

## 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

### 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)

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. Manual unlock key is included with the interlock switch.
4. TORX is a registered trademark of Camcar Textron.

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**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 <sup>2</sup> (approx. 5G)
Shock Resistance	1,000 m/sec <sup>2</sup> (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 <sub>th</sub> )	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) Inductive load (AC15)	10A 10A	10A 5A	6A 3A
		DC Resistive load (DC12) Inductive load (DC13)	6A 3A	- 0.9A	- -
	Auxiliary Circuit	AC Resistive load (AC12) Inductive load (AC15)	- -	3A -	3A 3A
		DC Resistive load (DC12) Inductive load (DC13)	3A -	- 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 energized	Door Opened Machine cannot be started Solenoid de-energized	Door Closed Machine cannot be started Solenoid de-energized
Door					
Circuit Diagram	 Contacts are linked to the solenoid mechanically	 Contacts are linked to the solenoid mechanically	 Contacts are linked to the solenoid mechanically	 Contacts are linked to the solenoid mechanically	 Contacts are linked to the solenoid mechanically
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	 Contacts are linked to the solenoid mechanically	 Contacts are linked to the solenoid mechanically	 Contacts are linked to the solenoid mechanically	 Contacts are linked to the solenoid mechanically (Note)	 Contacts are linked to the solenoid mechanically
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.

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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	 Contacts are linked to the solenoid mechanically	 Contacts are linked to the solenoid mechanically	 Contacts are linked to the solenoid mechanically	 Contacts are linked to the solenoid mechanically	 Contacts are linked to the solenoid mechanically
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	 Contacts are linked to the solenoid mechanically	 Contacts are linked to the solenoid mechanically	 Contacts are linked to the solenoid mechanically	 Contacts are linked to the solenoid mechanically (Note)	 Contacts are linked to the solenoid mechanically
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.

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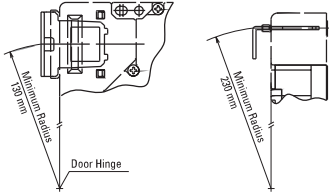


- When using the interlock switch for a hinged door, refer to the minimum radius of doors shown below. For the doors with small minimum radius, use angle adjustable actuators (HS9ZA3 or HS9Z-A3S).

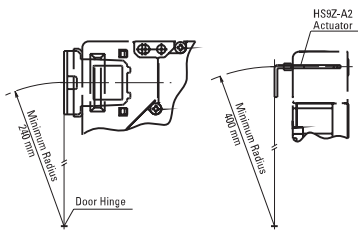
Note: Because deviation or dislocation of hinged door may occur in actual applications, make sure of the correct operation before installation.

**HS9Z-A2 Actuator**

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

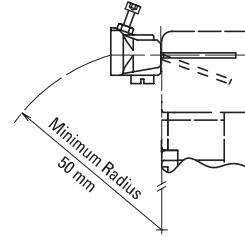


- When the door hinge is on the extension line of the actuator mounting surface:



**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:

