IDEC

Key Interlock Switches

HS5L-K

Ensuring further safety inside hazardous areas

Interlock switches with key for locking/unlocking in various applications

IDEC CORPORATION

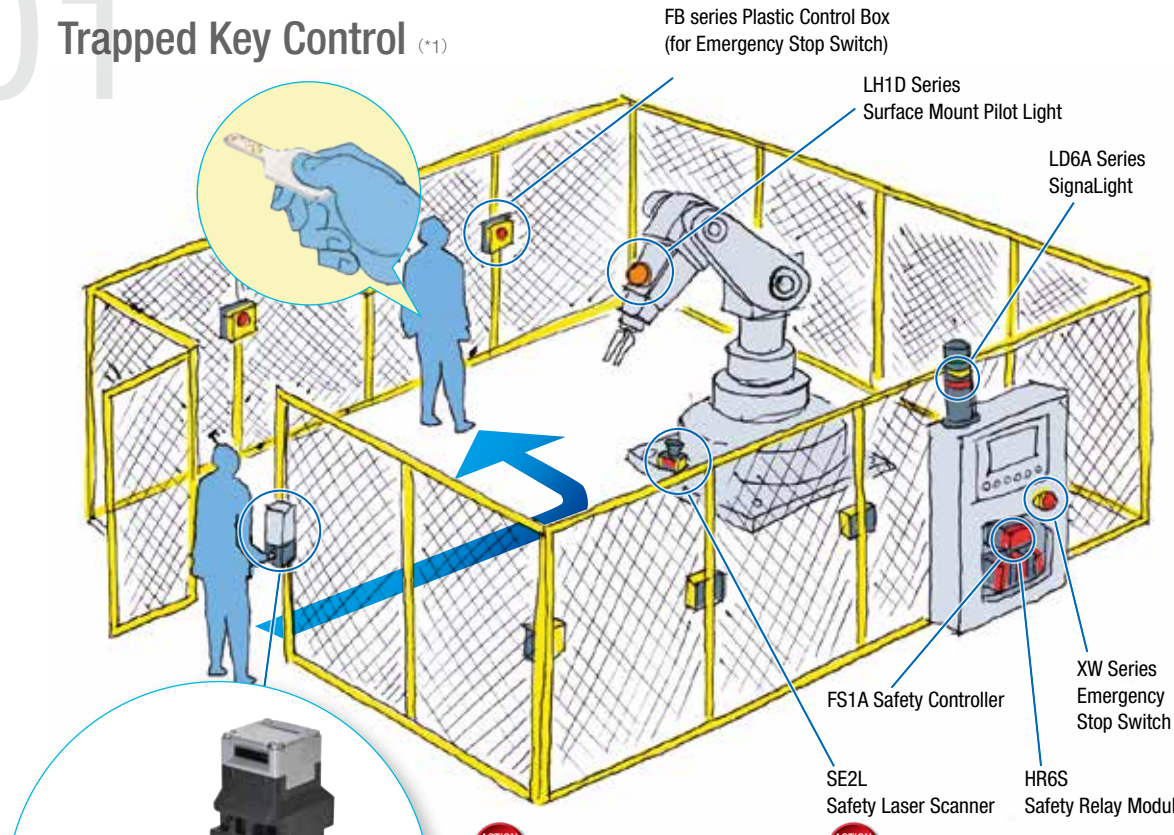
For Machine Safety Solutions

Key Interlock Switches

HS5L-K key interlock switches use a key to lock and unlock a door.
When the key is taken into a hazardous area, the interlock switch cannot be locked and the machine does not operate. Therefore, workers can be prevented from being locked in a hazardous area, and the system is prevented from restarting unexpectedly. Furthermore, because the key used for HS5L-K key interlock switches can also be used for HW series key selector switches (pin tumbler key), switching operation modes of systems and door unlocking can be performed using a single key.
11 types of key numbers are available, so that each system can have its own key, and a higher level of safety can be achieved.

APPLICATION 01

Trapped Key Control (*1)



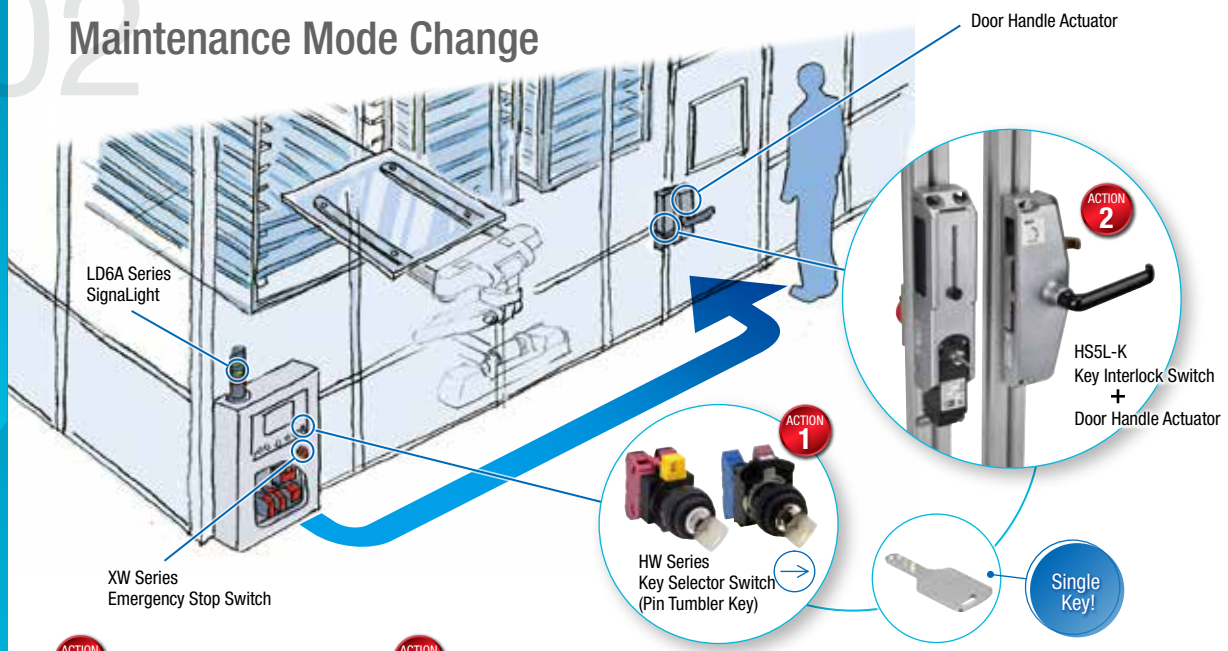
ACTION 1 Door unlocked (Safety output OFF) → ACTION 2 Take key into the hazardous area

Hazards of the system and robot are isolated by the safety guard.
The worker uses the key to unlock the door and disables the system from starting unexpectedly, then removes the key and brings it into the hazardous area. The system remains off until the worker walks out the door and locks the door with the key. This enables the worker carrying the key to work safely in the hazardous area.

*1) Trapped key control
The key used for the above purpose is called a trapped key" and the act of ensuring the safety of workers using a trapped key is called "trapped key control".

