42 Monitor Circuit: ⊖ 21 22 Monitor Circuit: 51 52		1m	HS5E-VD7Y401-G
				3m	HS5E-VD7Y403-G
				5m	HS5E-VD7Y405-G

- The contact configuration shows the status when the actuator is inserted and the switch is locked.
- Actuators are not supplied with the interlock switch and must be ordered separately.

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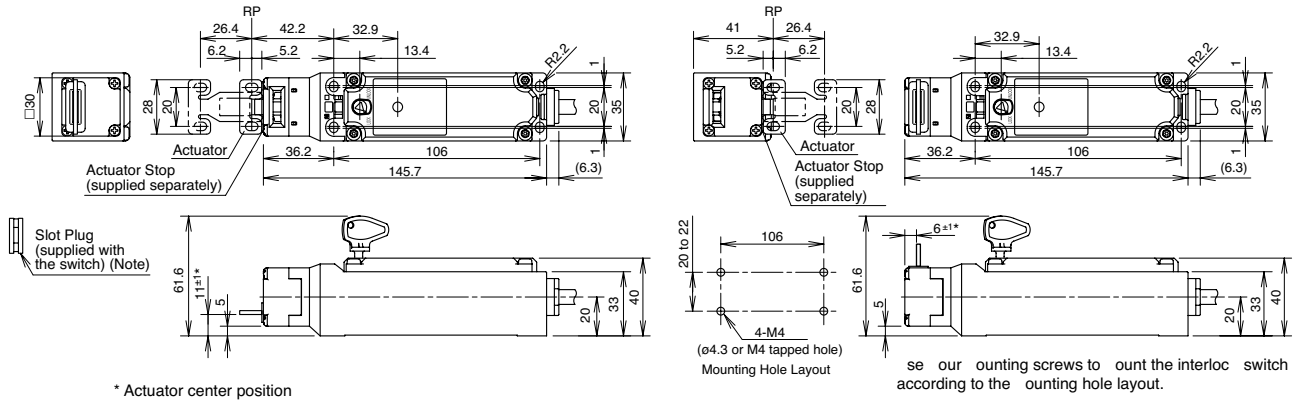
HS5E Miniature Interlock Switches with Solenoid

Dimensions

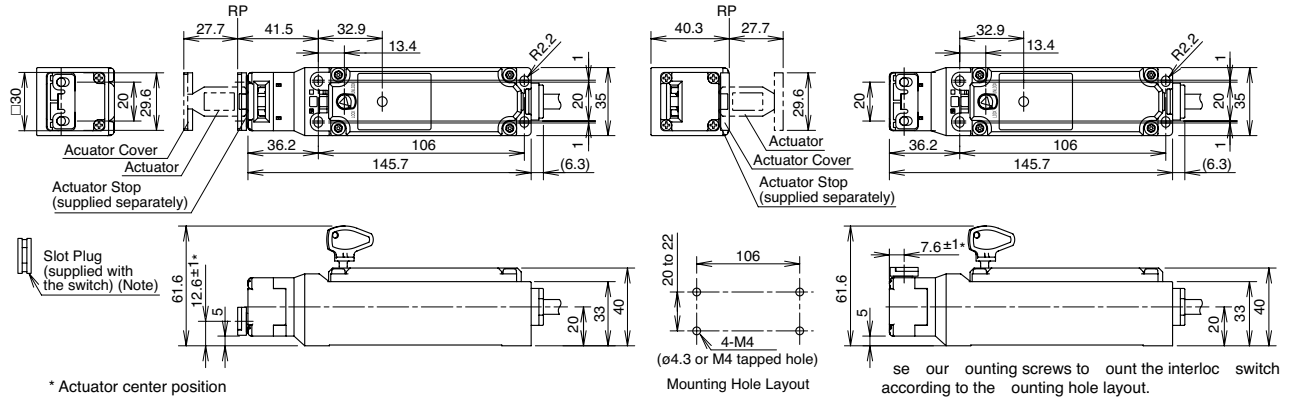
HS5E-□□4□-G (with indicator)

Horizontal Mounting/Straight Actuator (HS9Z-A51)



se our ounting screws to ount the interloc switch according to the ounting hole layout.

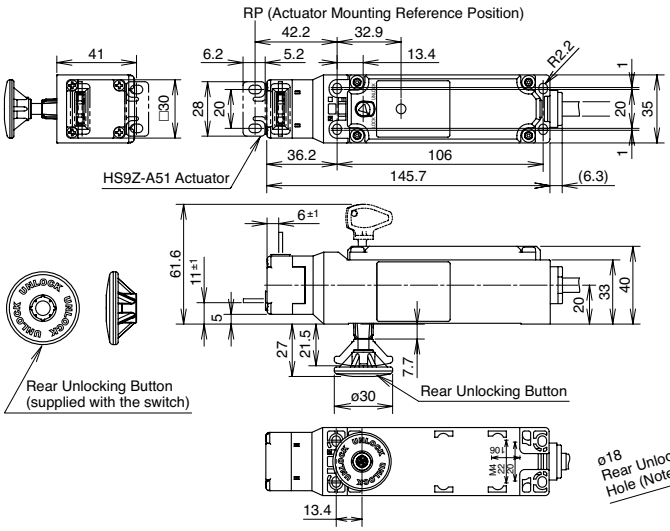
Vertical Mounting/Right-angle Actuator (HS9Z-A52)



se our ounting screws to ount the interloc switch according to the ounting hole layout.

All dimensions in mm.

HS5E-□44L□-G (rear unlocking button)
Horizontal Mounting/Straight Actuator (HS9Z-A51)

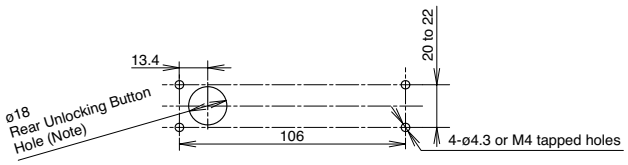


X ≤ 6	Panel mounting
6 < X < 23	Not mountable
23 ≤ X ≤ 53	Use HS9Z-FL5∗ rear unlocking button kit

X = Panel thickness
(including panel, mounting frame, and mounting plate)

Note: See page 39 for details.

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

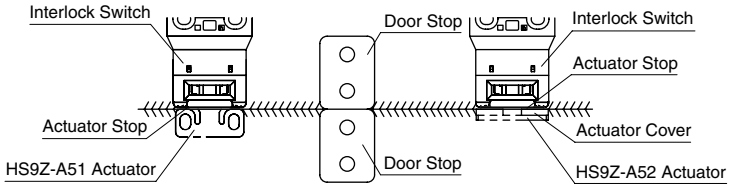


Note: With the mounting hole dimension, the rear unlocking button rod does not touch the hole even when the interlock switch moves sideways.

Actuator Mounting Reference Position

As shown in the figure on the right, the mounting reference position of the actuator when inserted in the interlock switch is where the actuator stop placed on the actuator lightly touches the interlock switch.

Note: After mounting the actuator, remove the actuator stop from the actuator.



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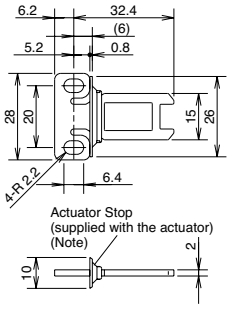
Actuators

Description	Actuator Retention Force	Part No.
Straight	1400N minimum	HS9Z-A51
Straight w/rubber bushings		HS9Z-A51A
Right-angle		HS9Z-A52
Right-angle w/rubber bushings		HS9Z-A52A
Angle Adjustable (vertical)		HS9Z-A53
Angle Adjustable (vertical/horizontal) (Note 1)	500N minimum	HS9Z-A55
Sliding Actuator (Note 2)	1000N minimum	HS9Z-SH5

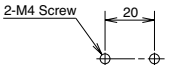
Note 1: When retention force of more than 500N is required, use HS9Z-A53.
Note 2: For details, see page 76.

