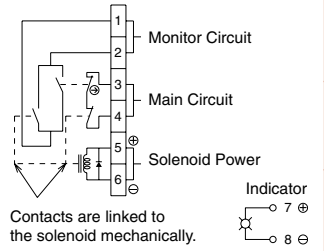
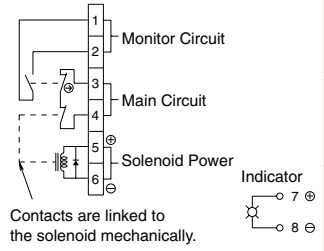
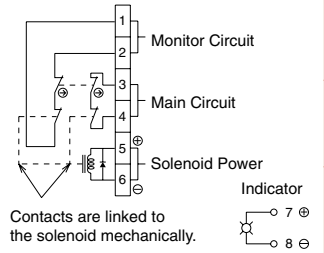
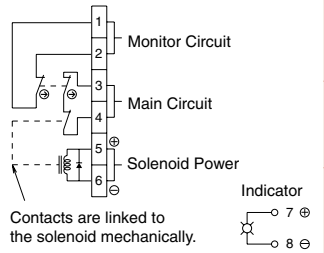
HS1E Full Size Solenoid Locking Switches

Key features:

- Plastic Housing: Lightweight
- 1500N locking retention force
- Available with a red or green indicator
- Choose from 4 circuit configurations
- Flexible Installation: The actuator can be accessed from two directions
- Ease of Wiring: M3.5 termination screws

Part Numbers (Mechanical Spring Lock Only)

Contact Configuration		LED	Standard	Manual Unlock Key
Main circuit: 1NC + 1NC Monitor circuit: 1NO/1NO		None	HS1E-40R	HS1E-40KR
		Green	HS1E-44R-G	HS1E-44KR-G
		Red	HS1E-44R-R	HS1E-44KR-R
Main circuit: 1NC + 1NC Monitor circuit: 1NO		None	HS1E-140R	HS1E-140KR
		Green	HS1E-144R-G	HS1E-144KR-G
		Red	HS1E-144R-R	HS1E-144KR-R
Main circuit: 1NC + 1NC Monitor circuit: 1NC + 1NC		None	HS1E-240R	HS1E-240KR
		Green	HS1E-244R-G	HS1E-244KR-G
		Red	HS1E-244R-R	HS1E-244KR-R
Main circuit: 1NC + 1NC Monitor circuit: 1NC		None	HS1E-340R	HS1E-340KR
		Green	HS1E-344R-G	HS1E-344KR-G
		Red	HS1E-344R-R	HS1E-344KR-R

1. Key wrench for TORX screws (HS9Z-T1) is supplied with the interlock switch.
2. Actuator is not supplied with the interlock switch, and must be ordered separately.
3. TORX is a registered trademark of Camcar Textron.

Actuator Keys & Accessories

Appearance	Part Number	Description
	HS9Z-A1	Straight Actuator
	HS9Z-A2	Right-angle Actuator
	HS9Z-A3	Adjustable Actuator
	HS9Z-T1	Key Wrench (included with switch)
	HS9Z-P1	Conduit Opening Plug (G1/2)

