



INSTRUCTION SHEET
Original Instructions
Interlock Switch with Key
HS5L-K Series



Thank you for purchasing this IDEC product. Confirm that the delivered product is what you have ordered. Read this instruction sheet to make sure of correct operation.

SAFETY PRECAUTIONS

In this operation instruction sheet, safety precautions are categorized in order of importance to Warning and Caution :

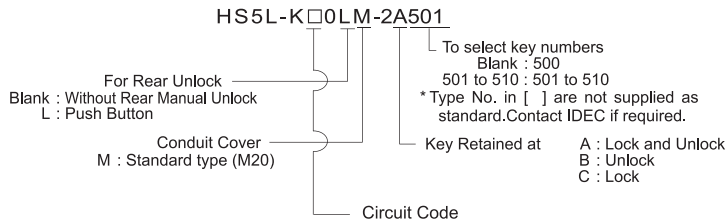
WARNING

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



Contact Configuration			Standard type	
Main circuit	Door monitor circuit	Lock monitor circuit	HS5L-K□ M-△	HS5L-K□ LM-△
-	1NC	1NC	√	√
-	2NC	-	-	-
-	1NC, 1NO	-	-	-
-	-	2NC	√	√
-	1NC, 1NO	1NC, 1NO	√	√
-	1NC, 1NO	2NC	-	-
-	2NC	1NC, 1NO	-	-
-	2NC	2NC	√	√
-	3NC	1NC	-	-
-	2NC, 1NO	1NC	-	-
-	1NC	3NC	-	-
-	1NC	2NC, 1NO	-	-
-	1NO	3NC	-	-
-	1NO	2NC, 1NO	-	-
1NC+1NC	-	-	√	-
1NC+1NC	-	-	-	-
-	1NO	1NC	-	-
-	-	1NC, 1NO	√	√
1NC+1NC	1NO	1NO	-	-
1NC+1NC	1NO	1NC	-	-
1NC+1NC	1NC	1NO	-	-
1NC+1NC	1NC	1NC	-	-
1NC+1NC	2NC	-	-	-
1NC+1NC	1NC, 1NO	-	-	-
1NC+1NC	-	2NC	-	-
1NC+1NC	-	1NC, 1NO	-	-
-	1NO	1NC, 1NO	-	-
-	1NO	2NC	-	-
-	1NC	1NC, 1NO	-	-
-	1NC	2NC	-	-
-	2NC	1NC	-	-
-	1NC, 1NO	1NC	-	-
-	-	3NC	-	-
-	-	2NC, 1NO	-	-

□ Rear Unlock Button

*1 Only type No. on √ mark are supplied as standard. Contact IDEC for the other if required.

2 Specifications and Ratings

Applicable Standards	EN ISO / ISO14119, IEC60947-5-1, EN60947-5-1, GS-ET-19, UL508, CSA C22.2 No.14, GB/T14048.5				
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	Electrical Equipment (Safety) Regulations 2016, Supply of Machinery (Safety) Regulations 2008, The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012				
Operating Condition	Operating Temperature	-25 to +70°C (no freezing) *2			
	Operating Humidity	20 to 95%RH (no condensation)			
	Pollution Degree	3 (Inside 2)			
	Altitude	2000m maximum			
Impulse withstand voltage (Uimp)	2.5kV				
Rated Insulation voltage (Ui)	250V				
	2.5A				
Thermal Current (th) Contact Ratings (Reference Values) (Ue, Ie)*3	AC	Resistive load (AC12)	-	2.5A	1.5A
		Inductive load (AC15)	-	1.5A	0.75A
	DC	Resistive load (DC12)	2.0A	0.4A	0.2A
		Inductive load (DC13)	1.0A	0.22A	0.1A
Class of Protection	Class II (IEC61140) *4 □				
Operating Frequency	900 operations/hour				
Operating Speed	0.05 to 1.0 m/s				
B10d	2,000,000 (EN ISO13849-1 Annex C Table C.1)				
Mechanical durability	2,000,000 operations minimum (GS-ET-19) The Rear Unlock Button: 3000 operations minimum (Type HS5L-K□L)				
Electrical Durability	100,000 operations min. (AC-12 250V/1.5A) 2,000,000 operations min. (AC/DC 24V 100mA) (900 operations / hour)				
Shock Resistance	Operating Extremes: 100m/s ² , Damage Limits: 1000m/s ²				
Vibration Resistance	Operating Extremes: 10 to 55 Hz, half amplitude 0.35mm Damage Limits: 30 Hz, half amplitude 1.5mm				
Actuator Retention Force	Fzh=1,400N minimum F1max=1820N minimum (GS-ET-19) *5, *6 (Fzh=500N minimum: HS9Z-A55 actuator)				
Direct Opening Travel	11 mm minimum (actuator: HS9Z-A51, A5P) 12 mm minimum (for other actuators)				
Direct Opening Force	120N minimum				
Contact Resistance	50 mΩ maximum (initial value)				
Degree of Protection	IP65 (IEC60529) , Indoor Use Only				
Conditional short circuit current	50A(250V)				
Short-circuit Protective Device	Use 250V / 10A fast acting type fuse *7				
Key	Operating Specifications	2 Positions			
	Mechanical Durability	100,000 operations min.			
	Key Operating Durability	10,000 operations min.			
	Key Tensile Strength	1.0N·m min.			
	Direct Opening Force	0.6N·m min.			
	Direct Opening Degree	90°			

*2 The upper temperature limit for UL certification is +50°C.

*3 Ratings approved by safety agencies

(1) TÜV rating	AC-15 250V/0.75A DC-13 30V/2.3A
(2) UL , c-UL rating	AC-15 250V/0.75A : Pilot Duty DC-13 30V/1A : Pilot Duty
(3) CCC rating	AC-15 250V/0.75A DC-13 30V/1A

*4 Basic insulation of 2.5kV impulse withstand circuits and between contact circuit SELV(safety extra low voltage) or circuits (such as 230V AC circuits) at the same time, the SELV or PELV requirements are met any more.

*5 The actuator retention force 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 interlock switch without lock (such as the HS5D interlock switch) or a sensor to detect door opening and stop the machine.

*6 F1max is maximum force. The actuator retention force Fzh is calculated in accordance with GS-ET-19:

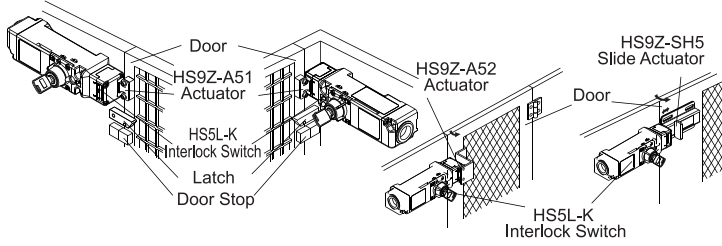
$$Fzh = \frac{\text{maximum force (F1max)}}{\text{Safety coefficient (=1.3)}}$$

*7 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 interlock switch may become inappropriate, and failure will occur.

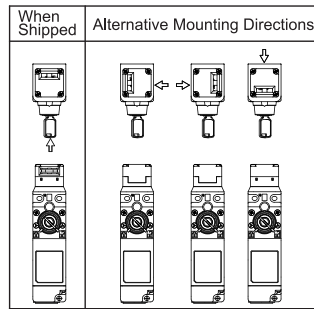
(Examples of Mounting on Sliding Doors) (Examples of Mounting on Hinged Doors)



The HS5L-K Head

- Changing the Mounting Directions of the HS5L-K Head

The head of the HS5L-K can be mounted in four directions by removing the four screws from the corners of the HS5L-K head.



WARNING

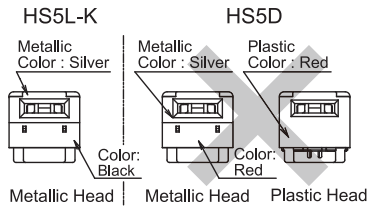
Mounting Directions of the HS5L-K Head

- Before changing the mounting direction of the HS5L-K head, turn the manual unlock to UNLOCK using the attached manual unlock key or disconnect wiring from the HS5L-K.
- 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 HS5L head, make sure that no foreign object enters into the interlock switch. Tighten the screws tightly, without leaving space between the head and body, otherwise the interlock switch may malfunction.
- Don't remove the screws of head except when the mounting directions of head is changed.

Mounting the Head

- Do not use the metallic or plastic head for the HS5D (without lock type). Be sure to use the head for the HS5L-K and mount the correct head.

Take care particularly when using with the HS5D (without lock type).



- Head Removal Detection Function

When the key is operated, the operation of the lock monitor circuit (41-42) and (51-52) are the same. However, when the head is removed, disparity is detected (41-42 : OFF, 51-52: ON). The disparity of the contacts detects the removal of the head.

<p>■ : Contact Closed</p> <p>□ : Contact Open</p>	Actuator Unlocked	Actuator Locked	When the HS5L-K head is removed
Lock Monitor Circuit (NC) ④ 41 → 42		■	□
Lock Monitor Circuit (NC) ④ 51 → 52	■	□	■

Key LOCK and UNLOCK positions are as shown on the right.

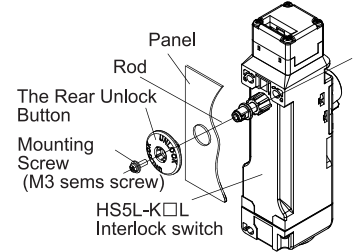
- Status when actuator is locked
- State when the actuator is UNLOCK

CAUTION

- When the head is removed from the device (e.g. when changing the mounting position of the head), the 41-42 lock monitor circuit opens (OFF position) and 51-52 monitor circuits close (ON position); so please make sure you connect the 41-42 lock monitor circuit to a safety circuit if you want to use the Head Removal Detection Function.
- The Head Removal Detection Function can only be used with the following spring-lock circuits: A,B,C,D,F,G, H, J, DD, VB, VD, VH, VJ, VW, VX, TB, TD, TH and TJ type circuits (lock monitor circuit NC: 2 circuits or more, excluding XH). This function cannot be used with other spring-lock type circuits and solenoid circuits.

Installing the Rear Unlock Button (Type HS5L-K□L)

- After installing the interlock switch on the panel, put the rear unlock 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 unlock button for frame kit (HS9Z-FL5□) sold separately.



CAUTION

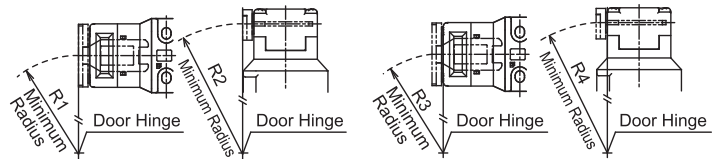
- After installing the rear unlock button, apply Loctite to the screw so that the screw does not become loose. The lod is made of stainless steel. The rear unlock button is glass-reinforced PA66 (66 nylon). The mounting screw is iron. Take the compatibility of plastic material and Loctite into consideration.

Minimum Radius of Hinged Door

- When using the interlock 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 surface.

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



	Minimum Radius			
	R1	R2	R3	R4
HS9Z-A52	230 mm	260 mm	170 mm	190 mm
HS9Z-A52	Mounting centers:12 mm	230 mm	260 mm	140 mm
	Mounting centers:20 mm	310 mm	170 mm	
HS9Z-A53		80 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)
HS9Z-A55S				

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.

Adjusting the Angle Adjustable (vertical/horizontal) Actuator (Type HS9Z-A53/A55/A55S)

- 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 the actuator enters the entry slot of the interlock 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 N•m. (Type HS9Z-A55/A55S)
Use screw locking agent that is compatible with the base material.
Base : PA66 (66 nylon) of glass reinforced grade
Angle adjustment screws : stainless steel

Actuator Mounting Reference Position

As shown below, the mounting reference position of the actuator inserted into the interlock switch is:

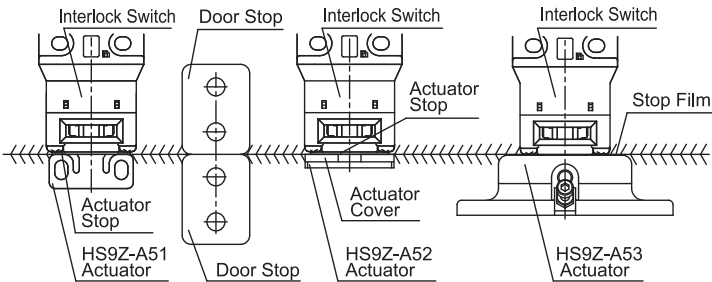
(Type HS9Z-A53)

The actuator stop film placed on the actuator touches the interlock switch lightly.

(Except Type HS9Z-A53)

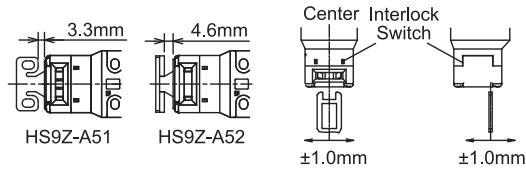
The actuator and actuator cover touches the actuator stop placed on the interlock switch lightly.

(After mounting the actuator, remove the actuator stop from the interlock switch.)



Actuator Mounting Tolerance

- Mounting tolerance of the actuator is 1.0 mm in the four lateral directions.
- Make sure the actuator can be inserted into the entry slot without any issue.
- 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 deviation) + (Door movement)
HS9Z-A51	≤ 3.3mm
HS9Z-A52	≤ 4.6mm
HS9Z-A51A	≤ 4.6mm
HS9Z-A52A	≤ 4.6mm
HS9Z-A53	≤ 5.6mm
HS9Z-A55	≤ 4.6mm
HS9Z-A55S	≤ 4.6mm

For Type HS9Z-A51A/A52A actuator

- When there is a displacement of interlock switch and actuator, the actuator may hit the entry slot of interlock switch hardly, thus damaging the entry slot and actuator. The rubber cushions on the HS9Z actuator prevent the actuator from damaging the entry slot by absorbing the shock with movement flexibility. Do not, however, exert excessive shocks, otherwise the failure of interlock switch may be caused.
- The rubber cushions may deteriorate depending on the operating environment and conditions. Immediately replace the deformed or cracked rubber cushions with new ones.

Recommended Screw Tightening Torque

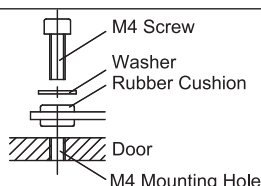
Name or Use	Screw Tightening Torque
For mounting the interlock switch (three M4 screws) *8	1.8 to 2.2 N•m
For mounting the cover (two M3 screws)	0.5 to 0.7 N•m
For mounting the HS5L-K head (four M3 screws)	0.9 to 1.1 N•m
For mounting the rear unlock button (one M3 screws)	0.5 to 0.7 N•m
For mounting the actuator (HS9Z-A51: two M4 screws) *8	1.8 to 2.2 N•m
(HS9Z-A52: two M4 Phillips screws) *8	0.8 to 1.2 N•m
(HS9Z-A51A/A52A: two M4 screws) *8, *9	1.0 to 1.5 N•m
(HS9Z-A53: two M6 screws) *8	4.5 to 5.5 N•m
(HS9Z-A55/A55S: two M4 screws) *8	1.0 to 1.5 N•m
Accessory (HS9Z-KC52: two M3.5 screws) *10	1.0 to 1.2 N•m
(HS9Z-BC53: three M4 screws) *10	1.8 to 2.2 N•m

CAUTION

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

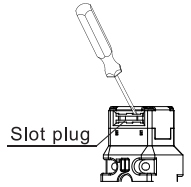
*9 In the case of HS9Z-A51A and HS9Z-A52A, using two M4 screws and two attached washers, fasten the actuator securely on the door.

*10 The above recommended tightening torques of 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.



Installing the slot plug (In the case of a standard sale model. Please check other models.)

- When not in use, close up the interlock switch actuator entry slots with slot plugs to prevent dust from entering.
- The actuator entry slot vertical to the mounting panel come closed up with slot plugs at time of shipment. When replacing, please use the tool as shown and replace it.

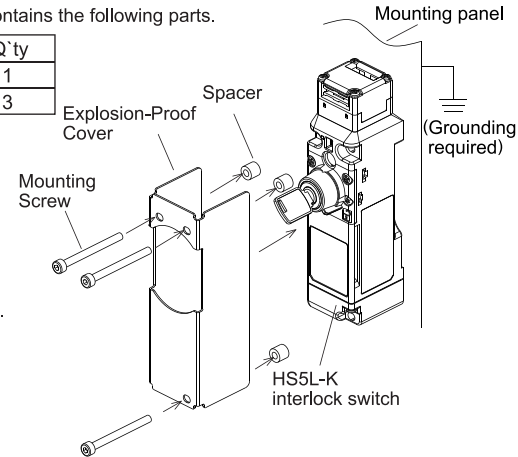


●HS9Z-BC53

- Check that the package contains the following parts.

Packing parts	Q'ty
Explosion-Proof Cover	1
Spacer	3

- Using the explosion-proof cover, three spacers, and three screws, install the HS5L-K switch on the mounting frame and panel.



CAUTION

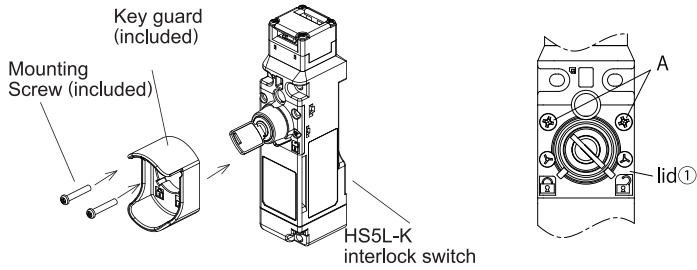
- When mounting, refer to the HS5L-K mounting hole layout.
- The mounting screw, spring lock washer and the nut must be provided by the user.
- If the HS5L-K type keyed safety switch is to be used in an explosive atmosphere, the product must be covered with a grounded metal to prevent electrostatic charging. Therefore, the mounting panel must be grounded, and the mounting screws for the explosion-proof cover must be made of conductive copper or steel for grounding.

●Using the HS5L-K in an explosive atmosphere

WARNING

- By using the explosion-proof cover with the HS5L-K key interlock switch, (HS5L-K, optional) and connecting the EB3N safety relay barrier, the HS5L-K can be using as a intrinsically safe explosion-proof product. When using the explosion-proof cover, affix the nameplate for ExiallBT6, supplied with the EB3N safety relay barrier, where it is easily visible.
- When using in an explosive atmosphere, see the EB3N safety relay instruction manual or user's manual. (The manuals can be downloaded from IDEC website. <http://www.idec.com/japan/EB3N>)
- When using the HS5L-K with the explosion-proof cover as an intrinsically safe explosion-proof product, be sure to use a grounded metal mounting panel or a frame. Use a mounting panel or a frame, that covers all the mounting surface.
- When using the explosion-proof cover, HS5L-K with rear unlocking button type, and rear unlocking button kit for frame mounting together, do not open a hole larger than the specified size.
- When connecting the lead wire, connect using a junction box. See the instruction manual supplied with the EB3N safety relay barrier.

●HS9Z-KC52



- To install the key guard
Make sure that the following parts are included in the package.

Packing parts	Q'ty
Key guard	1
Mounting Screw (included)	2

- Of the four screws on the lid ① of the main body of the HS5L-K type interlock switch with Key, remove two screws A. (Refer to the above figure.)
- Put the key guard over the boss around the key on the main body of HS5L-K type interlock switch with key, and then fix the key guard with the two fixing screws attached.

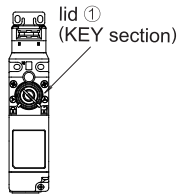
⚠ CAUTION

- The removed screws A cannot be used to fix the key guard. Be sure to use the supplied fixing screws to fix the key guard.
Also, please discard the removed screw A.

4 Instruction

For Mounting

- Do not apply an excessive shock to the interlock switch when opening or closing the door. A shock to the interlock switch exceeding 1,000 m/s² may cause failure.
- Provide a door guide, and ensure that force is applied on the interlock 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 interlock 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 place where it cannot be damaged.
- Do not open the lid ① of the switch. Loosening the screws may cause damage to the switch.
- Do not fasten and loosen the conduit at the bottom of the interlock switch.
- Use the dedicated actuators only. Other actuators will cause damage to the switch.
- Be careful not to injure yourself with the screwdriver tip when wiring the terminals.
- Be careful not to damage the square-shaped screwdriver port when inserting the driver into it in order to wire the terminals. Inserting the screwdriver with too much strength may damage the product.
- Before using the following accessories, be sure to refer to the instruction manual for the respective accessory and follow the instructions in the manual to ensure correct use.



HS9Z-DH5 / HS9Z-EH5 / HS9Z-SP51 / HS9Z-SH5 / HS9Z-BA5 / HS9Z-FL5 / HS9Z-BC53 / HS9Z-KC52

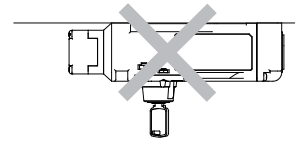
⚠ WARNING

- Turn off the power to the interlock switch before starting installation, removal, wiring, maintenance, and inspection on the interlock 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

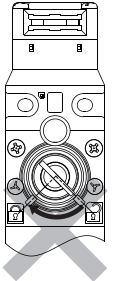
- Regardless of door types, do not use the interlock switch as a door stop. Install a mechanical door stop to the end of the door to protect the interlock switch against excessive force.
- Mount the actuator so that it will not hit the operator when the door is open, otherwise injury may be caused.
- 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.
- Do not cut or remodel the actuator, otherwise failure will occur.
- If multiple safety components are wired in series, the Performance Level to EN ISO13849-1 will be reduced due to the restricted error detection under certain circumstance.
- The insulation of the cable has to withstand environmental influences.
- The entire concept of the control system, in which the safety component is integrated, must be validated to EN ISO13849-2.

- Do not mount the interlock switch facing down as shown in the figure on the right. The key may fall due to vibration.



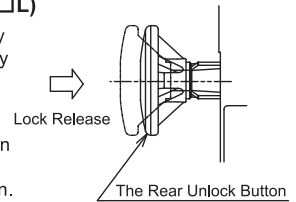
Key

- Be sure to take the following precautions. Otherwise, failure or damage may occur.
- When using the key, insert the key all the way.
- Do not apply a rotative force when inserting or removing the key.
- Also, do not pull the key during operation. Otherwise failure or damage may occur.
- Other than the standard key, there are 15 key variations. Be sure to use a key and cylinder with the same number.
- Do not apply excessive force to the key. Otherwise failure or damage may occur.
- With the key in the UNLOCK position, do not turn the key to the LOCK position with the actuator removed (door open). Otherwise failure or damage may occur.



For the Rear Unlock Button (Type HS5L-K□L)

- The rear unlock button is used for an emergency escape when the worker is confined in the safety hedge (the dangerous area). (The rear unlock button is according to EN ISO / ISO14119 (2013) ,GS-ET-19)
- 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 HS5L-K 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 HS5L-K in the position where the rear unlock button can be operated from outside the 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 Contact Operation

Contact Configuration and Operation

Type *12	Contact Configuration *13	Contact Operation (reference)
		(Travel: mm) 0 (Actuator Mounting Reference Position) Approx. 3.3 (Lock) Approx. 5.3 Approx. 6.9 Approx. 26.4
HS5L-XD□	Monitor Circuit: 11-12 Monitor Circuit: 41-42	11-12 41-42
HS5L-XF□	Monitor Circuit: 11-12 Monitor Circuit: 21-22	11-12 21-22
HS5L-XG□	Monitor Circuit: 11-12 Monitor Circuit: 23-24	11-12 23-24
HS5L-XH□	Monitor Circuit: 41-42 Monitor Circuit: 51-52	41-42 51-52
HS5L-VA□	Monitor Circuit: 11-12 Monitor Circuit: 23-24 Monitor Circuit: 53-54	11-12 23-24 41-42 53-54
HS5L-VB□	Monitor Circuit: 11-12 Monitor Circuit: 23-24 Monitor Circuit: 51-52	11-12 23-24 41-42 51-52
HS5L-VC□	Monitor Circuit: 11-12 Monitor Circuit: 21-22 Monitor Circuit: 53-54	11-12 21-22 41-42 53-54
HS5L-VD□	Monitor Circuit: 11-12 Monitor Circuit: 21-22 Monitor Circuit: 51-52	11-12 21-22 41-42 51-52
HS5L-VF□	Monitor Circuit: 11-12 Monitor Circuit: 21-22 Monitor Circuit: 31-32	11-12 21-22 41-42 31-32
HS5L-VG□	Monitor Circuit: 11-12 Monitor Circuit: 21-22 Monitor Circuit: 33-34	11-12 21-22 41-42 33-34
HS5L-VH□	Monitor Circuit: 11-12 Monitor Circuit: 51-52 Monitor Circuit: 61-62	11-12 41-42 51-52 61-62
HS5L-VJ□	Monitor Circuit: 11-12 Monitor Circuit: 51-52 Monitor Circuit: 63-64	11-12 41-42 51-52 63-64
HS5L-VW□	Monitor Circuit: 13-14 Monitor Circuit: 51-52 Monitor Circuit: 61-62	13-14 41-42 51-52 61-62
HS5L-VX□	Monitor Circuit: 13-14 Monitor Circuit: 51-52 Monitor Circuit: 63-64	13-14 41-42 51-52 63-64
HS5L-DD□	Main Circuit: 11-12 Main Circuit: 21-22	11-42 21-52
[HS5L-XB□]	Monitor Circuit: 13-14 Monitor Circuit: 41-42	13-14 41-42
[HS5L-XJ□]	Monitor Circuit: 41-42 Monitor Circuit: 53-54	41-42 53-54
[HS5L-A□]	Main Circuit: 11-12 Monitor Circuit: 23-24 Monitor Circuit: 53-54	11-42 23-24 53-54
[HS5L-B□]	Main Circuit: 11-12 Monitor Circuit: 23-24 Monitor Circuit: 51-52	11-42 23-24 51-52
[HS5L-C□]	Main Circuit: 11-12 Monitor Circuit: 21-22 Monitor Circuit: 53-54	11-42 21-22 53-54
[HS5L-D□]	Main Circuit: 11-12 Monitor Circuit: 21-22 Monitor Circuit: 51-52	11-42 21-22 51-52
[HS5L-F□]	Main Circuit: 11-12 Monitor Circuit: 21-22 Monitor Circuit: 31-32	11-42 21-22 31-32
[HS5L-G□]	Main Circuit: 11-12 Monitor Circuit: 21-22 Monitor Circuit: 33-34	11-42 21-22 33-34
[HS5L-H□]	Main Circuit: 11-12 Monitor Circuit: 51-52 Monitor Circuit: 61-62	11-42 51-52 61-62
[HS5L-J□]	Main Circuit: 11-12 Monitor Circuit: 51-52 Monitor Circuit: 63-64	11-42 51-52 63-64
[HS5L-TA□]	Monitor Circuit: 13-14 Monitor Circuit: 53-54	41-42 13-14 53-54
[HS5L-TB□]	Monitor Circuit: 13-14 Monitor Circuit: 51-52	41-42 13-14 51-52
[HS5L-TC□]	Monitor Circuit: 11-12 Monitor Circuit: 53-54	41-42 11-12 53-54
[HS5L-TD□]	Monitor Circuit: 11-12 Monitor Circuit: 51-52	41-42 11-12 51-52
[HS5L-TF□]	Monitor Circuit: 11-12 Monitor Circuit: 21-22	41-42 11-12 21-22
[HS5L-TG□]	Monitor Circuit: 11-12 Monitor Circuit: 23-24	41-42 11-12 23-24
[HS5L-TH□]	Monitor Circuit: 41-42 Monitor Circuit: 51-52 Monitor Circuit: 61-62	41-42 51-52 61-62
[HS5L-TJ□]	Monitor Circuit: 41-42 Monitor Circuit: 51-52 Monitor Circuit: 63-64	41-42 51-52 63-64

(Actuator Completely Inserted) (Actuator Pulled Out)
■:Contact Closed □:Contact Open

- Contact operation is based on the condition that the actuator is inserted into the center of the interlock switch slot.
- Contact operation shows the HS9Z-A51 actuator.
(For other actuators, add 1.3 mm to contact operation.)
- Use main circuit or monitor circuit with  for the input to safety circuit.

CAUTION

*11 This locking monitoring marking has been newly described in section 9.2.1 of EN ISO / ISO14119. It indicates that any devices with this marking meet the following EN ISO / ISO 14119 requirements:
- General (- General requirements for guard locking devices) (Section 5.7.1) *
- Locking monitoring (- Locking monitoring for guard locking devices) (Section 5.7.2.2)
When a lock monitor circuit (contact) has the locking monitoring marking, it means that one circuit (contact) can monitor the position and the locking function of the protective door. (The locking monitoring circuit (contact) is opened when opening or unlocking the protective door.)
*note HS5L-K interlock switches have obtained the locking monitoring certification marking.
*12 Type Nos. in [] are not supplied as standard. Contact IDEC if required.
*13 The Actuator is inserted, and HS5L-K is locked.

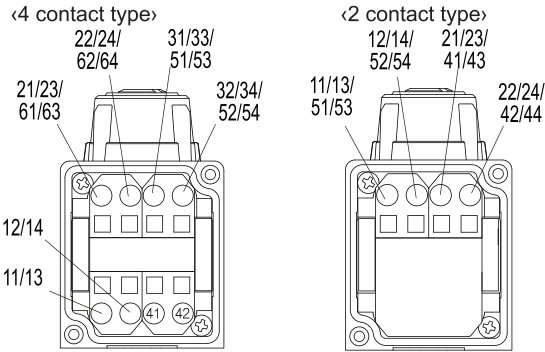
Operation Cycle

Door States	Closed	Closed	Open	Closed
Key Position /Rear Unlock Button	Lock Position /Returned status	Unlock Position /Returned status	Unlock Position /Returned status	Lock Position /When operating the Button
Main Circuit 11-42 21-52	Closed	Open	Open	Open
Monitor Circuit 11-12 21-22 31-32	Closed	Closed	Open	Closed
Monitor Circuit 13-14 23-24 33-34	Open	Open	Closed	Open
Monitor Circuit 41-42 51-52 61-62	Closed	Open	Open	Open
Monitor Circuit 53-54 63-64	Open	Closed	Closed	Closed
	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.

6 Wiring

Terminal wiring method

• Terminal NO.

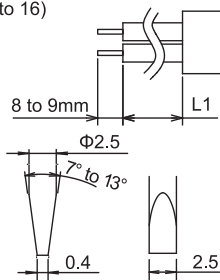


Note :

- The following type circuits are shipped with jumpers connecting the indicated terminals.
A,B,C,D,F,G,J type circuits: Jumper connecting 12-41
DD type circuit: Jumpers connecting 12-41 and 22-51
- When the NC contacts (11-12)/(21-22) of the door monitor circuit and NC contacts (41-42)/(51-52) of the lock monitor circuit are connected in series as inputs to the safety circuit, connect 12-41 or 22-51 before use.

• Recommended Wire Core Size : 0.3 to 1.5 mm² (AWG22 to 16)

Type	Routing direction	Wire Length: L1
HS5L-K□M-△ HS5L-K□LM-△	Straight orientation	30 to 35mm

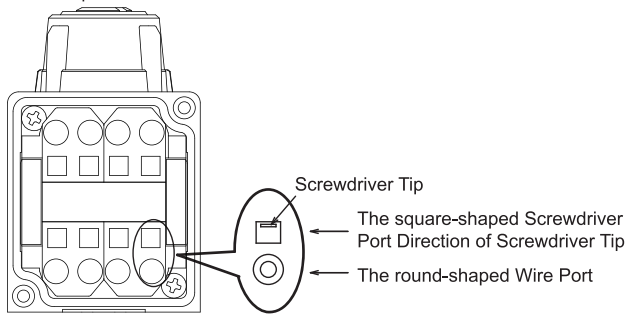


- For wiring, use the following applicable screwdriver.
(Tip shape of the driver is according to the standard of DIN5264)

• In applications using ferrules for stranded wires, choose the ferrule listed in the table.

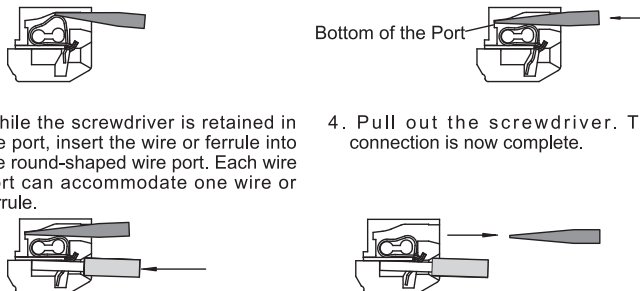
Part No.	AWG	Applicable wire (stranded)
S3TL-H034-10WT	22	0.34mm ²
S3TL-H05-12WA	20	0.5mm ²
S3TL-H075-12WW	18	0.75mm ²
S3TL-H10-12WY	17	1.0mm ²

• Wire insertion positions, screwdriver insertion positions, and the directions of screwdriver tip are shown below.



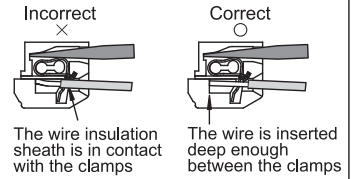
Wiring Instructions

- Insert the applicable screwdriver into the square-shaped port as shown, until the screwdriver tip touches the bottom of the spring.
- Push in the screwdriver until it touches the bottom of the port. The wire port is now open, and the screwdriver is held in place. The screwdriver will not come off even if you release your hand.
- While the screwdriver is retained in the port, insert the wire or ferrule into the round-shaped wire port. Each wire port can accommodate one wire or ferrule.
- Pull out the screwdriver. The connection is now complete.



CAUTION

- When using wire with insulation diameter of Φ2.0mm or less, do not insert the wire too deep where the insulation inserts into the spring clamp opening. Otherwise conductive failure will be caused. Make sure that the wire insulation is stripped 8 to 9 mm and the wire is inserted to the bottom.
- Please only connect one wire per terminal port (according to the general requirements section (13.1.1) of IEC60204).



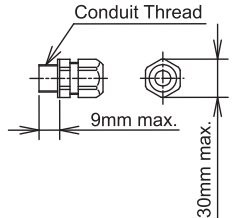
Applicable Connectors

Use a connector with a degree of protection IP65.

Applicable connector dimensions : See the figure on the right.

- When using plastic connector, metal connector and multi-core cable

(M20) Applicable Plastic Connector Example:
Type ST-M20×1.5 (made by LAPP)

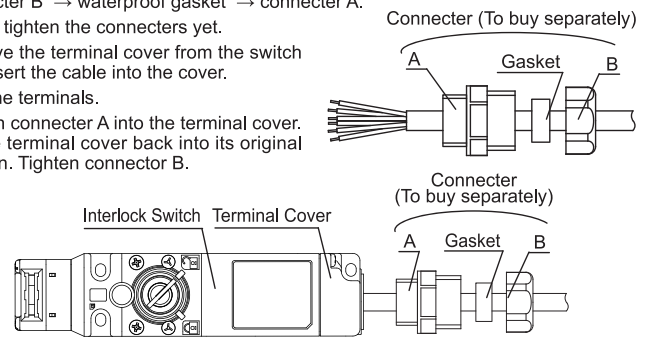


Note : Confirm the outside diameter of the multi-core cable, the connector type depends on the outside diameter of multi-core cable.

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

Connecters' mounting method

- Loosen connector A and connector B, and insert the cable into these pieces in the following order :
connector B → waterproof gasket → connector A.
Do not tighten the connectors yet.
- Remove the terminal cover from the switch and insert the cable into the cover.
- Wire the terminals.
- Tighten connector A into the terminal cover.
Fix the terminal cover back into its original position. Tighten connector B.



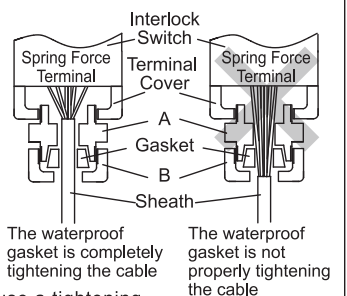
Note : To unwire the terminals, disassemble the product in the following order:

turn off the power → loosen connector B → remove the terminal cover → remove the waterproof gasket from connector A* → loosen connector A

* Please remove the water-proof gasket carefully with tools such as tweezers. Be careful when removing the gasket as damages may affect its waterproof properties. Also, loosening connector A without removing the gasket first may damage the cable and provoke connection issues. Please make sure you re-insert the waterproof gasket properly into connector A when re-assembling the product.

CAUTION

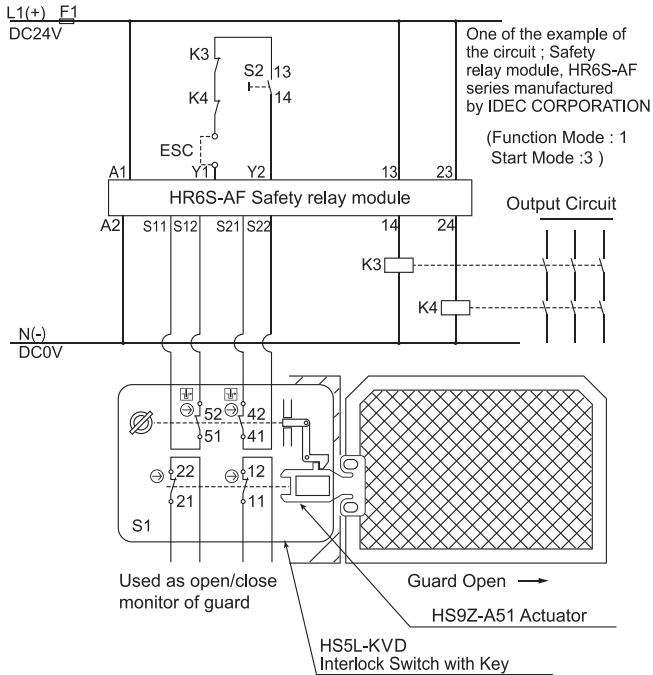
- Make sure not to lose any screw when removing the terminal cover from the switch.
- Please make sure the cable is inserted deep enough into the terminal cover so that the waterproof gasket can tighten the cable sheath completely and ensure its waterproof functions.
- Make sure you always tighten connector A before connector B, otherwise the wires which connect the terminals might get twisted or might break, and this might also damage the terminal ports.
- When tightening the connectors, only use a tightening torque that is approved by the connectors' manufacturer to ensure waterproof properties of the product.
- Do not pull or twist the cable with excessive force, otherwise you might damage the wires inside of it.



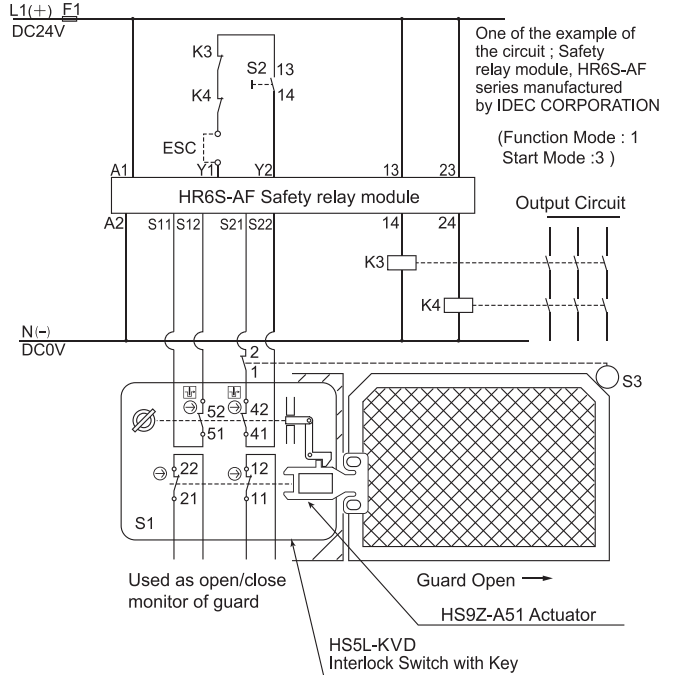
7 Example of wiring Diagram realizing Safety Category

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

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



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



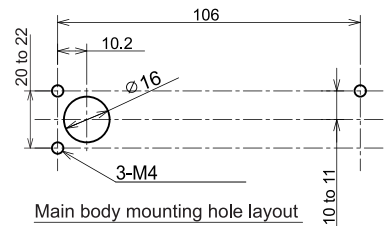
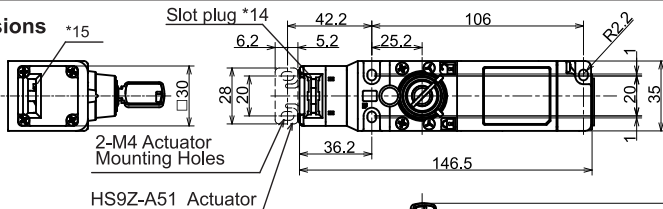
- S1: HS5L-KVD Interlock Switch with Key
- S2: Start Switch (HW Series Momentary)
- S3: Safety limit Switch
- ESC: Outside start condition
- K3, 4: Safety Contactor
- F1: Outside fuse of safety relay module at power supply line

Note: The insulation of the cable has to withstand environmental influences.

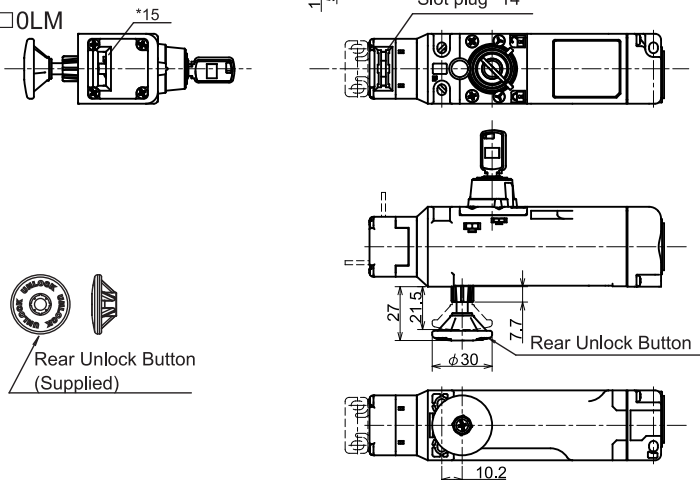
8 Dimensions (mm)

Interlock Switch dimensions

Type : HS5L-K□0M



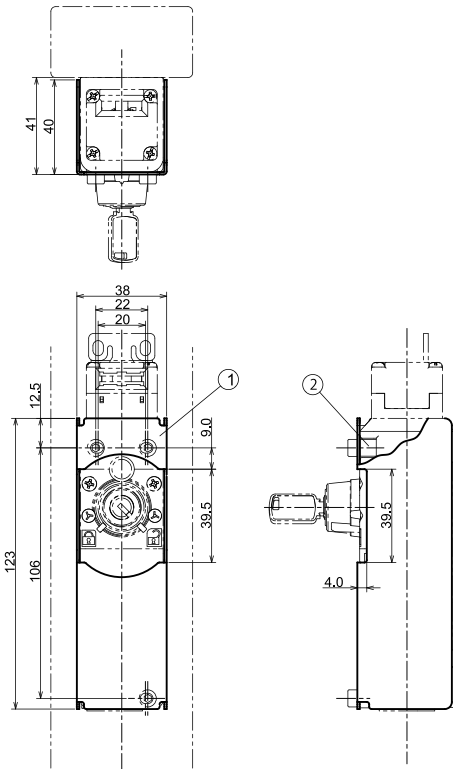
Type : HS5L-K□0LM



- *14 The actuator entry slot vertical to the mounting panel
- *15 The actuator entry slot horizontal to the mounting panel
- Note: When not in use, close up the interlock switch actuator entry slots with slot plugs to prevent dust from entering.
(The actuator entry slot vertical to the mounting panel come closed up with slot plugs at time of shipment. In the case of a standard sale model. Please check other models.)

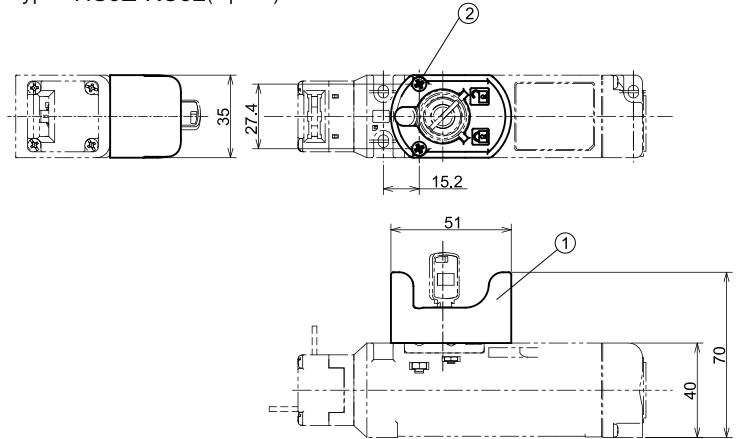
Accessories dimensions (To be sold by separately)

Type : HS9Z-BC53(OPTION)



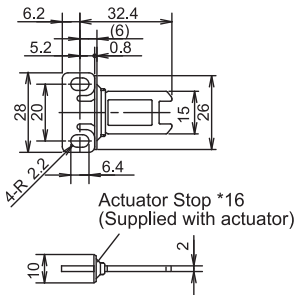
No.	Parts	Material
1	Explosion-Proof Cover	steel
2	Spacer	steel

Type : HS9Z-KC52(OPTION)

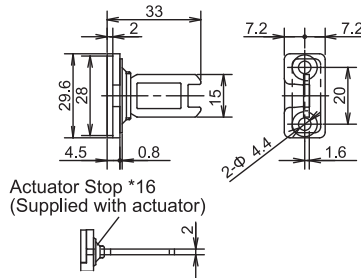


No.	Parts	Material
1	Key guard	polyamide
2	Mounting Screw	steel

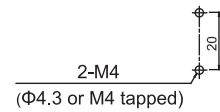
Type : HS9Z-A51(OPTION)



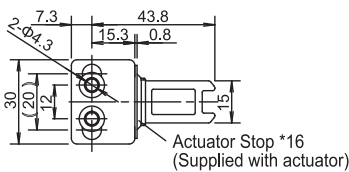
Type : HS9Z-A52(OPTION)



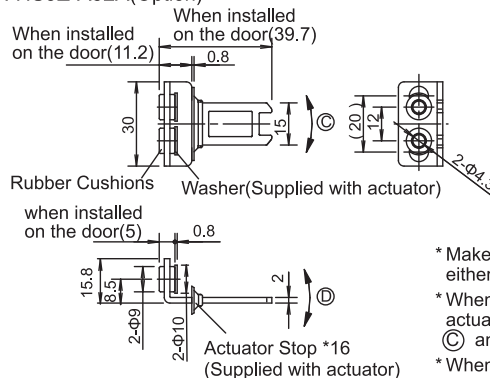
HS9Z-A51/A52 Actuator mounting hole layout



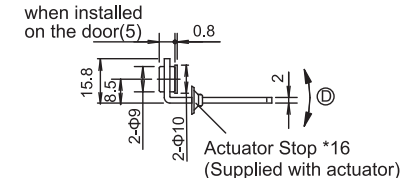
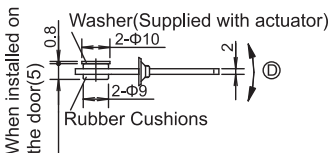
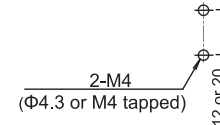
Type : HS9Z-A51A(OPTION)



Type : HS9Z-A52A(OPTION)



HS9Z-A51A/A52A Actuator mounting hole layout

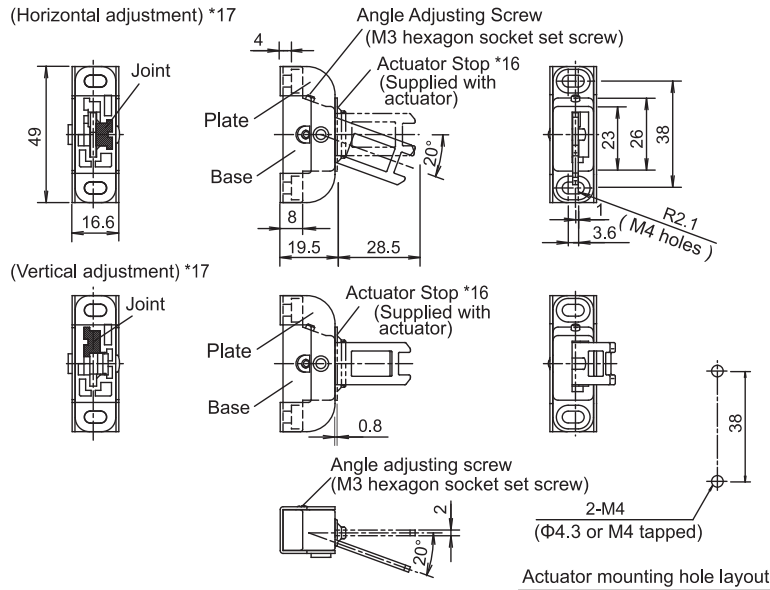


* Make sure to use the product with the mounting pitch at either 12 mm or 20 mm.

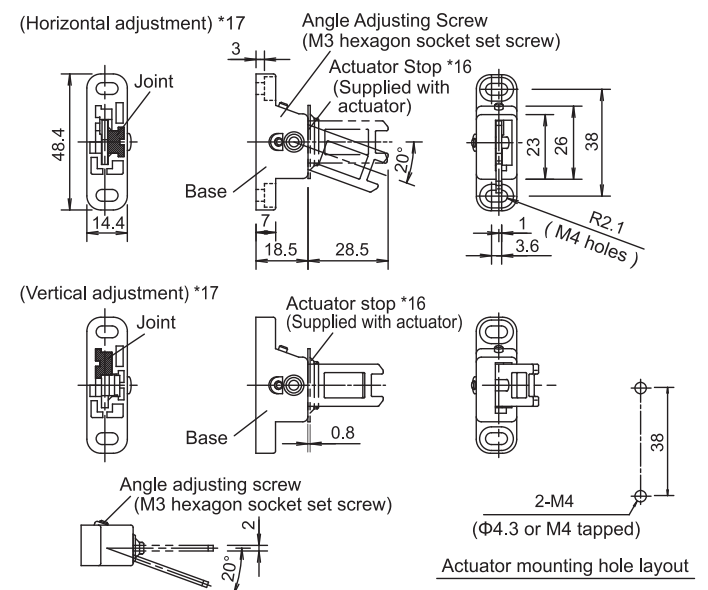
* When the mounting pitch is 12 mm (factory setting), the actuator has movement flexibility to the directions shown in ① and ②.

* When the mounting pitch is 20 mm, the actuator has movement flexibility to the directions shown in ③. Side the rubber cushions together with the screws.

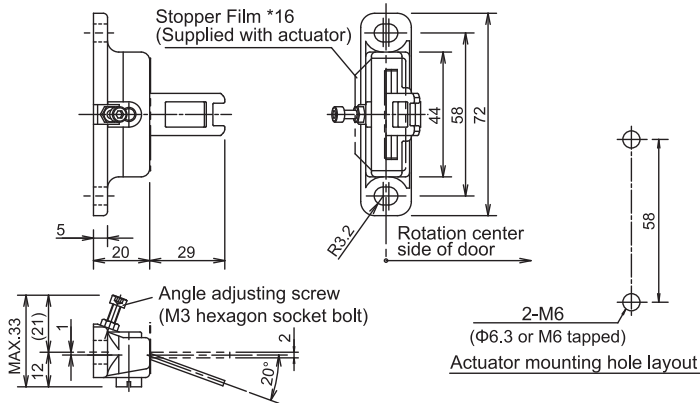
Type : HS9Z-A55S Angle Adjustable (vertical/horizontal) Actuator with plate (Option)
(Horizontal adjustment) *17



Type : HS9Z-A55 Angle Adjustable (vertical/horizontal) Actuator (Option)
(Horizontal adjustment) *17



Type : HS9Z-A53 Angle Adjustable (vertical) Actuator (Option)



*16 The actuator stop and The Stopper film are used when adjusting the actuator position. Remove after the actuator position is determined.

*17 The direction of adjustable angle can be changed (vertical or horizontal) by changing the insertion direction of the joint. Do not lose the joints. Actuators do not operatenormally without a joint.

(horizontal adjustment) (vertical adjustment)

9 Precaution for Disposal

Dispose of the HS5L-K interlock switch as an industrial waste.

IDEC CORPORATION <http://www.idec.com>

Manufacturer: IDEC CORP.
2-6-64 Nishimiyahara Yodogawa-ku, Osaka 532-0004, Japan

EU Authorized Representative: APEM SAS
55, Avenue Edouard Herriot BP1, 82303 Caussade Cedex, France

UK Authorized Representative: APEM COMPONENTS LIMITED

Drakes Drive, Long Crendon, Buckinghamshire, HP18 9BA, UK
Applicable UK Directive : The Electrical Equipment (Safety) Regulations 2016
Supply of Machinery (Safety) Regulations 2008

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
Applicable Standard(s) : EN 60947-5-1, EN 50581

EU DECLARATION OF CONFORMITY

We, IDEC CORPORATION 2-6-64, Nishimiyahara Yodogawa-ku, Osaka 532-0004, Japan declare under our sole responsibility that the product:

Description: Interlock Switch with Key
Model No: HS5L-K

Applied Union harmonized legislation and references to the relevant harmonization standards used or references the other technical specifications in relation to which conformity is declared.

Applicable EU Directive : Low Voltage Directive (2014/35/EU)
Machinery Directive (2006/42/EC)
RoHS Directive (2011/65/EU)

Applicable Standard(s) : EN 60947-5-1, GS-ET-19, EN 50581