Dimensions and Mounting Hole Layouts

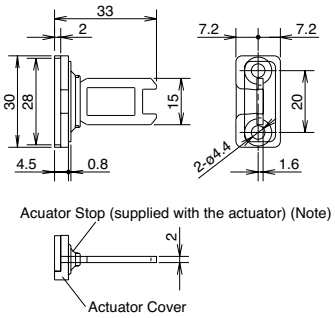
Straight Actuator (HS9Z-A51)



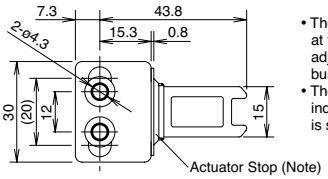
Actuator Mounting Hole Layout
(Straight, L-shaped)



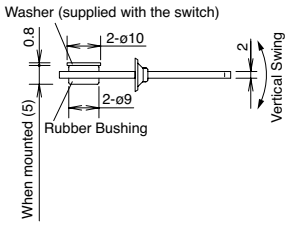
Right-angle Actuator (HS9Z-A52)



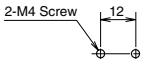
Straight Actuator w/Rubber Bushings (HS9Z-A51A)



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

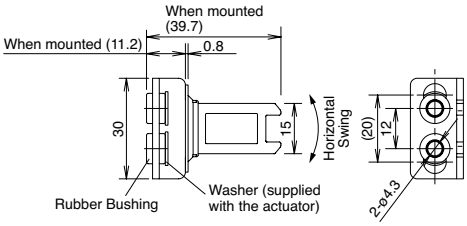


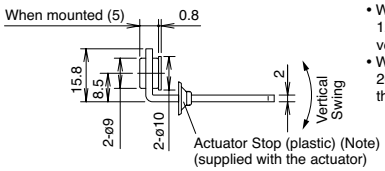
Actuator Mounting Hole Layout
Straight (with rubber bushings)
Right-angle (with rubber bushings)



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

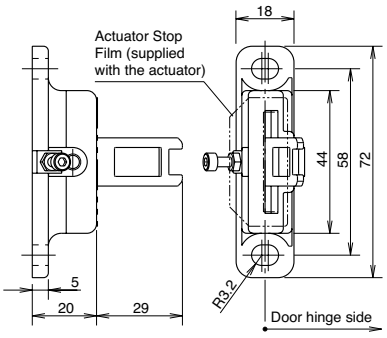
Right-angle Actuator w/Rubber Bushings (HS9Z-A52A)

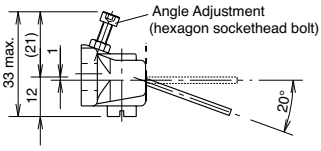




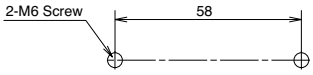
- When the mounting center distance is set to 12 mm, the actuator has flexibility both vertically and horizontally.
- When the mounting center distance is set to 20 mm, the actuator swings vertically. Adjust the distance by moving the rubber bushings.

Angle Adjustable (vertical) (HS9Z-A53)



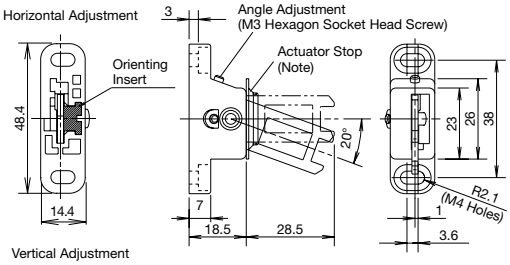


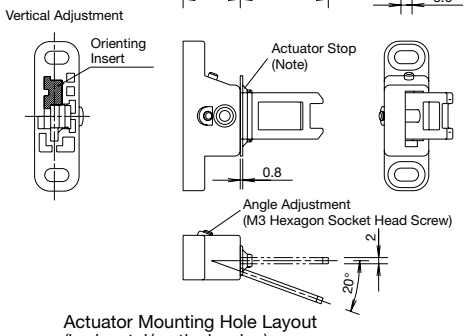
Actuator Mounting Hole Layout
(vertical swing)



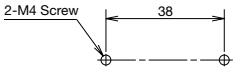
Note: The actuator stop is supplied with the actuator and used when adjusting the actuator position. Remove after the actuator position is determined.

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





Actuator Mounting Hole Layout
(horizontal/vertical swing)



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 orientating insert, otherwise the actuator will not swing properly.

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HS5E Miniature Interlock Switches with Solenoid

Accessories

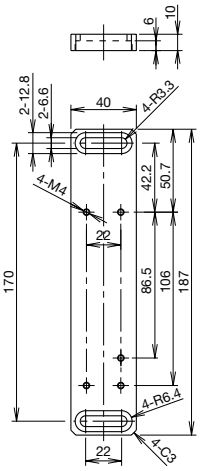
Description		Part No.	Remarks
Sliding Actuator		HS9Z-SH5	See page 76 for details.
Door Handle Actuator (See page 68)	Handle unit for right-hand door	HS9Z-DH5RH	Choose according to the required opening side.
	Handle unit for left-hand door	HS9Z-DH5LH	
	Switch cover unit	HS9Z-DH5C	Used for installing the interlock switch inside.
Plug Actuator		HS9Z-A5P	
Padlock Hasp		HS9Z-PH5	
Mounting Plate (Note 1)		HS9Z-SP51	When using the HS5E-□44L□-G, provide a mounting hole for the unlocking button as shown below in the mounting plate mounting hole layout.
Rear Unlocking Button Kit (Note 2)		HS9Z-FL53	Used when the total thickness of mounting frame, panel, and mounting plate ∗ is: 23 < X ≤ 33 (20 < X ≤ 30 when switch cover unit HS9Z-DH5C is used)
		HS9Z-FL54	Used when the total thickness of mounting frame, panel, and mounting plate ∗ is: 33 < X ≤ 43 (30 < X ≤ 40 when switch cover unit HS9Z-DH5C is used)
		HS9Z-FL55	Used when the total thickness of mounting frame, panel, and mounting plate ∗ is: 43 < X ≤ 53 (40 < X ≤ 50 when switch cover unit HS9Z-DH5C is used)

Note 1: When mounting HS5E-KVA0L (rear unlocking button) using a mounting plate, provide mounting holes on the mounting plate as shown below and use Rear Unlocking Button Kit (HS9Z-FL5□).

Note 2: See the table at right for choosing rear unlocking button kit.

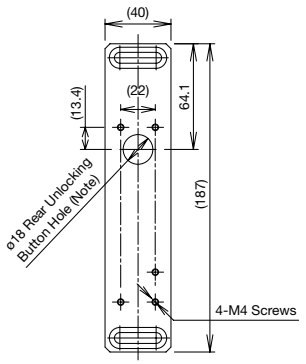
Dimensions

Mounting Plate (HS9Z-SP51)



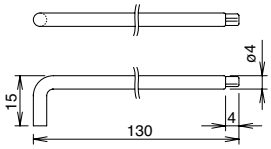
Material: Anodized aluminum A6063
Weight: Approx. 180g

Drilling Rear Unlocking Button Hole

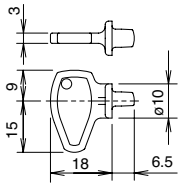


When installing the HS5E-□44L□-G (rear unlocking button), provide a rear unlocking button hole on the HS9Z-SP51.