APPLICATION 02

02 Maintenance Mode Change

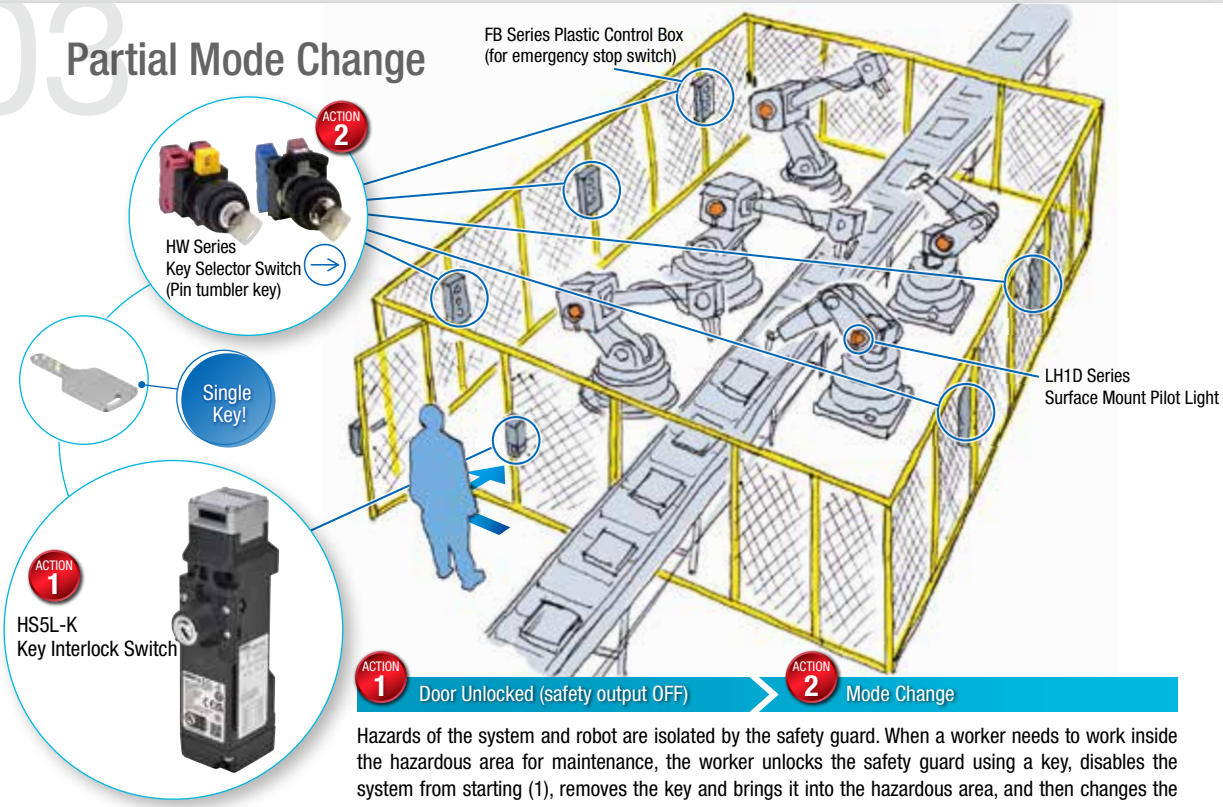


ACTION 1 Equipment Mode Change → ACTION 2 Door Unlocked (safety output OFF)

Hazards of the system and robot are isolated by the safety guard. When a worker needs to work inside the hazardous area for maintenance, after the worker changes modes (1), unlocks the guard using the same key, then removes the key to bring inside the hazardous area (2). The worker can switch operation modes and unlock the safety guard using a single key. Furthermore, when the key is taken inside the hazardous area, the guard cannot be locked and the system cannot be turned on. This enables the worker to work safely in the hazardous area.

APPLICATION 03

03 Partial Mode Change



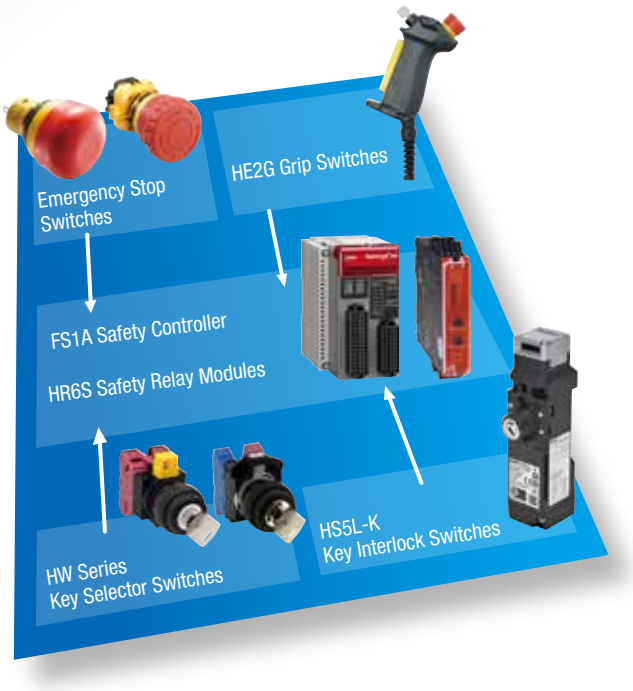
ACTION 1 Door Unlocked (safety output OFF) → ACTION 2 Mode Change

Hazards of the system and robot are isolated by the safety guard. When a worker needs to work inside the hazardous area for maintenance, the worker unlocks the safety guard using a key, disables the system from starting (1), removes the key and brings it into the hazardous area, and then changes the operation mode of each system or robot to maintenance mode (2). While the worker is carrying out maintenance work in the hazardous area, the safety guard cannot be locked and the system cannot be turned on. This enables the worker to work safely in the hazardous area.

Safety System Solutions

Machine Safety System Example

FS1A Safety Controller has pre-programmed safety circuits compliant with ISO 13849-1 PLe.
No programming required when establishing a safety system.
See pages 10 and 11 for circuit examples.



Other Features

HS5L-K Key Interlock Switches

Rear Unlocking Button

The door lock can be unlocked inside by a worker left inside a hazardous area. (See page 12)

Head Removal Detection

Head removal detection circuitry is employed in the HS5L-K. With this function, the monitor circuit (41-42) turns off when the head is removed from the interlock switch.

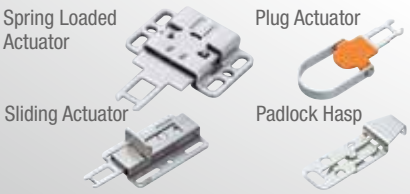
Disparity occurs (41-42: OFF, 51-52: ON) when the head is removed from interlock switches with circuit codes VD, XH, and DD, which has 2 or more lock monitor circuits equipped. This disparity is detected by the head removal detection function.

