

HS1E Interlock Switches with Solenoid

Lightweight interlock switch in plastic housing, providing high locking strength

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

Actuator Retention Force 3000N*

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

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.

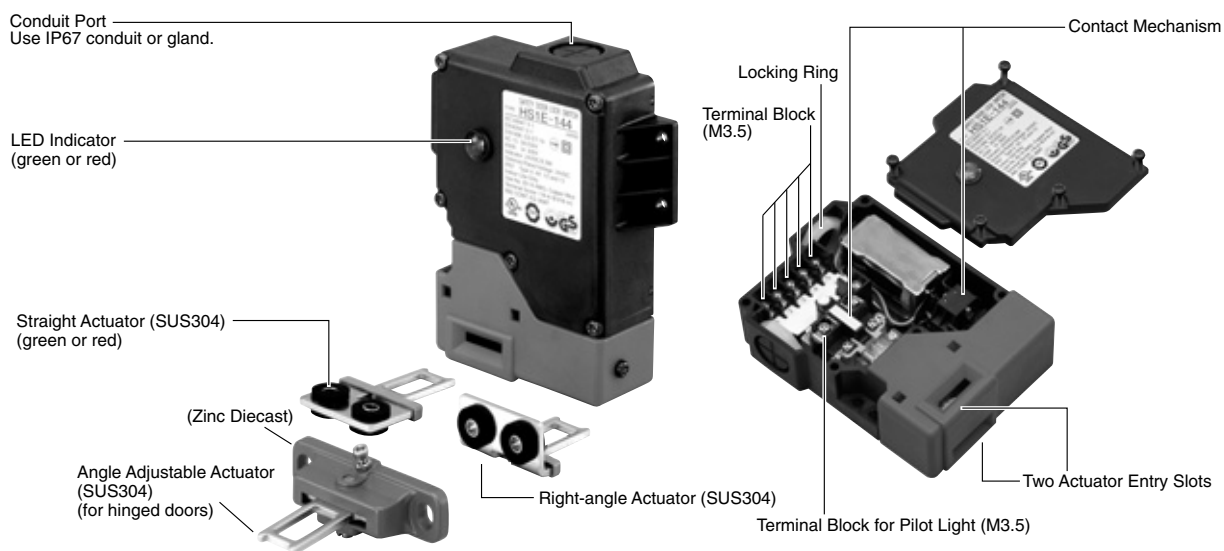
Solenoid Lock

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

* Retention force for horizontal direction (parallel to the mounting panel)



Parts and Functions



HS1E Interlock Swithes with Solenoid

Ratings

Contact Ratings

Rated Insulation Voltage (Ui)				300V (between LED or solenoid and ground: 60V)		
Rated Thermal Current (Ith)				Main circuit: 10A Auxiliary circuit: 3A		
Rated Voltage (Ue)				30V	125V	250V
Rated Current (Ie) (Note)	Main Circuit	AC	Resistive load (AC-12)	10A	10A	6A
			Inductive Load (AC-15)	10A	5A	3A
		DC	Resistive load (DC-12)	6A	—	—
			Inductive Load (DC-13)	3A	0.9A	—
	Monitor Circuit	AC	Resistive load (AC-12)	—	3A	3A
			Inductive Load (AC-15)	—	—	3A
		DC	Resistive load (DC-12)	3A	—	—
			Inductive Load (DC-13)	—	0.9A	—

- Minimum applicable load (reference value): 3V AC/DC, 5 mA (Applicable range is subject to operating conditions and load)
- Note: Ratings approved by safety agencies: A300: AC-15 3A/250V

Solenoid

Locking Mechanism	Spring Lock	Solenoid Lock
Rated Voltage	24V DC (100% duty cycle)	
Rated Current	292 mA	
Coil Resistance	82Ω (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 Duration	Continuous	
Insulation Class	Class F	

Indicator

Rated Voltage	24V DC
Rated Current	10 mA
Light Source	LED
Light Color	G (green), R (red)

- The lens cannot be replaced.

Part No. Development

HS1E-144KMSRP-R				
Contact Configuration			Indicator Color	
Main Circuit			G: green	
Monitor Circuit			R: red	
Blank: 1NC+1NC	1NO/1NO		Conduit Port	
1: 1NC+1NC	1NO		Blank: G1/2	
2: 1NC+1NC	1NC/1NC		P: PG13.5	
3: 1NC+1NC	1NC		Housing Color	
Solenoid Voltage/Lock Mechanism			R: red/black	
4: 24V DC/Spring Lock			Actuator Retention Force	
7Y: 24V DC/Solenoid Lock			MS: 3000N*	
Indicator Rated Voltage			Manual Unlock Key	
4: 24V DC			Blank: Without key	
0: Without indicator			K: With key	

* Retention force for horizontal direction (parallel to the mounting panel)

Actuator / Key Wrench for TORX Screws

Name	Specification	Part No.	Ordering No.	Package Quantity
Straight Actuator	—	HS9Z-A1	HS9Z-A1	1
Right-angle Actuator		HS9Z-A2	HS9Z-A2	
Angle Adjustable Actuator (for hinged door)		HS9Z-A3	HS9Z-A3	
Straight Actuator		HS9Z-A1S	HS9Z-A1S	
Right-angle actuator		HS9Z-A2S	HS9Z-A2S	
Angle Adjustable Actuator (for hinged door)		HS9Z-A3S	HS9Z-A3S	
Key Wrench for TORX Screws		HS9Z-T1	HS9Z-T1	
Conduit Port Plug		HS9Z-P1	HS9Z-P1	
Locking Ring for Gland	M20 thread	HW9Z-NM20	HW9Z-NM20PN05	5















Specifications

Applicable Standards	UL508 (UL listed) ISO 14119 IEC 60947-5-1 GS-ET-19 (BG approval) GB14048.5 (CCC approval) IEC 60204-1/EN 60204-1 (applicable standards for use)	CSA C22.2, No. 14 (c-UL listed) EN 1088 (TUV approval) EN 60947-5-1 (TUV approval)
Operating Temperature	-20 to 40°C (no freezing)	
Relative Humidity	45 to 85% (no condensation)	
Storage Temperature	-40 to +80°C (no freezing)	
Pollution Degree	3	
Impulse Withstand Voltage	4 kV (between LED, solenoid and grounding: 2.5 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 (IEC 61140)	
Degree of Protection	IP67 (IEC 60529)	
Shock Resistance	Damage limits: 1000 m/s ²	
Vibration Resistance	Operating extremes: 10 to 55 Hz, amplitude 0.35 mm Damage limits: 30 Hz, amplitude 1.5 mm	
Actuator Operating Speed	0.05 to 1.0 m/s	
Direct Opening Travel	11 mm minimum	
Direct Opening Force	20N minimum	
Actuator Retention Force	3000N minimum (HS1E-***MS: GS-ET-19) (2800N for vertical direction to the mounting panel)	
Operating Frequency	900 operations per hour	
Mechanical Life	1,000,000 operations minimum (GS-ET-19)	
Electrical Life	100,000 operations minimum (AC-12, 250V, 6A) 1,000,000 operations minimum (24V AC/DC, 100mA) (operating frequency 900 operations per hour)	
Conditional Short-circuit Current	100A (250V) (Use 250V/10A fast-blow fuse for short-circuit protection.)	
Weight (approx.)	500g	

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Power Supplies
PLCs & SmartRelay
Operator Interfaces
Sensors
Control Stations
Explosion Protection
References

HS1E Interlock Switches with Solenoid

Interlock Switch

Lock Mechanism	Contact Configuration	Conduit Port Size	Style		Part No.
			Indicator	Manual Unlock Key	
Spring Lock	Pilot Light Door Monitor Lock Monitor (Actuator inserted) (Solenoid OFF)  Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NO Main Circuit:  3 4 Monitor Circuit:  1 2	G1/2	—	—	HS1E-140MSR
			With	—	HS1E-144MSR-②
			—	With	HS1E-140KMSR
			With	With	HS1E-144KMSR-②
	Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NO Main Circuit:  3 4 Monitor Circuit:  1 2	PG13.5	—	—	HS1E-140MSRP
			With	—	HS1E-144MSRP-②
			—	With	HS1E-140KMSRP
			With	With	HS1E-144KMSRP-②
	Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NC Main Circuit:  3 4 Monitor Circuit:  1 2	G1/2	—	—	HS1E-340MSR
			With	—	HS1E-344MSR-②
			—	With	HS1E-340KMSR
			With	With	HS1E-344KMSR-②
		PG13.5	—	—	HS1E-340MSRP
			With	—	HS1E-344MSRP-②
			—	With	HS1E-340KMSRP
			With	With	HS1E-344KMSRP-②
Solenoid Lock	Pilot Light Door Monitor Lock Monitor (Actuator Inserted) (Solenoid ON)  Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NO Main Circuit:  3 4 Monitor Circuit:  1 2	G1/2	—	—	HS1E-17Y0MSR
			With	—	HS1E-17Y4MSR-②
			—	With	HS1E-17Y0KMSR
			With	With	HS1E-17Y4KMSR-②
	Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NO Main Circuit:  3 4 Monitor Circuit:  1 2	PG13.5	—	—	HS1E-17Y0MSRP
			With	—	HS1E-17Y4MSRP-②
			—	With	HS1E-17Y0KMSRP
			With	With	HS1E-17Y4KMSRP-②
	Main Circuit: 1NC+1NC, Door Monitor Circuit: 1NC Main Circuit:  3 4 Monitor Circuit:  1 2	G1/2	—	—	HS1E-37Y0MSR
			With	—	HS1E-37Y4MSR-②
			—	With	HS1E-37Y0KMSR
			With	With	HS1E-37Y4KMSR-②
		PG13.5	—	—	HS1E-37Y0MSRP
			With	—	HS1E-37Y4MSRP-②
			—	With	HS1E-37Y0KMSRP
			With	With	HS1E-37Y4KMSRP-②