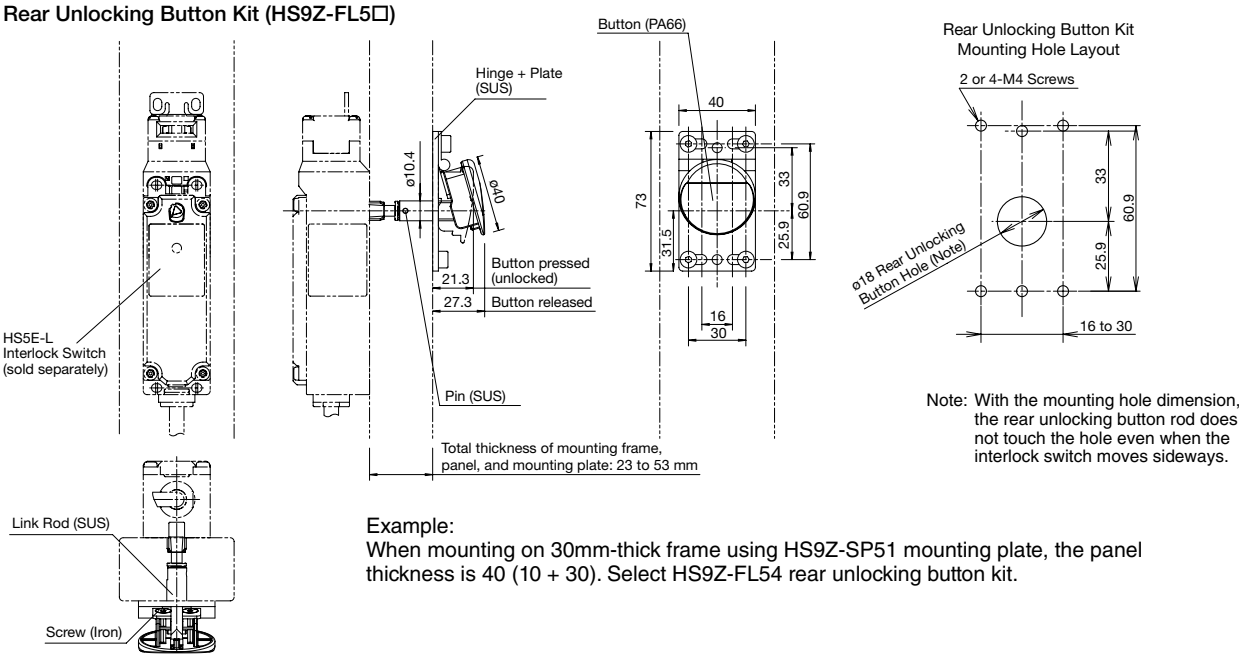
Manual Unlocking Key (metal) (HS9Z-T3)



Manual Unlocking Key (plastic)



Rear Unlocking Button Kit (HS9Z-FL5□)



Note: With the mounting hole dimension, the rear unlocking button rod does not touch the hole even when the interlock switch moves sideways.

Example:
When mounting on 30mm-thick frame using HS9Z-SP51 mounting plate, the panel thickness is 40 (10 + 30). Select HS9Z-FL54 rear unlocking button kit.

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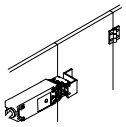
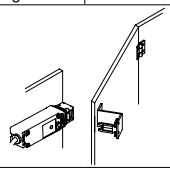
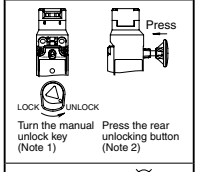
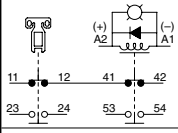
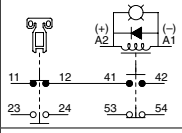
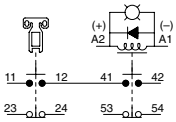
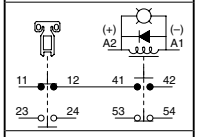
Circuit Diagrams and Operating Characteristics

Standard and Rear Unlocking - Spring Lock

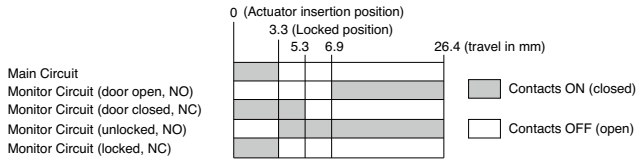
		Status 1	Status 2	Status 3	Status 4	Manual Unlock
Interlock Switch Status		• Door Closed • Machine ready to operate • Solenoid de-energized	• Door Closed • Machine cannot be operated • Solenoid energized	• Door Open • Machine cannot be operated • Solenoid energized	• Door Open • Machine cannot be operated • Solenoid de-energized	• Door Closed • Machine cannot be operated • Solenoid de-energized
Door Status						
Circuit Diagram (HS5E-A4)						
Door		Closed (locked)	Closed (unlocked)	Open	Open	Closed (unlocked)
Contact Configuration	HS5E-A4 Main Circuit 11–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-A4 Monitor Circuit (door open) 23-24	OFF (open)	OFF (open)	ON (closed)	ON (closed)	OFF (open)
	HS5E-A4 Monitor Circuit (unlocked) 53–54	OFF (open)	ON (closed)	ON (closed)	ON (closed)	ON (closed)
	HS5E-B4 Main Circuit 11–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-B4 Monitor Circuit (door open) 23–24	OFF (open)	OFF (open)	ON (closed)	ON (closed)	OFF (open)
	HS5E-B4 Monitor Circuit (locked) 51–52	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-C4 Main Circuit 11–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-C4 Monitor Circuit (door closed) 21–22	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
	HS5E-C4 Monitor Circuit (unlocked) 53–54	OFF (open)	ON (closed)	ON (closed)	ON (closed)	ON (closed)
	HS5E-D4 Main Circuit 11–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-D4 Monitor Circuit (door closed) 21–22	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
	HS5E-D4 Monitor Circuit (locked) 51–52	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-F4 Main Circuit 11–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-F4 Monitor Circuit (door closed) 21–22	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
	HS5E-F4 Monitor Circuit (door closed) 31–32	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
	HS5E-G4 Main Circuit 11–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-G4 Monitor Circuit (door closed) 21–22	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
	HS5E-G4 Monitor Circuit (door open) 33–34	OFF (open)	OFF (open)	ON (closed)	ON (closed)	OFF (open)
	HS5E-H4 Main Circuit 11–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-H4 Monitor Circuit (locked) 51–52	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-H4 Monitor Circuit (locked) 61–62	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-J4 Main Circuit 11–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-J4 Monitor Circuit (locked) 51–52	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-J4 Monitor Circuit (unlocked) 63–64	OFF (open)	ON (closed)	ON (closed)	ON (closed)	ON (closed)
Solenoid Power A1-A2 (all model)		OFF (de-energized)	ON (energized)	ON (energized)	OFF (de-energized)	OFF (de-energized)

- The above contact configuration shows the status when the actuator is inserted and locked.
- Main Circuit: Connected to the control circuit of machine drive part, sending interlock signals of the protective door.
- Monitor Circuit: Sends monitoring signals of protective door open/closed status or protective door lock/unlock status.