2-Contact Types Available

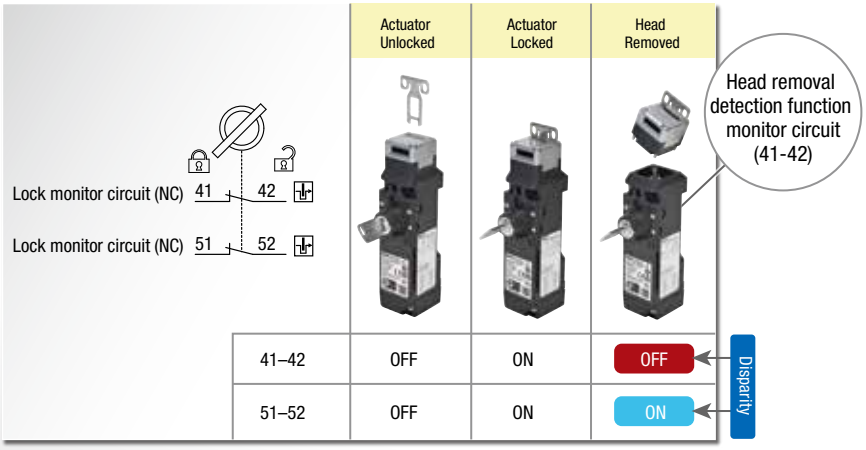
Suitable for applications requiring low-risk safety measures.

Various Actuators

Actuators can be selected depending on door shape and applications (see page 12).



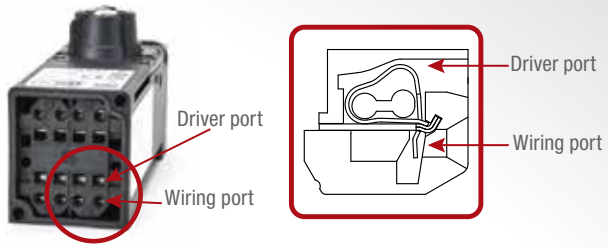
HS5L-KVD0M (lock monitor circuit example)



Other Features

Spring Clamp Terminals

Spring clamp terminals offer excellent vibration resistance, preventing wires from loosening. No need for additional tightening.



Actuator for Safety Guards

Key interlock switches can be used together with actuators for safety guards.

Door handle actuator

Slide handle actuator (metal) (*1)

Key Guard

Key guard is used to prevent accidental use by workers or objects colliding with the key.

HW Series Key Selector Switches

Pin Tumbler Key Type

■Trapped key control by using HS5L-K key interlock switch together with HW series key selector switch (pin tumbler key) is possible.
■A variety of models are available—2-position and 3-position maintained, spring-return, and key retained positions.
■Pin tumbler key provides high security.

• See separate catalog on HW series key selector switches (pin tumbler key).

HW series
key selector switches
(Pin tumbler key)

HS5L-K Key Interlock Switches

Interlock switches with 2-contacts and 4-contacts. Key lock feature available for key locking management.

- Power supply or wiring for locking is not required since a key can be used for unlocking.
- The key for the HS5L-K key interlock switches can also be used with HW series key selector switches. The mode change of the device and unlocking of the door can be achieved using a single key.
- Unlocking using a key is possible even during power failure or maintenance.
- Features head removal detection function.

See website for details on approvals and standards.

What is lock monitoring marking?

This Lock Supervision Mark is a new mark in EN ISO/ISO 14119 clause 9.2.1 and indicates that the following requirements of EN ISO/ISO 14119 have been met.

5.7.1 General requirements
5.7.2.2 Locking monitoring

The lock monitor circuit (contacts) with this marking can monitor both the status of protective door and locking function.
(locking monitor contact [circuits] opens when the protective door is closed and locked)

Performance Specifications

Applicable standards		EN ISO14119 GS-ET-19 (TÜV) EN60947-5-1, (IEC60947-5-1) (TÜV) UL508 (UL Listing) CSA C22.2 No. 14 (c-UL Listing) GB/T14048.5 (CCC)
	Applicable standards for use	IEC60204-1/EN60204-1
Standard operating conditions		Operating temperature:-25 to +70°C (no freezing) (*2) Relative humidity: 20 to 95%RH (no condensation) Storage temperature: -40 to +80°C (no freezing) Operating environment: Pollution degree 3
Impulse withstand voltage		2.5kV
Insulation resistance		Between live and dead metal parts: 100MΩ min. (500V DC megger) Between terminals of different poles: 100MΩ min. (500V DC megger)
Electric shock protection		Class II (IEC61140)
Degree of Protection		IP65
Shock resistance		Operating extremes: 100m/s² Damage limits: 1000m/s²
Vibration resistance		Operating extremes: 10 to 55Hz, amplitude 0.35 min. Damage limits: 30Hz, amplitude 1.5mm min.
Actuator operating speed		0.05 to 1.0 m/s
Direct operating travel		10.0mm min. (Actuator: HS9Z-A51/A5P) 11.0mm min. (Actuator: HS9Z-SH5) 11.3mm min. (Actuator: HS9Z-A52) 24.5mm min. (Actuator: HS9Z-BA5)
Direct opening force		120N minimum
Actuator retention force (*3)		Fzh = 1400N min. (GS-ET-19) However, Fzh=500N min. when HS9Z-A55 is used
Operation frequency		900 operations per hour
Rear unlocking button Mechanical durability		3,000 times min. (HS5L-K□L)
Mechanical durability		2,000,000 times min. (Operation frequency 900 times/hour, actuator insert/remove) 100,000 times min. when using HS9Z-SH5 (actuator insert/remove)
Electrical durability		100,000 times min. (Operating Frequency: 900 operations/hour) 2,000,000 times min. (24V AC/DC, 100mA)
Conditional short-circuit current		50A (250V) (*4)
Weight (approx.)		Approx. 240g / with rear unlocking button: Approx. 250g

*2) The highest temperature limit for UL is +50°C
*3) See page 12 for actuator retention force.
*4) Use 250V/10A fast-blow fuse for short-circuit protection.

Ratings

Contact ratings

Rated insulation voltage (Ui)			250V		
Rated current (Ith)			2.5A		
Rated working voltage (Ue)			30V	125V	250V
Rated operating current (Ie)	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

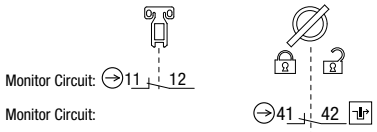
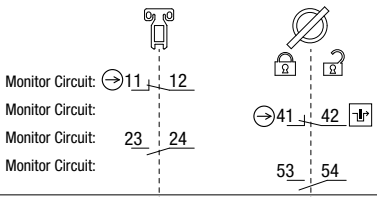
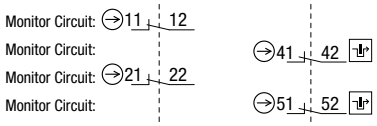
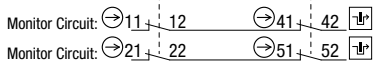
Minimum applicable load (reference value) = 3V AC/DC, 5mA
(Applicable range may vary with operating conditions and load types.)
Note) UL, c-UL rating: Pilot Duty AC 0.75A/ 250V, Pilot Duty DC 1.0A/30V
TÜV rating: AC-15AC-15 0.75A/250V, DC-13 2.3A/30V
CCC rating: AC-15 0.75A/250V, DC-13 1.0A/30V

Key Specifications

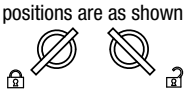
Operating method	Maintained (90° 2-position)
Mechanical durability	100,000 operations minimum
Insertion/removal durability	10,000 operations minimum
Operator strength	1.0 N·m minimum
Direct opening force	0.6 N·m minimum
Direct opening angle	90°