Specifications

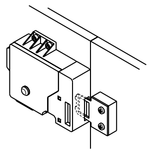
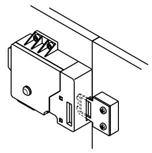
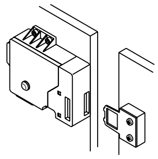
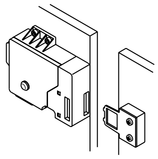
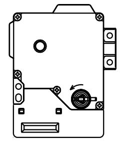
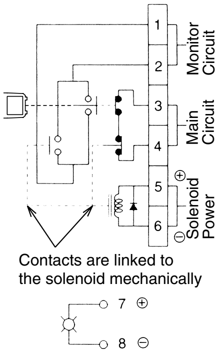
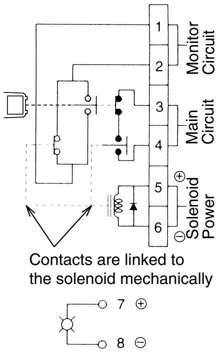
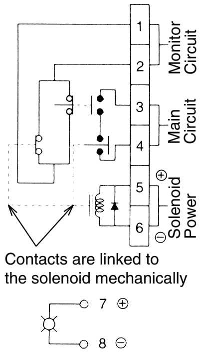
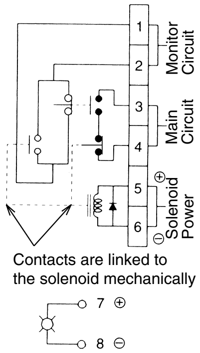
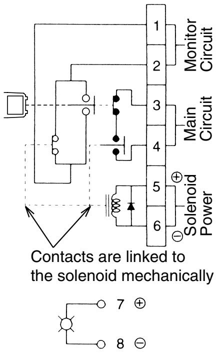
Conforming to Standards		EN1088, IEC60947-5-1, EN60947-5-1(TUV), ISO14119, GS-ET-19 (BG), UL508, CSA C22.2 No. 14, GB14048.5 (CCC approval), IEC60204-1, EN60204-1 (applicable standards for use)
Operating Temperature		–20 to +40°C (no freezing)
Storage Temperature		–40 to +80°C
Relative Humidity		40 - 85% RH (no condensation)
Altitude		2,000m maximum
Rated Insulation Voltage (Ui)		300V (between LED or solenoid and ground: 60V)
Impulse Withstand Voltage (Uimp)		4 kV (between LED or solenoid and ground: 2.5 kV)
Insulation Resistance (measured with 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 (according to IEC61140)
Pollution Degree		3 (IEC60947-5-1)
Degree of Protection		IP67 (IEC60529)
Vibration Resistance	Operating Extremes	10 to 55 Hz, minimum (amplitude 0.35 mm)
	Damage Limits	50 m/sec^2 (approx. 5G)
Shock Resistance		1,000 m/sec^2 (approx. 100G)
Actuator Retention Force		1,500N minimum (per GS-ET-19)
Actuator Operating Speed		0.05 to 1.0m/s
Direct Opening Travel		11mm minimum
Direct Opening Force		20N minimum
Thermal Current (I_{th})		Main circuit: 10A, Auxiliary circuit: 3A
Contact Gap		Main circuit: 1.7 mm min., Auxiliary circuit: 1.2 mm min.
Operating Frequency		900 operations/hour max.
Mechanical Life		1,000,000 operations min. (at full rated load) 900 ops/hr (AC-12/250V, 6A)
Electrical Life		100,000 operations (rated load)
Conditional Short-circuit Current		100A (per IEC60947-5-1)
Recommended Short Circuit Protection		250V, 10A fuse (Type D01 based on IEC60269-1, 60269-2)
Solenoid Unit	Operating Voltage	24V DC
	Current	292mA (initial value)
	Coil Resistance	102Ω (at 20°C)
	Pickup Voltage	20.4V maximum (at 20°C)
	Drop Out Voltage	2.4V minimum (at 20°C)
	Allowable Voltage	26.4V max (continuous)
	Insulation Class	Class F
Indicator	Operating Voltage	24V DC
	Current	10mA
	Light Source	LED lamp
	Lens Color	Red or Green
Weight (approx.)		500g