Note 1: Actuator can be unlocked manually for confirming the door movement before wiring and energizing, and also for emergency situation such as power failure.

Note 2: When the operator is confined in a hazardous zone, the actuator can be unlocked manually by pressing the rear unlocking button.

Operation Chracteristics (reference)



- The operation characteristics shown in the chart above are of the HS9Z-A51. For other actuators, add 1.3 mm.
- The operation characteristics show the contact status when the actuator enters the entry slot of an interlock switch.

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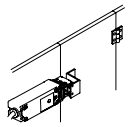
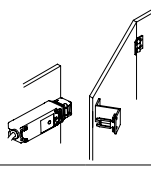
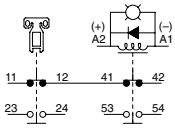
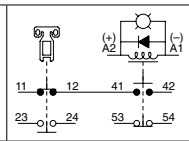
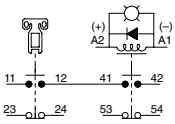
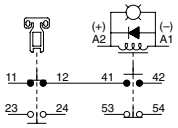
HS5E Miniature Interlock Switches with Solenoid

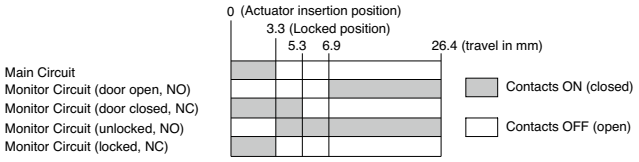
Standard - Solenoid Lock

		Status 1	Status 2	Status 3	Status 4	Unlocked with Manual Unlocking Key
Interlock Switch Status		• Door Closed • Machine ready to operate • Solenoid energized	• Door Closed • Machine cannot be operated • Solenoid de-energized	• Door Open • Machine cannot be operated • Solenoid de-energized	• Door Open • Machine cannot be operated • Solenoid energized	• Door Closed • Machine cannot be operated • Solenoid de-energized → energized
Door Status						
Circuit Diagram (HS5E-A7Y)						
Door		Closed (locked)	Closed (unlocked)	Open	Open	Closed (unlocked)
Contact Configuration	HS5E-A7Y (Door Monitor (Actuator inserted) / Lock Monitor (Solenoid ON)) Main Circuit: 11–12, 41–42; Monitor Circuit: 23–24; Monitor Circuit: 53–54					
	Main Circuit 11–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	Monitor Circuit (door open) 23–24	OFF (open)	OFF (open)	ON (closed)	ON (closed)	OFF (open)
	Monitor Circuit (unlocked) 53–54	OFF (open)	ON (closed)	ON (closed)	ON (closed)	ON (closed)
	HS5E-B7Y Main Circuit: 11–12, 41–42; Monitor Circuit: 23–24; Monitor Circuit: 51–52					
	Main Circuit 11–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	Monitor Circuit (door open) 23–24	OFF (open)	OFF (open)	ON (closed)	ON (closed)	OFF (open)
	Monitor Circuit (locked) 51–52	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-C7Y Main Circuit: 11–12, 41–42; Monitor Circuit: 21–22; Monitor Circuit: 53–54					
	Main Circuit 11–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	Monitor Circuit (door closed) 21–22	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
	Monitor Circuit (unlocked) 53–54	OFF (open)	ON (closed)	ON (closed)	ON (closed)	ON (closed)
	HS5E-D7Y Main Circuit: 11–12, 41–42; Monitor Circuit: 21–22; Monitor Circuit: 51–52					
	Main Circuit 11–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	Monitor Circuit (door closed) 21–22	ON (closed)	ON (closed)	OFF (open)	OFF (open).	ON (closed)
	Monitor Circuit (locked) 51–52	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-F7Y Main Circuit: 11–12, 41–42; Monitor Circuit: 21–22; Monitor Circuit: 31–32					
	Main Circuit 11–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	Monitor Circuit (door closed) 21–22	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
	Monitor Circuit (door closed) 31–32	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
	HS5E-G7Y Main Circuit: 11–12, 41–42; Monitor Circuit: 21–22; Monitor Circuit: 33–34					
	Main Circuit 11–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	Monitor Circuit (door closed) 21–22	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
	Monitor Circuit (door open) 33–34	OFF (open)	OFF (open)	ON (closed)	ON (closed)	OFF (open)
	HS5E-H7Y Main Circuit: 11–12, 41–42; Monitor Circuit: 51–52; Monitor Circuit: 61–62					
	Main Circuit 11–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	Monitor Circuit (locked) 51–52	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	Monitor Circuit (locked) 61–62	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-J7Y Main Circuit: 11–12, 41–42; Monitor Circuit: 51–52; Monitor Circuit: 63–64					
	Main Circuit 11–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	Monitor Circuit (locked) 51–52	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	Monitor Circuit (unlocked) 63–64	OFF (open)	ON (closed)	ON (closed)	ON (closed)	ON (closed)
Solenoid Power A1-A2 (all model)		ON (energized)	OFF (de-energized)	OFF (de-energized)	ON (energized) (Note 2)	OFF to ON (Note 1) (Note 2)

- The above contact configuration shows the status when the actuator is inserted and locked.
- Main Circuit: Connected to the control circuit of machine drive part, sending interlock signals of the protective door.
- Monitor Circuit: Sends monitoring signals of protective door open/closed status or protective door lock/unlock status.

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 shown in the chart above are of the HS9Z-A51. For other actuators, add 1.3 mm.
- The operation characteristics show the contact status when the actuator enters the entry slot of an interlock switch.

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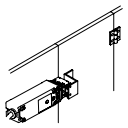
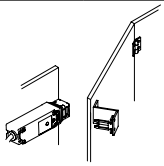
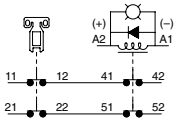
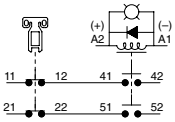
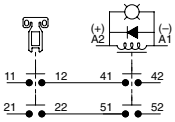
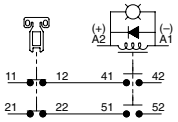
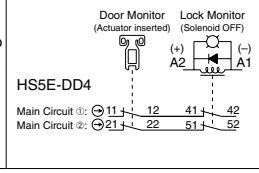
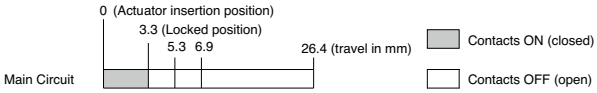
Dual Safety Circuit

		Status 1	Status 2	Status 3	Status 4	Unlocked with Manual Unlocking Key
Interlock Switch Status		• Door Closed • Machine ready to operate • Solenoid de-energized	• Door Closed • Machine cannot be operated • Solenoid energized	• Door Open • Machine cannot be operated • Solenoid energized	• Door Open • Machine cannot be operated • Solenoid de-energized	• Door Closed • Machine cannot be operated • Solenoid de-energized
Door Status						
Circuit Diagram (HS5E-DD4)						
Door		Closed (locked)	Closed (unlocked)	Open	Open	Closed (unlocked)
Contact Configuration	 Main Circuit ① 11–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	Main Circuit ② 21–52	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
Solenoid Power A1-A2 (all model)		OFF (de-energized)	ON (energized)	ON (energized)	OFF (de-energized)	OFF (de-energized)

- The above contact configuration shows the status when the actuator is inserted and locked.
- Main Circuit: Connected to the control circuit of machine drive part, sending interlock signals of the protective door.

Note: Actuator can be unlocked manually for confirming the door movement before wiring and energizing, and also for emergency situation such as power failure.

