

IDEC

INSTRUCTION SHEET

Solenoid Type Safety Switch

HSSE Series

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 PRECAUTIONS

In this operating instruction sheet, safety precautions are categorized to Caution:

CAUTION

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

1. Type

Circuit Code		HSSE-A4L01-G	
Main circuit	Door monitor circuit	Lock monitor circuit	Pilot Light Color
A : 1NC+1NC	1NO	1NO	G: Green
B : 1NC+1NC	1NO	1NC	Cable Length
C : 1NC+1NC	1NC	1NO	O1: 1m
D : 1NC+1NC	1NC	1NC	O3: 3m
F : 1NC+1NC	2NC	-	O5: 5m
G : 1NC+1NC	1NC, 1NO	-	For Rear Unlock
H : 1NC+1NC	-	2NC	Blank: Without Rear Manual Unlock
J : 1NC+1NC	-	1NC, 1NO	L: Push Button
DD: 1NC+1NC	-	-	[K]: Manual Unlock Key
VA: -	1NC, 1NO	1NC, 1NO	Pilot Light
VB: -	1NC, 1NO	2NC	4: With pilot light
VC: -	2NC	1NC, 1NO	0: Without pilot light
VD: -	2NC	2NC	4: 24V DC / Spring Lock
VF: -	3NC	1NC	7Y: 24V DC / Solenoid Lock
VG: -	2NC, 1NO	1NC	
VH: -	1NC	3NC	
VI: -	1NC	2NC, 1NO	Type Nos. in [] are not supplied as standard. Contact IDEC if required.

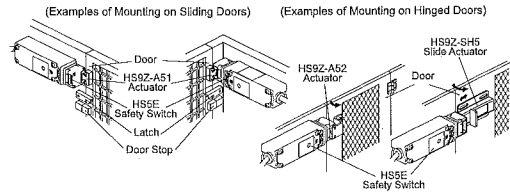
2. Specifications and Ratings

Applicable Standards	ISO14119, EN1088 IEC60947-5-1, EN60947-5-1 CS-E119, UL508, CSA C22.2 No.14, GB 14048.5	
Standards for Use	IEC60204-1/EN60204-1	
Applicable Directives	73/23/EEC (Low Voltage Directive)	
Thermal Current <Ith>	2.5A	
Type HSSE-V	-25°C < Operating temperature < 35°C	
	2.5A (< 2 circuits)	
	1.0A (> 2 circuits)	
Type HSSE-V	35°C < Operating temperature < 50°C	
	1.0A (1 circuit)	
	0.5A (> 2 circuits)	
Contact Ratings	30V 125V 250V	
(Reference Values)	AC Resistive load (AC12) - 2A 1A Inductive load (AC15) - 1A 0.5A DC Resistive load (DC12) 2A 0.4A 0.2A Inductive load (DC15) 1A 0.22A 0.1A	
Class of Protection	Class II (IEC61140) *1 □	
Operating Frequency	900 operations/hour	
Operating Speed	0.05 to 1.0 m/s	
Mechanical durability	1,000,000 operations min. (CS-ET-19) Rear Unlock Button: 3000 operations min. (Type HSSE-LL)	
Actuator Tensile Strength when Locked	1,400N min. (GS-ET-19)*2 (800N min.: HS9Z-A55 actuator)	
Direct Opening Travel	11 mm min. (actuator: HS9Z-A51 ASP) 12 mm min. (for other actuators)	
Direct Opening Force	30N min.	
Contact Resistance	300 mΩ max. (initial value, 1m cable)	
Degree of Protection	IP67 (IEC60529)	
Short-circuit Protective Device	Use 250V / 10A fast acting type fuse	
Rated Operating Voltage	24V DC	
	Rated Current	285 mA (initial value)
	Turn ON Voltage	Rated voltage x 85% max. (at 20°C)
Rated Power Consumption	Approx. 6.4W	
	Rated Operating Voltage	24V DC
	Rated Current	10 mA
Light Source	LED	
Illumination Color	Green	

