IDEC

INSTRUCTION SHEET
Original Instructions
Solenoid Type Safety Switch
HS6E Series

(Main circuit・Door monitor circuit)

* In order to verify if the product you are interested in is certified with the S mark, please check the following section on our website: "List of type numbers certified with the S mark"

Confirm that the delivered product is what you have ordered. Read his instruction sheet to make sure of correct operation.

SAFETY PRECAUTIONS

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

⚠ WARNING

Warning notices are used to emphasize that improper operation may cause severe personal injury or death.

⚠ CAUTION

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

1 Type

HS6E-L44B01-G

Circuit Code

	Main Circuit	Door Monitor Circuit	Lock Monitor Circuit
L :	1NC+1NC	2NC	1NO
M :	1NC+1NC	2NC	1NC
N :	1NC+1NC	1NC, 1NO	1NO
P :	1NC+1NC	1NC, 1NO	1NC
VL :		3NC	1NC, 1NO
VM :		3NC	2NC
VN :		2NC, 1NO	1NC, 1NO
VP :		2NC, 1NO	2NC

Pilot Light Color
G : Green

Cable Length
01 : 1m
03 : 3m
05 : 5m

Housing Color
B : Black

Indicator Voltage
4 : 24V DC

Solenoid Voltage / Lock Mechanism
4 : 24V DC / Spring Lock
7Y : 24V DC / Solenoid Lock

⚠ CAUTION

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 ompletely. 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.

2 Specifications and Ratings

Applicable Standards		EN ISO / ISO14119, GB14048.5 IEC60947-5-1, EN60947-5-1 GS-ET-19, UL508, CSA C22.2 No.14
	Standards for Use	IEC60204-1, EN60204-1
Interlocking device Type /the level of coded		Type 2 Interlocking device / low level coded actuator (EN ISO / ISO14119)
Applicable Directives		Machinery Directive, Low Voltage Directive
Condition	Operating Temperature	-25 to +50°C (no freezing)
	Operating Humidity	45 to 85%RH(no condensation)
	Pollution degree	3(Inside 2)
	Altitude	2,000m maximum
Impulse withstand voltage ‹Uimp›		1 5kV(Main,Lock monitor circuit) 2 5kV(Door monitor circuit) 0.5kV(Between ground and LED,solenoid circuit)
Rated Insulation voltage ‹Ui›		150V(Main,Lock monitor circuit) 300V(Door monitor circuit) 30V(Between ground and LED,solenoid circuit)
Thermal Current ‹Ith›		-25°C ≤ Operating temperature < 35°C 2.5A (≤ 2 circuits) 1.0A (≥ 3 circuits) 35°C ≤ Operating temperature ≤ 50°C 1.0A (1 circuit) 0.5A (≥ 2 circuits)

Contact Ratings ‹Ue, Ie›			30V	125V	250V
Main Circuit, Look monitor circuit	AC	Resistive load (AC-12)	-	2A	-
		Inductive load (AC-15)	-	1A	-
	DC	Resistive load (DC-12)	2A	0.4A	-
		Inductive load (DC-13)	1A	0.22A	-
Door monitor circuit	AC	Resistive load (AC-12)	-	2.5A	1.5A
		Inductive load (AC-15)	-	1.5A	0.75A
	DC	Resistive load (DC-12)	2.5A	1.1A	0.55A
		Inductive load (DC-13)	2.3A	0.55A	0.27A

Class of Protection	Class II (IEC61140) *1 ▣
Operating Frequency	900 operations/hour
Operating Speed	0.05 to 1.0 m/s
B10d	2,000,000 (EN ISO 13849-1 AnnexC Table C.1)
Mechanical Durability	1,000,000 operations minimum. (GS-ET-19)
Electrical Durability	100,000 operations minimum. (900 operations / hour, AC-12 125V 2A, DC-12 125V 0.4A) 1,000,000 operations minimum. (900 operations / hour, 24V AC/DC 0.1A Resistive Load)
Shock Resistance	Operating Extremes:100m/s², Damage Limits:1,000m/s²
Vibration Resistance	Operating Extremes:10 to 55 Hz, half amplitude 0.35mm Damage Limits: 30 Hz, half amplitude 1 5mm
Actuator Tensile Strength when Locked	Fzh=500N minimum F1max.=650N minimum (GS-ET-19) *2, *3 (Fzh=100N minimum: HS9Z-A62 actuator)
Direct Opening Travel	8 mm minimum
Direct Opening Force	60 N minimum
Contact Resistance	300 m Ω maximum (initial value, 1m cable)
Degree of Protection	IP67 (IEC60529) NEMA Type12 (operating temp. -25 to 45°C)
Conditional short circuit current	50A (250V)
Short-circuit Protective Device	Use 250V / 10A fast acting type fuse *4