Operation Chracteristics (reference)



- The operation characteristics shown in the chart above are of the HS9Z-A51. For other actuators, add 1.3 mm.
- The operation characteristics show the contact status when the actuator enters the entry slot of an interlock switch.

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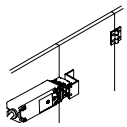
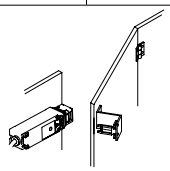
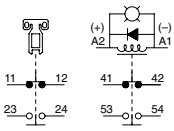
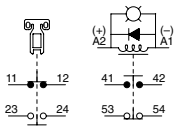
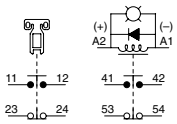
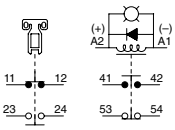
HS5E Miniature Interlock Switches with Solenoid

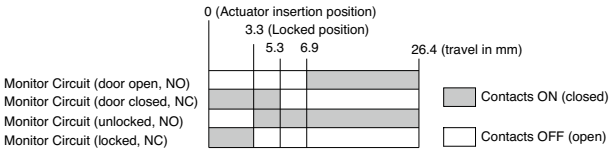
Four-circuit Independent Output - Spring Lock

		Status 1	Status 2	Status 3	Status 4	Unlocked with Manual Unlocking Key
Interlock Switch Status		• Door Closed • Machine ready to operate • Solenoid de-energized	• Door Closed • Machine cannot be operated • Solenoid energized	• Door Open • Machine cannot be operated • Solenoid energized	• Door Open • Machine cannot be operated • Solenoid de-energized	• Door Closed • Machine cannot be operated • Solenoid de-energized
Door Status						
Circuit Diagram (HS5E-VA4)						
Door		Closed (locked)	Closed (unlocked)	Open	Open	Closed (unlocked)
Contact Configuration	HS5E-VA4 (Door Monitor (Actuator Inserted), Lock Monitor (Solenoid OFF))					
	Monitor Circuit (door closed) 11–12	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
	Monitor Circuit (door open) 23–24	OFF (open)	OFF (open)	ON (closed)	ON (closed)	OFF (open)
	Monitor Circuit (locked) 41–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	Monitor Circuit (unlocked) 53–54	OFF (open)	ON (closed)	ON (closed)	ON (closed)	ON (closed)
	HS5E-VB4					
	Monitor Circuit (door closed) 11–12	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
	Monitor Circuit (door open) 23–24	OFF (open)	OFF (open)	ON (closed)	ON (closed)	OFF (open)
	Monitor Circuit (locked) 41–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	Monitor Circuit (locked) 51–52	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-VC4					
	Monitor Circuit (door closed) 11–12	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
	Monitor Circuit (door closed) 21–22	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
	Monitor Circuit (locked) 41–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	Monitor Circuit (unlocked) 53–54	OFF (open)	ON (closed)	ON (closed)	ON (closed)	ON (closed)
	HS5E-VD4					
	Monitor Circuit (door closed) 11–12	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
	Monitor Circuit (door closed) 21–22	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
	Monitor Circuit (locked) 41–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	Monitor Circuit (locked) 51–52	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
Solenoid Power A1-A2 (all model)		OFF (de-energized)	ON (energized)	ON (energized)	OFF (de-energized)	OFF (de-energized)

- The above contact configuration shows the status when the actuator is inserted and locked.
- Monitor Circuit: Sends monitoring signals of protective door open/closed status or protective door lock/unlock status.

Note: Actuator can be unlocked manually for confirming the door movement before wiring and energizing, and also for emergency situation such as power failure.

Operation Chracteristics (reference)



- The operation characteristics shown in the chart above are of the HS9Z-A51. For other actuators, add 1.3 mm.
- The operation characteristics show the contact status when the actuator enters the entry slot of an interlock switch.

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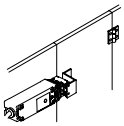
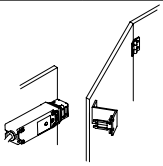
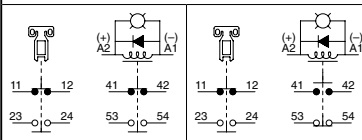
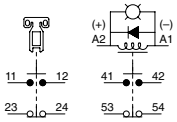
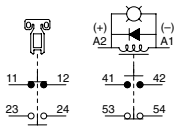
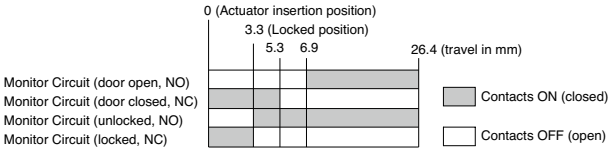
Four-circuit Independent Output - Solenoid Lock

		Status 1	Status 2	Status 3	Status 4	Unlocked with Manual Unlocking Key
Interlock Switch Status		• Door Closed • Machine ready to operate • Solenoid energized	• Door Closed • Machine cannot be operated • Solenoid de-energized	• Door Open • Machine cannot be operated • Solenoid de-energized	• Door Open • Machine cannot be operated • Solenoid energized	• Door Closed • Machine cannot be operated • Solenoid de-energized → energized
Door Status						
Circuit Diagram (HS5E-VA7Y)						
Door		Closed (locked)	Closed (unlocked)	Open	Open	Closed (unlocked)
Contact Configuration	HS5E-VA7Y Monitor Circuit: 11–12 Monitor Circuit: 23–24 Monitor Circuit: 41–42 Monitor Circuit: 53–54	Monitor Circuit (door closed) 11–12	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
		Monitor Circuit (door open) 23–24	OFF (open)	OFF (open)	ON (closed)	ON (closed)	OFF (open)
		Monitor Circuit (locked) 41–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
		Monitor Circuit (unlocked) 53–54	OFF (open)	ON (closed)	ON (closed)	ON (closed)	ON (closed)
	HS5E-VB7Y Monitor Circuit: 11–12 Monitor Circuit: 23–24 Monitor Circuit: 41–42 Monitor Circuit: 51–52	Monitor Circuit (door closed) 11–12	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
		Monitor Circuit (door open) 23–24	OFF (open)	OFF (open)	ON (closed)	ON (closed)	OFF (open)
		Monitor Circuit (locked) 41–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
		Monitor Circuit (locked) 51–52	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
	HS5E-VC7Y Monitor Circuit: 11–12 Monitor Circuit: 21–22 Monitor Circuit: 41–42 Monitor Circuit: 53–54	Monitor Circuit (door closed) 11–12	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
		Monitor Circuit (door closed) 21–22	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
		Monitor Circuit (locked) 41–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
		Monitor Circuit (unlocked) 53–54	OFF (open)	ON (closed)	ON (closed)	ON (closed)	ON (closed)
	HS5E-VD7Y Monitor Circuit: 11–12 Monitor Circuit: 21–22 Monitor Circuit: 41–42 Monitor Circuit: 51–52	Monitor Circuit (door closed) 11–12	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
		Monitor Circuit (door closed) 21–22	ON (closed)	ON (closed)	OFF (open)	OFF (open)	ON (closed)
		Monitor Circuit (locked) 41–42	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
		Monitor Circuit (locked) 51–52	ON (closed)	OFF (open)	OFF (open)	OFF (open)	OFF (open)
Solenoid Power A1-A2 (all model)		ON (energized)	OFF (de-energized)	OFF (de-energized)	ON (energized) (Note 2)	OFF (de-energized) to ON (energized) (Note 1) (Note 2)

- The above contact configuration shows the status when the actuator is inserted and locked.
- Monitor Circuit: Sends monitoring signals of protective door open/closed status or protective door lock/unlock status.