HS5L-K

Package Quantity: 1

2-Contact	Circuit code	Contact code	Gland Port Size	Key removal position	Part No.	
					Without rear unlocking button	With rear unlocking button
2-contact	XD		M20	A A: Removable in all positions	HS5L-KXD0M-2A	HS5L-KXD0LM-2A
				B Removable at UNLOCK position	HS5L-KXD0M-2B	HS5L-KXD0LM-2B
				C Removable at LOCK position	HS5L-KXD0M-2C	HS5L-KXD0LM-2C
	XH		M20	A A: Removable in all positions	HS5L-KXH0M-2A	HS5L-KXH0LM-2A
				B Removable at UNLOCK position	HS5L-KXH0M-2B	HS5L-KXH0LM-2B
				C Removable at LOCK position	HS5L-KXH0M-2C	HS5L-KXH0LM-2C
	XJ		M20	A A: Removable in all positions	HS5L-KXJ0M-2A	HS5L-KXJ0LM-2A
				B Removable at UNLOCK position	HS5L-KXJ0M-2B	HS5L-KXJ0LM-2B
				C Removable at LOCK position	HS5L-KXJ0M-2C	HS5L-KXJ0LM-2C
4-contact	VA		M20	A A: Removable in all positions	HS5L-KVA0M-2A	HS5L-KVA0LM-2A
				B Removable at UNLOCK position	HS5L-KVA0M-2B	HS5L-KVA0LM-2B
				C Removable at LOCK position	HS5L-KVA0M-2C	HS5L-KVA0LM-2C
	VD		M20	A A: Removable in all positions	HS5L-KVD0M-2A	HS5L-KVD0LM-2A
				B Removable at UNLOCK position	HS5L-KVD0M-2B	HS5L-KVD0LM-2B
				C Removable at LOCK position	HS5L-KVD0M-2C	HS5L-KVD0LM-2C
	DD		M20	A A: Removable in all positions	HS5L-KDD0M-2A	
				B Removable at UNLOCK position	HS5L-KDD0M-2B	
				C Removable at LOCK position	HS5L-KDD0M-2C	

- The contact configuration indicates that the actuator is inserted and locked.
- Key LOCK and UNLOCK positions are as shown on the right.



- Actuators are not supplied with interlock switches and must be ordered separately.
- See below to specify key numbers.

HS5L-KVA0M-2A501
- Not specified: 500 (default key)
- -501 to -510

Note) Key number is engraved on the cylinder. (However, the standard type is not engraved.)

Part No. Configuration

HS5L-K VA 0 L M - 2 A 501

(1) Circuit configuration code

	Main circuit	Door monitor circuit	Lock monitor circuit
XD:	–	1NC	1NC
XH:	–	–	2NC
XJ:	–	–	1NC, 1NO
VA:	–	1NC, 1NO	1NC, 1NO
VD:	–	2NC	2NC
DD:	1NC+1NC 1NC+1NC	–	–

(2) Manual unlock
- **Blank**: None
- **L**: Pushbutton

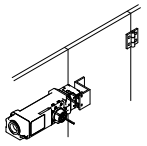
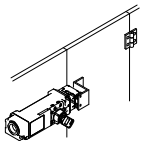
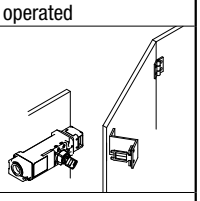
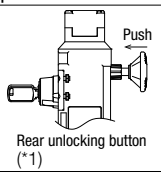
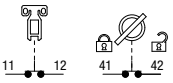
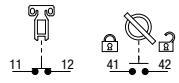
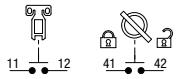
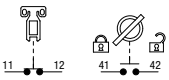
(3) Key removal position
- **A**: Removable at LOCK/UNLOCK
- **B**: Removable at UNLOCK (unremovable at LOCK)
- **C**: Removable at LOCK (unremovable at UNLOCK)

(4) Key number
Not specified: Standard key number (500)
- **-501** to **-510**

Note) Key number is engraved on the cylinder. (However, the standard type is not engraved.)

Circuit Diagrams and Operating Characteristics

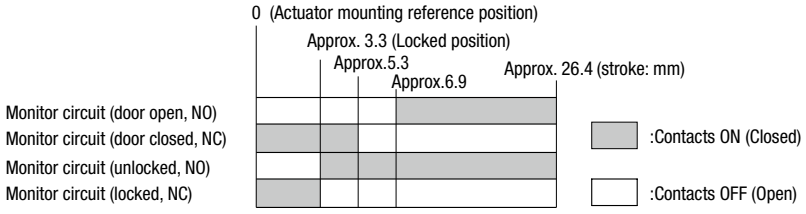
2-contact

Interlock switch status		Status 1 Door closed Machine ready to operate	Status 2 Door closed Machine cannot be operated	Status 3 Door open Machine cannot be operated	When unlocking manually Door closed Machine cannot be operated
Door status					
Circuit example: HS5L-KXD					
Door		Closed (locked)	Closed (unlocked)	Open	Closed (unlocked)
Part no. and circuit diagram	HS5L-KXD Monitor Circuit: 11 12 Monitor Circuit: 41 42	Monitor circuit (Door closed) 11 - 12			
		Monitor circuit (Locked) 41 - 42			
	HS5L-KXH Monitor Circuit: 41 42 Monitor Circuit: 51 52	Monitor circuit (Locked) 41 - 42			
		Monitor circuit (Locked) 51 - 52			
	HS5L-KXJ Monitor Circuit: 41 42 Monitor Circuit: 53 54	Monitor circuit (Locked) 41 - 42			
		Monitor circuit (Unlocked) 53 - 54			

*1) When an operator is confined within a hazardous area, the actuator can be unlocked manually by pressing the rear unlocking button.

- The contact configuration indicates that the actuator is inserted and locked.
- Monitor circuit: Sends monitoring signals of protective door open/closed status (door monitor) or protective door lock/unlock status (lock monitor).

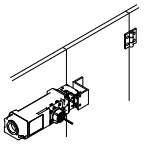
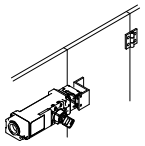
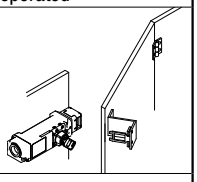
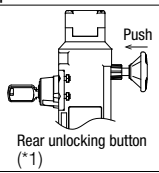
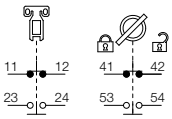
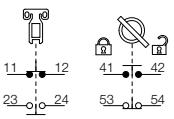
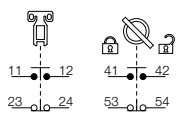
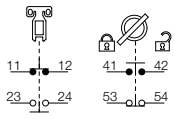
Operating Characteristics (Reference)



- The operation characteristics shown in the chart above are for HS9Z-A51. For other actuators, add 1.3mm.
- The operation characteristics show the contact status when the actuator enters the entry slot of an interlock switch.