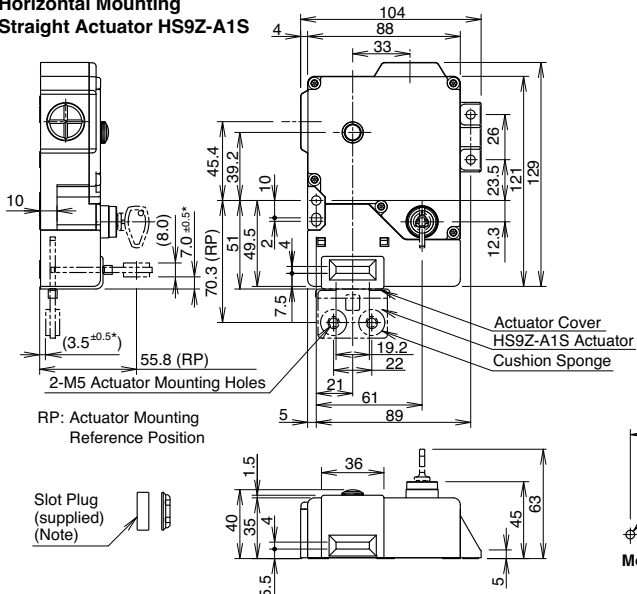
- Key wrench for TORX* screws (HS9Z-T1) is supplied with the interlock switch.
- Specify an indicator color code in place of ② in the Part No.
G: green, R: red
- Actuator is not supplied with the interlock switch, and must be ordered separately.

HS1E Interlock Switches with Solenoid

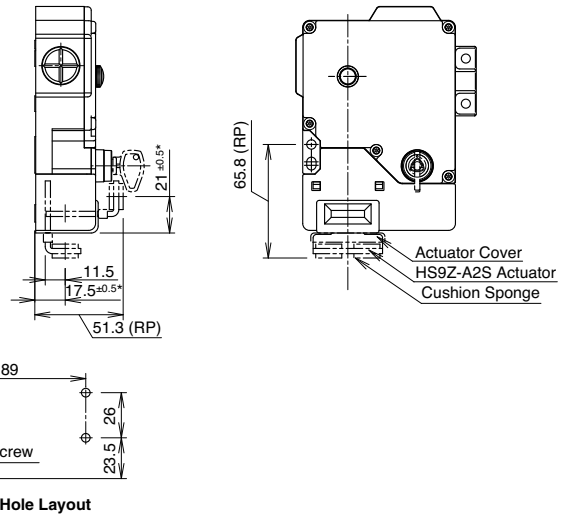
Dimensions

HS1E-□MS

Horizontal Mounting Straight Actuator HS9Z-A1S



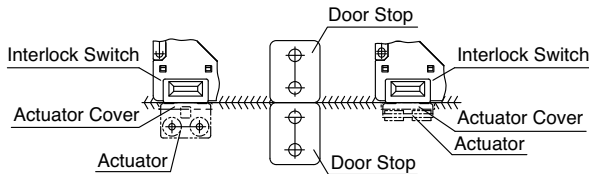
Vertical Mounting Right-angle Actuator HS9Z-A2S



- Note: Plug the unused atuator entry slot using the slot plug supplied with the interlock switch.
 • Use three mounting screws to mount the interlock switch according to the mounting hole layout.
 * Actuator center position

Actuator Mounting Reference Position (RP)

As shown in the figure below, the mounting reference position of the actuator when inserted in the interlock switch is:
 The actuator cover touches the interlock switch lightly.
 After mounting the actuator, remove the actuator cover from the actuator switch.

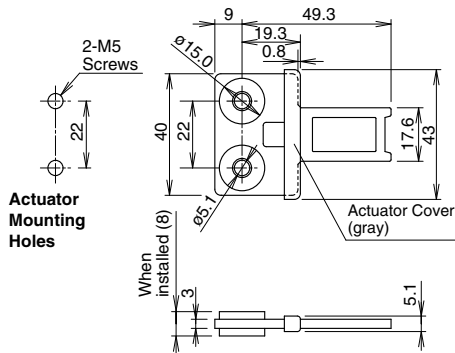


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Control Stations
Explosion Protection
References

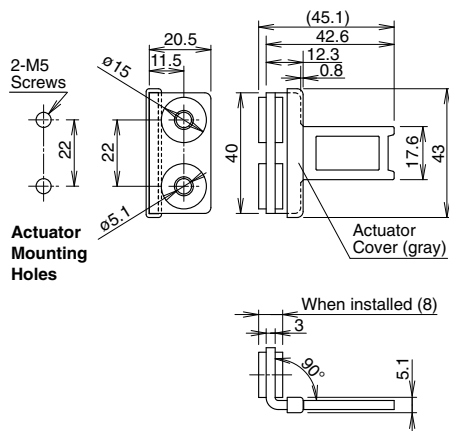
HS1E Interlock Switches with Solenoid

Actuator Dimensions

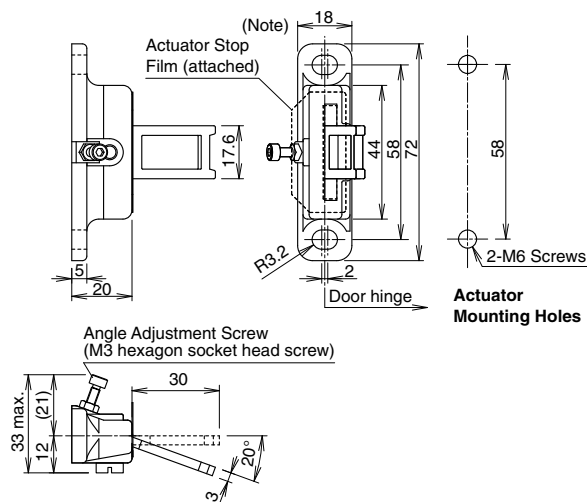
Straight Actuator (HS9Z-A1S)



Right-angle Actuator (HS9Z-A2S)



Angle Adjustable Actuator (HS9Z-A3S)



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

HS1E Interlock Switches with Solenoid

Circuit Diagrams and Operating Characteristics

Spring Lock

HS1E-14□□MSR-* (Main Circuit: 1NC+1NC, Monitor Circuit: 1NO)

Interlock Switch Status	Status 1	Status 2	Status 3	Status 4	Manual Unlock
	<ul style="list-style-type: none"> Door closed Machine ready to operate Solenoid de-energized 	<ul style="list-style-type: none"> Door closed Machine cannot be started Solenoid energized 	<ul style="list-style-type: none"> Door open Machine cannot be started Solenoid energized 	<ul style="list-style-type: none"> Door open Machine cannot be started Solenoid de-energized 	<ul style="list-style-type: none"> Door closed Machine cannot be started Solenoid de-energized
Door					
Circuit Diagram					
Contact Configuration Main Circuit: ③ ④ Monitor Circuit: ① ②	Main Circuit 3-4: Closed Monitor Circuit 1-2: Open	3-4: Open 1-2: Open	3-4: Open 1-2: Closed	3-4: Open 1-2: Closed	3-4: Open 1-2: Open
Solenoid Power	5-6: Power OFF	5-6: Power ON	5-6: Power ON	5-6: Power OFF	5-6: Power OFF

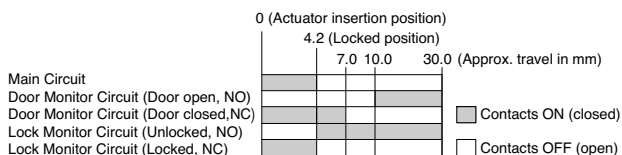
- Main circuit: Connected to the machine drive control circuit, sending interlock signals to the protective door.
- Monitor circuit: Sends ON/OFF signals of the main circuit and monitoring signals of open/closed status of the protective door.