Contact Ratings

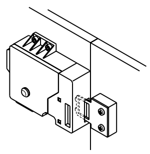
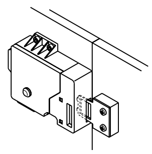
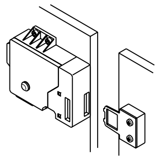
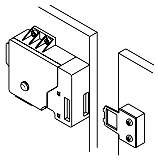
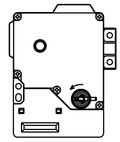
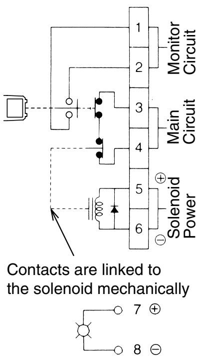
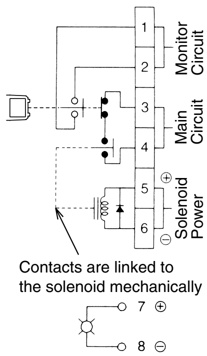
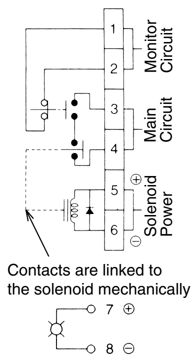
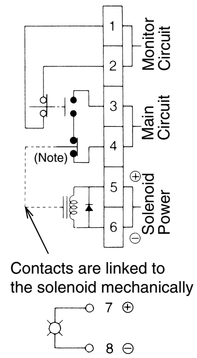
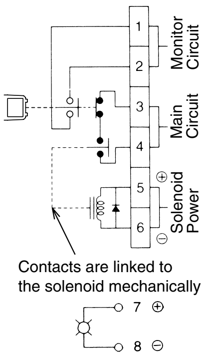
				Operating Voltage (Ue)	30V	125V	250V
Rated Operating Current (Ie)	Main Circuit	AC	Resistive load (AC12)		10A	10A	6A
			Inductive load (AC15)		10A	5A	3A
		DC	Resistive load (DC12)		6A	–	–
			Inductive load (DC13)		3A	0.9A	–
	Auxiliary Circuit	AC	Resistive load (AC12)		–	3A	3A
			Inductive load (AC15)		–	–	3A
		DC	Resistive load (DC12)		3A	–	–
			Inductive load (DC13)		–	0.9A	–

Application Examples and Circuit Diagrams

HS1E-4 (Main Circuit: 1NC-1NC, Auxiliary Circuit: 1NO/1NO)

	Status 1	Status 2	Status 3	Status 4	Unlocked Manually
Switch/Door Status	Door Closed Machine ready to operate Solenoid de-energized	Door Closed Machine cannot be started Solenoid de-energized	Door Opened Machine cannot be started Solenoid de-energized	Door Opened Machine cannot be started Solenoid de-energized	Door Closed Machine cannot be started Solenoid de-energized
Door					
Circuit Diagram					
Main Circuit	3-4: Closed	3-4: Open	3-4: Open	3-4: Closed	3-4: Open
Aux. Circuit	1-2: Open	1-2: Closed	1-2: Closed	1-2: Closed	1-2: Closed
Solenoid	5-6: Power OFF	5-6: Power ON	5-6: Power ON	5-6: Power OFF	5-6: Power OFF

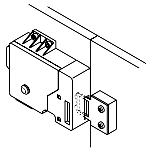
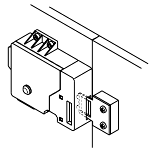
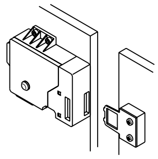
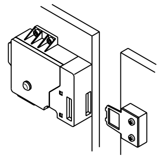
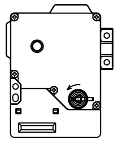
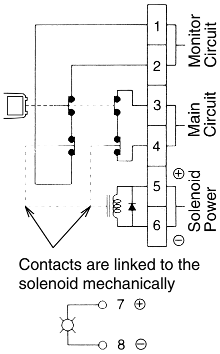
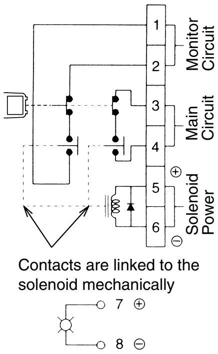
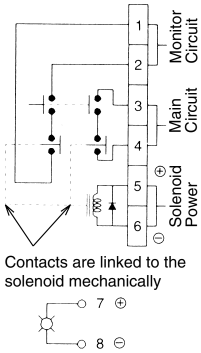
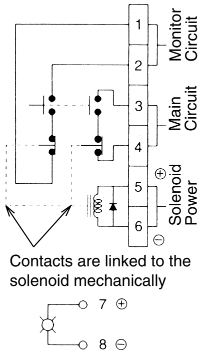
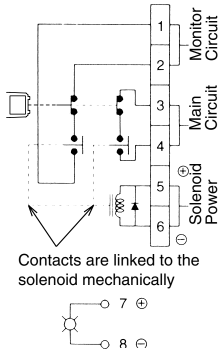
HS1E-14 (Main Circuit: 1NC-1NC, Auxiliary Circuit: 1NO)