Circuit Diagrams and Operating Characteristics

4-contact

Interlock switch status		Status 1	Status 2	Status 3	When unlocking manually
		Door closed Machine ready to operate	Door closed Machine cannot be operated	Door open Machine cannot be operated	Door closed Machine cannot be operated
Door status					
Circuit example: HS5L-KVA					
Door		Closed (locked)	Closed (unlocked)	Open	Closed (unlocked)
Part no. and circuit diagram	HS5L-KVA	Monitor circuit (Door closed) 11 - 12				
		Monitor circuit (Door open) 23 - 24				
		Monitor circuit (Locked) 41 - 42				
		Monitor circuit (Unlock) 53 - 54				
	HS5L-KVD	Monitor circuit (Door closed) 11 - 12				
		Monitor circuit (Door closed) 21 - 22				
		Monitor circuit (Locked) 41 - 42				
		Monitor circuit (Locked) 51 - 52				
	HS5L-KDD	Main circuit 11 - 42				
		Main circuit 21 - 52				

*1) When an operator is confined within a hazardous area, the actuator can be unlocked manually by pressing the rear unlocking button.

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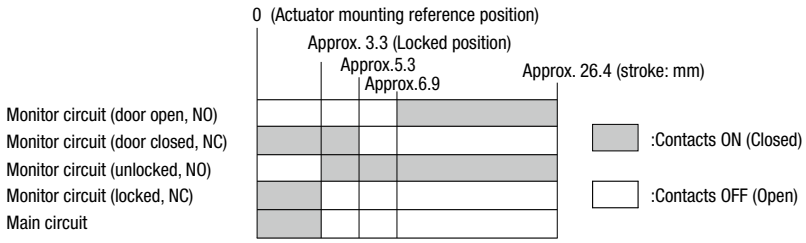
- Monitor circuit: Sends monitoring signals of protective door open/closed status (door monitor) or protective door lock/unlock status (lock monitor).

Operating Characteristics (Reference)



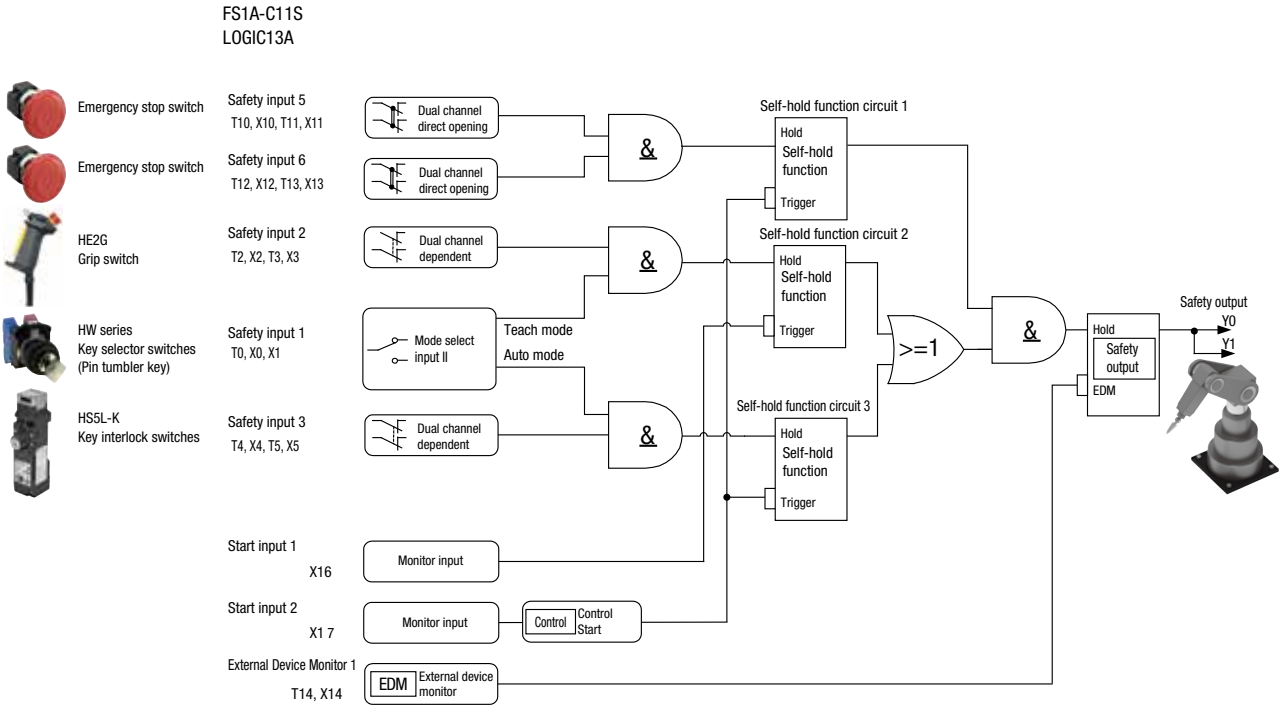
- The operation characteristics shown in the chart above are for HS9Z-A51.
  For other actuators, add 1.3mm.
- The operation characteristics show the contact status when the actuator enters the entry slot of an interlock switch.

Logic circuit using a FS1A safety controller

Pattern 1: Example of a logic diagram for trapped key control (one robot)

Pattern 1 description

Turn the key selector switch to Teach Mode and remove the key. Unlock HS5L-K using the same key, then remove the key and open the door to enter. The robot will move by gripping the enabling switch.



Pattern 2: Example of a logic diagram for partial mode switching (multiple robots)

Pattern 2 description

Three FS1A safety controllers are required for two robots. Four FS1A safety controllers for required for three robots.

Turn the key selector switch of the first robot (logic no. 103) to Teach Mode and remove the key. Unlock the HS5L-K interlock switch using the same key and open the safety guard to enter.

Using the same key, turn the key selector switches of the second (logic No. 13b) or subsequent robots to be operated to Teach Mode. Gripping the enabling switch in the enabling position enables the robot to operate.

Note 1) Only one robot can be used for teaching. Multiple robots cannot be used simultaneously.

Note 2) The emergency stop switch connected to the first FS1A is effective for all robots.