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 Chracteristics (reference)



- The operation characteristics shown in the chart above are of the HS9Z-A51. For other actuators, add 1.3 mm.
- The operation characteristics show the contact status when the actuator enters the entry slot of an interlock switch.

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HS5E Miniature Interlock Switches with Solenoid

⚠ Safety Precautions

- In order to avoid electric shock or fire, turn power off before installation, removal, wire connection, maintenance, or inspection of the interlock switch.
- If relays are used in the circuit between the interlock 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 interlock switch. Perform a 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 interlock switch and the load. Safety security can be endangered in the event of a malfunction of the PLC.
- Do not disassemble or modify the interlock switch, otherwise a breakdown or an accident may occur.
- Do not install the actuator in a location where the human body may come in contact. Otherwise injury may occur.
- Solenoid lock is locked when energized, and unlocked when de-energized. When energization is interrupted due to wire disconnection or other failures, the interlock switch may be unlocked causing possible danger to the operators. Solenoid lock must not be used in applications where locking is strictly required for safety. Perform a risk assessment and determine whether solenoid lock 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.
- When using the four-circuit independent output type as an input to safety circuit, connect the door monitor circuits (11-12, 21-22, 31-32) ⊖ and lock monitor circuits (41-42, 51-52, 61-62) in series.

Instructions

- Regardless of door types, do not use the interlock switch as a door stop. Install a mechanical door stop at the end of the door to protect the interlock switch against excessive force.
- Do not apply excessive shock to the interlock switch when opening or closing the door. A shock to the interlock switch exceeding 1,000 m/s^2 may cause damage to the interlock switch.
- Prevent foreign objects such as dust and liquids from entering the interlock 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 interlock switch through the actuator entry slots.
- Entry of foreign objects into the interlock switch may affect the mechanism of the interlock switch and cause a breakdown.
- Plug the unused actuator entry slot using the slot plug supplied with the interlock switch.
- Do not store the interlock switches in a dusty, humid, or organic-gas atmosphere.
- Use proprietary actuators only. When other actuators are used, the interlock switch may be damaged.
- Do not modify the actuator, otherwise it will damage the interlock switch.
- Do not open the lid of the interlock switch. Loosening the screws may cause damage to the interlock switch.
- The actuator retention force is 1400N. Do not apply a load higher than the rated value. When a higher load is expected, provide an additional system consisting of another interlock switch without lock (such as the HS5B interlock switch) or a sensor to detect door opening and stop the machine.
- Regardless of door types, do not use the interlock switch as a door lock. Install a separate lock using a latch or other measures.
- While the solenoid is energized, the interlock switch temperature rises approximately 40°C above the ambient temperature (to approximately 90°C while the ambient temperature is 50°C). To prevent burns, do not touch. If cables come into contact with the interlock switch, use heat-resistant cables.
- Solenoid has polarity. Be sure of the correct polarity when wiring, otherwise solenoid will be damaged. Do not apply voltage over the rated voltage, otherwise the solenoid will be burnt.
- Although the HS9Z-A51A and HS9Z-A52A actuators (w/ rubber bushings) alleviate the shock when the actuator enters a slot in the interlock switch, make sure that excessive shock is not applied. If the rubber bushings become deformed or cracked, replace with new ones.

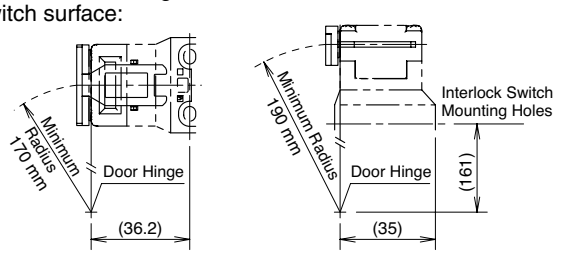
Minimum Radius of Hinged Door

- When using the interlock 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).

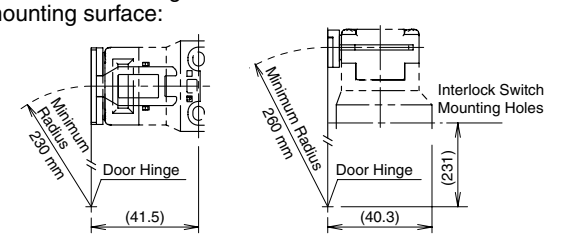
Note: Because deviation or dislocation of hinged door may occur in actual applications, make sure of the correct operation before installation.

HS9Z-A52 Actuator

- When the door hinge is on the extension line of the interlock switch surface:

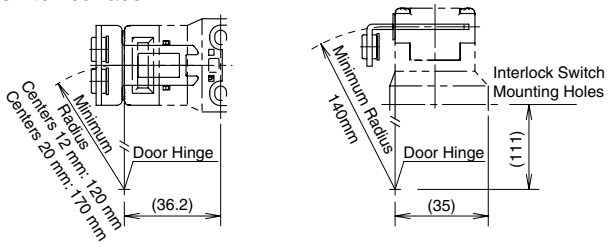


- When the door hinge is on the extension line of the actuator mounting surface:



HS9Z-A52A Actuator (w/rubber bushings)

- When the door hinge is on the extension line of the interlock switch surface:



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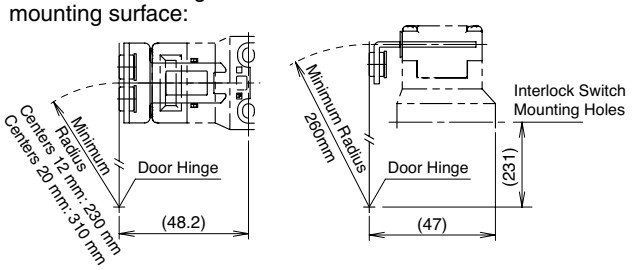
Instructions

- When the door hinge is on the extension line of the actuator mounting surface:

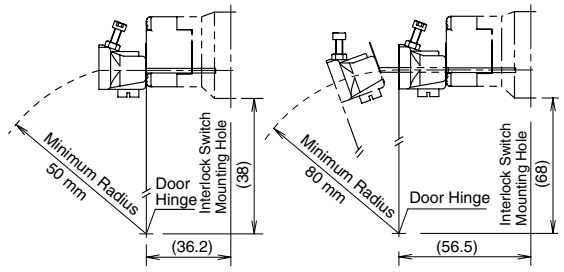


Actuator Angle Adjustment

- Using the angle adjustment screw, the actuator angle can be adjusted (refer to the dimensional drawing on page 45). 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 interlock switch.
- After adjusting the actuator angle, apply Loctite to the adjustment screw so that the screw will not move.