- Basic insulation of 2.5kV impulse withstand voltage is ensured between different contact circuits and between contact circuits and LED or solenoid in the enclosure. When both SELV (safety extra low voltage) or PELV (protective extra low voltage) circuits and other circuits (such as 230V AC circuits) are used for the solenoid power and contact circuits at the same time, the SELV or PELV requirements are not met any more.
- The actuator locking strength is rated at 1400N of static load. Do not apply a load higher than the rated value. When a higher load is expected to work on the actuator, provide an additional system consisting of another safety switch without lock (such as the HS5B safety switch) or a sensor to detect door opening and stop the machine.

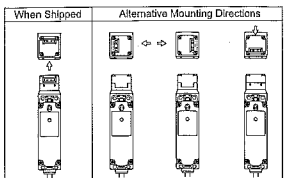
3. Mounting Examples

- Mount the HSSE safety switch on the stationary side.
- Mount the actuator on the moving door.
- See the figures below.



The HSSE Head

- Changing the Mounting Directions of the HSSE Head
- The head of the HSSE can be mounted in four directions by removing the four screws from the corners of the HSSE head.



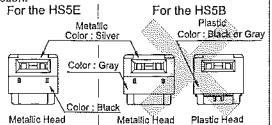
CAUTION

Mounting Directions of the HSSE Head

- Before changing the mounting direction of the HSSE head, turn the manual unlock to UNLOCK using the attached manual unlock key or disconnect wiring from the HSSE.
- If the head position is changed after wiring without taking the above action, the machine may start to operate and the worker may face danger.
- When replacing the HSSE head, make sure that no foreign object enters into the safety switch. Tighten the screws tightly, without leaving space between the head and body, otherwise the safety switch may malfunction.

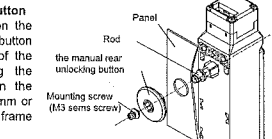
Mounting the Head

- Do not use the metallic or plastic head for the HS5B (without lock type). Be sure to use the head for the HSSE and mount the correct head.
- Take care particularly when using with the HS5B (without lock type).



(Type HSSE-LL)

- Installing the manual rear unlocking button
- After installing the interlock switch on the panel, put the manual rear unlocking button (supplied) on the rod on the back of the interlock switch, and fasten using the mounting screw. When installing on the aluminum frame of the thickness of 6mm or more, use the rear unlocking button for frame kit (HS9Z-FL5L) sold separately.



CAUTION

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

4. Precautions for Operation

- Regardless of door types, do not use the safety switch as a door stop.
- Install a mechanical door stop to the end of the door to protect the safety switch against 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/s² may cause failure.
- Regardless of door types, do not use the safety switch as a door lock. Install a separate lock as shown in 3.
- Do not open the lid of the switch. Loosening the screws may cause damage to the switch. Entry of foreign objects in the actuator entry slot may affect the mechanism of the switch and cause a breakdown. If the operating atmosphere is contaminated, use a protective cover to prevent the entry of foreign objects into the switch through the actuator entry slots.
- While the solenoid is energized, the switch temperature rises approximately 40°C above the ambient temperature (to approximately 90°C while the ambient temperature is 50°C). Keep hands off to prevent burns. If cables come into contact with the switch, use heat-resistant cables.
- Solenoid has polarity. Be sure to wire correctly.
- Do not fasten and loosen the conduit at the bottom of the safety switch.
- When wiring, make sure that liquid such as water and oil does not intrude from the tip of cable.
- When bending the cable during wiring, secure the cable radius of 30 mm at the minimum.
- Use the dedicated actuators only. Other actuators will cause damage to the switch.