	Status 1	Status 2	Status 3	Status 4	Unlocked Manually
Switch/Door Status	Door Closed Machine ready to operate Solenoid de-energized	Door Closed Machine cannot be started Solenoid energized	Door Opened Machine cannot be started Solenoid energized	Door Opened Machine cannot be started Solenoid de-energized	Door Closed Machine cannot be started Solenoid de-energized
Door					
Circuit Diagram					
Main Circuit	3-4: Closed	3-4: Open	3-4: Open	3-4: Open	3-4: Open
Aux. Circuit	1-2: Open	1-2: Open	1-2: Closed	1-2: Closed	1-2: Open
Solenoid	5-6: Power OFF	5-6: Power ON	5-6: Power ON	5-6: Power OFF	5-6: Power OFF

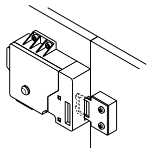
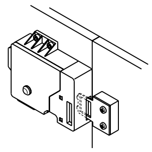
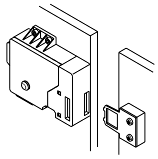
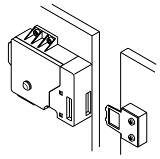
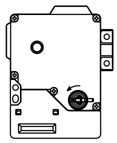
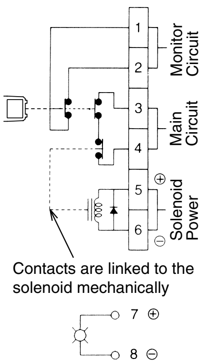
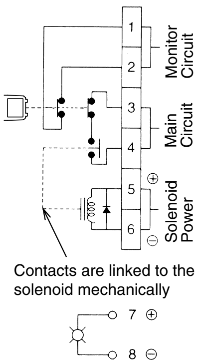
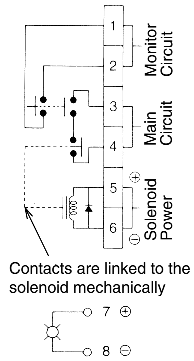
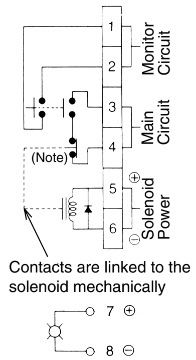
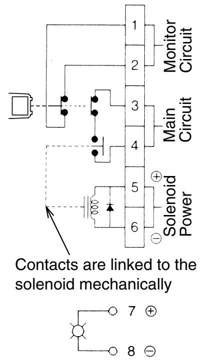
1. Main Circuit: used to enable the machine to start only when the main circuit is closed.
2. Auxiliary Circuit: used to indicate whether the machine circuit or door is open or closed.
3. Terminals 7 and 8 are used for the LED indicator, and are isolated from solenoid and door status.