HS1E-34□□MSR-* (Main Circuit: 1NC+1NC, Monitor Circuit: 1NC)

Interlock Switch Status	Status 1	Status 2	Status 3	Status 4	Manual Unlock
	<ul style="list-style-type: none"> Door closed Machine ready to operate Solenoid de-energized 	<ul style="list-style-type: none"> Door closed Machine cannot be started Solenoid energized 	<ul style="list-style-type: none"> Door open Machine cannot be started Solenoid energized 	<ul style="list-style-type: none"> Door open Machine cannot be started Solenoid de-energized 	<ul style="list-style-type: none"> Door closed Machine cannot be started Solenoid de-energized
Door					
Circuit Diagram					
Contact Configuration Main Circuit: ③ ④ Monitor Circuit: ① ②	Main Circuit 3-4: Closed Monitor Circuit 1-2: Closed	3-4: Open 1-2: Closed	3-4: Open 1-2: Open	3-4: Open 1-2: Open	3-4: Open 1-2: Closed
Solenoid Power	5-6: Power OFF	5-6: Power ON	5-6: Power ON	5-6: Power OFF	5-6: Power OFF

- Main circuit: Connected to the machine drive control circuit, sending interlock signals to the protective door.
- Monitor circuit: Sends ON/OFF signals of the main circuit and monitoring signals of open/closed status of the protective door.

Operation Characteristics (reference)



- The operation characteristics show the contact status when the actuator enters into the center of the entry slot.
- The circuit No. 12-41 and 22-51 are interconnected. Use circuits 11-42 and 21-52 for safety circuits.

HS1E Interlock Switches with Solenoid

Solenoid Lock

HS1E-17Y□□MSR-* (Main Circuit: 1NC+1NC, Monitor Circuit: 1NO)

		Status 1	Status 2	Status 3	Status 4	Manual Unlock
Interlock Switch Status		<ul style="list-style-type: none"> Door closed Machine ready to operate Solenoid energized 	<ul style="list-style-type: none"> Door closed Machine cannot be started Solenoid de-energized 	<ul style="list-style-type: none"> Door open Machine cannot be started Solenoid de-energized 	<ul style="list-style-type: none"> Door open Machine cannot be started Solenoid energized 	<ul style="list-style-type: none"> Door closed Machine cannot be started Solenoid de-energized, then energized
Door						
Circuit Diagram						
Contact Configuration Main Circuit: 3-4 Monitor Circuit: 1-2	Main Circuit	3-4: Closed	3-4: Open	3-4: Open	3-4: Open	3-4: Open
	Monitor Circuit	1-2: Open	1-2: Open	1-2: Closed	1-2: Closed	1-2: Open
Solenoid Power		5-6: Power ON	5-6: Power OFF	5-6: Power OFF	5-6: Power ON (Note 2)	5-6: Power OFF → ON (Note1) (Note 2)

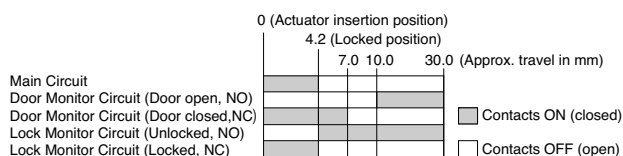
- Main circuit: Connected to the machine drive control circuit, sending interlock signals to the protective door.
- Monitor circuit: Sends ON/OFF signals of the main circuit and monitoring signals of open/closed status of the protective door.
- Note 1: Do not attempt manual unlocking while the solenoid is energized.
- Note 2: Do not energize the solenoid for a long time while the door is open or while the door is unlocked manually.

HS1E-37Y□□MSR-* (Main Circuit: 1NC+1NC, Monitor Circuit: 1NC)

		Status 1	Status 2	Status 3	Status 4	Manual Unlock
Interlock Switch Status		<ul style="list-style-type: none"> Door closed Machine ready to operate Solenoid energized 	<ul style="list-style-type: none"> Door closed Machine cannot be started Solenoid de-energized 	<ul style="list-style-type: none"> Door open Machine cannot be started Solenoid de-energized 	<ul style="list-style-type: none"> Door open Machine cannot be started Solenoid energized 	<ul style="list-style-type: none"> Door closed Machine cannot be started Solenoid de-energized, then energized
Door						
Circuit Diagram						
Contact Configuration Main Circuit: 3-4 Monitor Circuit: 1-2	Main Circuit	3-4: Closed	3-4: Open	3-4: Open	3-4: Open	3-4: Open
	Monitor Circuit	1-2: Closed	1-2: Closed	1-2: Open	1-2: Open	1-2: Closed
Solenoid Power		5-6: Power ON	5-6: Power OFF	5-6: Power OFF	5-6: Power ON (Note 2)	5-6: Power OFF → ON (Note1) (Note 2)

- Main circuit: Connected to the machine drive control circuit, sending interlock signals to the protective door.
- Monitor circuit: Sends ON/OFF signals of the main circuit and monitoring signals of open/closed status of the protective door.
- Note 1: Do not attempt manual unlocking while the solenoid is energized.
- Note 2: Do not energize the solenoid for a long time while the door is open or while the door is unlocked manually.

Operation Characteristics (reference)



- The operation characteristics show the contact status when the actuator enters into the center of the entry slot.
- The circuit No. 12-41 and 22-51 are interconnected. Use circuits 11-42 and 21-52 for safety circuits.

HS1E Interlock Swithes 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 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 malfunction or an accident may occur.
- Do not install the actuator in the location where the human body may come into 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 risk assessment and determine whether solenoid lock is appropriate.

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.
- When wiring, unscrew the cover with part number label only. Unnecessary loosening of other screws may cause a malfunction of the interlock switch.
- A shock to the door exceeding $1,000 \text{ m/s}^2$ (approx. 100G) may cause the contacts of the interlock switch to chatter, and a malfunction of the interlock switch may occur.
- 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 a considerable amount of foreign objects into the interlock switch may affect the mechanism of the interlock switch and cause a malfunction.
- Plug the unused actuator entry slot using the slot plug supplied with the interlock switch.
- Do not store the interlock switch in a dusty, humid, or organic-gas atmosphere.
- Use dedicated 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.
- The cover uses special screws which cannot be removed or tightened by general screwdrivers. Use the special wrench supplied with the interlock switch.
- 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 to approximately 100°C . Do not touch to prevent burns. If cables come into contact with the interlock switch, use heat-resistant cables.
- The solenoid has polarity. Make sure of the correct polarity when wiring. Do not apply overvoltage, otherwise the solenoid will be burnt.
- Actuator retention force is 3000N (static load). When larger force is expected, add a system using interlock switch without lock (ex. HS5D) and sensor in order to detect door opening and to stop the machine.

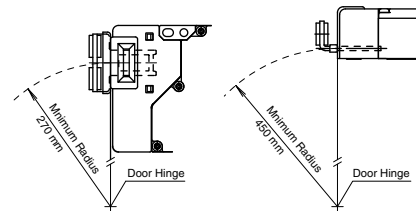
Minimum Radius of Hinged Door

- 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-A3S).

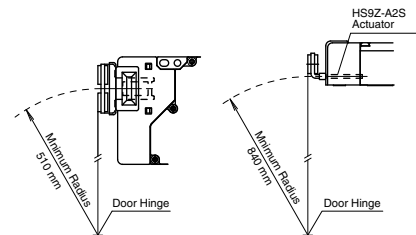
Note: Because deviation or dislocation of hinged door may occur in actual applications, make sure of the correct operation before installation.

HS9Z-A2S 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:



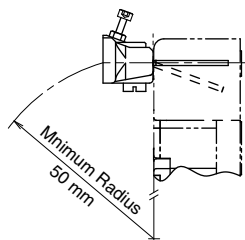
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Display Lights
LED Illumination Units
Display Units
Safety Products
Terminal Blocks
Comm. Terminals
AS-Interface
Relays & Timers
Sockets
Circuit Protectors
Power Supplies
PLCs & SmartRelay
Operator Interfaces
Sensors
Control Stations
Explosion Protection
References

HS1E Interlock Switches with Solenoid

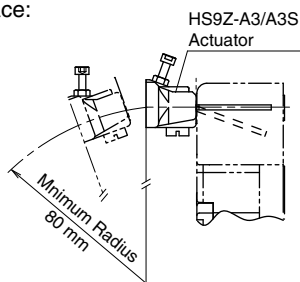
Instructions

When using the HS9Z-A3S Angle Adjustable (vertical) 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:

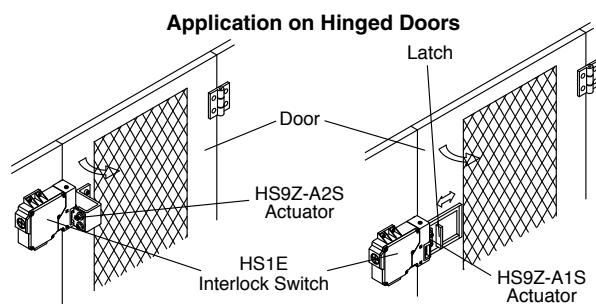
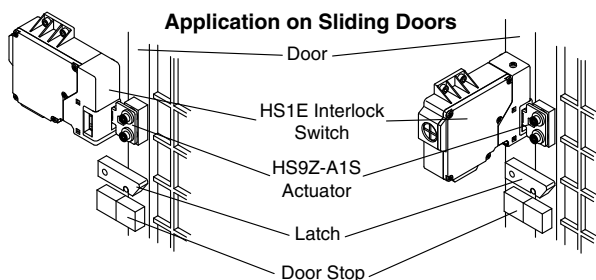


Actuator Angle Adjustment

- Using the angle adjustment screw, the actuator angle can be adjusted (refer to the dimensional drawing). Adjustable angle: 0 to 20°
- The larger the adjusted angle of the actuator, the smaller the applicable radius of the door opening.
- After installing the actuator, open the door. Then adjust the actuator so that its edge can be inserted properly into the actuator entry slot of the interlock switch.
- Recommended tightening torque for angle adjustment: 0.8 N·m
- After adjusting the actuator angle, apply Loctite to the adjustment screw so that the screw will not move.