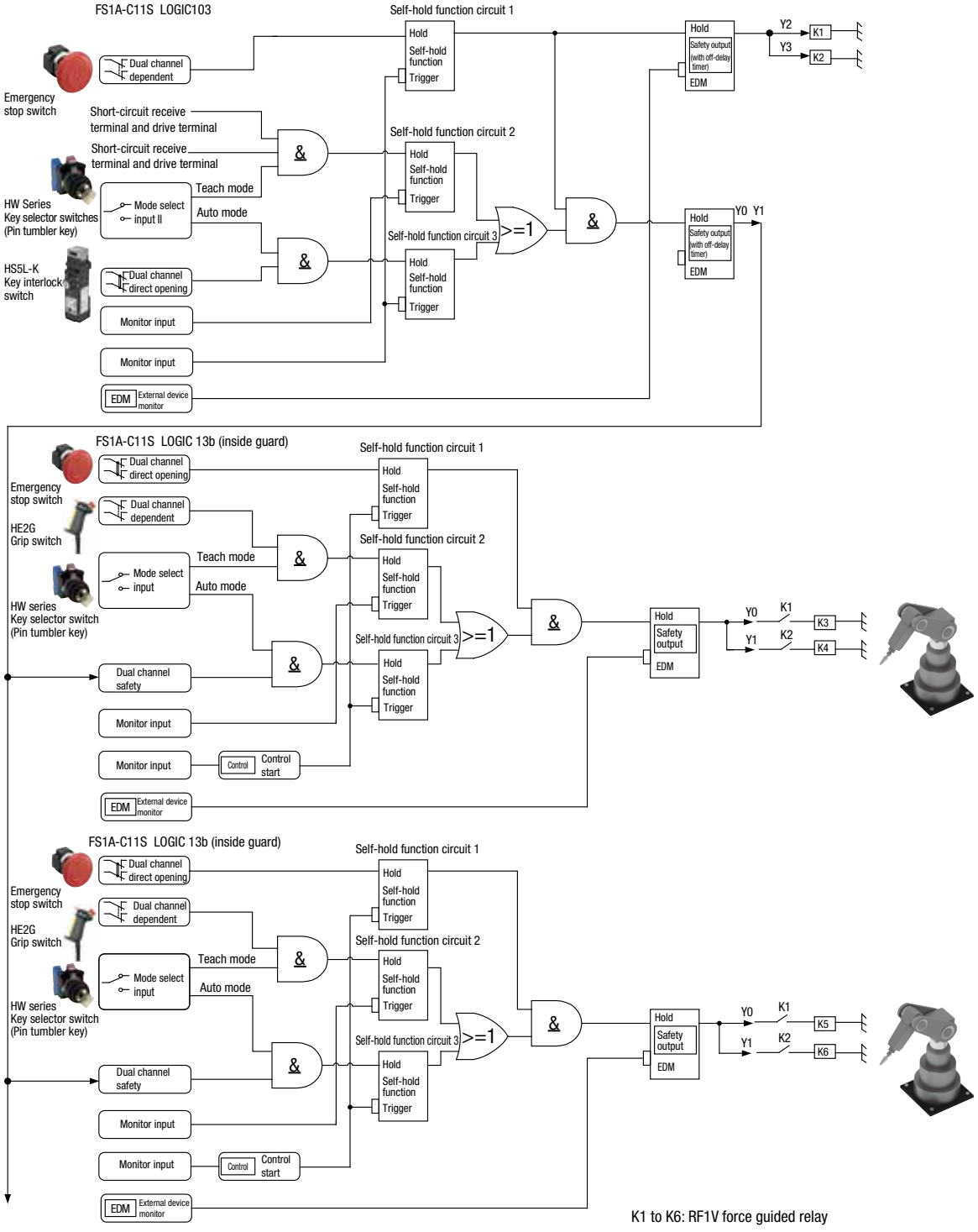
Note 3) Connect safety outputs Y2 and Y3 (solid state outputs) of the first FS1A safety controller to the RF1V force guided relay (K1, K2), and connect its NO contact to the safety output Y0, Y1 of the second and the subsequent FS1A safety controllers. Connect NC contact to the EDM input of the first FS1A safety controller.

The required number of RF1V (K1, K2): For two robots – 2NO2NC For three robots – 3NO1NC For four robots – 4NO2NC

Note 4) The emergency stop switch connected to the second and subsequent FS1A safety controllers are effective for only one robot.

Note 5) Connect the NC contacts of K3 and K4 to EDM input of the second FS1A safety controller. Connect the NC contacts of K5 and K6 to the EDM input of the third FS1A safety controller.

Select force guided relays for K3, K4, K5, and K6 according to the operation control circuits of the robots.



K1 to K6: RF1V force guided relay

Accessories

Actuator

Package quantity: 1

Name	Part No.	Remarks
Straight	HS9Z-A51	The actuator retention force when using this product is Fzh = 1400N.
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) with plate	HS9Z-A55S	
Angle adjustable (vertical/horizontal)	HS9Z-A55	The actuator tensile strength when using this product is Fzh=500N. When retention force of 500N or more is required, use HS9Z-A55S.

Accessories

Package quantity: 1

Name		Part No.	Remarks
Key guard (*1)		HS9Z-KC52	Cover fixing screws: 2 (supplied)
Door handle actuator Actuator (*2)	Switch cover unit (*1)	HS9Z-DH5C2	Used with an interlock switch
	Handle unit (for right-opening doors)	HS9Z-DH5RH	Choose according to the opening direction
	Handle unit (for left-opening doors)	HS9Z-DH5LH	
Slide handle actuator (*2)		HS9Z-EH5L	Used with an interlock switch
Rear unlocking button kit for frame mounting (*3)		HS9Z-FL53	Mounting panel thickness (X): 23 < X ≤ 33 ≤ (*4)
		HS9Z-FL54	Mounting panel thickness (X): 33 < X ≤ 43 ≤ (*4)
		HS9Z-FL55	Mounting panel thickness (X): 43 < X ≤ 53 ≤ (*4)
Sliding Actuator (*2)		HS9Z-SH5	The actuator tensile strength when using this product is Fzh=1400N.
Spring loaded actuator (*2) (*5)		HS9Z-BA5	The actuator retention force when using this product is Fzh = 1400N.
Plug actuator		HS9Z-A5P	
Padlock hasp		HS9Z-PH5	
Mounting plate (*6)		HS9Z-SP51	Can be used for installing the interlock switch on the aluminum frame.

*1) For use only on HS5L-K interlock switches.
*2) See separate catalog for specifications.
*3) When directly installing HS5L-K key interlock switches with rear unlocking button (HS5L-K☐L: sold separately).
*4) Mounting part refers to a part to where the product will be attached (such as a frame).
*5) For sliding doors only. Do not use for opening doors.
*6) When mounting the rear unlocking button (HS5L-K☐☐L) on an aluminum frame using a mounting plate, drill holes in the mounting plate (see page 17) and use the rear unlocking button kit for frame mounting (HS9Z-FL5☐).
• For instructions on accessories, see each catalog or instruction sheet for correct use.

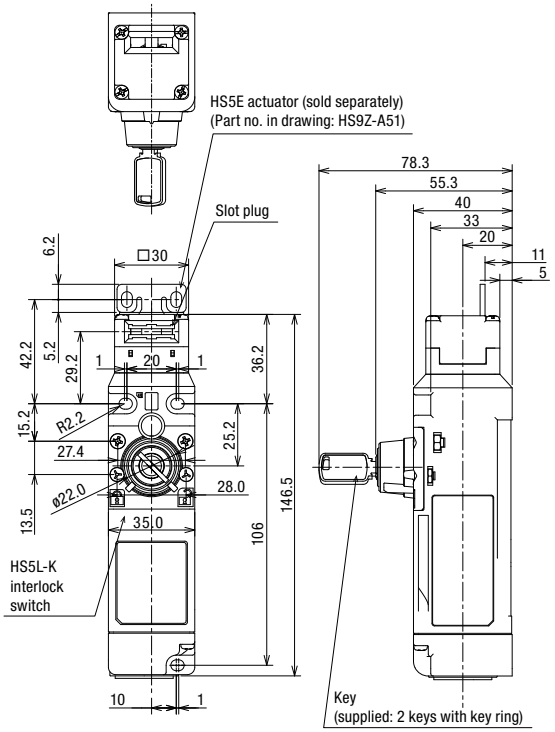
Dimensions / Mounting Hole Layout

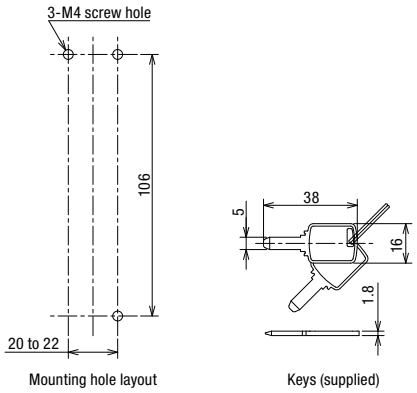
All dimensions in mm.