Solenoid	Rated Operating Voltage	DC24V 100% duty cycle
	Rated Current	110 mA (solenoid 100mA, LED 10mA : initial value)
	Turn ON Voltage	Rated voltage x 85% maximum (at 20°C)
	Turn OFF Voltage	Rated voltage x 10% minimum (at 20°C)
Indicator	Rated Operating Voltage	DC24V 100% duty cycle
	Light Source	LED
	Illumination Color	Green
	Rated Power Consumption	Approx. 2.7W

Ratings approved by safety agencies

(1) TÜV rating
  Main circuit, Look monitor circuit
    AC-15 125V/1A
    DC-13 125V/0.22A
    DC-13 30V/1A

  Door monitor circuit
    AC-15 240V/0.75A
    DC-13 250V/0.27A
    DC-13 30V/2.3A

(2) UL, c-UL rating
  Main circuit, Look monitor circuit
    1A, 125V ac, Pilot Duty
    0.22A, 125V dc, Pilot Duty
    1A, 30V dc, Pilot Duty

  Door monitor circuit
    C300 0.75A, 240V ac, Pilot Duty
    Q300 0.27A, 250V dc, Pilot Duty

(3) CCC rating
  Main circuit, Look monitor circuit
    AC-15 125V/1A
    DC-13 30V/1A

  Door monitor circuit
    AC-15 240V/0.75A
    DC-13 30V/2.3A

(4) KOSHA rating
  Main circuit, Look monitor circuit
    AC-15 125V/1A
    DC-13 125V/0.22A

  Door monitor circuit
    AC-15 240V/0.75A
    DC-13 250V/0.27A

*1 Basic insulation of 2.5kV, 1.5kV impulse withstand voltage is ensured between different contact circuits and between contact circuits and LED or solenoid in he 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 he solenoid power and contact circuits at the same time, the SELV or PELV requirements are not met any more.

*2 The actuator locking strength is rated at 500N 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 HS6B/HS7A safety switch) or a sensor to detect door opening and stop the machine.

*3 F1max. is maximum force. The actuator's guard-locking force Fzh is calculated in accodance with GS-ET-19:

$$Fzh = \frac{\text{maximum force (F1max.)}}{\text{Safety coefficient (=1.3)}}$$

*4 Make sure that a fast acting fuse for short-circuit protection trips before overheating of the wires.
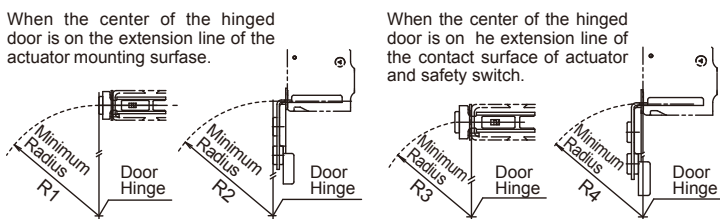
3 Mounting Examples

• Install the interlock switch on the immovable machine or guard, and install the actuator on the movable door. Do not install both interlock switch and actuator on the movable door, otherwise the angle of insertion of the actuator to the safety switch may become inappropriate, and failure will occur.

(Examples of Mounting on Sliding Doors)   (Examples of Mounting on Hinged Doors)

- Door
- HS9Z-A61 Actuator
- HS6E Safety Switch
- Latch
- Door Stop
- HS9Z-A62S Actuator
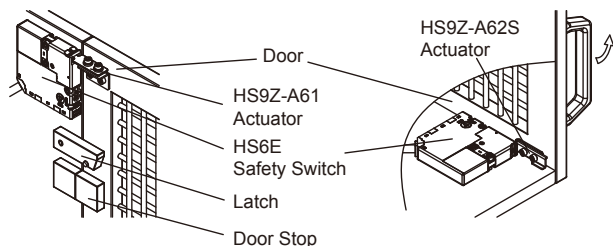
Minimum Radius of Hinged Door

• 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.

When the center of the hinged door is on he extension line of the contact surface of actuator and safety switch.

	Minimum Radius			
	R1	R2	R3	R4
HS9Z-A62/-A62S	230mm	230mm	160mm	160mm
HS9Z-A65/-A66	70mm (Horizontal Swing)	70mm (Vertical Swing)	50mm (Horizontal Swing)	50mm (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 devia ion or dislocation of the hinged door, make sure of correct operation in the actual application before installation.

When inserting an actuator into the slot, make sure to arrange the ⊓ shapes in the same direction, as shown on the right.
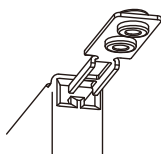

The Adjustable (vertical/horizontal) Actuator

• Using the angle adjustment screw (M3 hexagon 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 he 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. Use screw locking agent that is compatible with the base material.

　Base : PA66 (66 nylon) of glass reinforced grade

　Angle adjustment screws : stainless steel

Installing the Safety Switch and Actuator

• When installing the actuator, position the actuator using the actuator stop (for positioning the entry slot center and mounting reference position).

• As shown on the right, the mounting reference position of the actuator when inserted in the safety switch is where the actuator stop touches the actuator.

• Install a door stop as shown on the right to protect the safety switch and actuator against excessive force. Do not use the safety switch as a door stop, otherewise the safety switch will be damaged.


- HS9Z-A61 Actuator
- Actuator Stop
- Mounting Reference
- 0.8mm
- Safety Switch
- Door Stop
- Door Stop
- Latch
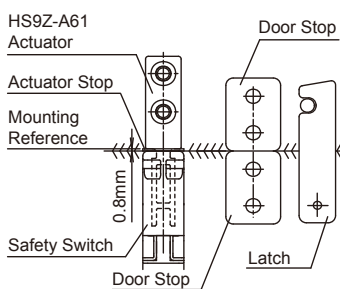
• After removing the actuator stop, ensure that the actuator is installed within the tolerances shown below.

　From he entry slot center of the safety switch (*5, 6) : ±1.0mm

　The gap between the actuator shoulder and the safety switch surface (*7)

　　HS9Z-A61/-A62/-A65/-A66 : 1.9mm or shorter

　　HS9Z-A62S : 1.3mm or shorter

±1.0mm (*5)　±1.0mm (*6)　Entry Direction 1.9mm(*7) When using HS9Z-A61

Safety Switch Surface
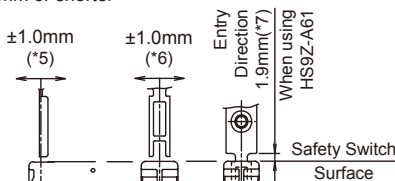
• To ensure correct operation, it is recommended to fasten the door using a latch to achieve the above tolerance values.

• Make sure the actuator can be inserted into the entry slot without any issue.

• Perform operation test before starting operation in order to confirm the open/close operation of contacts and locking/unlocking operation.

• When the actuator is pulled while locked in the safety switch, the actuator moves within the range shown below.

　　HS9Z-A61/-A62/-A65/-A66 : 4.1mm maximum from the safety switch surface

　　HS9Z-A62S : 3.5mm maximum from the safety switch surface

　The open/close status of the contacts are maintained within the range.When a gap is caused because of actuator relocation, make sure that the gap does not lead to new risks.

HS9Z-A61, HS9Z-A62, HS9Z-A62S ACTUATOR

• When there is a displacement of safety switch and actuator, the actuator may hit the entry lot of safety switch hardly, thus damaging the entry slot and actuator. The rubber cushions on the HS9Z actuator prevent the actuator from damaging the entry slit by absorbing the shock with movement flexibility. Do not, however, exert excessive shocks, otherwise the failure of safety switch may be caused.

• The rubber cushions may deteriorate depending on the operatiing environment and conditions. Immediately replace the deformed or crasked rubber cushions with new ones.

Recommended Screw Tightening Torque

Name or Use	Screw Tightening Torque
For mounting the safety switch (M4 screw) *8	1.0 to 1 5 N•m
For mounting the actuator (M4 screw) *8	1.0 to 1 5 N•m

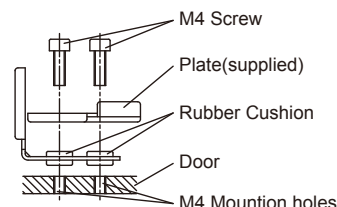### ⚠ CAUTION

*8　When he torque is not enough to recommended screw tightening torque, make sure that he screw do not become loose by using adhesive sealants etc. to keep right operation and mounting positioning.

Mounting HS9Z-A62S actuator

Using two M4 screws and plate, fasten the actuator securely on the door.

Plate has directionality. Do not lose the plate. The actuator may fall off from the door if there is no plate, and the actuator does not properly.

The tensile strength of the HS9Z-A62 actuator is 100N. If an excessive tensile force is applied, the actuator may fall off the door. When a tensile force exceeding 100N is expected, use the HS9S-A62S actuator with a plate.


- M4 Screw
- Plate(supplied)
- Rubber Cushion
- Door
- M4 Mountion holes

4 Precautions for Operation

For Mounting

• Do not apply an excessive shock to the safety switch when opening or closing the door. A shock to the safety switch exceeding 1,000m/s² may cause failure.

• Provide a door guide, and ensure that force is applied on the safety switch only in the actuator insertion direction.

• Do not pull the actuator while it is locked. Also, regardless of door types, do not use the safety switch as a door lock. Install a separate lock as shown in section 3.

• 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.

• Make sure to install the product in a safe place out of reach. Make sure to conduct a proper risk assessment evaluation before using the product, and use a shield or a cover to protect the product if need be.

• While the solenoid is energized, the switch temperature rises approximately 35°C above the ambient temperature (to approximately 85°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.

