B-768(4)



## INSTRUCTION SHEET

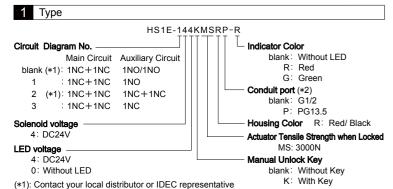
**HS1E Safety Switch** 



Confirm that the delivered product is what you have ordered. Read this instruction sheet to make sure of correct operation. Make sure that the instruction sheet is kept by the end user.

SAFETY NOTE

Caution notices are used where inattention might cause personal injury or damage to equipment.



(\*2): When using M20 conduit port, use with HW9Z-NM20 connector locking ring sold separately.

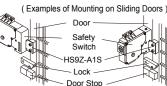
#### 2 Specifications and Ratings

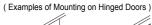
Z Specific	alion	s and Raings								
Applicable Standards			ISO14119, EN1088							
			IEC60947-5-1, EN60947-5-1							
			GS-ET-19, UL508, CSA C22.2 No.14, GB 14048. 5							
Standards for Use			IEC60204-1/EN60204-1							
Applicable Directives			89/392/EEC(Machine Directive)							
F.F			73/23/EEC(Low voltage Derective)							
Operating	ating Temperature	-25 to +40°C (no freezing)								
Condition	Operating Humidity 45 to 85% (no condensation)									
	Stora	ge Temperature	-40 to +80°C (no freezing)							
Pollution Degree 3										
Thermal Curre	Thermal Current <ith></ith>			Main Circuit: 10A, Auxiliary Circuit: 3A						
Contact Rating	S		30V 125V 250							
(Reference Va	( Reference Values )				Resistive load(AC-12)		10A	6A		
< Ue , le >			Main	С	Inductive load(AC-15)	10A	5A	3A		
			Circuit	D	Resistive load(DC-12)	6A	-	-		
				C	Inductive load(DC-13)	3A	0.9A	-		
				Α	Resistive load(AC-12)	-	3A	3A		
			Auxiliary	С	Inductive load(AC-15)	-	-	3A		
			Circuit	D	Resistive load(DC-12)	3A	-	-		
				С	Inductive load(DC-13)	-	0.9A	-		
Electric Shock	Electric Shock Protection Class			Class II 📵						
Degree of Prot	Degree of Protection			IP67(IEC60529)						
Vibration Resis	tance	Damage Limits	1000m/s <sup>2</sup>							
Shock		Operating Extremes	10 to 55	Hz	, half amplitude 0.35 m	nm				
Resistance		Damage Limits	30 Hz, h	alf	amplitude 1.5 mm					
Operating Free	Operating Frequency			900 operations/hour						
Operating Speed			0.05 to 1.0 m/s							
	Actuator Tensile Strength when Locked			Bottom slot: 3000N min., Front slot: 2800N min. (GS-ET-19						
Direct Opening			11mm minimum							
	Direct Opening Force			20N minimum						
	Contact Resistance			100m Ω maximum (Initial value)						
	Short-circuit protective device			250V, 10A fast acting type fuse						
	Solenoid Rated Operating Voltage			24VDC 100%ED						
Solenoid Rated Current			292mA							
Solenoid Turn ON Voltage			Rated Voltage × 85% maximum (at 20°C)							
Solenoid Turn OFF Voltage			Rated Voltage × 10% minimum (at 20°C)							
Solenoid Rated Power Consumption			Approx. 7W							
Illuminated Part Rated Operating Voltage			24VDC							
Illuminated Part Rated Current			10mA							
Illuminated Part Light Source			LED lamp							
Lens Color			R(Red), G(Green) ( $\phi$ 12 Lens)							
Weight			Approx. 500g							

### 3 Mounting

- Mount the safety switch on the equipment body.
- · Mount the actuator on the door.

See the figure below







#### 4 Notes for Operation

- Regardless of door types, do not use the safety switch as a door stop. Install a mechanical door stop at the end of the door to protect the safety switch against an excessive force.
- Do not apply an excessive shock to the safety switch when opening or closing the door. A shock to the safety switch exceeding 1,000 m/s<sup>2</sup> may cause failure
- Regardless of door types,do not use the safety switch as a door lock.
- Install a separated lock as shown in item 3.
- When opening the safety switch lid to wire, open the lid (a) only. (See the figure on the right.)
- Never remove other screws, otherwise the safety switch may be damaged.
- The safety switch cover can be only removed or installed with the special I -shaped wrench supplied with the safety switch · Avoid foreign objects such as dust, liquid and oil from entering the safety
- switch while connecting a conduit or wiring. Entry of foreign objects in the actuator entry slot may affect the mechanism of the safety switch and cause a breakdown. If the operating atmosphere is contaminated,use a protective cover to prevent the entry of foreign objects into the safety switch through the actuator entry slots.
- Do not touch the solenoid while it is being energized, otherwise burning on hand will be caused (coil temperature rises up to approx. 100 degree C). Use heat-resistant wire when the solenoid touches wires.
- Use only the designated actuator for the HS1E.
- Other actuators will cause a breakdown of the safety switch.