CAUTION

- 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.
- Mount the actuator so that it will not hit the operator when the door is open, otherwise injury may be caused.
- Pay attention to the management of spare actuator. Safety function of door interlock switch will be lost in case the spare actuator is inserted into the interlock 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.
- Solenoid lock type
- This safety switch is designed to lock the actuator while the solenoid is energized and to release it when deenergized.
- When the power to the solenoid is interrupted by accident, such as disconnection, the lock is released before a machine stops completely. Then, the worker may be exposed to hazards.
- This safety switch can be used only for limited applications which do not especially need to be locked for safety.

For Manual Unlocking

- (Type HSSE-LL) The HSSE allows manual unlocking of the actuator to precheck proper door operation before wiring or turning power on, as well as for emergency use such as a power failure.
- (Type HSSE-L7Y) If the actuator is not unlocked although the solenoid is deenergized, the actuator can be unlocked manually.
- To change the normal position to the manual unlocking position as shown above, turn the key fully (90 degrees) using the special key included with the switch.
- Using the switch with the key being not fully turned (less than 90 degrees) may cause damage to the switch or errors.
- When manually unlocked, the switch will keep the main and lock monitor circuit disconnected and the door unlocked.
- (Type HSSE-CL) Manual unlocking on the front and rear sides are interlocked. Unlocking status is maintained when either side is unlocked.

CAUTION

- Before manually unlocking the safety switch, make sure the machine has come to a complete stop. Manual unlocking during operation may unlock the switch before the machine stops, and the function of safety switch with solenoid is lost.
- While the solenoid is energized, do not unlock the actuator manually (solenoid lock type).
- Do not apply excessive force (0.45 N·m or more) to the manual unlock key. Otherwise the manual unlock switch will be damaged. Do not attach the key to the switch intentionally (the key is designed to fall off when the operator's hand is off the key).
- Do not leave the manual unlock switch in the switch during operation. This is dangerous because the switch can always be unlocked while the machine is in operation.

(Type HSSE-LL)

- The Rear Unlock Button
- The Rear Unlock Button is used for an emergency escape when the worker is confined in the safety hedge (the dangerous area).
- The lock is released when the Rear Unlock Button is pressed, and the door can be opened.
- To return to locked status, pull back the button. While the Rear Unlock Button is depressed, the main circuit remains open and the door is unlocked.

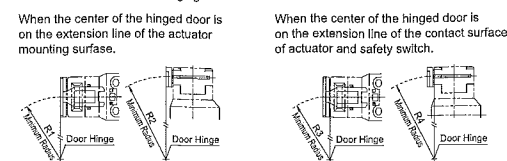
CAUTION

- Install the HSSE to ensure that a worker can operate the Rear Unlock Button from inside the safety hedge (the dangerous area). It is dangerous to install the HSSE in the position where the Rear Unlock Button can be operated from outside the safety hedge (the dangerous area), because it is possible to unlock while the machine is operating.
- Use hand to press the button, and do not use a tool. Do not apply excessive force to the Rear Unlock Button.

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.



Type	Minimum Radius			
	R1	R2	R3	R4
HS9Z-A52	230 mm	260 mm	170 mm	190 mm
HS9Z-A52A	230 mm	260 mm	170 mm	140 mm
HS9Z-A53	80 mm (Vertical Swing)	80 mm (Vertical Swing)	50 mm (Vertical Swing)	50 mm (Vertical Swing)
HS9Z-A55	70 mm (Horizontal Swing)	70 mm (Vertical Swing)	50 mm (Horizontal Swing)	50 mm (Vertical Swing)

CAUTION

- The values shown above are based on the condition that the actuator enters and exits the actuator entry slot smoothly 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.

(Type HS9Z-A53/A55)

- Adjusting the Angle Adjustable (vertical/horizontal) Actuator
- Using the angle adjustment screw (M3 hexagonal socket set screw), the actuator angle can be adjusted up to 20° (refer to dimensions).
- The larger the actuator angle, the smaller the applicable radius of the door swing.
- 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.
- After adjusting the actuator angle, apply loctite or the like on the adjustment screw to prevent loosening.