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- When the actuator is locked or unlocked, the NC lock monitor contacts and NO unlock monitor contacts cause bouncing. When designing a control circuit, take the bouncing into consideration (reference values: 20ms).
- Solenoid has polarity. Be sure to wire correctly and do not apply reverse voltage otherwise the solenoid will be damaged. Do not apply voltage that exceed the rated voltage, otherwise the solenoid will be burnt out.
- Do not fasten or loosen the conduit at the bottom of he safety switch.
- When wiring, make sure that liquid such as water and oil does not intrude from the end of the cable.
- When bending the cable during wiring, secure the cable radius of 30mm at the minimum. Do not apply an excessive shock, such as tensile and compressing force, to the connection part of the cabel and switch.
- Use the proprietary actuators only. Other actuators will cause damage to the switch.
- Ensure that the safety switch is installed on a flat mounting surface, and provide sufficient strength to the mounting surface so that it will not be distorted during operation. Make sure that no foreign objects are caught between the safety switch and mounting surface. Uneven surface, distorted surface, or foreign objects may result in the malfunction of safety switch.

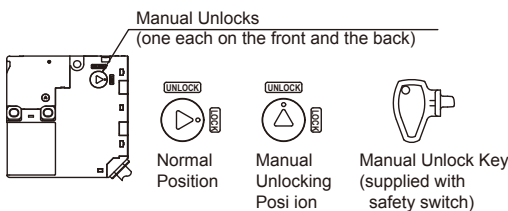minimum radius 30mm
(50)
Conduit
(70)
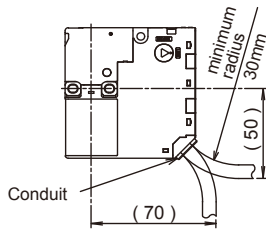
⚠ WARNING

- 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.
- Do not disassemble or modify the switch. Also do not attempt to disable the interlock switch function, otherwise a breakdown or an accident will result.

⚠ CAUTION

- HS6E Series Safety Switches are Type 2 low-level coded interlocking devices (EN ISO / ISO14119). The following system installation & mounting instructions are EN ISO / ISO14119 requirements to prevent function failure from the interlock switch.
  1. Using permanent fixing methods (e.g. welding, rivets, special screws...etc) to prevent dismantling or de-positioning of the interlock device. However, permanent fixing methods are not an adequate solution if you expect the interlock device to fail during the machinery lifetime, or if you need to replace the product in quick manner. In these situations, other measures (see 2.) should be put in place to reduce the risks of function failure.
  2. At least one of the following measures should be applied to prevent function failure.
     (1) Mounting the interlock device in a place out of reach from workers
     (2) Using shielding protection to prevent physical obstruction of the device
     (3) Mounting the interlock device in a hidden position
     (4) Integrate status monitoring & cycling testing of the device to the control system to prevent product failure.
- 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. When a higher load works on the lock portion of the safety switch, the actuator may not unlock.
- 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.
- Do not cut or remodel the actuator, otherwise failure will occur.
- If multiple safety components are wired in series, the Performance Level to EN ISO 13849-1 will be reduced due to he restricted error detection under certain circumstance.
- The entire concept of the control system, in which the safety component is integrated, must be validated to EN ISO 13849-2.

For Manual Unlocking

- Spring lock type : The HS6E 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.
- Solenoid lock type : If the actuator is not unlocked although the solenoid is deenergized, the actuator can be unlocked manually.

Manual Unlocks
(one each on the front and the back)

UNLOCK — Normal Position
UNLOCK — Manual Unlocking Posi ion
Manual Unlock Key (supplied with safety switch)

Manual Unlocking Method

- When using the manual unlock key :
  To change the normal position to the manual unlocking position as shown above, turn the key fully (90 degrees) using the propietary key supplied 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.
  Note: When manually unlocked, the switch will keep the main circuit disconnected and the door unlocked.
- When unlocking by pushing he plate insaide the safety switch :
  Remove the screw at the side of the safety switch and insert a small screwdriver. Push the plate inside the safety switch toward the LED pilot light using a small screwdriver until the actuator is unlocked. See the figure on the right.

Driver
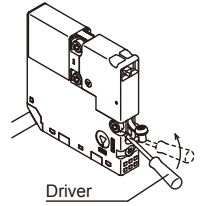
⚠ CAUTION

- 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 leave the manual unlock key attached to the switch during operation. This is dangerous because the switch can always be unlocked while the machine is in operation. Do not attach the key to the switch intentionally (the key is designed to fall off when the operator's hand is off he key).
- Unlocking by pushing the plate inside the safety switch must be perfomed in emergency only. After unlocking, make sure to tighten the M4 screw to the tightening torque of 0.3 to 0.5 N•m. Do not apply excessive force to the M4 screw. Otherwise the safety switch is damaged. Make sure that all screws are installed, otherwise the waterproof capability is lost.