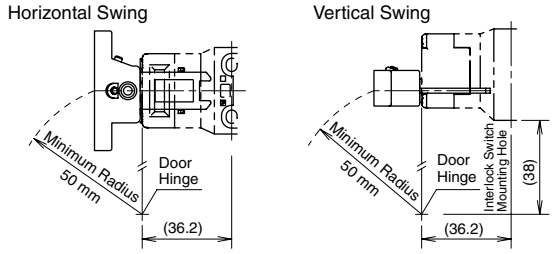
When using the HS9Z-A53 Angle Adjustable (vertical) Actuator

- When the door hinge is on the extension line of the interlock switch surface: 50 mm
- When the door hinge is on the extension line of the actuator mounting surface: 80 mm

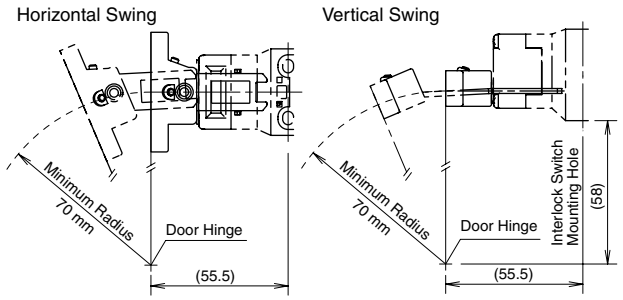


When using the HS9Z-A55 Angle Adjustable (vertical/horizontal) Actuator

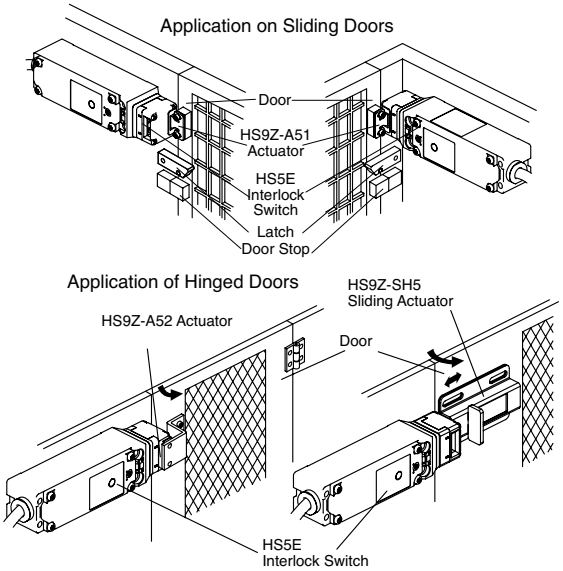
- When the door hinge is on the extension line of the interlock switch surface: 50 mm



- When the door hinge is on the extension line of the actuator mounting surface: 70 mm

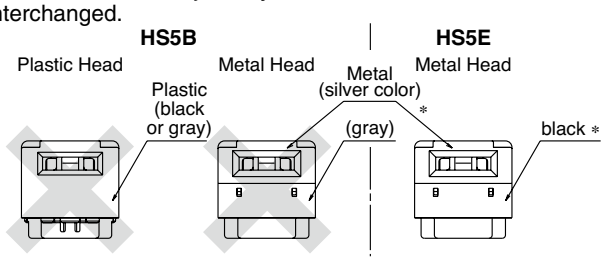


Mounting Examples



Installing the Head

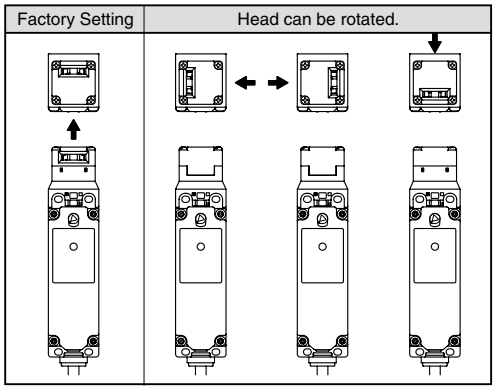
Do not use the plastic and metal head of he HS5B interlock switches on the HS5E. The metal heads of the HS5E and HS5B interlock switches look similar. When using these interlock switches adjacently, ensure that the heads are not interchanged.



The HS5E metal head can be distinguished easily with the black plastic part (HS5E metal head has gray plastic part).

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 interlock switch. Tighten the screws tightly, without leaving space between the head and body, otherwise the interlock switch may malfunction.
Recommended tightening torque: 0.9 to 1.1 N·m.



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HS5E Miniature Interlock Switches with Solenoid

Instructions

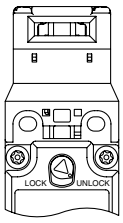
For Manual Unlocking

Spring lock

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

Solenoid lock

The solenoid lock interlock switch normally does not need the manual unlock. However, only when the interlock switch would not release the actuator even though the solenoid is de-energized, the interlock switch can be unlocked manually. Unlock the interlock switch manually only when the solenoid is de-energized. Do not unlock the interlock switch manually when the solenoid is energized.



Normal Position

Manual Unlocking Position

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

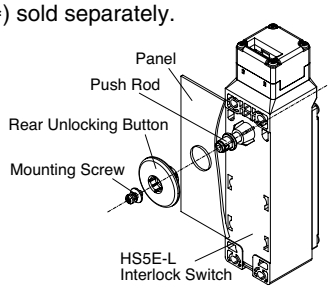
Manual Unlocking Key
(supplied with the switch)

Safety Precautions

Before manually unlocking the interlock switch, make sure that the machine has come to a complete stop. Manual unlocking during operation may unlock the interlock switch before the machine stops, and the function of interlock switch with solenoid is lost.

Installing the Rear Unlocking Button

After installing the interlock switch on the panel, place the rear unlocking button (supplied with the switch) on the push rod on the back of the interlock switch, and fasten the button using the M3 sems screw. Rear unlocking button can be installed alone when the total thickness of mounting frame and panel is 6 mm or less. When the total thickness of mounting frame, panel, and mounting plate is 23 to 53 mm, use the rear unlocking button kit (HS9Z-FL5∗) sold separately.

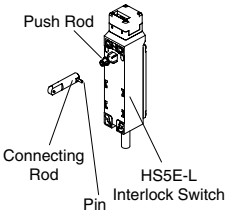


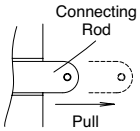
Safety Precautions

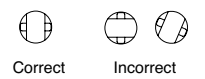
After installing the rear unlocking button, apply Loctite to the screw so that the screw does not become loose. The button is made of glass-reinforced PA66 (66 nylon). The screw is made of iron. Take the compatibility of the plastic material and Loctite into consideration.

Installing the Rear Unlocking Button Kit

1. Install the connecting rod onto the push rod on the HS5E-L rear unlocking button interlock switch.
2. A pin is attached to the connecting rod. Insert the pin into the hole in the push rod, using pliers.
3. Pull the connecting rod from the hole in the mounting frame, and turn the button operating pin to the horizontal position.







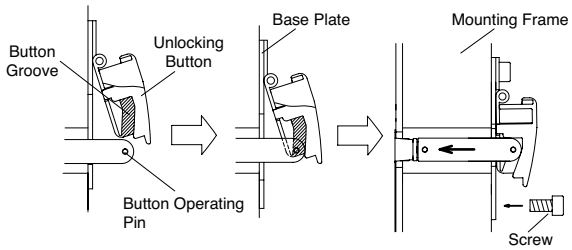
Safety Precautions

Ensure that the connecting rod is pulled out completely and it is horizontal to the interlock switch, otherwise the unlocking button cannot be installed.

Note: Frame must be supplied by the user.

For the mounting hole layout of interlock switches, see page 44. When using the mounting plate HS9Z-SP51, provide a hole for the connecting rod in the plate according to the mounting plate mounting hole layout shown on page 46.

4. Install the unlocking button on the connecting rod by fitting the pin to the grooves on the back of the button, and fasten the base plate on the mounting frame using the screws.