- Turn off the power to the safety switch before starting installation, removal, wiring, maintenance, and inspection on the safety switch. Failure to turn power off may cause electrical shocks or fire hazard.
- · Use wires of a proper size to meet voltage and current requirements. Tighten the terminal screws to a recommended tightening torque of 0.9 to 1.1N·m. Loose terminal screws will cause unexpected heating and fire hazard during operation.
- Do not instal the actuator in the location where the human body may come into contact. Otherewise injury may occur.
- Pay attention to the management of spare actuator. Safety function of safety switch will be lost. in case the spare actuator is inserted into the safety switch.
- Ensure that the actuator is firmly fastened to the door (welding, rivet, special screw) in the appropriate location, so that the actuator cannot be removed easily

#### Manual Unlocking

- The HS1E allows manual unlocking of the key to precheck door operation before wiring or turning on power, as well as for emergency use such as a power failure. (Unlocking Method)

 HS1E with manual unlock key To change the normal position to the manual UNI OCK unlocking position as shown on the right, turn the key fully (90 degrees) using the red plastic key included with the safety switch. Using the safety switch with the key being not fully turned(less than 90 degrees) may cause damage to the safety switch or errors. (note: when manually unlocked, the safety switch will

keep the main circuit disconnected and the door unlocked.) Do not attach the key to the safety switch intentionally (the key is designed to fall off when the operator's hand is off the key). In such case, safety standards become unapplied because the safety switch can be always unlocked during machine operation, and therefore will give hazardous conditions to workers.

 HS1F without manual unlock key Remove the screw at the side of the safety switch using the wrench

for mounting the HS1E lid. Push the lever inside the safety switch toward the pilot light using a small screwdriver until the actuator is unlocked. See the figure on the right.

Insert a small screwdriver form the hole of the reverse side of the safety switch. Push the pin inside the safety switch toward the pilot light using a small screwdriver until the actuator is unlocked. See the figure on the right. A hole for the lever should be opened on the mounting panel. When opening the hole,apply proper protection against water and other foreign objects.

# ⊗ ⊗

UNLOCK

#### **∴** CAUTION

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

## 5 Adjustments

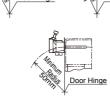
### Minimum Radius of Hinged Door

When using the safety switch for a hinged door, the minimum radius of the applicable door is shown in the following figures.

When the center of the hinged door is on the extension line of the actuator mounting surfase. · L-shaped actuator: HS9Z-A2S

/hen the center of the hinged door is on \ the extension line of the contact surface of actuator and safety switch.



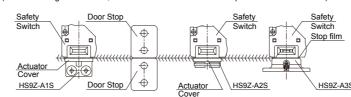


Note: The figures shown above are based on the condition that the actuator enters and exits the actuator entry slot smoothry when the door is closed or opened. Since there may be deviation or dislocation of the hinged door, make sure of correct operation in the actual application before installation.

Door Hinge

#### Actuator Mounting Reference Position

· As shown below, the mounting reference position of the actuator inserted into the safety switch is the actuator cover or stop film touches the safety switch lightly (After mounting the actuator, remove the actuator cover or stop film from the actuator.)



#### **Actuator Mounting Tolerance**

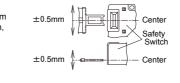
<u>`</u>0,

L-shaped wrench

safety switch

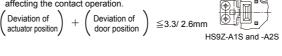
Type: HS9Z-T1

Mounting tolerance of the actuator is 0.5mm from the center of the actuator to up, down, right, and, left,

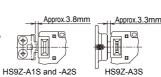


· Actuator can move

3.3mm (HS9Z-A1S and -A2S)/ 2.6mm (HS9Z-A3S) from the mounting reference position without affecting the contact operation



· When closing the door, the actuator is inserted and locked within approx. 3.8mm (HS9Z-A1S and -A2S)/ 3.3mm (HS9Z-A3S) from the mounting reference



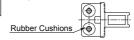
HS9Z-A3S

#### Recommended Screw Tightening Torque

reconlinenced corew rightening rorque						
	Screw Tightening Torque					
For mounting the safety switch (M5 screw) *3	3.2 to 3.8 N⋅m					
For mounting the actuator						
HS9Z-A1S, HS9Z-A2S (M5 screw) *3, *4	2.7 to 3.3 N⋅m					
HS9Z-A3S (M6 screw)	4.5 to 5.5 N⋅m					
For mounting the lid (M4)	0.9 to 1.1 N⋅m					
Terminal screw (M3.5)	0.9 to 1.1 N·m					
Connector (G1/2)	2.7 to 3.3 N⋅m					
Angle adjusting screw of HS9Z-A3S (M3 Hexagon Socket Head Screw)	0.8 N·m					

\*3: The recommended tightening torques of the mounting screw 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 become loose after mounting.

\*4: When rubber cushions (and spacers) are not used, use M6 screws and tighten to a torque of 4.5 to 5.5 N·m.