5　Contact Operation

Contact Configuration and Operation

Type	Contact Configuration *9	Contact Operation (reference)
HS6E-L□	Main Circuit : 11-12 41-42 Monitor Circuit : 21-22 Monitor Circuit : 31-32 Monitor Circuit : 53-54	11-42 21-22 31-32 53-54
HS6E-M□	Main Circuit : 11-12 41-42 Monitor Circuit : 21-22 Monitor Circuit : 31-32 Monitor Circuit : 51-52	11-42 21-22 31-32 51-52
HS6E-N□	Main Circuit : 11-12 41-42 Monitor Circuit : 21-22 Monitor Circuit : 33-34 Monitor Circuit : 53-54	11-42 21-22 33-34 53-54
HS6E-P□	Main Circuit : 11-12 41-42 Monitor Circuit : 21-22 Monitor Circuit : 33-34 Monitor Circuit : 51-52	11-42 21-22 33-34 51-52
HS6E-VL□	Monitor Circuit : 11-12 41-42 Monitor Circuit : 21-22 Monitor Circuit : 31-32 Monitor Circuit : 53-54	11-12 21-22 31-32 41-42 53-54
HS6E-VM□	Monitor Circuit : 11-12 41-42 Monitor Circuit : 21-22 Monitor Circuit : 31-32 Monitor Circuit : 51-52	11-12 21-22 31-32 41-42 51-52
HS6E-VN□	Monitor Circuit : 11-12 41-42 Monitor Circuit : 21-22 Monitor Circuit : 33-34 Monitor Circuit : 53-54	11-12 21-22 33-34 41-42 53-54
HS6E-VP□	Monitor Circuit : 11-12 41-42 Monitor Circuit : 21-22 Monitor Circuit : 33-34 Monitor Circuit : 51-52	11-12 21-22 33-34 41-42 51-52

Door Monitor　Lock Monitor
(+) A2　(−) A1

(Travel: mm)
0(Actuator Mounting Reference Position)
Approx.1.1 (Lock)
Approx. 4.7
Approx. 5.0
Approx 27.4

(Actuator Completely Inserted)　(Actuator Pulled Out)
■ Contact closed
□ Contact open

⚠ CAUTION

*9   The Actuator is inserted, and HS6E is locked.

- Contact operation is based on the condition that the actuator is inserted into the center of the safety switch slot.
- Contact operation shows the HS9Z-A61, A62, A65, A66 actuators. (For HS9Z-A62S actuator, decreases 0.6mm to contact operations)
- Terminals 12-41 are connected together internally. Use terminals 11-42 for safety circuit inputs. (without HS6E-V□)
- Indicator turns on when solenoid is energized.

⚠ CAUTION

When using the outputs from the HS6E-V safety switch as inputs to safety circuits, connect the door monitor circuits (11-12, 21-22, 31-32) ⊝ and lock monitor circuits (41-42, 51-52) in series. (GS-ET-19)

Then, the contact rating for he lock monitor circuit is applied.(HS6E-V□)

Operation Cycle

• Spring Lock Type (HS6E-□4)

Door States	Closed	Closed	Open	Closed
Door Manual Unlock Key	-	-	-	Turn the key to unlock position.
Main Circuit 11-42	Closed	Open	Open	Open
Door Monitor Circuit 21-22 31-32	Closed	Closed	Open	Closed
Door Monitor Circuit 33-34	Open	Open	Closed	Open
Lock Monitor Circuit 51-52	Closed	Open	Open	Open
Lock Monitor Circuit 53-54	Open	Closed	Closed	Closed
Solenoid Power A1-A2	Off	On	Off/On	Off
	Door is locked. The machine can be operated.	Door is unlocked. The machine can not be operated.	The machine can not be operated.	Door is unlocked. The machine can not be operated.

• Spring Lock Type (HS6E-V□4)

Door States	Closed	Closed	Open	Closed
Door Manual Unlock Key	-	-	-	Turn the key to unlock position.
Door Monitor Circuit 11-12 21-22 31-32	Closed	Closed	Open	Closed
Door Monitor Circuit 33-34	Open	Open	Closed	Open
Lock Monitor Circuit 41-42 51-52	Closed	Open	Open	Open
Lock Monitor Circuit 53-54	Open	Closed	Closed	Closed
Solenoid Power A1-A2	Off	On	Off/On	Off
	Door is locked. The machine can be operated.	Door is unlocked. The machine can not be operated.	The machine can not be operated.	Door is unlocked. The machine can not be operated.