5. After fastening the screws, check if locking and unlocking operations can be performed.

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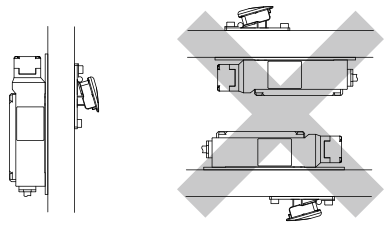
Instructions

Safety Precautions

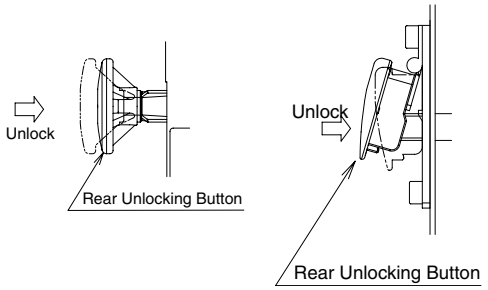
Install the rear unlocking button kit in the correct direction as shown below. Do not install the kit in incorrect directions, otherwise malfunction will be caused.



Do not apply strong force exceeding 100 m/s^2 to the interlock switch while the rear unlocking button is not pressed, otherwise malfunction will be caused.

Manual Unlocking using the Rear Unlocking Button

- The rear unlocking button is used by the operator confined in a hazardous area for emergent escape.



How to operate

- When the rear unlocking button is pressed, the interlock switch is unlocked and the door can be opened.
- To lock the interlock switch, pull back the button.
- When the button remains pressed, the interlock switch cannot be locked even if the door is closed, and the main circuit remains open.

Safety Precautions

- Install the rear unlocking button in the place where only the operator inside the hazardous area can use it. Do not install the button in the place where an operator outside the hazardous area can use it, otherwise the interlock switch can be unlocked during usual machine operation, causing danger.
- Operate the rear unlocking button by hand only. Do not operate using a tool or with excessive force. Do not apply force to the button from the direction other than the proper direction, otherwise the button will be damaged.

Recommended Tightening Torque

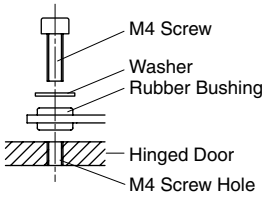
- HS5E interlock switch: 1.8 to 2.2 N·m (four M4 screws) (Note)
- Rear unlocking button: 0.5 to 0.7 N·m
- Rear unlocking button kit: 4.8 to 5.2 N·m (M5 screw)
- Actuators

HS9Z-A51:	1.8 to 2.2 N·m (two M4 screws)
HS9Z-A52:	0.8 to 1.2 N·m (two M4 Phillips screws)
HS9Z-A51A/A52A:	1.0 to 1.5 N·m (two M4 screws)
HS9Z-A53:	4.5 to 5.5 N·m (two M6 screws)
HS9Z-A55:	1.0 to 1.5 N·m (two M4 screws)

Note: The above recommended tightening torque of the mounting screws are the values 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.

- To avoid unauthorized or unintended removal of the interlock switch and the actuator, it is recommended that the interlock 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 washer (supplied with the actuator) on the hinged door, and mount tightly using two M4 screws.

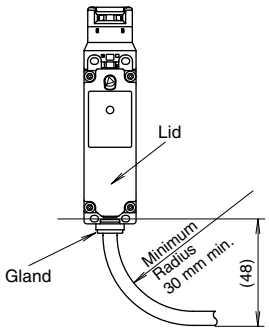
Mounting centers:
12 mm (factory setting), adjustable to 20 mm



Note: Choose mounting centers of either 12 mm or 20 mm.

Cables

- Do not fasten or loosen the gland 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 interlock switch. Otherwise the interlock switch will be damaged.



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HS5E Miniature Interlock Switches with Solenoid

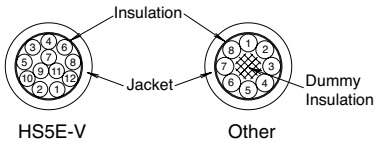
Instructions

Wire Identification

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

- HS5E-V: Wires of gray and gray/white insulation cannot be used.
- HS5E-DD: Wires of brown and brown/white insulation cannot be used.

No.	Insulation	No.	Insulation	No.	Insulation	No.	Insulation
1	White	4	Blue	7	Blue/White	10	Pink/White
2	Black	5	Brown/White	8	Orange/White	11	Gray
3	Brown	6	Orange	9	Pink	12	Gray/White



Terminal Number Identification

- When wiring, the terminal number of each contact can be identified by wire color.
- The following table shows the identification of terminal numbers.

Model	Circuit Diagram
HS5E-A	Door Monitor; Lock Monitor; (+) White A2; (–) A1 Black Main Circuit: Blue 11 — 12 — 41 — 42 Blue/White Monitor Circuit: Orange 23 — 24 Orange/White Monitor Circuit: Brown 53 — 54 Brown/White
HS5E-B	Main Circuit: Blue 11 — 12 — 41 — 42 Blue/White Monitor Circuit: Orange 23 — 24 Orange/White Monitor Circuit: Brown 51 — 52 Brown/White
HS5E-C	Main Circuit: Blue 11 — 12 — 41 — 42 Blue/White Monitor Circuit: Orange 21 — 22 Orange/White Monitor Circuit: Brown 53 — 54 Brown/White
HS5E-D	Main Circuit: Blue 11 — 12 — 41 — 42 Blue/White Monitor Circuit: Orange 21 — 22 Orange/White Monitor Circuit: Brown 51 — 52 Brown/White
HS5E-F	Main Circuit: Blue 11 — 12 — 41 — 42 Blue/White Monitor Circuit: Orange 21 — 22 Orange/White Monitor Circuit: Brown 31 — 32 Brown/White
HS5E-G	Main Circuit: Blue 11 — 12 — 41 — 42 Blue/White Monitor Circuit: Orange 21 — 22 Orange/White Monitor Circuit: Brown 33 — 34 Brown/White
HS5E-H	Main Circuit: Blue 11 — 12 — 41 — 42 Blue/White Monitor Circuit: Brown 51 — 52 Brown/White Monitor Circuit: Orange 61 — 62 Orange/White
HS5E-J	Main Circuit: Blue 11 — 12 — 41 — 42 Blue/White Monitor Circuit: Brown 51 — 52 Brown/White Monitor Circuit: Orange 63 — 64 Orange/White
HS5E-DD	Main Circuit ①: Blue 11 — 12 — 41 — 42 Blue/White Main Circuit ②: Orange 21 — 22 — 51 — 52 Orange/White

- When wiring, cut unnecessary wires such as the dummy insulation (white) and any unused wires.

Model	Circuit Diagram
HS5E-VA	Door Monitor; Lock Monitor; (+) White A2; (–) A1 Black Monitor Circuit: Blue 11 — 12 Blue/White Pink 41 — 42 Pink/White Monitor Circuit: Orange 23 — 24 Orange/White Monitor Circuit: Brown 53 — 54 Brown/White
HS5E-VB	Monitor Circuit: Blue 11 — 12 Blue/White Pink 41 — 42 Pink/White Monitor Circuit: Orange 23 — 24 Orange/White Monitor Circuit: Brown 51 — 52 Brown/White
HS5E-VC	Monitor Circuit: Blue 11 — 12 Blue/White Pink 41 — 42 Pink/White Monitor Circuit: Orange 21 — 22 Orange/White Monitor Circuit: Brown 53 — 54 Brown/White
HS5E-VD	Monitor Circuit: Blue 11 — 12 Blue/White Pink 41 — 42 Pink/White Monitor Circuit: Orange 21 — 22 Orange/White Monitor Circuit: Brown 51 — 52 Brown/White

- The above contact configuration shows the status when the actuator is inserted and locked.

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