Mounting Examples

Mount the interlock switch on a fixed machine or guard, and mount the actuator on the hinged door. Do not mount both interlock switch and actuator on the hinged doors, otherwise malfunction will occur.



For Manual Unlocking

Spring lock

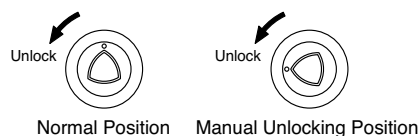
The HS1E allows manual unlocking of the actuator to pre-check proper door operation before wiring or turning power on, as well as for emergency use such as a power failure.

Solenoid lock

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

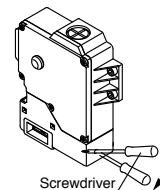
With Manual Unlock Key

- When unlocking the interlock switch manually, turn the key fully using the special 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 part, otherwise the manual unlock part 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.



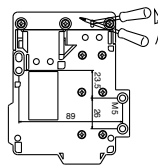
Without Manual Unlocking Key

- Remove the screw located on the side of the interlock switch using the proprietary wrench supplied with the interlock switch. Insert a small screwdriver into the interlock switch to push the lever inside of the interlock switch toward the indicator until the actuator is unlocked (see the figure on the right).



Common Unlocking Operation

- Insert a small screwdriver into the oblong hole on the back of the interlock switch, then push the lever inside the interlock switch toward the indicator until the actuator is unlocked (see below).



Note: 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 control panel. When opening the hole, apply proper protection against water or other foreign objects.

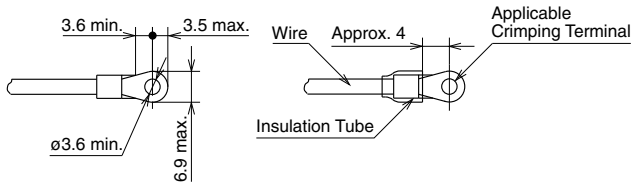
Caution

- For solenoid lock, do not attempt manual unlocking while the solenoid is energized. Also, make sure that the machine has come to a complete stop before unlocking the interlock switch manually. Manual unlocking during machine operation loses the function of solenoid lock interlock switch.

HS1E Interlock Switches with Solenoid

Instructions

Applicable Crimping Terminal



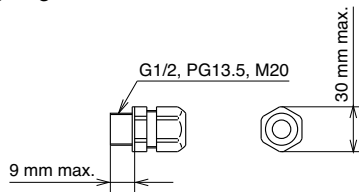
- Use an insulation tube on the crimping terminal.
- When using stranded wires, make sure that loose wires do not cause short circuit. Also, do not solder the terminal to prevent loose wires.

Applicable Wire Size

- 0.5 to 1.25 mm²

Applicable Cable Glands

- Use IP67 cable gland. When using M20-size cable gland, use locking ring HW9Z-NM20.



When Using Flexible Conduits (Example)

- Flexible conduit example: VF-03 (Nihon Flex)

Conduit Port Size	Plastic Cable Gland	Metal Cable Gland
G1/2	—	RLC-103 (Nihon Flex)
PG13.5	—	RBC-103PG13.5 (Nihon Flex)
M20 (Note 1)	—	RLC-103EC20 (Nihon Flex)

When Using Multi-core Cables (Example)

Conduit Port Size	Plastic Cable Gland	Metal Cable Gland
G1/2	SCS-10* (Seiwa Electric)	ALS-16** (Nihon Flex)
PG13.5	ST13.5 (K-MECS)	ABS-**PG13.5 (Nihon Flex)
M20 (Note 1)	ST-M20X1.5 (K-MECS) (Note 2)	ALS-**EC20 (Nihon Flex)

- Different cable glands are used depending on the cable sheath outside diameter. When purchasing a cable gland, confirm that the cable gland is applicable to the cable sheath outside diameter.

Note 1: When using M20 cable gland, order HW9Z-NM20 locking ring and replace with the locking ring installed in the HS1E interlock switch.

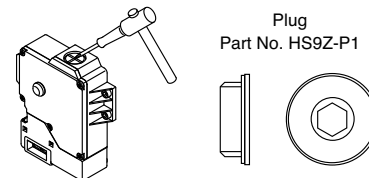
Note 2: When using ST-M20X1.5 cable gland, use together with a gasket (Part No.: GPM20, K-MECS).

Recommended Tightening Torque of Mounting Screws

- Interlock switch: 3.2 to 3.8 N·m (three M5 screws)
- Lid mounting screw: 0.9 to 1.1 N·m (M4 screw)
- Terminal screw: 0.9 to 1.1 N·m (M3.5 screw)
- Connector: 2.7 to 3.3 N·m
- Actuators
 - HS9Z-A1/A2/A3/A3S: 4.5 to 5.5 N·m (two M6 screws)
 - HS9Z-A1S/A2S: 2.7 to 3.3 N·m (two M5 screws)
- Mounting bolts must be provided by users.
- The above recommended tightening torques of the mounting screws are the values confirmed with hex socket head bolts. When other screws are used and tightened to a smaller torque, make sure that the screws do not come loose after mounting.
- Mounting bolts must be provided by the users.
- To avoid unauthorized or unintended removal of the interlock switch and the actuator, it is recommended that the interlock switch and the actuator be installed in an unremovable manner, for example using special screws or welding the screws.

Conduit Port Opening

- Make an opening for wire connection by breaking one of the conduit-port knockouts on the interlock switch housing using a screwdriver.
- When breaking the conduit port, take care not to damage the contact block or other parts inside the interlock 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 (Part No.: HS9Z-P1).



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Display Lights
LED Illumination Units
Display Units
Safety Products
Terminal Blocks
Comm. Terminals
AS-Interface
Relays & Timers
Sockets
Circuit Protectors
Power Supplies
PLCs & SmartRelay
Operator Interfaces
Sensors
Control Stations
Explosion Protection
References

HS1E Interlock Switches with Solenoid (3-circuit)

Dual main circuit + lock monitor circuit provide more safety to your system

- Basic unit and solenoid unit in one housing
- Lightweight plastic housing
- All terminal screws are M3.5, allowing easy wiring.
- Two main circuits 1NC+1NC and a monitor circuit 1NC realizes duplicated main circuit and lock monitor.
- Hostage control can be achieved using the hostage key.
- Guard door can be locked automatically by installing the actuator on the guard and interlock switch on the machine.
- Spring lock and solenoid lock are available.
- Equipped with two actuator entry slots.
- Double insulation structure
- 30 different numbers are available for key, so that neighboring switches cannot be operated by the same key.

Actuator Retention Force 3000N

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

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.