• Solenoid Lock Type (HS6E-□7Y)

Door States	Closed	Closed	Open	Closed
Door Manual Unlock Key	-	-	-	Turn the key to unlock position.
Main Circuit 11-42	Closed	Open	Open	Open
Door Monitor Circuit 21-22 31-32	Closed	Closed	Open	Closed
Door Monitor Circuit 33-34	Open	Open	Closed	Open
Lock Monitor Circuit 51-52	Closed	Open	Open	Open
Lock Monitor Circuit 53-54	Open	Closed	Closed	Closed
Solenoid Power A1-A2	On	Off	Off/On *11	Off *10, *11
	Door is locked. The machine can be operated.	Door is unlocked. The machine can not be operated.	The machine can not be operated.	Door is unlocked. The machine can not be operated.

• Solenoid Lock Type (HS6E-V□7Y)

Door States	Closed	Closed	Open	Closed
Door Manual Unlock Key	-	-	-	Turn the key to unlock position.
Door Monitor Circuit 11-12 21-22 31-32	Closed	Closed	Open	Closed
Door Monitor Circuit 33-34	Open	Open	Closed	Open
Lock Monitor Circuit 41-42 51-52	Closed	Open	Open	Open
Lock Monitor Circuit 53-54	Open	Closed	Closed	Closed
Solenoid Power A1-A2	On	Off	Off/On *11	Off *10,11
	Door is locked. The machine can be operated.	Door is unlocked. The machine can not be operated.	The machine can not be operated.	Door is unlocked. The machine can not be operated.

⚠ CAUTION

*10   Do not attempt manual unlocking when the solenoid is energized.
*11   Do not energize the solenoid for a long time while the door is open or when the door is unlocked manually.
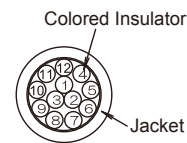
6 Wiring

Wiring

- Cable specifications
  UL style 2464, 12c×No.22AWG, (80°C 300V)
- Wire identification
  Wires are identified by the color and white line printed on the wire.
  Do not use wire which is Gray, Gray / White. (without HS6E-V□)

Colored Insulator

Jacket

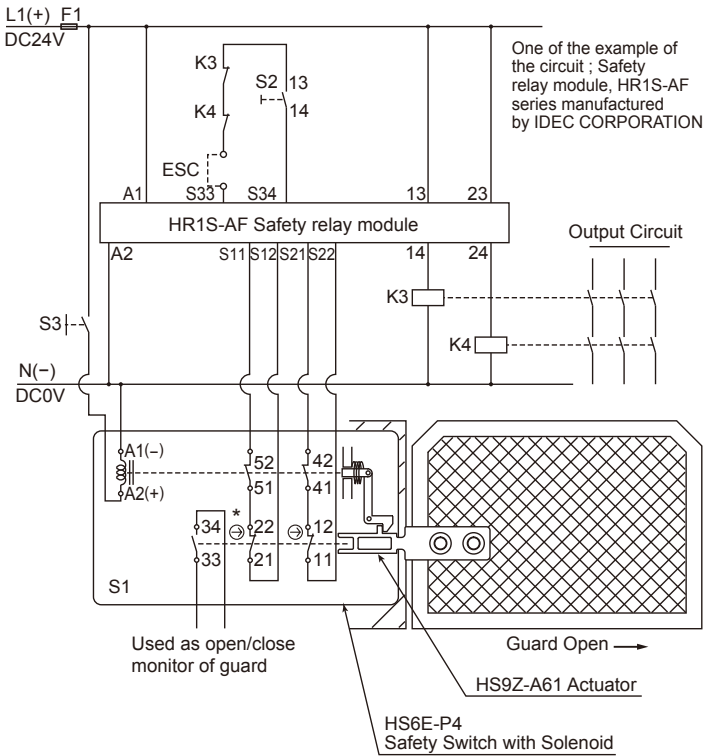| No.	Insulator Color	No.	Insulator Color	No.	Insulator Color
1	Blue / White	5	Orange / White	9	Pink / White
2	Gray	6	Gray / White	10	Brown / White
3	Pink	7	White	11	Brown
4	Orange	8	Black	12	Blue

Terminal number identification

- When wiring, the terminal number on each contact is identified by wire color. The following table shows the identification of terminal numbers.
- When wiring, cut unnecessary wires such as unused wires to avoid incorrect wiring.