(Type HS9Z-A53)

- Tightening torque of angle adjustment screw: 0.8 Nm.

(Type HS9Z-A55)

- Use screw locking agent that is compatible with the base material.
- Base: PA66 (66 nylon) of glass reinforced grade
- Angle adjustment screws: stainless steel

6. Contact Operation and Wiring

Contact Configuration and Operation

Type	Contact Configuration	Contact Operation (reference)
HSSE-A*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S3, 54, BN/W	11-12: 42 BU/W 23-24: 54 BN/W 53-54: 54 BN/W
HSSE-B*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S1, 52, BN/W	11-12: 42 BU/W 23-24: 52 BN/W 51-52: 52 BN/W
HSSE-C*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S3, 54, BN/W	11-12: 42 BU/W 23-24: 54 BN/W 53-54: 54 BN/W
HSSE-D*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S1, 52, BN/W	11-12: 42 BU/W 23-24: 52 BN/W 51-52: 52 BN/W
HSSE-F*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S1, 52, BN/W	11-12: 42 BU/W 23-24: 52 BN/W 51-52: 52 BN/W
HSSE-G*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S1, 52, BN/W	11-12: 42 BU/W 23-24: 52 BN/W 51-52: 52 BN/W
HSSE-H*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S1, 52, BN/W	11-12: 42 BU/W 23-24: 52 BN/W 51-52: 52 BN/W
HSSE-I*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S1, 52, BN/W	11-12: 42 BU/W 23-24: 52 BN/W 51-52: 52 BN/W
HSSE-J*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S1, 52, BN/W	11-12: 42 BU/W 23-24: 52 BN/W 51-52: 52 BN/W
HSSE-DD*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S1, 52, BN/W	11-12: 42 BU/W 23-24: 52 BN/W 51-52: 52 BN/W
HSSE-VA*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S1, 52, BN/W	11-12: 42 BU/W 23-24: 52 BN/W 51-52: 52 BN/W
HSSE-VB*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S1, 52, BN/W	11-12: 42 BU/W 23-24: 52 BN/W 51-52: 52 BN/W
HSSE-VC*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S1, 52, BN/W	11-12: 42 BU/W 23-24: 52 BN/W 51-52: 52 BN/W
HSSE-VD*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S1, 52, BN/W	11-12: 42 BU/W 23-24: 52 BN/W 51-52: 52 BN/W
HSSE-VE*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S1, 52, BN/W	11-12: 42 BU/W 23-24: 52 BN/W 51-52: 52 BN/W
HSSE-VF*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S1, 52, BN/W	11-12: 42 BU/W 23-24: 52 BN/W 51-52: 52 BN/W
HSSE-VG*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S1, 52, BN/W	11-12: 42 BU/W 23-24: 52 BN/W 51-52: 52 BN/W
HSSE-VH*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S1, 52, BN/W	11-12: 42 BU/W 23-24: 52 BN/W 51-52: 52 BN/W
HSSE-VI*	Main Circuit: BU G 11, 12, 23, 24, OG/W Monitor Circuit: BN S1, 52, BN/W	11-12: 42 BU/W 23-24: 52 BN/W 51-52: 52 BN/W

Operation Cycle

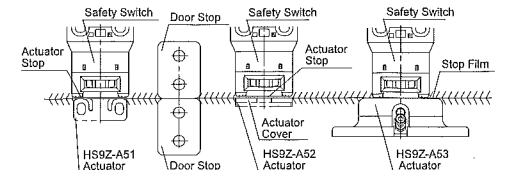
Door States	Spring Lock Type (HSSE-L74)	Solenoid Lock Type (HSSE-L7Y)
Main Circuit	11-12: Closed, 21-22: Closed, 23-24: Open, 31-32: Open	11-12: Closed, 21-22: Closed, 23-24: Open, 31-32: Open
Monitor Circuit	11-12: Closed, 21-22: Closed, 23-24: Open, 31-32: Open	11-12: Closed, 21-22: Closed, 23-24: Open, 31-32: Open
Solenoid Power	A1-A2: Off	A1-A2: Off
Manual Unlock Key / Rear Unlock Button	Turn the key to lock position. / Returned status	Turn the key to lock position. / Returned status
Door is locked. The machine can be operated.	Door is unlocked. The machine can be operated.	Door is unlocked. The machine can be operated.