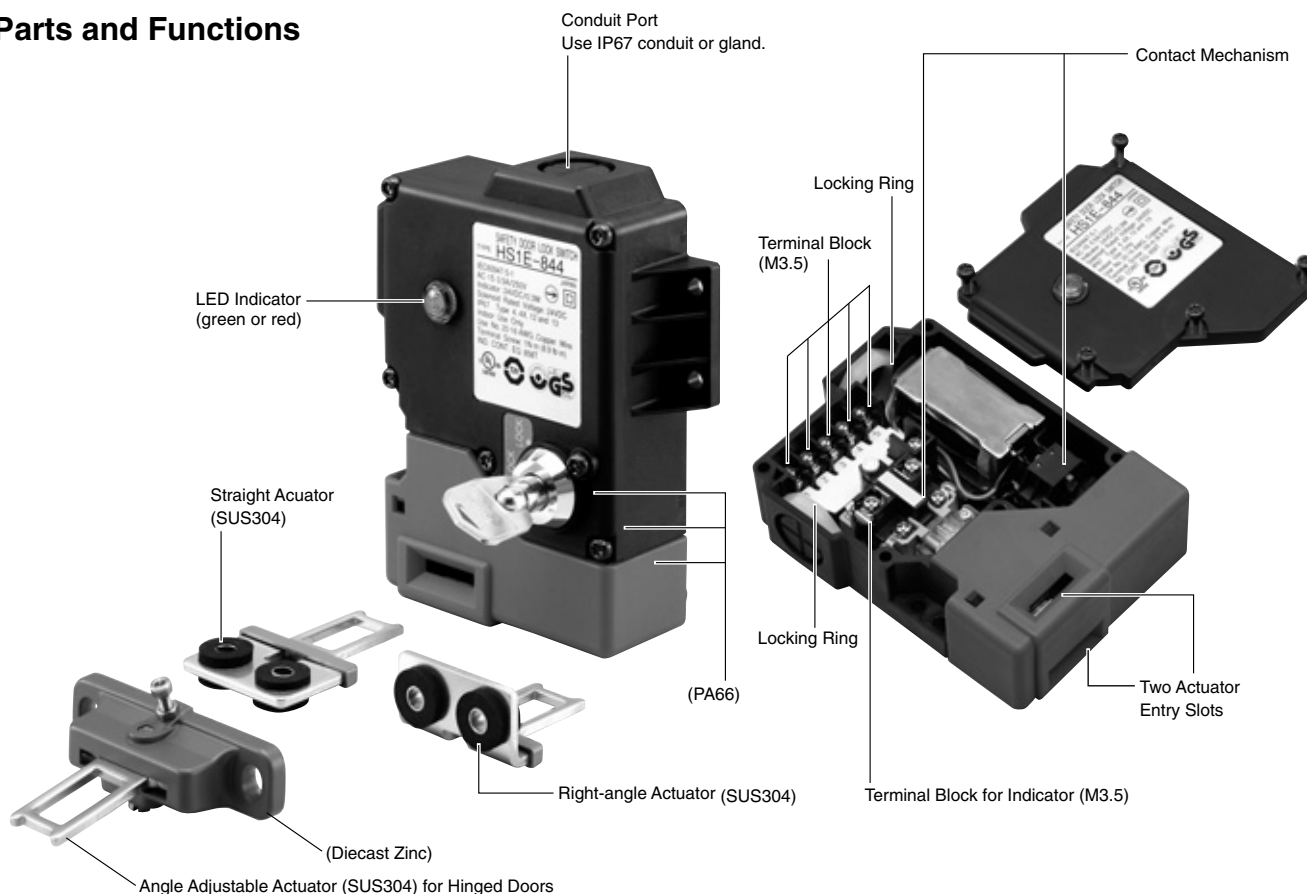
Solenoid Lock

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

* Retention force for horizontal direction (parallel to the mounting panel)



Parts and Functions



HS1E Interlock Switches with Solenoid (3-circuit)

Interlock Switch

Lock Mechanism	Contact Configuration	Conduit Port Size	Style			Part No.
			Indicator	Manual Unlock Key	Hostage Key	
Spring Lock	<p>Main circuit ①: 1NC+1NC, Lock monitor circuit: 1NC Main circuit ②: 1NC+1NC</p>	G1/2	—	—	—	HS1E-840MSR
			With	—	—	HS1E-844MSR-②
			—	With	—	HS1E-840KMSR
			With	With	—	HS1E-844KMSR-②
	<p>Main circuit ①: 1NC+1NC, Lock monitor circuit: 1NC Main circuit ②: 1NC+1NC Monitor circuit: 5-6</p>	PG13.5	—	—	—	HS1E-840MSRP
			With	—	—	HS1E-844MSRP-②
			—	With	—	HS1E-840KMSRP
			With	With	—	HS1E-844KMSRP-②
	<p>Main circuit ①: 1NC+1NC, Lock monitor circuit: 1NC Main circuit ②: 1NC+1NC Monitor circuit: 5-6</p>	G1/2	—	—	With	HS1E-K840MSR-□
			With	—	With	HS1E-K844MSR-②-□
		PG13.5	—	—	With	HS1E-K840MSRP-□
			With	—	With	HS1E-K844MSRP-②-□

- Specify a key number in place of □ in the Part No. (T001 to T030)
- Key wrench for TORX screws (HS9Z-T1) is supplied with the interlock switch.
- Specify an indicator color code in place of ② in the Part No.
G: green, R: red
- The contact configuration shows when the actuator is inserted and locked.
- Actuator is not supplied with the interlock switch, and must be ordered separately.

Actuator / Key Wrench for TORX Screws

Name	Specification	Part No.	Ordering No.	Package Quantity
Straight Actuator	—	HS9Z-A1S	HS9Z-A1S	1
Right-angle Actuator		HS9Z-A2S	HS9Z-A2S	
Angle Adjustable Actuator (for hinged door)		HS9Z-A3S	HS9Z-A3S	
Key Wrench for TORX Screws		HS9Z-T1	HS9Z-T1	
Conduit Port Plug		HS9Z-P1	HS9Z-P1	
Locking Ring for Gland	M20 thread	HW9Z-NM20	HW9Z-NM20PN05	5

- When using M20 size gland, order locking ring HW9Z-NM20 separately.

Part No. Development

HS1E-844KMSRP-R				HS1E-K844MSRP-R-T001			
Contact Configuration	—	—	—	Contact Configuration	—	—	—
Main Circuit	8: 1NC+1NC, 1NC+1NC	—	—	Main Circuit	8: 1NC+1NC, 1NC+1NC	—	—
Monitor Circuit	1NC	—	—	Monitor Circuit	1NC	—	—
Solenoid Voltage	4: 24V DC	—	—	Solenoid Voltage	4: 24V DC	—	—
Indicator Rated Voltage	4: 24V DC	—	—	Indicator Rated Voltage	4: 24V DC	—	—
0: Without indicator	—	—	—	0: Without indicator	—	—	—
Indicator Color	G: green	—	—	Indicator Color	G: green	—	—
R: red	—	—	—	R: red	—	—	—
Conduit Port	Blank: G1/2	—	—	Conduit Port	Blank: G1/2	—	—
P: PG13.5	—	—	—	P: PG13.5	—	—	—
Housing Color	R: red/black	—	—	Housing Color	R: red/black	—	—
Retention Force	MS: 3000N*	—	—	Retention Force	MS: 3000N*	—	—
Manual Unlock Key	Blank: Without key	—	—	Manual Unlock Key	Blank: Without key	—	—
K: With key	—	—	—	K: With key	—	—	—

- * Retention force for horizontal direction (parallel to the mounting panel)

HS1E Interlock Switches with Solenoid (3-circuit)

Ratings

Contact Ratings

Rated Insulation Voltage (Ui)				300V (between LED or solenoid and ground: 60V)		
Rated Thermal Current (Ith)				2.5A		
Rated Voltage (Ue)				30V	125V	250V
Rated Current (Ie) (Note)	Main Circuit	AC	Resistive load (AC-12)	—	2A	1A
			Inductive Load (AC-15)	—	1A	0.5A
		DC	Resistive load (DC-12)	2A	0.4A	0.2A
			Inductive Load (DC-13)	1A	0.22A	0.1A

- Minimum applicable load (reference value): 3V AC/DC, 5 mA
(Applicable range is subject to operating conditions and load.)

Solenoid

Model	HS1E	HS1E-K
Rated Voltage	24V DC (100% duty cycle)	
Rated Current	292 mA	206 mA
Coil Resistance	82Ω (at 20°C)	116Ω (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
Lens Color	G (green), R (red)

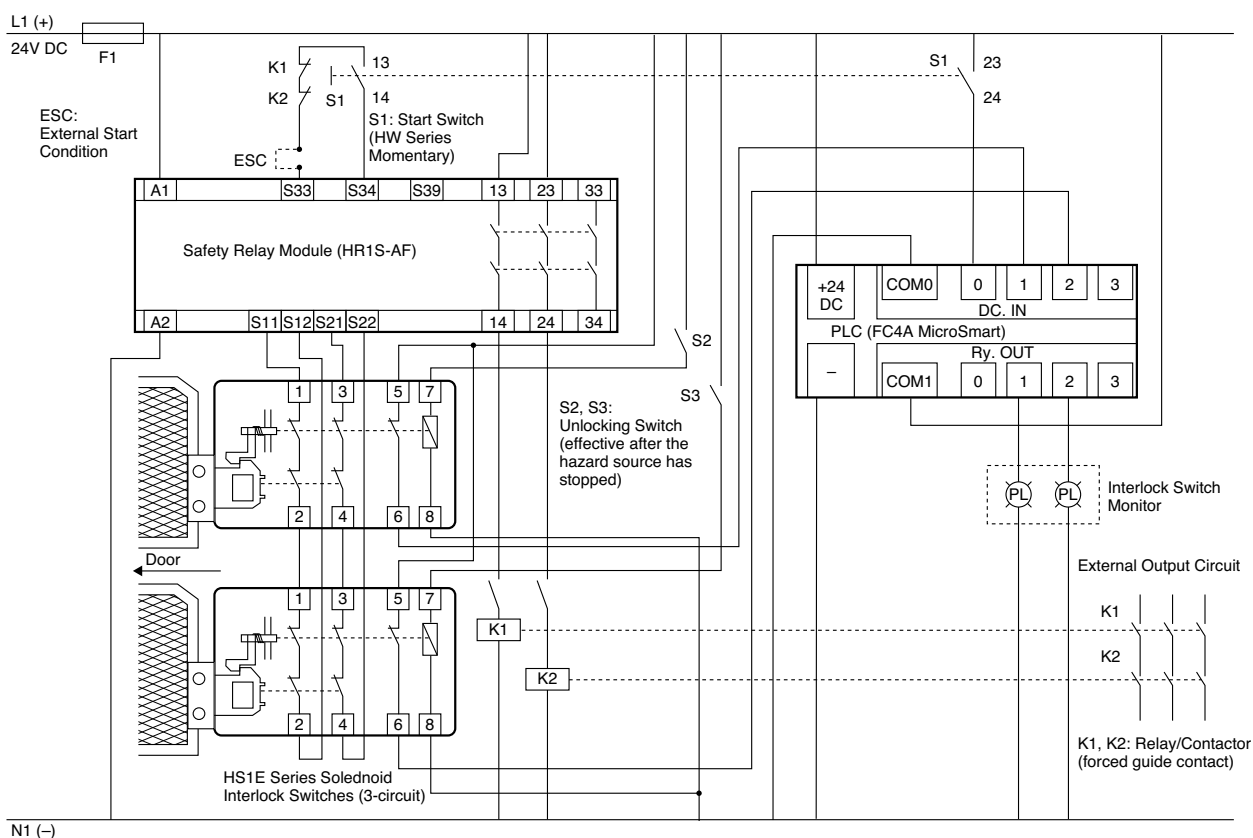
- The lens cannot be replaced.