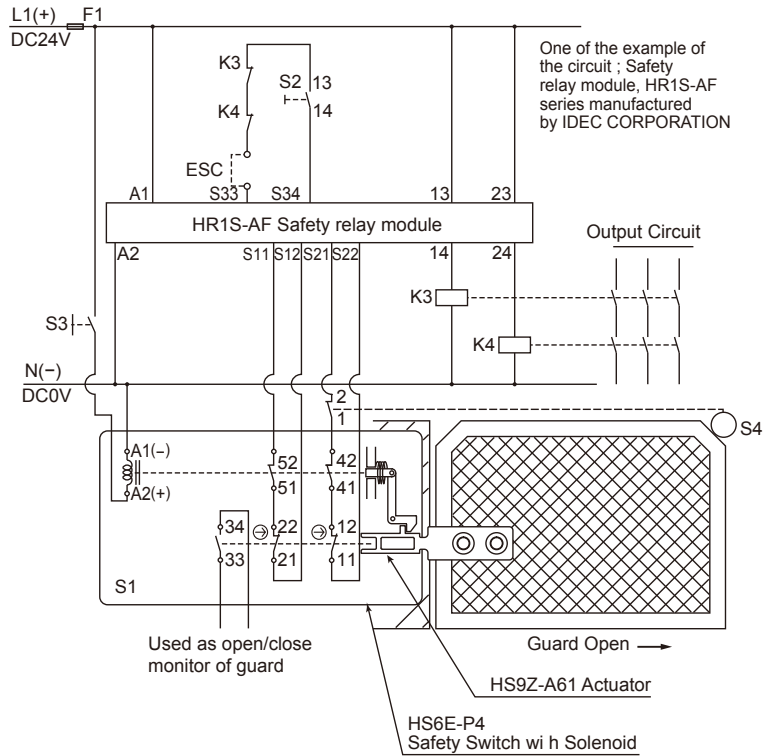| Circuit No.	Insulator Color
11	Blue
12 / 42 (without HS6E-V□)	Blue / White
21	Brown
22	Brown / White
31, 33	Orange
32, 34	Orange / White
41 (HS6E-V□)	Gray
42 (HS6E-V□)	Gray / White
51, 53	Pink
52, 54	Pink / White
A1(-)	Black
A2(+)	White

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7 Example of wiring Diagram realizing Safety Category

**Example of a circuit diagram for Safety Category 3
(attainable PL = d)**

(Condiion 1: To apply the fault exclusion of mechanical structural parts including the actuator
→ Make sure to use the product within the product specification range described in this manual and the version of the manual provided with the product)

(Condiion 2: Documentation of the reason for he machine/equipment manufacturer to have applied the fault exclusion based on ISO13849-1, ISO13849-2 or IEC62061)

One of the example of the circuit ; Safety relay module, HR1S-AF series manufactured by IDEC CORPORATION

Output Circuit

Used as open/close monitor of guard

Guard Open →

HS9Z-A61 Actuator

HS6E-P4 Safety Switch with Solenoid

S1: HS6E-P4 Safety Switch with Solenoid
S2: Starting Switch (HW Series Momentary)
S3: Unlocking Enabling Switch
S4: Safety limit Switch
ESC: Outside start condition
K3, 4: Safety Contactor
F1: Outside fuse of safety relay module at power supply line

*Connect 21-22 and 51-52 in series.

**Example of a circuit diagram for Safety Category 4
(attainable PL = e)**

One of the example of the circuit ; Safety relay module, HR1S-AF series manufactured by IDEC CORPORATION

Output Circuit

Used as open/close monitor of guard

Guard Open →

HS9Z-A61 Actuator

HS6E-P4 Safety Switch wi h Solenoid

Note: Use the monitoring device(Safety relay module) provided the capavility to detect a cross short circuit. The insulation of the cable has to withstand environmental influences. If a control device o her than the one shown in the draft is used, the used control device has to be equipped with a cross short circuit monitor.

8 Dimensions and Mounting (mm)

R.P.: Actuator mounting reference position

Safety Switch dimensions

Straight Actuator (HS9Z-A61)
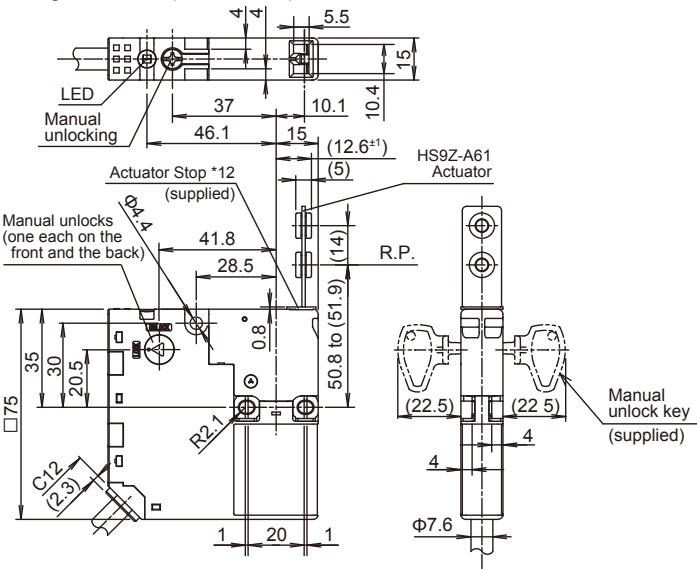
L-shaped Actuator (HS9Z-A62S)
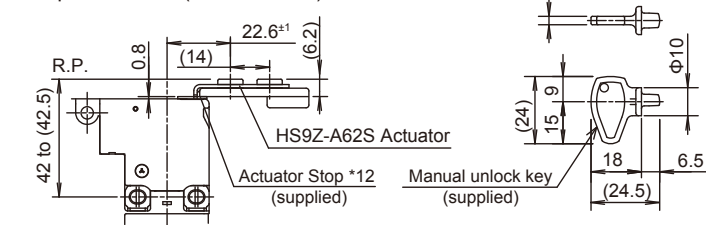
**Mountiong Hole Layout
(when mounted on the front side)**

*Reversible Mounting Possible

Provide mounting holes as pecified, and install the safety switch using three mounting screws.

Do not install the switch using only one or two mounting screws, otherwise the safety switch will not be fixated properly, resulting in the malfunction of safety switch.
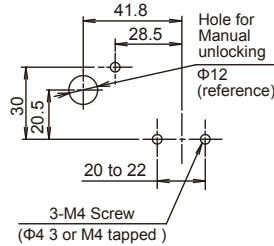
Accessories dimensions

Type:HS9Z-A61
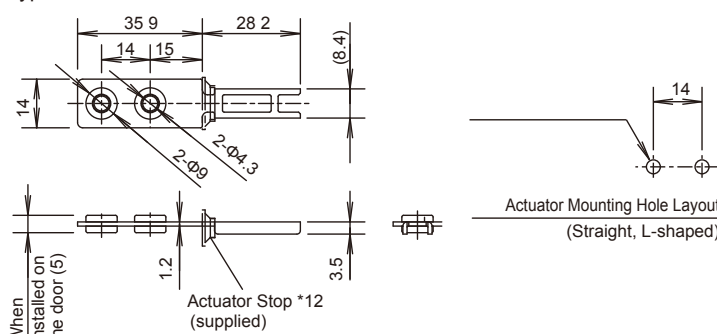
Type:HS9Z-A62
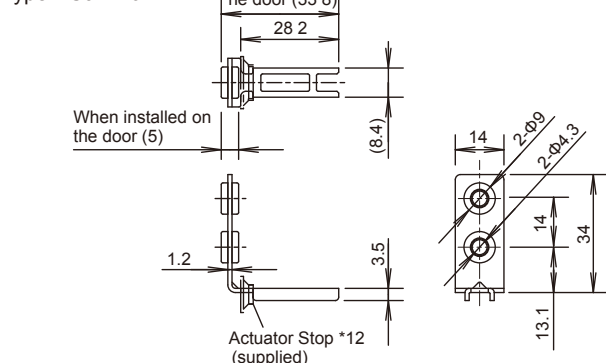
Type:HS9Z-A65

(Horizontal Adjustment)
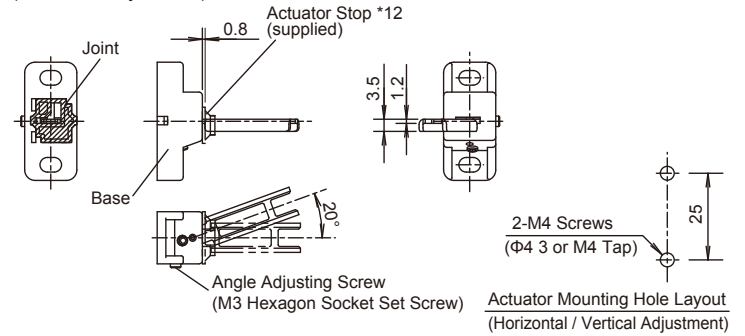
(Vertical Adjustment)
Factory defalut *13

Type:HS9Z-A66

Note: HS9Z-A65 and HS9Z-A66 are different in the insertion direction of the metal key (180°).

(Horizontal Adjustment)

(Vertical Adjustment)   Factory defalut *13
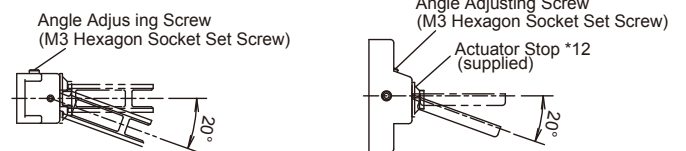
*12 The actuator stop is used when adjusting he actuator position. Remove after he actuator position is determined.

*13 The direction of adjustable angle can be changed (vertical or horizontal) by changing the insertion direction of the joint (white plastic part). See the figures below. Do not lose the joints. Actuators do not operate normally without a joint.

(Horizontal Adjustment)   (Vertical Adjustment)
                          Factory defalut
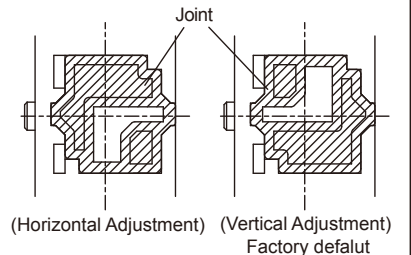
9 Precaution for Disposal

Dispose of the HS6E safety switch as an industrial waste.

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