Application Examples and Circuit Diagrams, continued

HS1E-24 (Main Circuit: 1NC+1NC, Auxiliary Circuit: 1NC+NC)

	Status 1	Status 2	Status 3	Status 4	Unlocked Manually
Switch/Door Status	Door Closed Machine ready to operate Solenoid de-energized	Door Closed Machine cannot be started Solenoid energized	Door Opened Machine cannot be started Solenoid energized	Door Opened Machine cannot be started Solenoid de-energized	Door Closed Machine cannot be started Solenoid de-energized
Door					
Circuit Diagram					
Main Circuit	3-4: Closed	3-4: Open	3-4: Open	3-4: Open	3-4: Open
Aux. Circuit	1-2: Closed	1-2: Open	1-2: Open	1-2: Open	1-2: Open
Solenoid	5-6: Power OFF	5-6: Power ON	5-6: Power ON	5-6: Power OFF	5-6: Power OFF

HS1E-34 (Main Circuit: 1NC+1NC, Auxiliary Circuit: 1NC)

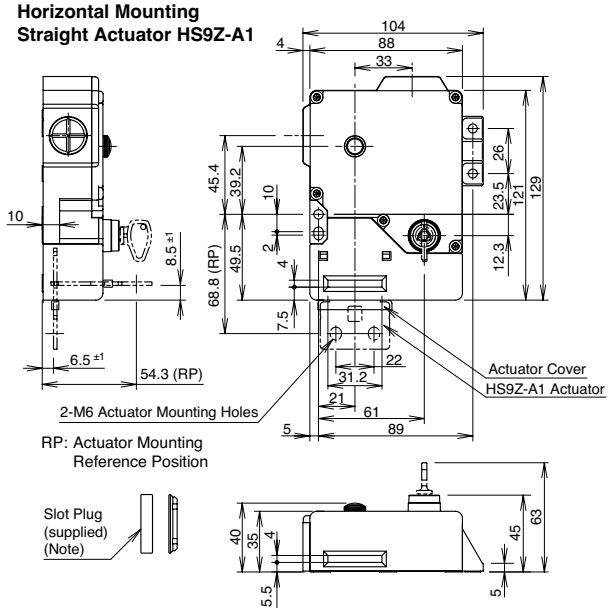
	Status 1	Status 2	Status 3	Status 4	Unlocked Manually
Switch/Door Status	Door Closed Machine ready to operate Solenoid de-energized	Door Closed Machine cannot be started Solenoid energized	Door Opened Machine cannot be started Solenoid energized	Door Opened Machine cannot be started Solenoid de-energized	Door Closed Machine cannot be started Solenoid de-energized
Door					
Circuit Diagram					
Main Circuit	3-4: Closed	3-4: Open	3-4: Open	3-4: Open	3-4: Open
Aux. Circuit	1-2: Closed	1-2: Closed	1-2: Open	1-2: Open	1-2: Closed
Solenoid	5-6: Power OFF	5-6: Power ON	5-6: Power ON	5-6: Power OFF	5-6: Power OFF

1. Main Circuit: used to enable the machine to start only when the main circuit is closed.
2. Auxiliary Circuit: used to indicate whether the machine circuit or door is open or closed.
3. Terminals 7 and 8 are used for the LED indicator, and are isolated from solenoid or door status.

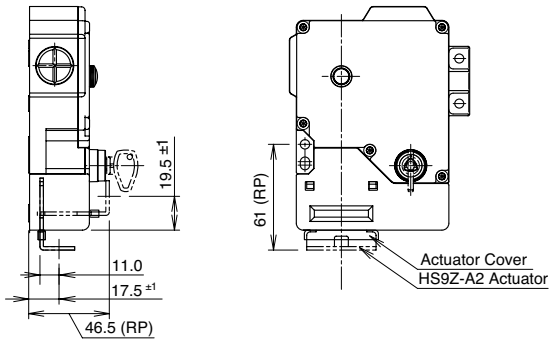
Dimensions (mm)

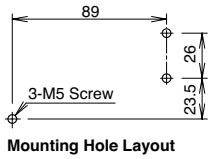
HS1E with indicator - using 1500N operating force