Interlock Switches

HS5L-K□□0M-2□□

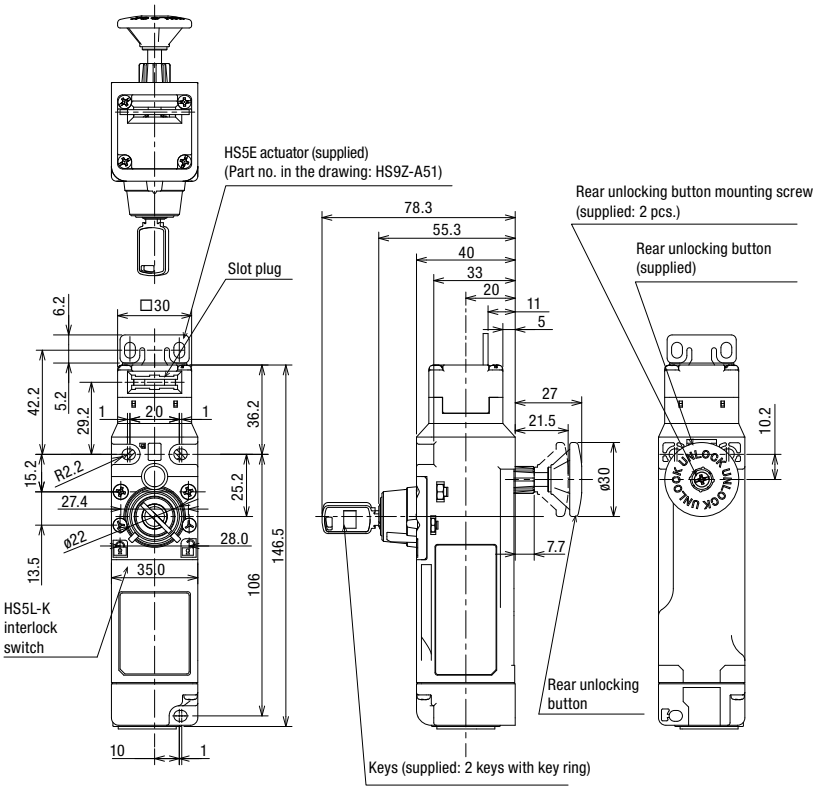
Horizontal mounting with straight actuator (HS9Z-A51)

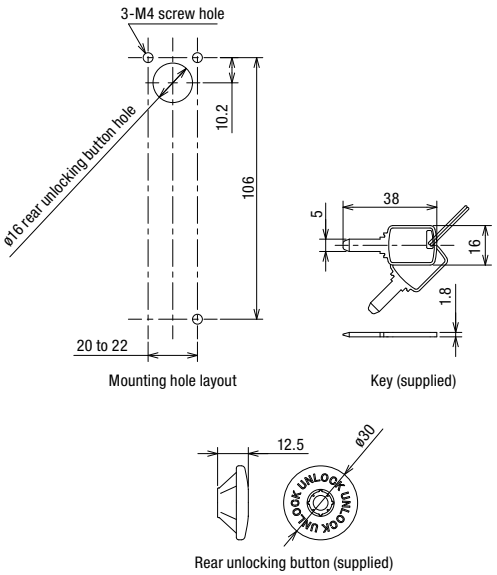




HS5L-K□□0LM-2□□ (with rear unlocking button)

Horizontal mounting with straight actuator (HS9Z-A51)



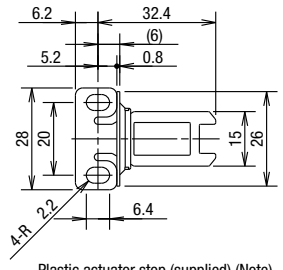


Dimensions / Mounting Hole Layout

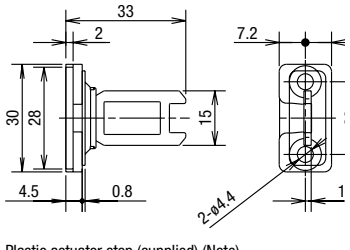
All dimensions in mm.

Accessories

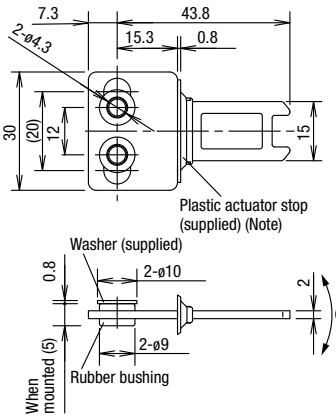
Actuator (straight) (HS9Z-A51)



Angle adjustable (right-angle) (HS9Z-A52)

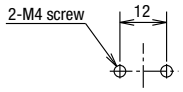


Actuator (Straight with rubber bushing) (HS9Z-A51A)



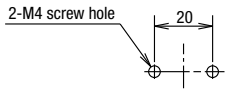
- The mounting center distance is set to 12mm at factory. When a 20mm distance is required, adjust the distance by moving the rubber bushing sideways.
- The actuator has flexibility to the direction indicated by the arrows (B).

Actuator mounting hole layout (Straight with rubber bushings) (right-angle with rubber bushings)

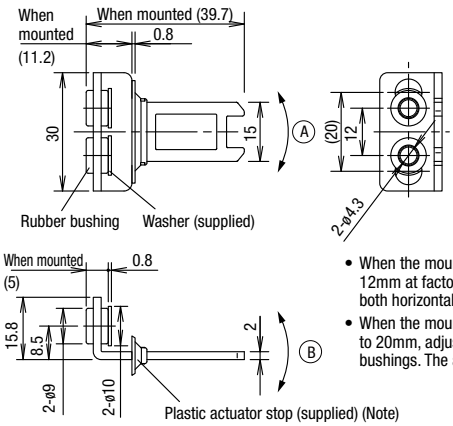


- Mounting centers can be widened to 20mm by moving the rubber bushings.

Actuator mounting hole layout (Straight actuator, right-angle actuator)

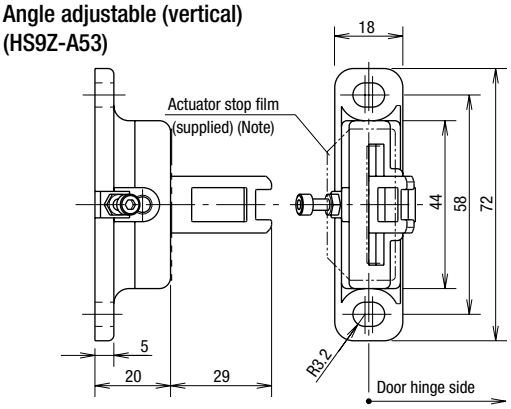


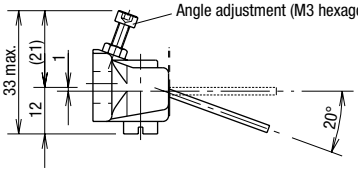
Actuator (right-angle with rubber bushing) (HS9Z-A52A)



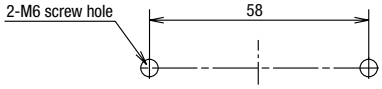
- When the mounting center distance is set to 12mm at factory, the actuator has flexibility both horizontally (A) and vertically (B).
- When the mounting center distance is set to 20mm, adjust by moving the rubber bushings. The actuator swings vertically (B).