CAUTION

- Do not attempt manual unlocking when the solenoid is energized.
- Do not energize the solenoid for a long time while the door is open or when the door is unlocked manually.

Actuator Mounting Reference Position

- As shown below, the mounting reference position of the actuator inserted into the safety switch is: (Type HS9Z-A53)
- The actuator stop film placed on the actuator touches the safety switch lightly. (Except Type HS9Z-A53)
- The actuator and actuator cover touches the actuator stop placed on the safety switch lightly. (After mounting the actuator, remove the actuator stop placed on the safety switch.)



Actuator Mounting Tolerance

- Mounting tolerance of the actuator is 1.0 mm in the four lateral directions.
- When closing the door, the actuator is inserted and locked within a certain distance from the reference position. After the actuator has been locked, the contact operation is not affected by the actuator movement in the locked state.

Actuator	(Actuator deviation) + (Door movement)
HS9Z-A51	≤ 3.3mm
HS9Z-A52	≤ 4.6mm
HS9Z-A51A	≤ 4.6mm
HS9Z-A52A	≤ 5.6mm
HS9Z-A53	≤ 4.6mm
HS9Z-A55	≤ 4.6mm

Recommended Screw Tightening Torque

Name or Use	Screw Tightening Torque
For mounting the safety switch (M4 screw) *3	1.8 to 2.2 N·m
For mounting the actuator (HS9Z-A51: two M4 screws) *3	1.8 to 2.2 N·m
(HS9Z-A52: two M4 Phillips screws)	0.8 to 1.2 N·m
(HS9Z-A51/A52A: two M4 screws) *3	1.0 to 1.5 N·m
(HS9Z-A53: two M6 screws) *3	4.5 to 5.5 N·m
(HS9Z-A55: two M4 screws) *3	1.0 to 1.5 N·m
For mounting the HSSE head (M3)	0.9 to 1.1 N·m
For mounting the manual rear unlocking button (M3 semi screw)	0.5 to 0.7 N·m

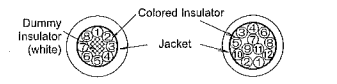
CAUTION

- *3: 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.

Wiring

- Cable specifications UL style 2464 (80°C 300V)
- (Type HSSE-CL, DD) 8c × No.21 AWG
- (Type HSSE-VL) 12c × No.22 AWG

- Wires are identified by the color and white line printed on the wire.
- (Type HSSE-VL) Do not use wire which is Gray, Gray / White.
- (Type HSSE-DD) Do not use wire which is Brown, Brown / White.
- (Type HSSE-CL, HSSE-DD) (Type HSSE-VL)



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

Terminal Number Identification

- When wiring, the terminal number on each contact is identified by wire color.
- The following shows the identification of terminal number
- When wiring, cut unnecessary wires such as dummy insulator (white) and/or unused wires to avoid incorrect wiring.
- (Type HSSE-VL) Blue/White is circuit No. 12.
- (Type HSSE-DD) Orange/White is circuit No. 52.

Circuit No.	Insulator Color
11	Blue
(12), 41	Blue / White
21, 22, 51, 63	Orange
22, 24, (52), 62, 64	Orange / White
31, 33, 51, 53	Brown
32, 34, 52, 54	Brown / White
41	Pink
42	Pink / White
A1 (-)	Black
A2 (+)	White

7. Dimensions and Mounting (mm)