#### Opening the Connector Hole

Circuit Configuration

- · Break a desired knockout to mount a connector using a hammer and
- Remove the connector lock nut from inside the safety switch before breaking the knockout to open a connector hole.
- · When breaking the knockout to open a connector hole, be careful not to damage the internal contact block.

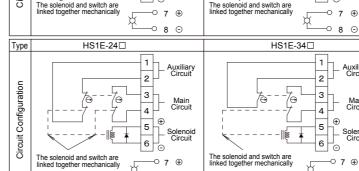
Note: Cracks or burrs on the connector hole will degrade the waterproof characteristics

## Adjusting the Angle Adjustable Actuator (HS9Z-A3S)

- the actuator angle can be adjusted up to 20°
- After installing the actuator, open the door. Then adjust the actuator angle so that the actuator enters the entry slot of the safety switch properly.

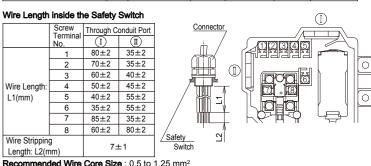
# · Using the angle adjusting screw (M3 hexagon socket head screw), The larger the actuator angle, the smaller the applicable radius of the door swing. · After adjusting the actuator angle, apply loctite or the like on the adjusting screw to prevent loosening. 6 Wiring

# HS1E-14□ Type The solenoid and switch are linked together mechanically

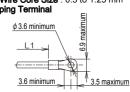


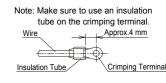
#### Operation Cycle

Doo	r States	Closed			Closed		Open		
Туре	Main Circuit	•3-4 :	Closed	•3-4 :	Open	• 3-4 :	Open		
HS1E-4□	Auxiliary Circuit	•1-2 :	Open	•1-2:	Closed	• 1-2 :	Closed		
	Solenoid Power	•5-6 :	Off	•5-6 :	On	• 5-6 :	Off / On		
Туре	Main Circuit	•3-4 :	Closed	•3-4 :	Open	• 3-4 :	Open		
HS1E-14□	Auxiliary Circuit	•1-2:	Open	•1-2:	Open	• 1-2 :	Closed		
	Solenoid Power	•5-6 :	Off	•5-6:	On	• 5-6 :	Off / On		
Type HS1E-24□	Main Circuit	•3-4 :	Closed	•3-4 :	Open	• 3-4 :	Open		
	Auxiliary Circuit	•1-2 :	Closed	•1-2 :	Open	• 1-2 :	Open		
	Solenoid Power	•5-6 :	Off	•5-6:	On	• 5-6 :	Off / On		
Type HS1E-34□	Main Circuit	•3-4 :	Closed	•3-4 :	Open	• 3-4 :	Open		
	Auxiliary Circuit	•1-2 :	Closed	•1-2:	Closed	• 1-2 :	Open		
	Solenoid Power	•5-6 :	Off	•5-6 :	On	• 5-6 :	Off / On		
	Door is locked The machine be operated.		achine can	•The m	unlocked. achine can operated.		achine can		









Conduit Thread

\_ 9 maximum

#### Applicable Connectors

Use a connector with a degree of protection IP67. Applicable connector dimensions: See the figure on the right. When using the M20 connector, replace the locking nut in the safety switch with the connector locking nut (HW9Z-NM20) sold seprately.

· When using flexible conduit and metal connector Applicable Flexible Conduit Example: Type VF-03(made by Nihon Flex) Applicable Metal Connector Example(G1/2): Type RLC-103(made by Nihon Flex) (PG13.5): Type RBC-103PG13.5(made by Nihon Flex) (M20): RLC-103EC20(made by Nihon Flex)

 When using plastic connector, metal connector and multi-core cable (G1/2)Applicable Plastic Connector Example: Type SCS-10□(made by Seiwa Electric) Applicable Metal Connector Example: Type ALS-16□□(made by Nihon Frex) (PG13.5)Applicable Plastic Connector Example: Type ST13.5(made by LAPP)

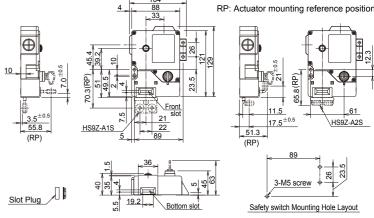
Applicable Metal Connector Example : Type ABS-□□PG13.5(made by Nihon Flex)

(M20)Applicable Plastic Connector Example: ST-M20 × 1.5(made by LAPP) Applicable Metal Connector Example : ALS-□□EC20(made by Nihon Flex) Note: Confirm the outside diameter of the multi-core cable, the connector type depends on

the outside diameter of multi-core cable

Note: When using ST-M20 × 1.5, use with gasket GP-M (Type No: GPM20, made by LAPP).

#### 7 Dimensions



Note: Use the slot plug attached to the safety switch to close the unused actuator entry slot.

#### 8 Precaution for Disposal

Dispose of HS1E Safety Switch as an industrial waste.

## IDEC CORPORATION

http://www.idec.com