Specifications

Applicable Standards	UL508 (UL listed)	CSA C22.2, No. 14 (c-UL listed)
	ISO 14119	EN 1088 (TÜV approval)
	IEC 60947-5-1	EN 60947-5-1 (TÜV approval)
	GS-ET-19 (BG approval)	GB14048.5 (CCC approval)
	IEC 60204-1/EN 60204-1 (applicable standards for use)	
Operating Temperature	-20 to 40°C (no freezing)	
Relative Humidity	45 to 85% (no condensation)	
Storage Temperature	-40 to +80°C (no freezing)	
Pollution Degree	3	
Impulse Withstand Voltage	4 kV (between LED or solenoid and grounding: 2.5 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 (IEC 61140)	
Degree of Protection	IP67 (IEC 60529)	
Shock Resistance	Damage limits: 1000 m/s ²	
Vibration Resistance	Operating extremes: 10 to 55 Hz, amplitude 0.35 mm Damage limits: 30 Hz, amplitude 1.5 mm	
Actuator Operating Speed	0.05 to 1.0 m/s	
Direct Opening Travel	11 mm minimum	
Direct Opening Force	20N minimum	
Actuator Retention Force	3000N minimum (GS-ET-19) (2800N in the direction vertical to the mounting panel)	
Operating Frequency	900 operations per hour	
Mechanical Life	1,000,000 operations minimum (GS-ET-19) 30,000 operations minimum (key operation)	
Electrical Life	100,000 operations minimum (rated load) 1,000,000 operations minimum (24V AC/DC, 100mA, operating frequency 900 operations per hour)	
Conditional Short-circuit Current	50A (250V) (Use 250V/10A fast-blow fuse for short-circuit protection.)	
Weight (approx.)	500g	

Example of Safety Circuit + Monitoring using 3-circuit Interlock Switches (safety category 3)

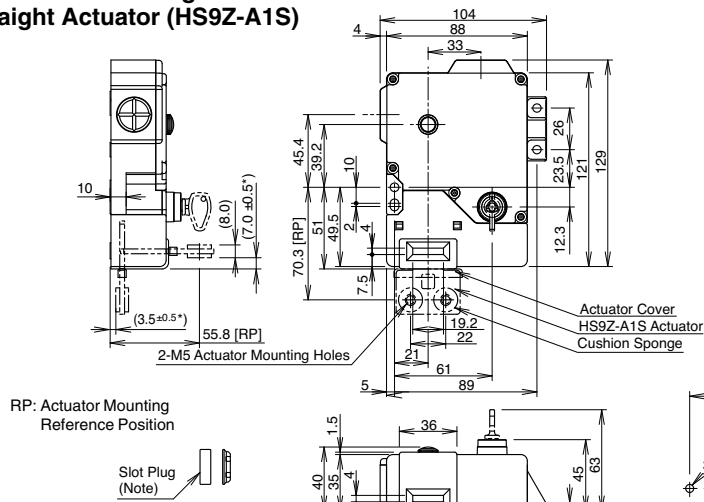
Before operation of the following circuit, it is recommended for the entire safety-related system to undergo a third party evaluation.



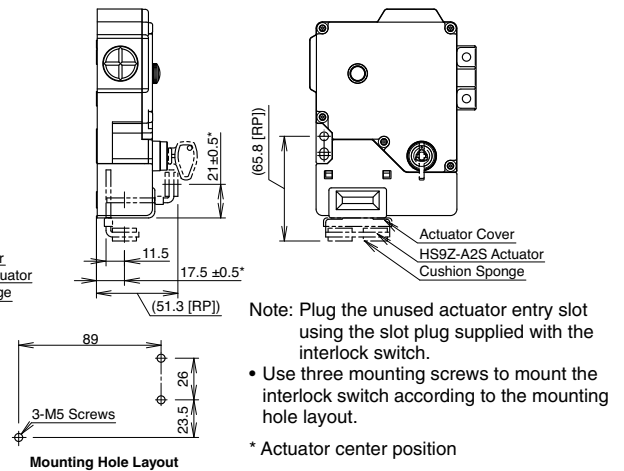
HS1E Interlock Switches with Solenoid (3-circuit)

Dimensions

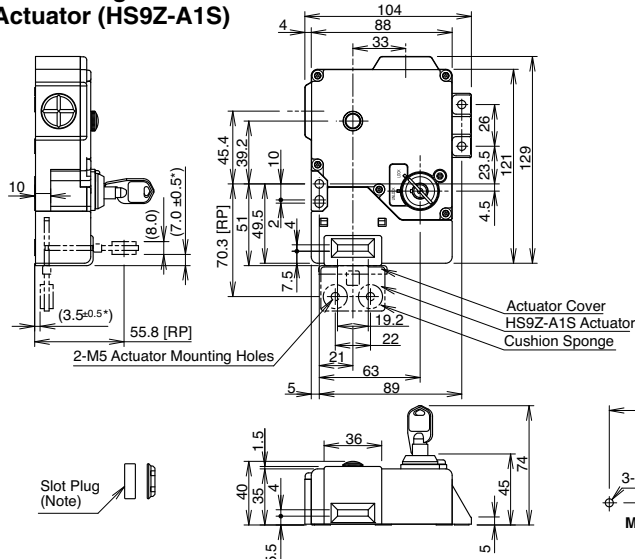
HS1E Horizontal Mounting Straight Actuator (HS9Z-A1S)



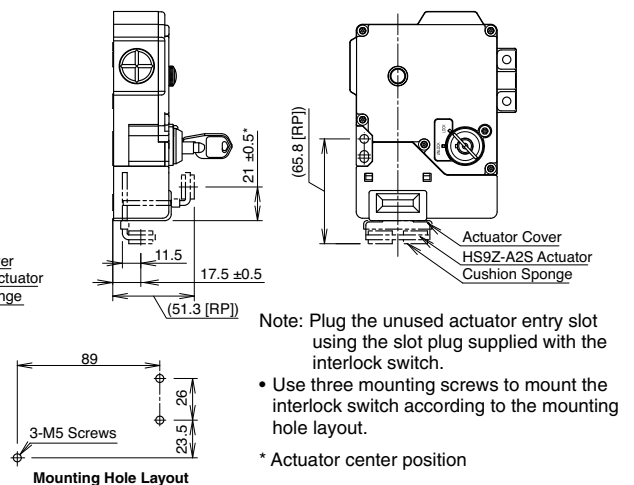
Horizontal Mounting Straight Actuator (HS9Z-A2S)



HS1E-K Horizontal Mounting Straight Actuator (HS9Z-A1S)

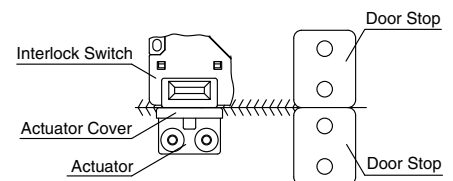


Horizontal Mounting Straight Actuator (HS9Z-A2S)



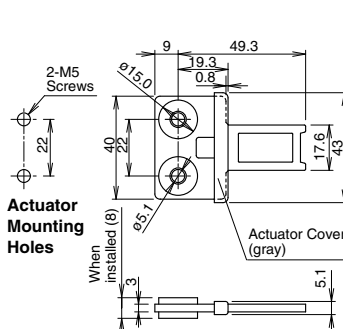
Actuator Mounting Reference Position

As shown in the figure on the right, the mounting reference position of the actuator when inserted in the interlock switch is:
The actuator cover lightly touches the interlock switch.
After mounting the actuator, remove the actuator cover from the actuator.