Horizontal Mounting
Straight Actuator HS9Z-A1



Vertical Mounting
Right-angle Actuator HS9Z-A2



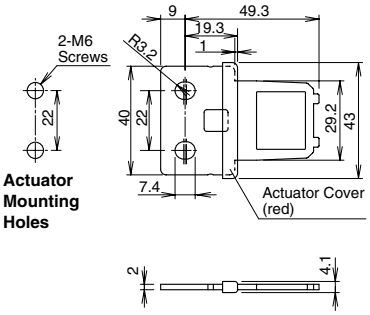


Mounting Hole Layout

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

Accessories

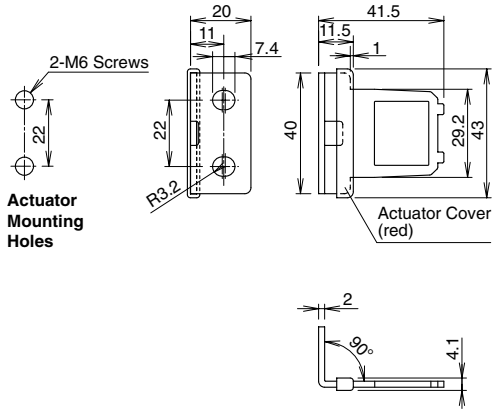
Straight Actuator (mainly for sliding doors) HS9Z-A1



Actuator Mounting Holes

Right-angle Actuator (mainly for hinged doors) HS9Z-A2

*After installing the actuator, remove the actuator cover.

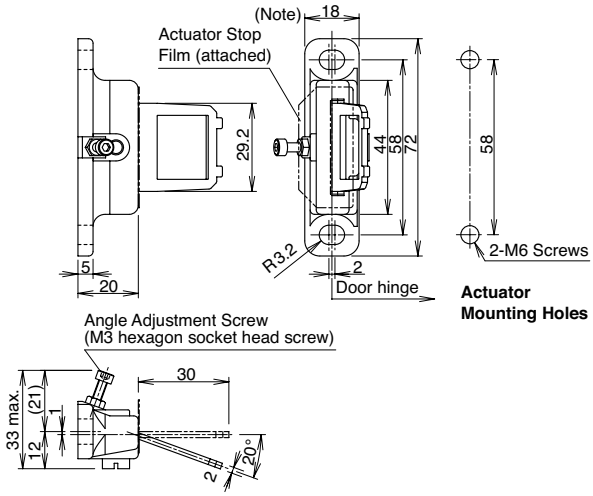


Actuator Mounting Holes

Adjustable Actuator

- The actuator angle is adjustable (0° to 20°) for hinged doors.
- The minimum radius of the door opening can be as small as 100mm.

For HS1/HS2 Series (HS9Z-A3)



All dimensions in mm.

Accessories, continued

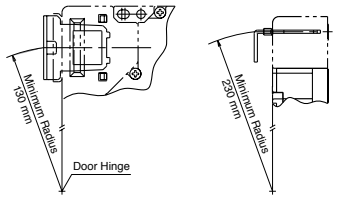
Minimum Radius of Hinged Door

- 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 (HS9ZA3 or HS9Z-A3S).

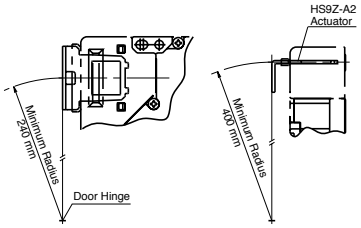
  Note: Because deviation or dislocation of hinged door may occur in actual applications, make sure of the correct operation before installation.

HS9Z-A2 Actuator

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

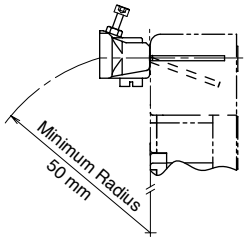


- When the door hinge is on the extension line of the actuator mounting surface:



When using the HS9Z-A3 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: