B-2227-1(1)

Instruction Sheet

Interlock switch with key

HS5L-K Series

IDEC CORPORATION

IDEC

B-2227-1(1)

INSTRUCTION SHEET

Original instructions

Interlock switch with key

HS5L-K series

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 from Warning and Caution: as follows:

⚠ 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 Model number configuration

HS5L-K□0LM-2A501

- For Rear Unlock: Blank: Without Rear Manual Unlock; L: Push Button
- Conduit Cover: M: Standard type (M20)
- To select key numbers: Blank: 500; 501 to 510: 501 to 510
  * Type No. in [ ] are not supplied as standard.Contact IDEC if required.
- Key Retained at: A : Lock and Unlock; B : Unlock; C : Lock
- Circuit Code
- Standard type

Contact configuration

Door&lock circuit	Door monitor circuit	Lock monitor circuit		HS5L-K□M-△	HS5L-K□LM-△
-	1NC	1NC	XD	√	√
-	-	2NC	XH	√	√
-	-	1NC, 1NO	XJ	√	√
-	1NC, 1NO	1NC, 1NO	VA	√	√
-	2NC	2NC	VD	√	√
1NC+1NC 1NC+1NC	-	-	DD	√	-

*1 Only type No. on √ mark is supplied as standard.

Rear unlocking button

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/T 14048.5			
	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		Low Voltage Directive, Machinery Directive, RoHS Directive			
Standard operating conditions	Operating temperature	-25 to +70°C (no freezing)			
	Operating humidity	20 to 95%RH (no condensation)			
	Operating environment	Pollution degree 3 (inside 2)			
	Altitude	2,000m maximum			
Impulse withstand voltage (Uimp)		2.5kV			
Rated insulation voltage (Ui)		250V			
Thermal current (Ith)		2.5A			
Rated operating voltage (Ue) Rated operating current (Ie)*3			30V	125V	250V
	AC	Resistive load (AC-12)	-	2.5A	1.5A
		Inductive load (AC-15)	-	1.5A	0.75A
	DC	Resistive load (DC-12)	2.0A	0.4A	0.2A
		Inductive load (DC-13)	1.0A	0.22A	0.1A
Class of protection		Class II (IEC61140) *4 ⧈			
Operation frequency		900 operations per hour			
Operation speed		0.05 to 1.0m/s			
B10d		2,000,000 (ISO 13849-1 Annex C Table C.1)			
Mechanical durability		2,000,000 operations minimum (GS-ET-19) The Rear Unlocking Button: 3,000 operations minimum (Type HS5L-K-□L)			
Electrical durability		100,000 operations minimum (AC-12 250V/1.5A) 2,000,000 operations minimum (AC/DC 24V 100mA) (900 operations/hour)			
Shock resistance		Operating extremes: 100m/s^2, Damage limits: 1,000m/s^2			
Vibration resistance		Operating extremes: 10 to 55Hz, half amplitude 0.35mm Damage limits: 30Hz, half amplitude 1.5mm			
Actuator tensile strength when locked		Fzh=1,400N minimum F1max=1,820N minimum (GS-ET-19) *5, *6 (However, Fzh=500N minimum, when HS9Z-A55 is used)			
Direct opening travel		11mm minimum (Actuator: HS9Z-A51/A5P) 12mm minimum (Actuator: HS9Z-A52/A51A/A52A/A53/A55/A55S)			
Direct opening force		120N minimum			
Contact resistance		50mΩ 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	Function specifications	Maintained (90° 2-position)			
	Mechanical durability	100,000 times minimum			
	Key operating durability	10,000 operations minimum			
	Operator strength	1.0 N·m minimum			
	Direct opening force	0.6 N·m minimum			
	Direct opening angle	90°			

*2 The highest temperature limit for UL 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 (interlock 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 locking strength is rated at 1,400N 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's guard-locking 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

• When using the HS5L-K series Key interlock switches, please use them with the actuators/accessories listed in the table below.

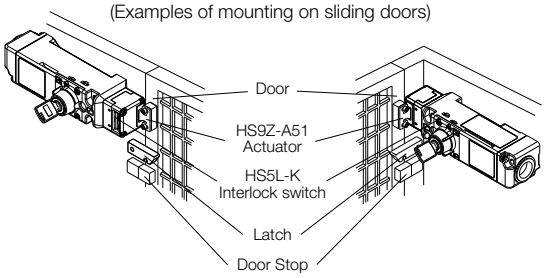
	Name		Part No.
Actuator	Straight		**HS9Z-A51**
	Straight (with rubber bushing)		**HS9Z-A51A**
	Right-angle		**HS9Z-A52**
	Right-angle (with rubber bushing)		**HS9Z-A52A**
	Angle adjustable (vertical)		**HS9Z-A53**
	Angle adjustable (vertical/horizontal)		**HS9Z-A55**
	Angle adjustable (vertical/horizontal) with plate		**HS9Z-A55S**
Accessory	Key guard		**HS9Z-KC52**
	Explosion-proof cover		**HS9Z-BC53**
	Actuator (straight)		**HS9Z-SH5**
	Door handle actuator	Handle unit (for right-opening doors)	**HS9Z-DH5RH**
		Handle unit (for left-opening doors)	**HS9Z-DH5LH**
		Switch cover unit	**HS9Z-DH5C**
	Slide handle actuator		**HS9Z-EH5L**
	Plastic slide handle actuator		**HS9Z-LH5**
	Spring loaded actuator		**HS9Z-BA5**
	Plug actuator		**HS9Z-A5P**
	Padlock hasp		**HS9Z-PH5**
	Mounting plate		**HS9Z-SP51**
	Rear unlocking button kit for frame mounting		**HS9Z-FL5□**

⚠ CAUTION

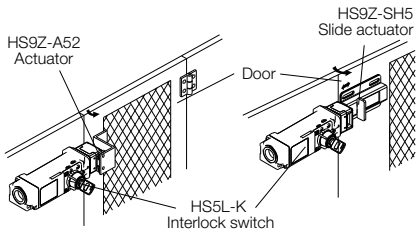
Before using the following accessories, be sure to refer to the instruction manual for the respective accessory and follow the instructions in the manual to ensure correct use.

• 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)

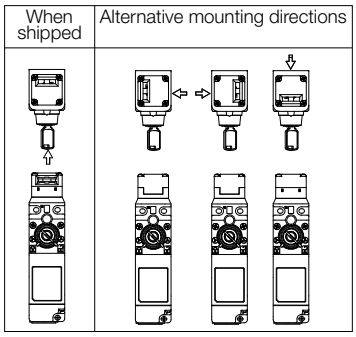


(Examples of mounting on hinged doors)



❑ The HS5L-K head

• Changing the mounting directions of the HS5L-K head
The head can be rotated by removing the four screws from the corners of the head and reinstalling the head in the desired orientation.



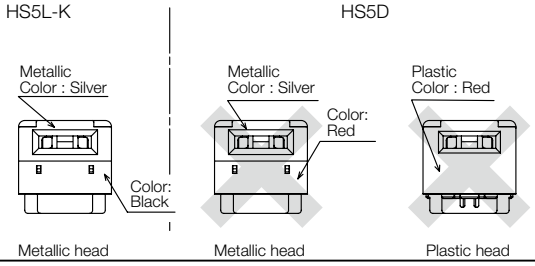
⚠ WARNING

❑ Mounting directions of the HS5L-K head

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

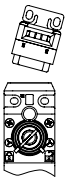
❑ Mounting the head

• **Do not use plastic and metallic heads of HS5D interlock switches on the HS5L-K.**
Be sure to use HS5L-K metallic heads. The metal head can be distinguished easily by the color of the plastic.



❑ Head removal detection function

• When the actuator is operated, the operation of the monitor circuit (11-42) and (51-52) are the same. However, when the head is removed, disparity is detected (11-42: OFF, 51-52: ON). This disparity is detected by the head removal detection function.

		Actuator Unlocked	Actuator locked	Head removed
				
Monitor circuit (NC)	41 42			
Monitor circuit (NC)	51 52			

Contact Close: Contact Open:

• Key LOCK and UNLOCK positions are as follows.

: Status when actuator is locked

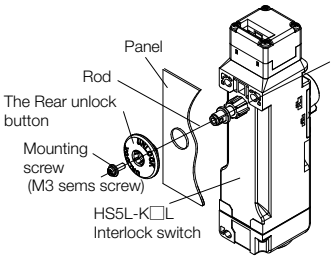
: State when the actuator is UNLOCK

⚠ 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: DD and VD types (lock monitor circuit NC: 2 or more circuits: except XH).

❑ Installing the rear unlocking button (Type HS5L-K-□L)

After installing the interlock switch on the panel, put the rear unlocking button (supplied) on the rod on the back of the interlock switch, and fasten using the mounting screw (supplied). When installing on the aluminum frame with a thickness of 6mm or more, use the rear unlocking button for the frame kit (HS9Z-FL5) sold separately.



⚠ CAUTION

After installing the rear unlocking button, apply Loctite to the screw so that the screw does not become loose. The rod is made of stainless steel. The rear unlocking button is glass-reinforced PA66 (66 nylon).The mounting screw is iron. Use screw locking agent that is compatible with the base material.

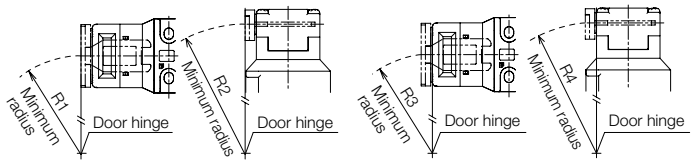
❑ Minimum radius of hinged door

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

• Type HS9Z-A52

· When the center of the hinged door is on the extension line of the actuator mounting surface.

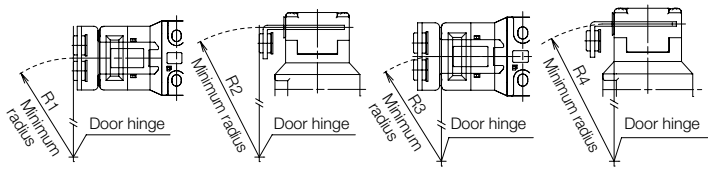
· When the center of the hinged door is on the extension line of the contact surface of actuator and interlock switch.



• Type HS9Z-A52A

· 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 of hinged door			
		R1	R2	R3	R4
HS9Z-A52		230mm	260mm	170mm	190mm
HS9Z-A52A	Mounting centers: 12mm	230mm	260mm	120mm	140mm
	Mounting centers: 20mm	310mm		170mm	
HS9Z-A53			80mm (Vertical swing)		50mm (Vertical swing)
HS9Z-A55 **HS9Z-A55S**		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 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**
  Recommended tightening torque: 0.8N·m

- **Type HS9Z-A55/A55S**
  Base: PA66 (66 nylon) of glass reinforced grade, Angle adjustment screws: steel
  Use screw locking agent that is compatible with the base material.

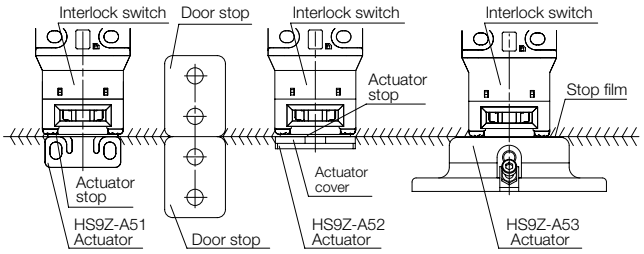
❑ Actuator mounting reference position

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

- **Type HS9Z-A53**
  The actuator stopper film placed on the actuator touches the interlock switch lightly.

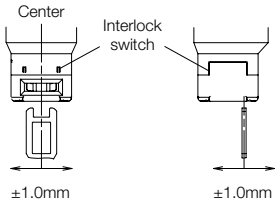
- **Type HS9Z-A51/A51A/A52/A52A/A55/A55S**
  The actuator and actuator cover touches the actuator stop placed on the interlock switch lightly.

* After mounting the actuator, remove the actuator stop or stopper film from the interlock switch.



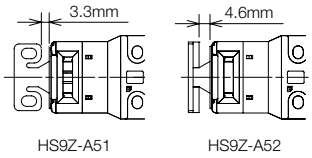
❑ Actuator mounting tolerance

- Mounting tolerance of the actuator is 1.0mm 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 **HS9Z-A51A** **HS9Z-A52A**	≤4.6mm
HS9Z-A53	≤5.6mm
HS9Z-A55 **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. If the rubber is deformed or damaged, immediately replace with a new one.

- **Recommended screw tightening torque**

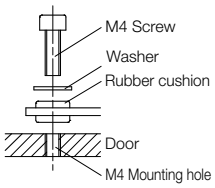
	Recommended tightening torque
For mounting the interlock switch	
HS5L-K key interlock switch (three M4 screws) *8	1.8 to 2.2N·m
For mounting the cover (two M3 screws)	0.5 to 0.7N·m
HS5L-K head screw (four M3 screws)	0.9 to 1.1N·m
Rear unlocking button (M3 sems screw)	0.5 to 0.7N·m
For mounting the actuator	
HS9Z-A51 (two M4 screws) *8	1.8 to 2.2N·m
HS9Z-A52 (two M4 flat head screws)	0.8 to 1.2N·m
HS9Z-A51A/A52A (two M4 screws) *8, 9	1.0 to 1.5N·m
HS9Z-A53 (two M6 screws) *8	4.5 to 5.5N·m
HS9Z-A55/A55S (two M4 screws) *8	1.0 to 1.5N·m
Accessory	
HS9Z-KC52 (two M3.5 screws) *10	1.0 to 1.2N·m
HS9Z-BC53 (three M4 screws) *10	1.8 to 2.2N·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 When installing the HS9Z-A51A and HS9Z-A52A actuators, use the washer (supplied with the actuator) on the hinged door, and mount tightly using two M4 screws.

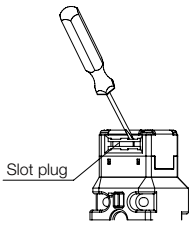
*10 The above tightening torque of the mounting screw is the value confirmed with hex socket head bolts. When other screws are used and tightened to a smaller torque, make sure that the screws do not become loose after mounting.



❑ Installing the slot plug

(In the case of supplied as standard. Please check other models.)

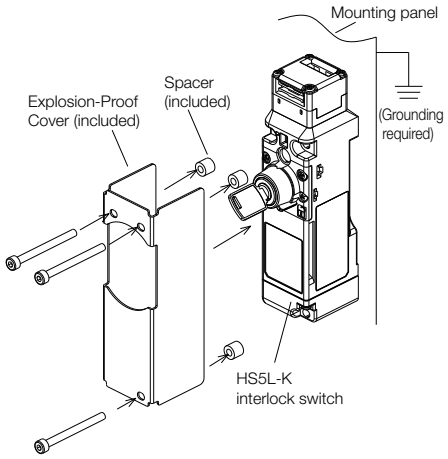
- When not in use, close up the interlock switch actuator entry slots with slot plugs to prevent dust from entering.
- Actuator entry slots vertical to the mounting panel come closed up with slot plugs at time of shipment. When replacing, please use the tool as shown.



❑ Explosion-proof cover (HS9Z-BC53)

• Make sure that the following items are included.

Items	Package Quantity
Explosion-proof cover	1
Spacer	3



• Using the explosion-proof cover 3 spacers and 3 fixing screws, install the HS5L-K Key interlock switch on the mounting panel or frame.

⚠ 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 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

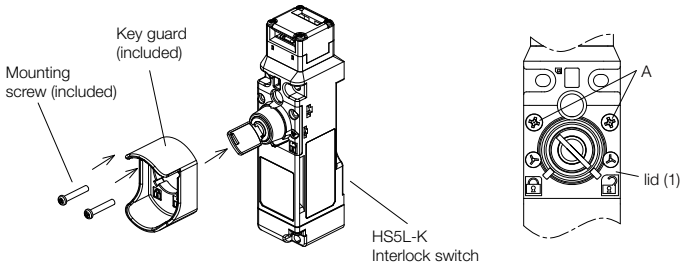
⚠ WARNING

- By using the explosion-proof cover with the HS5L-K, (HS5L-K, optional) and connecting the EB3N safety relay barrier, the HS5L-K can be using as an intrinsically safe explosion-proof product. When used as intrinsically safe explosion-proof equipment, be sure to affix the label (including the certification mark) that comes with the EB3N type safety relay barrier for ExiaIIBT6 in an easily visible position.
- 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: https://jp.idec.com/c/EB3N_Series
- 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.

❑ Installing the key guard (HS9Z-KC52)

• Make sure that the following items are included.

Items	Package Quantity
Key guard	1
Fixing screw	2



- Out of the four screws on the cover ① on the HS5L-K, remove the two screws (A). (Refer to the above figure)
- Put the key guard over the projection around the key on HS5L-K and then fix the key guard with the two supplied fixing screws.

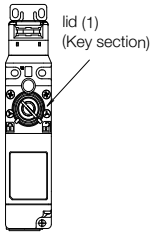
⚠ WARNING

The removed screw A cannot be used to fix the key guard. Be sure to use the supplied fixing screws to secure the key guard. Remove after the actuator position is determined.

4 Instructions

❑ For mounting

- Do not apply an excessive shock to the interlock switch when opening or closing the door. A shock to the interlock switch exceeding1,000m/s^2 may cause damage to the interlock switch.
- 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 stop. 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 of the interlock switch (1).
  Loosening the screws may cause damage to the switch.
- Do not fasten and loosen the conduit at the bottom of the interlock switch.
- Use proprietary actuators only. Using other actuators may damage the interlock 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.



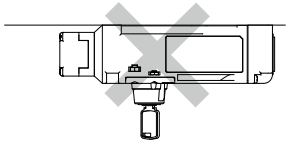
⚠ WARNING

- Turn off the power to the interlock switch before starting installation, removal, wiring, maintenance, and inspection of the interlock switch. Failure to turn power off may cause electrical shock or fire.
- Do not disassemble or modify the interlock switch. Also do not attempt to disable the interlock switch function, otherwise a breakdown or an accident will result. Otherwise, malfunction or damage may occur.

⚠ CAUTION

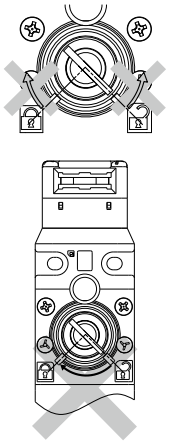
- Regardless of door types, do not use the interlock switch as a door stop. Install a mechanical door stop at the end of the door to protect the interlock switch against excessive force.
- Do not install the actuator in a location where the human body may come in contact. Otherwise injury may occur.
- 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, otherwise, damage may occur.
- If multiple safety components are wired in series, the Performance Level to ENISO13849-1 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 ENISO13849-2.

- Do not mount the interlock switch facing down as shown in the figure below. Otherwise, the key may fall off due to shock.

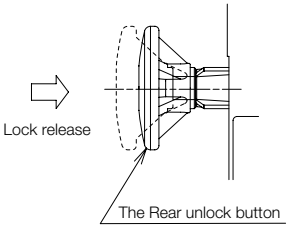


❑ Key

- Follow the instructions below to avoid operating failures and damage.
- Be sure to insert the key to the bottom of the key hole.
- Do not apply rotation force when removing or inserting the key. Also, do not pull the key while rotating. Otherwise, operating failures and damage may occur.
- 10 types of key numbers are available in addition to a standard key. Use a key that matches with the number on the key cylinder.
- Do not apply rotating force that exceeds the operating force range of the key. Otherwise, operating failures and 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, operating failures and damage may occur.



- **Rear unlocking button (Type HS5L-K□L)**
- The rear unlocking button is used for an emergency escape when the worker is confined in the safety hedge (the dangerous area). (Compliant with escape release described in EN ISO/ISO 14119 [2003] and GS-ET-19)
- The lock is released when the rear unlocking button is pressed, and the door can be opened.
- To lock the interlock switch, pull back the button. While the rear unlocking button is depressed, the main circuit remains open and the door is unlocked.

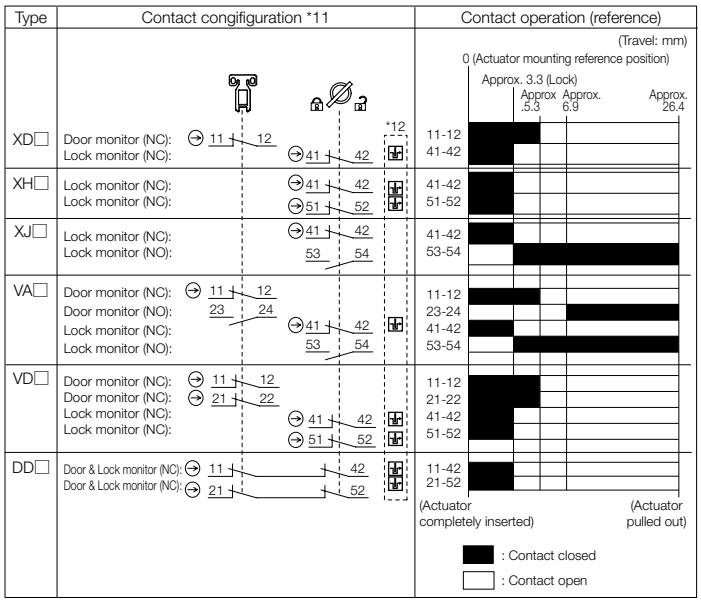


⚠ CAUTION

- Install the HS5L-K to ensure that a worker can operate the rear unlocking button from inside the safety fence (the dangerous area). It is dangerous to install the HS5L-K in the position where the rear unlocking button can be operated from outside the safety fence (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 unlocking button. Otherwise the button will be damaged.

5 Contact operation

❑ Contact configuration and operation



- 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 1.3mm.)
- Use door & lock circuit (NC) or lock monitor circuit with for the input to safety circuit.

⚠ CAUTION

*11 The contact configuration indicates that the actuator is inserted and locked.
*12 This locking monitoring marking has been described in section 9.2.1 of EN ISO/ ISO14119. It indicates that any devices with this marking meet the following EN ISO/ ISO14119 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)
The lock monitor circuit (contacts) with this marking can monitor both the status of protective door and locking function. (The locking monitoring circuit (contact) turns ON only when the protective door is closed and locked.)
* HS5L-K interlock switches have obtained the locking monitoring certification marking.

❑ Operation cycle

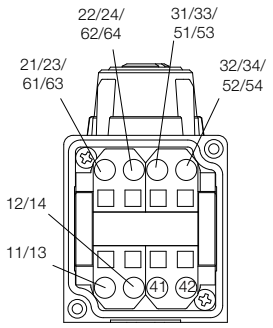
Door status	Closed	Closed	Open	Closed
Key position	Turn the key to lock position	Turn the key to lock position	Turn the key to lock position	Turn the key to unlock position
Rear unlocking button	Returned status	Returned status	Returned status	When operating the button
Door&lock circuit (NC) 11-42 21-52	Closed	Open	Open	Open
Door monitor circuit (NC) 11-12 21-22 31-32	Closed	Closed	Open	Closed
Door monitor circuit (NO) 13-14 23-24 33-34	Open	Open	Closed	Open
Monitor circuit (NC) 41-42 51-52 61-62	Closed	Open	Open	Open
Monitor circuit (NO) 53 -54 63-64	Open	Closed	Closed	Closed
	Door is locked. The machine can be operated.	Door is unlocked. The machine cannot be operated.	The machine cannot be operated.	Door is unlocked. The machine cannot be operated.

6 Wiring

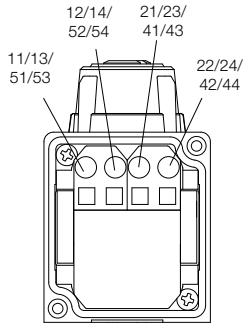
❑ Terminal wiring method

- Terminal No.

<4 contact type>



<2 contact type>



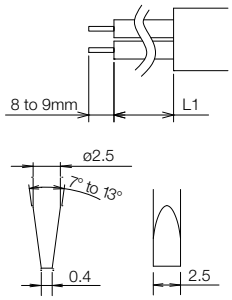
Note: · The following type circuits are shipped with jumpers connecting the indicated terminals. DD type circuit: Jumpers connecting 12-41 and 22-51
· When connecting the NC contact (11-12, 21-22) of door monitor circuit and NC contacts (41-42, 51-52) of the lock monitor circuit in a series as an input to a safety circuit, connect 12-41 or 22-51.

- Applicable wires
0.3 to 1.5mm^2 (AWG22 to 16)

- Wire length and example of layout

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)



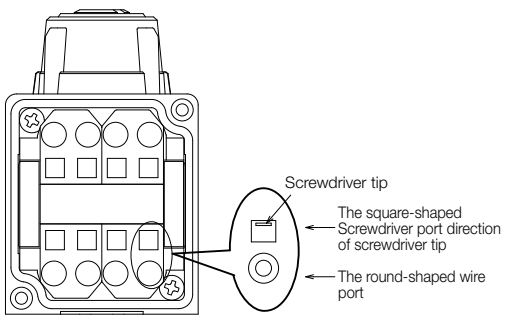
- In applications using ferrules for stranded wires, choose the ferrule listed in the table.

Applicable wire (stranded) mm^2	AWG	Part No.
0.34	22	**S3TL-H034-10WT**
0.5	20	**S3TL-H05-12WA**
0.75	18	**S3TL-H075-12WW**
1	17	**S3TL-H10-12WY**

- Recommended tools (sold separately)

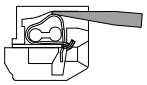
Item	Part No.	Ordering No.	Remarks
Crimping tool	PZ6 Roto L	1444050000	Overseas limited sale

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

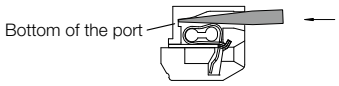


❑ Inserting the wire

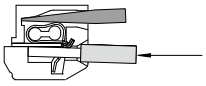
(1) Insert the screwdriver into the square-shaped port from a slightly slanted angle as shown, until the screw-driver tip touches the bottom of the spring.



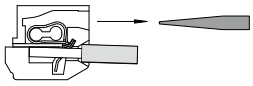
(2) Push in the screwdriver until it touches the bottom of the port. The wire port is opened, and the screwdriver is held in place. The screwdriver will not come off even if you release your hand.



(3) While the screwdriver is retained in the port, insert the wire or ferrule into the round-shaped wire port.

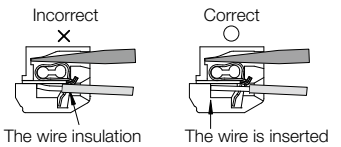


(4) Pull out the screwdriver.
The connection is now complete.



⚠ CAUTION

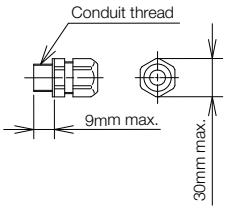
- When using wires with insulation diameter of Ø2.0mm or less, do not insert the wire too deep where the insulation inserts into the spring clamp opening. Otherwise, conductive failure may occur. Make sure that the wire insulation is stripped 8 to 9mm and the wire is inserted to the bottom.



- Please only connect one wire per terminal port.
(according to the general requirements section (13.1.1) of IEC60204)

❑ Applicable cable glands

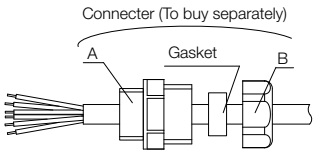
Use a cable gland with IP65 protection degree.
When using plastic connector, metal connector and multi-core cable.(M20)
Applicable plastic connector example: Type ST-M20×1.5 (made by LAPP)

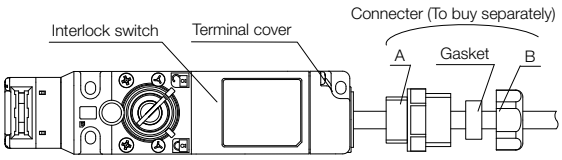


* Confirm the outside diameter of the multi-core cable, the connector type depends on the outside diameter of multi-core cable. Please check carefully before purchasing connectors.
* When using ST-M20×1.5, use with gasket GP-M (Type No: GPM20, made by LAPP).

❑ Connector wiring

Perform wiring according to following procedures (1) to (4).
(1) Insert the cable into the connector. Leave A and B untightened.
(2) Open the cover and insert the cable into the cover.
(3) Wire to the terminals.
(4) Tighten in the order of A → Cover → B.



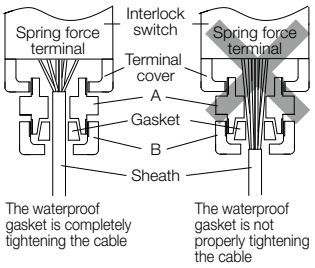


* To remove the wiring, turn the power off and then unwire in the order of B → cover (→waterproof gasket → A).

Note: When removing A, because the waterproofing gasket is tightly attached to the cable, pull out the gasket carefully with tweezers so that the gasket is not damaged before loosening A. Otherwise, the cable will rotate together with A when loosened, and might break due to excessive twisting. Also, when reassembling, place the gasket in the original position first.

⚠ CAUTION

- When opening the cover, be careful not to lose the cover mounting screw.
- When tightening connector B, insert the cable into the connector, and set it to a position where the gasket of the connector holds the cable sheath, otherwise, its waterproof performance might be impaired.
- Tighten the connector in order of A →B. If connector B is tightened first, the wiring connected to the spring clamp terminal may become twisted when tightening A, causing disconnection or malfunction.



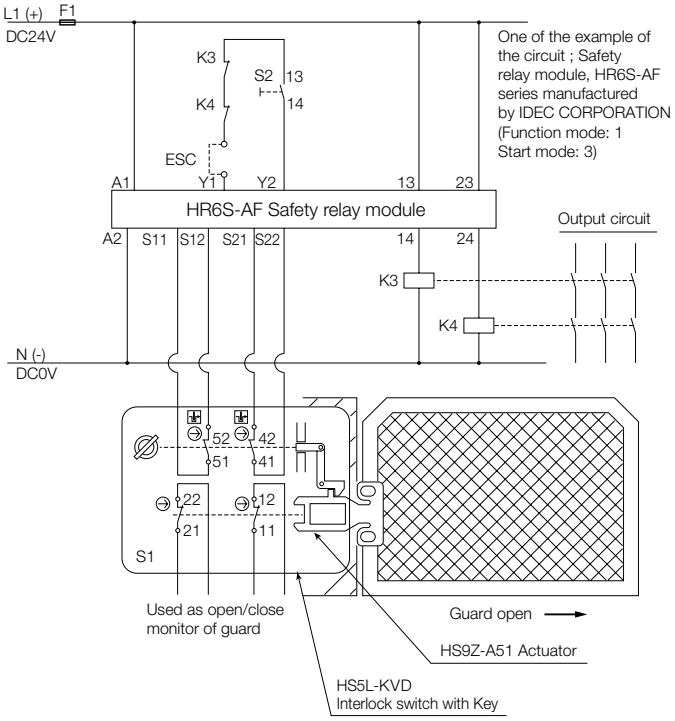
Note: Make sure that the entire bore surface of the gasket is in contact with the sheath.

- Tighten the connectors with tightening torque according to the torque value recommended by the connector manufacturer. Otherwise, waterproof performance might be impaired.
- Do not exert excessive load, pressure, or tensile force on the cable, otherwise, disconnection or malfunction might occur.

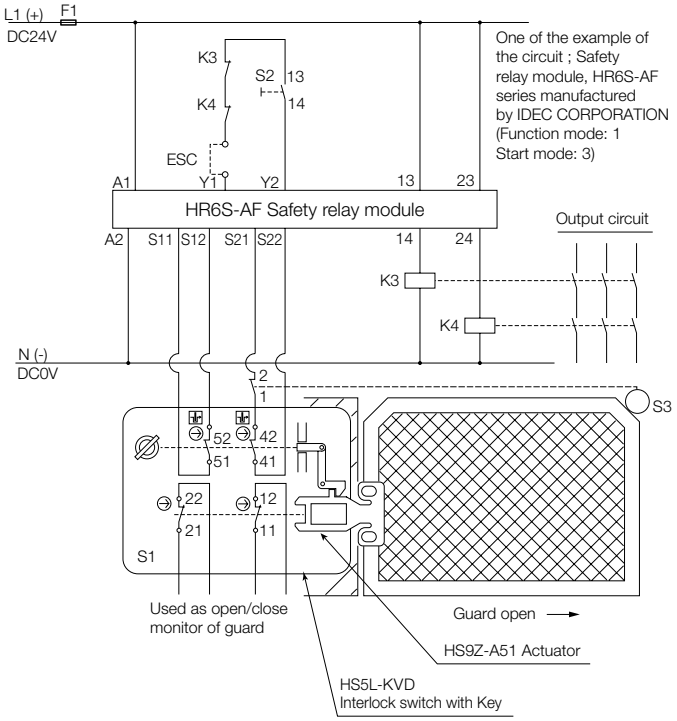
7 Example of wiring diagram realizing safety category

❑ 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 ISO13849-1, ISO13849-2 or IEC62061.)



❑ Example of a circuit for Safety category 4 (achievable PL=e)



S1: HS5L-KVD key interlock switch
S2: Start switch (HW Series momentary)
S3: Safety limit switch
ESC: Outside start condition
K3, K4: Safety contactor
F1: Outside fuse of safety relay module at power supply line

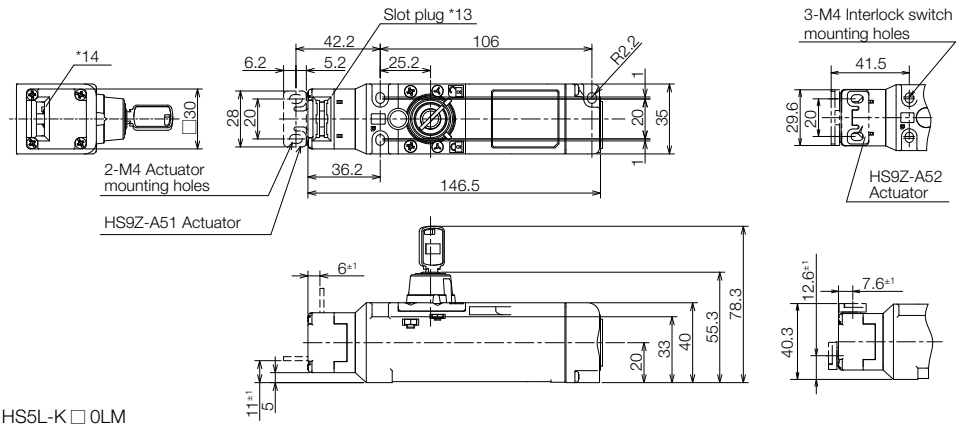
Note: The insulation of the cable has to withstand environmental influences.

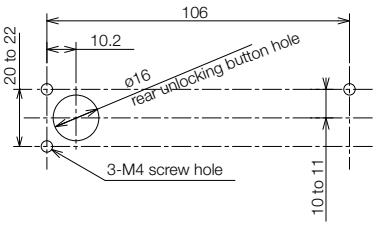
8 Part names and dimensions

All dimensions in mm.

❑ Interlock switch dimensions

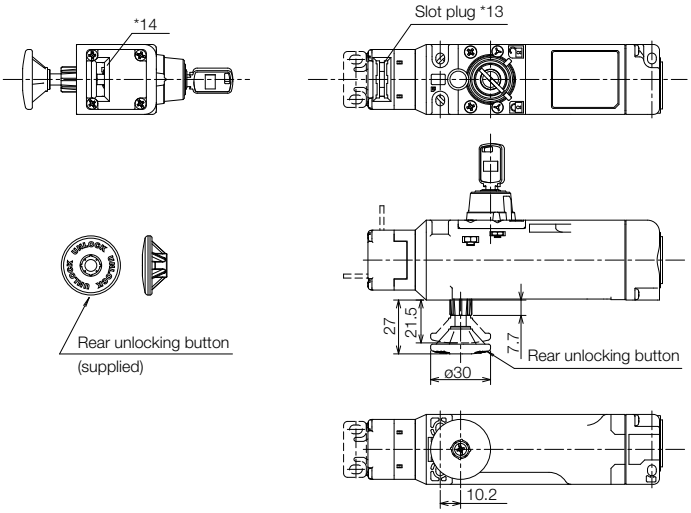
• Type: HS5L-K□0M





Main body mounting hole layout

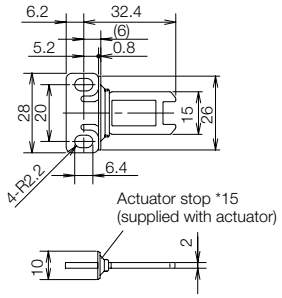
• Type: HS5L-K□0LM



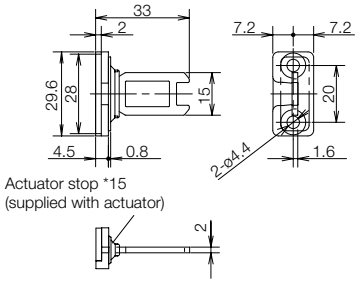
13 The actuator entry slot vertical to the mounting panel
*14 The actuator entry slot horizontal to the mounting panel
* When not in use, close up the interlock switch actuator entry slots with slot plugs to prevent dust from entering.(Actuator entry slots on the front come closed up with slot plugs at time of shipment.)
(In the case of supplied as standard. Please check other models.)

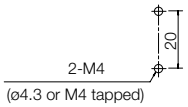
❑ Actuator dimensions

• Type: HS9Z-A51 Straight (sold separately)



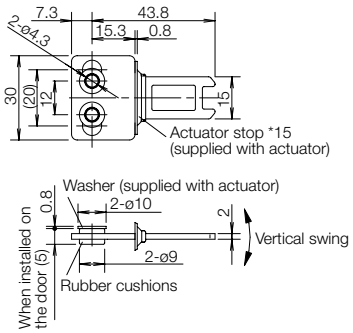
• Type: HS9Z-A52 Right-angle (sold separately)





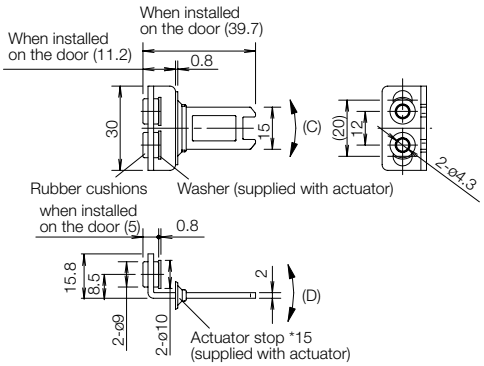
Mounting hole layout

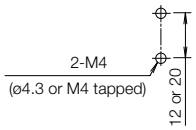
• Type: HS9Z-A51A Straight with rubber bushings (sold separately)



* Mounting centers must be 12 or 20mm.
* The mounting center distance is set to 12mm at the factory. When a 20mm distance is required, adjust the distance by moving the rubber bushing sideways.
* The actuator has flexibility to the direction indicated by the arrows.

• Type: HS9Z-A52A Right-angle with rubber bushings (sold separately)

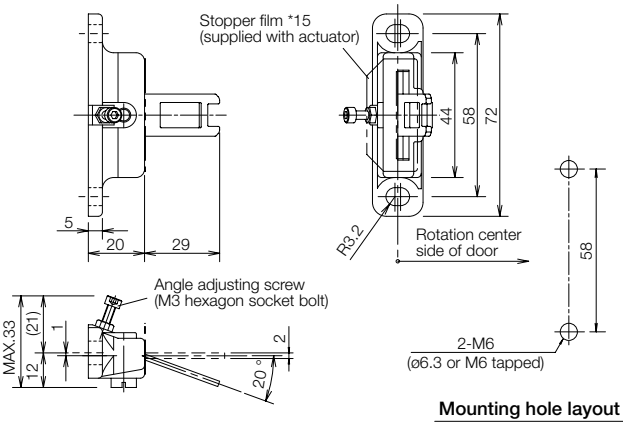




Mounting hole layout

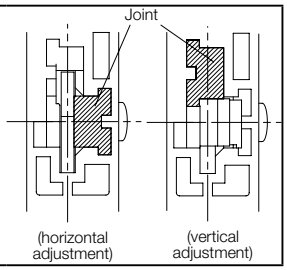
* Mounting centers must be 12 or 20mm.
When the mounting center distance is set to 12mm at factory, the actuator has flexibility both horizontally (C) and vertically (D).
* When the mounting center distance is set to 20mm, adjust by moving the rubber bushings. The actuator swings vertically (D)

• Type: HS9Z-A53 Angle Adjustable (vertical) (sold separately)

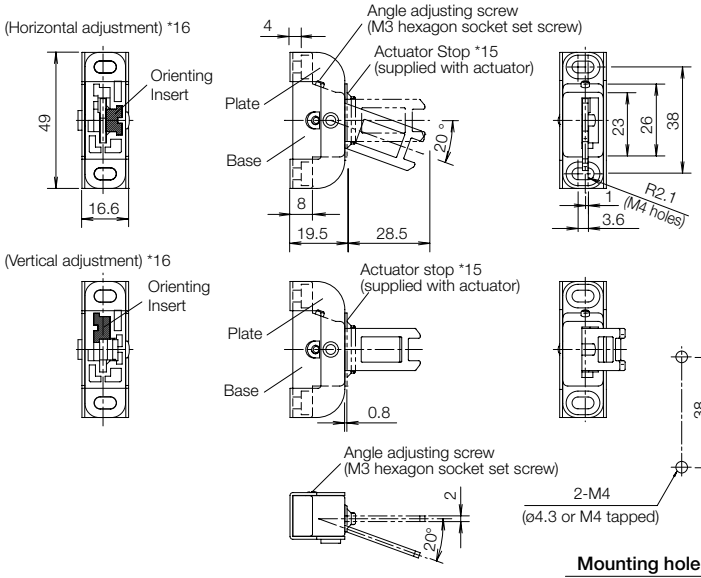


Mounting hole layout

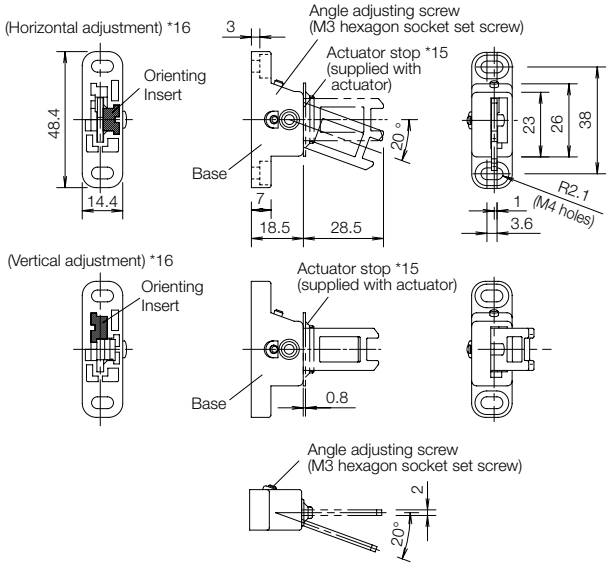
*15 The actuator stop and stopper film are used when adjusting the actuator position. Remove after the actuator position is determined.
*16 The orientation of actuator swing (horizontal/vertical) can be changed using the orienting insert (white plastic) installed on the back of the actuator. Attach the orienting insert if necessary. Do not lose the orienting insert, otherwise the actuator will not operate properly.



• Type: HS9Z-A55S Angle adjustable (vertical/horizontal) with plate (sold separately)



• Type: HS9Z-A55 Angle adjustable (vertical/horizontal) (sold separately)



Mounting hole layout

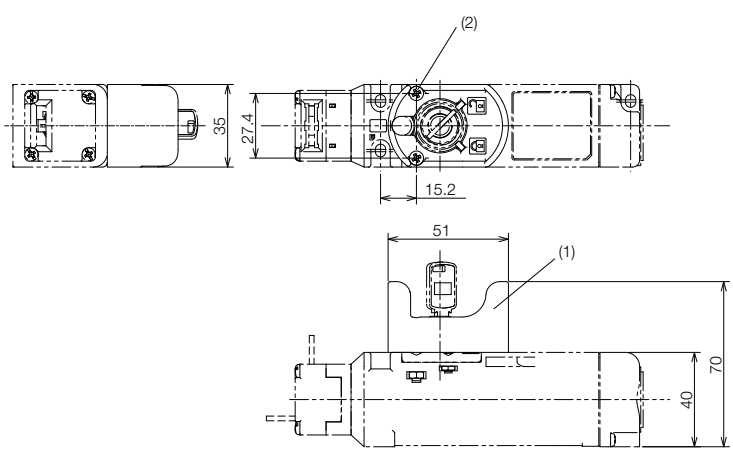
❑ Accessory dimensions

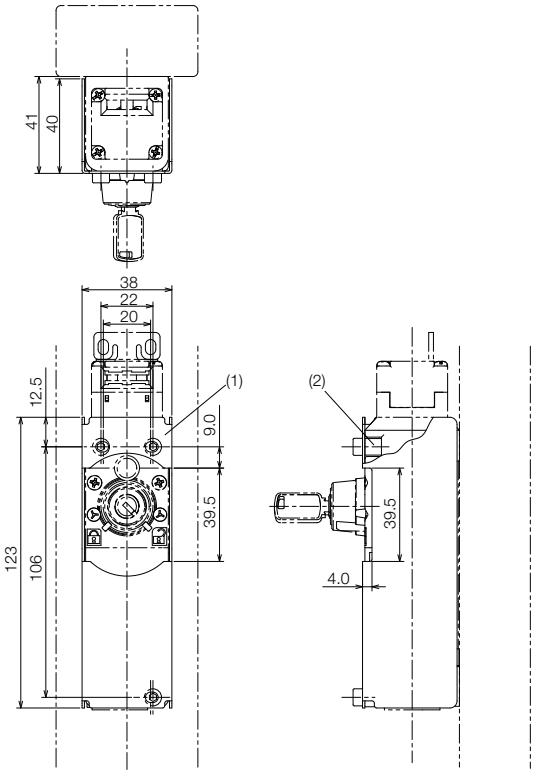
• Type: HS9Z-KC52 (sold separately)

Legend	Item	Material
1	HS9Z-KC52: Key guard	Polyamide
2	Mounting screws (two)	Steel

• Type: HS5L-BC53 Angle adjustable (sold separately)

Legend	Item	Material
1	HS9Z-BC53: Explosion-proof cover	Steel
2	Spacers (three supplied)	Steel





9 Precaution for Disposal

• Dispose of this product as an industrial waste.

Name and address of Manufacturer: **IDEC CORPORATION** 2-6-64 Nishimiyahara Yodogawa-ku, Osaka 532-0004, Japan	**Name and address of the authorized representative:** **APEM SAS** 55, Avenue Edouard Herriot BP1, 82303 Caussade Cedex, France
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) and (EU) 2015/863 Applicable Standard (s): EN 60947-5-1, GS-ET-19, EN IEC 63000	**EU DECLARATION OF CONFORMITY** **UK Authorized Representative: APEM COMPONENTS LIMITED** Drankes Drive, Long Crendon, Buckinghamshire, HP18 9BA, UK Applicable UK Directive: 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 IEC 63000

IDEC CORPORATION

Head Office 6-64, Nishi-Miyahara-2-Chome, Yodogawa-ku, Osaka 532-0004, Japan

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		India	IDEC Controls Indis Private Ltd.	**Taiwan**	IDEC Taiwan Corporation		

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