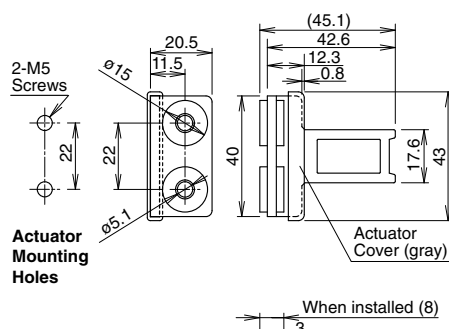


Actuator Dimensions

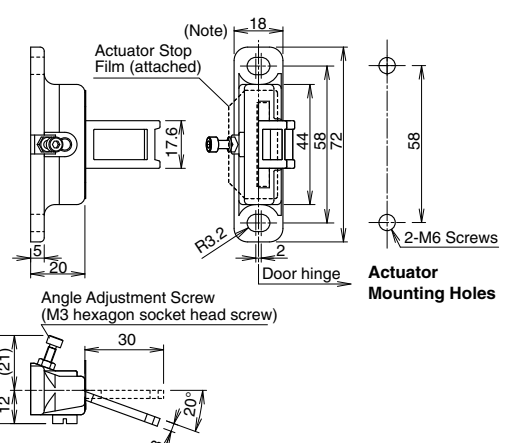
Straight Actuator (HS9Z-A1S)



Right-angle Actuator (HS9Z-A2S)



Angle Adjustable Actuator (HS9Z-A3S)



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

Flush Silhouette
Switches & Pilot Lights
Display Lights
LED Illumination Units
Display Units
Safety Products
Terminal Blocks
Comm. Terminals
AS-Interface
Relays & Timers
Sockets
Circuit Protectors
Power Supplies
PLCs & SmartRelay
Operator Interfaces
Sensors
Control Stations
Explosion Protection
References

HS1E Interlock Switches with Solenoid (3-circuit)

Circuit Diagrams and Operating Characteristics

Spring Lock

HS1E-84□□MSR-* (Main Circuit: 1NC+1NC, 1NC+1NC, Monitor Circuit: 1NC)

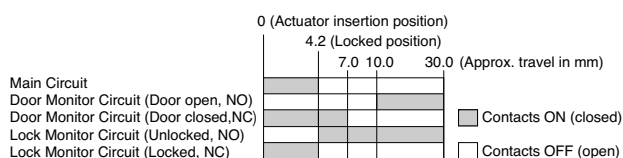
Interlock Switch Status	Status 1	Status 2	Status 3	Status 4	Manual Unlock
	<ul style="list-style-type: none"> Door closed Machine ready to operate Solenoid de-energized 	<ul style="list-style-type: none"> Door closed Machine cannot be started Solenoid energized 	<ul style="list-style-type: none"> Door open Machine cannot be started Solenoid energized 	<ul style="list-style-type: none"> Door open Machine cannot be started Solenoid de-energized 	<ul style="list-style-type: none"> Door closed Machine cannot be started Solenoid de-energized
Door					
Circuit Diagram					
Contact Configuration Door Monitor (Actuator inserted) Lock Monitor (Solenoid OFF) 	Main Circuit 1-2, 3-4: Closed Monitor Circuit 5-6: Closed	1-2, 3-4: Open 5-6: Open	1-2, 3-4: Open 5-6: Open	1-2, 3-4: Open 5-6: Open	1-2, 3-4: Open 5-6: Open
Solenoid Power	7-8: Power OFF	7-8: Power ON	7-8: Power ON	7-8: Power OFF	7-8: Power OFF

HS1E-K84□□MSR-* (Main Circuit: 1NC+1NC, 1NC+1NC, Monitor Circuit: 1NC)

Interlock Switch Status	Status 1	Status 2	Status 3	Status 4	Status 5	Status 6
	<ul style="list-style-type: none"> Door closed Key is installed Solenoid de-energized 	<ul style="list-style-type: none"> Door closed Key is installed Solenoid energized 	<ul style="list-style-type: none"> Door closed Key is removed Solenoid energized 	<ul style="list-style-type: none"> Door open Key is removed Solenoid de-energized 	<ul style="list-style-type: none"> Door open Key is removed Solenoid de-energized 	<ul style="list-style-type: none"> Door closed Key is removed Solenoid de-energized
Door						
Circuit Diagram						
Contact Configuration Door Monitor (Actuator inserted) Lock Monitor (Solenoid OFF) 	Main Circuit 1-2, 3-4: Closed Monitor Circuit 5-6: Closed	1-2, 3-4: Open 5-6: Open	1-2, 3-4: Open 5-6: Open	1-2, 3-4: Open 5-6: Open	1-2, 3-4: Open 5-6: Open	1-2, 3-4: Open 5-6: Open
Solenoid Power	7-8: Power OFF	7-8: Power ON	7-8: Power ON	7-8: Power OFF	7-8: Power OFF	7-8: Power OFF
Remarks	<ul style="list-style-type: none"> Door locked Key retained Machine ready to operate 	<ul style="list-style-type: none"> Door locked Key removable Machine cannot operate 	<ul style="list-style-type: none"> Door can be opened Machine cannot operate 	<ul style="list-style-type: none"> Machine cannot operate 	<ul style="list-style-type: none"> Machine cannot operate 	<ul style="list-style-type: none"> Door can be opened Machine cannot operate

- Main circuit: Connected to the machine drive control circuit, sending interlock signals to the protective door.
- Monitor circuit: Sends ON/OFF signals of the main circuit and monitoring signals of open/closed status of the protective door.

Operation Characteristics (reference)



- The operation characteristics show the contact status when the actuator enters into the center of the entry slot.
- The circuit No. 12-41 and 22-51 are interconnected. Use circuits 11-42 and 21-52 for safety circuits.

HS1E Interlock Switches with Solenoid (3-circuit)

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 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 malfunction or an accident may occur.
- Do not install the actuator in the location where the human body may come into contact. Otherwise injury may occur.

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.
- For HS1E-K, do not apply excessive force to the locked key. Applying force to the key may interfere with solenoid operation, resulting in a failure to unlock. Also, applying a torque larger than 1.8 N·m to the key results in damage.
- 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/s² may cause damage to the interlock switch.
- When wiring, unscrew the cover with part number label only. Unnecessary loosening of other screws may cause a malfunction of 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 a considerable amount of foreign objects into the interlock switch may affect the mechanism of the interlock switch and cause a malfunction.
- Plug the unused actuator entry slot using the slot plug supplied with the interlock switch.
- Do not store the interlock switch in a dusty, humid, or organic-gas atmosphere.
- Use dedicated 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.
- The cover uses special screws which cannot be removed or tightened by general drivers. Use the special wrench supplied with the interlock switch.
- 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 to approximately 100°C (HS1E-J: 115°C). Do not touch to prevent burns. If cables come into contact with the interlock switch, use heat-resistant cables.
- The solenoid has polarity. Make sure of the correct polarity when wiring. Do not apply overvoltage, otherwise the solenoid will be burnt.
- Actuator retention force is 3000N (static load). When larger force is expected, add a system using interlock switch without lock (ex. HS5D) and sensor in order to detect door opening and to stop the machine.

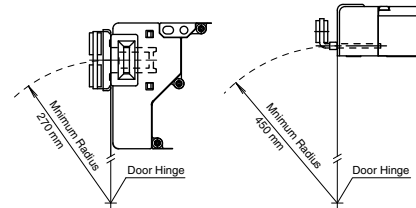
Minimum Radius of Hinged Door

- When using the interlock switch for a hinged door, refer to the minimum radius of doors shown on the right. For the doors with small minimum radius, use angle adjustable actuators (HS9Z-A3S).

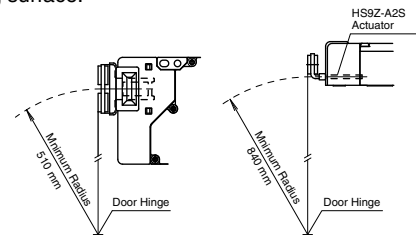
Note: Because deviation or dislocation of hinged door may occur in actual applications, make sure of the correct operation before installation.

HS9Z-A2S Actuator (w/rubber cushions)

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

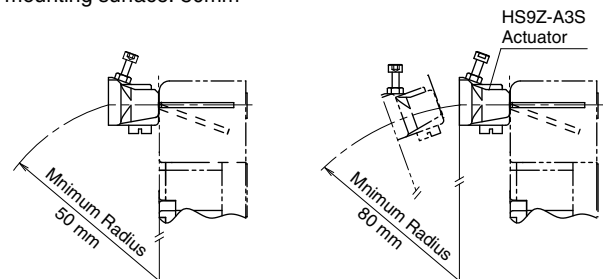


- When the door hinge is on the extension line of the actuator mounting surface:



HS9Z-A3S Actuator

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



Actuator Angle Adjustment

- Using the angle adjustment screw, the actuator angle can be adjusted (refer to the dimensional drawing). Adjustable angle: 0 to 20°
- The larger the adjusted angle of the actuator, the smaller the applicable radius of the door opening.
- After installing the actuator, open the door. Then adjust the actuator so that its edge can be inserted properly into the actuator entry slot of the interlock switch.
- Recommended tightening torque of angle adjustable screw: 0.8 N·m
- After adjusting the actuator angle, apply Loctite to the adjustment screw so that the screw will not move.

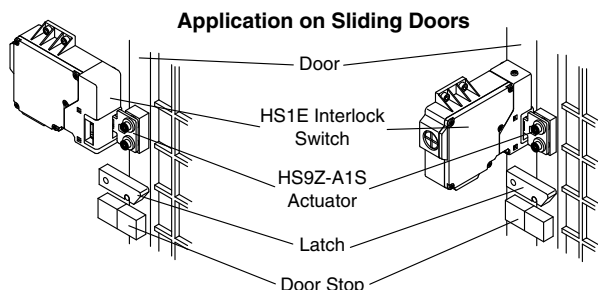
Flush Silhouette
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Operator Interfaces
Sensors
Control Stations
Explosion Protection
References

HS1E Interlock Switches with Solenoid (3-circuit)

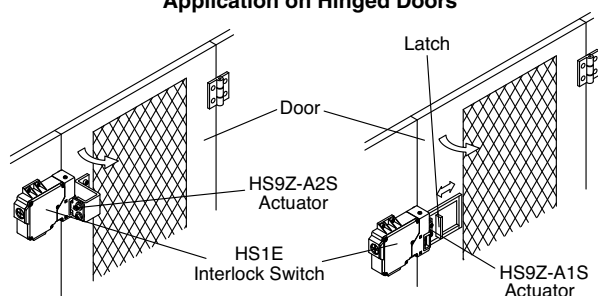
Instructions

Mounting Examples

Mount the interlock switch on a fixed machine or guard, and mount the actuator on the hinged door. Do not mount both interlock switch and actuator on the hinged doors, otherwise malfunction will occur.



Application on Sliding Doors



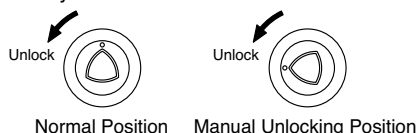
Application on Hinged Doors

Manual Unlocking (HS1E)

The HS1E allows manual unlocking of the actuator to precheck proper entry of the actuator into the slot as well as for emergency use such as a power failure.

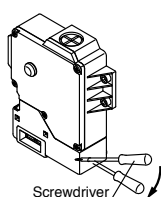
With Manual Unlock Key

- When locking or unlocking the interlock switch manually, turn the key fully using the special 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 part, otherwise the manual unlock part 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.



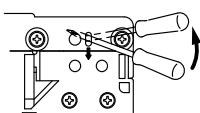
Without Manual Unlock Key

- Remove the screw located on the side of the interlock switch using the special wrench supplied with the interlock switch. Insert a small screwdriver into the interlock switch to push the lever inside of the interlock switch toward the indicator until the actuator is unlocked (see the figure on the right).



Common Unlocking Operation

- Insert a small screwdriver into the elliptical hole on the back of the interlock switch, then push the lever inside the interlock switch toward the indicator until the actuator is unlocked.



Note: The unlocking method is intended for an escape from a machine when an operator is locked in. For access to the unlocking entry, an access hole is needed in the mounting panel. When opening the hole, apply proper protection against water or other foreign objects.

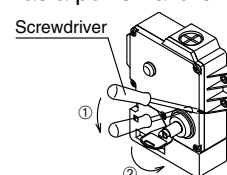
Caution

- For manual unlock type, make sure that the machine has come to a complete stop before unlocking the interlock switch manually. Manual unlocking during machine operation loses the function of solenoid lock interlock switch.

Manual Unlocking by Hostage Key (HS1E-K)

The HS1E-K has a hostage key for manual unlocking of the actuator to precheck proper entry of the actuator into the slot as well as for emergency use such as a power failure.

- Remove the screw located on the front of the interlock switch using the special wrench supplied with the interlock switch. Insert a small screwdriver into the hole to push the lever inside the interlock switch away from the hostage key until the key is unlocked.
- Turn the hostage key to UNLOCK side to unlock the actuator as shown on the right.



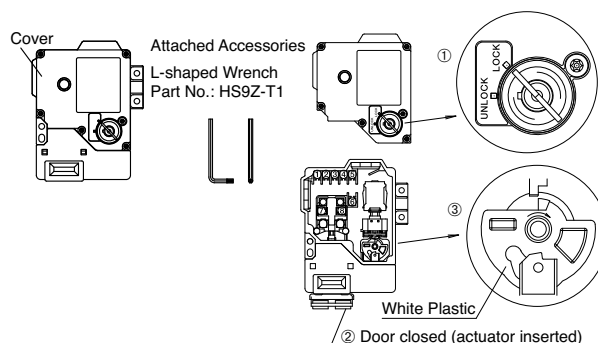
Note: Before manually unlocking the interlock switch, make sure that the machine has come to a complete stop. Manual unlocking during operation may unlock the interlock switch before the machine stops, and the function of interlock switch is lost. After unlocking, install the screw.

Opening/Closing the Cover (HS1E-K)



For safety, make sure that the power is turned off before opening or closing the cover.

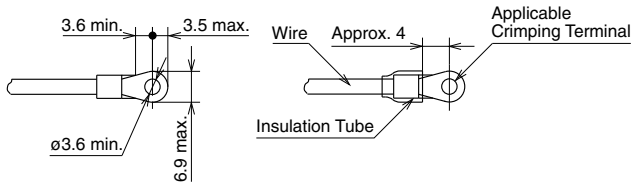
- When opening the interlock switch cover, remove the screws of the cover only. Do not remove other screws, otherwise failure of interlock switch will be caused.
- The cover uses special screws which cannot be removed or tightened by general drivers. Use the special wrench supplied with the interlock switch.
- When wiring, make sure that any liquid such as water and oil does not enter the interlock switch.
- Close the cover in the following method.
 - Turn the key to LOCK position.
 - Close the door (actuator is inserted).
 - Turn the white plastic part in the interlock switch clockwise until the plastic part comes to the position shown in the figure below.
 - Close the cover and tighten the screws to the appropriate torque.



HS1E Interlock Switches with Solenoid (3-circuit)

Instructions

Applicable Crimping Terminal



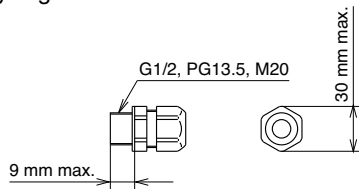
- Use an insulation tube on the crimping terminal.
- When using stranded wires, make sure that loose wires do not cause short circuit. Also, do not solder the terminal to prevent loose wires.

Applicable Wire Size

- 0.5 to 1.25 mm²

Applicable Cable Glands

- Use IP67 cable gland. When using M20-size cable gland, use locking ring HW9Z-NM20.



When Using Flexible Conduits (Example)

- Flexible conduit example: VF-03 (Nihon Flex)

Conduit Port Size	Plastic Cable Gland	Metal Cable Gland
G1/2	—	RLC-103 (Nihon Flex)
PG13.5	—	RBC-103PG13.5 (Nihon Flex)
M20 (Note 1)	—	RLC-103EC20 (Nihon Flex)

When Using Multi-core Cables (Example)

Conduit Port Size	Plastic Cable Gland	Metal Cable Gland
G1/2	SCS-10* (Seiwa Electric)	ALS-16** (Nihon Flex)
PG13.5	ST13.5 (K-MECS)	ABS-***PG13.5 (Nihon Flex)
M20 (Note 1)	ST-M20X1.5 (K-MECS) (Note 2)	ALS-***EC20 (Nihon Flex)

- Different cable glands are used depending on the cable sheath outside diameter. When purchasing a cable gland, confirm that the cable gland is applicable to the cable sheath outside diameter.

Note 1: When using M20 cable gland, order HW9Z-NM20 locking ring and replace with the locking ring installed in the HS1E interlock switch.

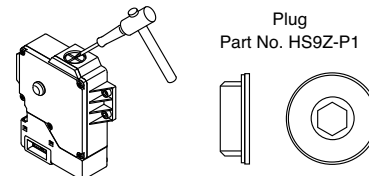
Note 2: When using ST-M20X1.5 cable gland, use together with a gasket (Part No.: GPM20, K-MECS).

Recommended Tightening Torque of Mounting Screws

- Interlock switch: 3.2 to 3.8 N·m (three M5 screws)
- Lid mounting screw: 0.9 to 1.1 N·m (M4 screw)
- Terminal screw: 0.9 to 1.1 N·m (M3.5 screw)
- Connector: 2.7 to 3.3 N·m
- Actuators
 - HS9Z-A3S: 4.5 to 5.5 N·m (two M6 screws)
 - HS9Z-A1S/A2S: 2.7 to 3.3 N·m (two M5 screws)
- Mounting bolts must be provided by users.
- The above recommended tightening torques of the mounting screws are the values confirmed with hex socket head bolts. When other screws are used and tightened to a smaller torque, make sure that the screws do not come loose after mounting.
- Mounting bolts must be provided by the users.
- To avoid unauthorized or unintended removal of the interlock switch and the actuator, it is recommended that the interlock switch and the actuator be installed in an unremovable manner, for example using special screws or welding the screws.

Conduit Port Opening

- Make an opening for wire connection by breaking one of the conduit-port knockouts on the interlock switch housing using a screwdriver.
- When breaking the conduit port, take care not to damage the contact block or other parts inside the interlock 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 (Part No.: HS9Z-P1).



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References