Angle adjustable (vertical) (HS9Z-A53)

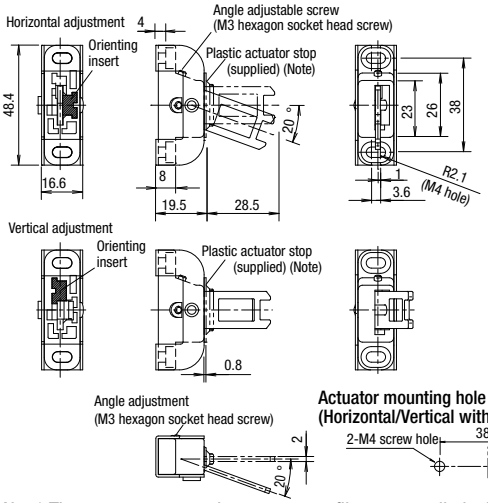




Actuator mounting hole layout

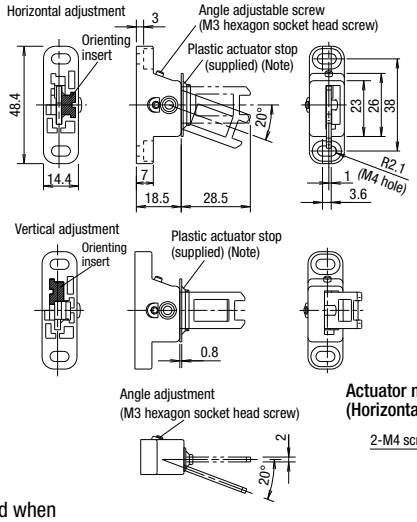


Angle actuator (horizontal/vertical with plate) (HS9Z-A55S)

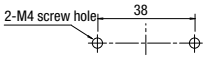


Actuator mounting hole layout (Horizontal/Vertical with plate)

Angle actuator (horizontal/vertical) (HS9Z-A55)



Actuator mounting hole layout (Horizontal/Vertical)



Note) The actuator stop and actuator stop film are supplied with the actuator and used when adjusting the actuator position. Remove after the actuator position is determined.

Horizontal/Vertical actuator orientation

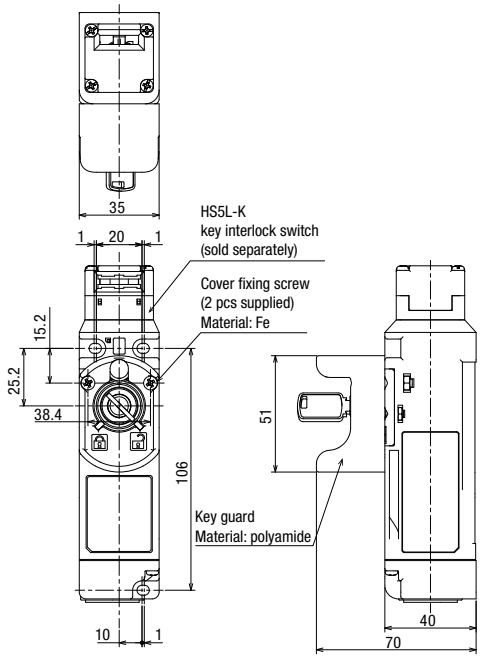
The orientation of the actuator swing (horizontal/vertical) can be changed using the orienting insert (white plastic) installed on the back of the actuator. Attach the orienting insert if necessary. Do not lose the orienting insert, otherwise, the actuator will not operate properly.

Dimensions / Mounting Hole Layout

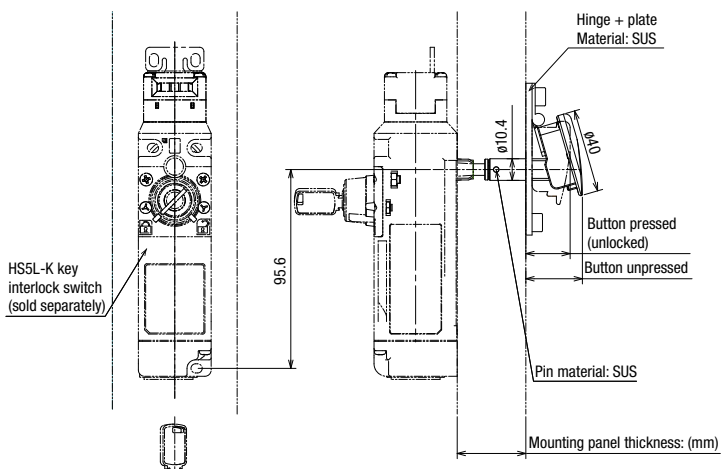
All dimensions in mm.

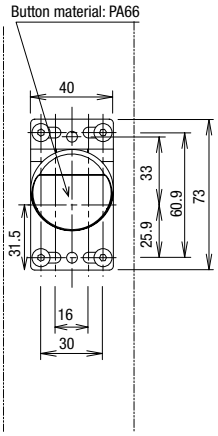
Accessories

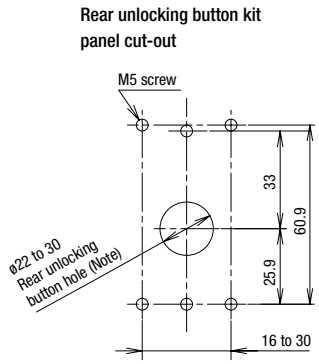
Key guard (HS9Z-KC52)

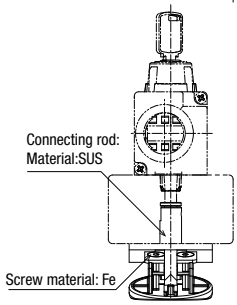


Rear unlocking button kit for frame mounting (HS9Z-FL5*: optional)









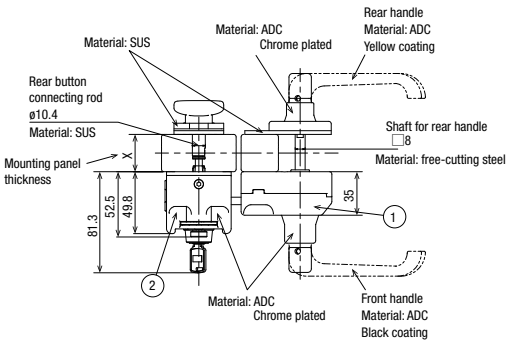
Note: With the mounting hole dimension, the rear unlocking button rod does not touch the mounting hole even when the interlock switch moves sideways.

Dimensions / Mounting Hole Layout

All dimensions in mm.

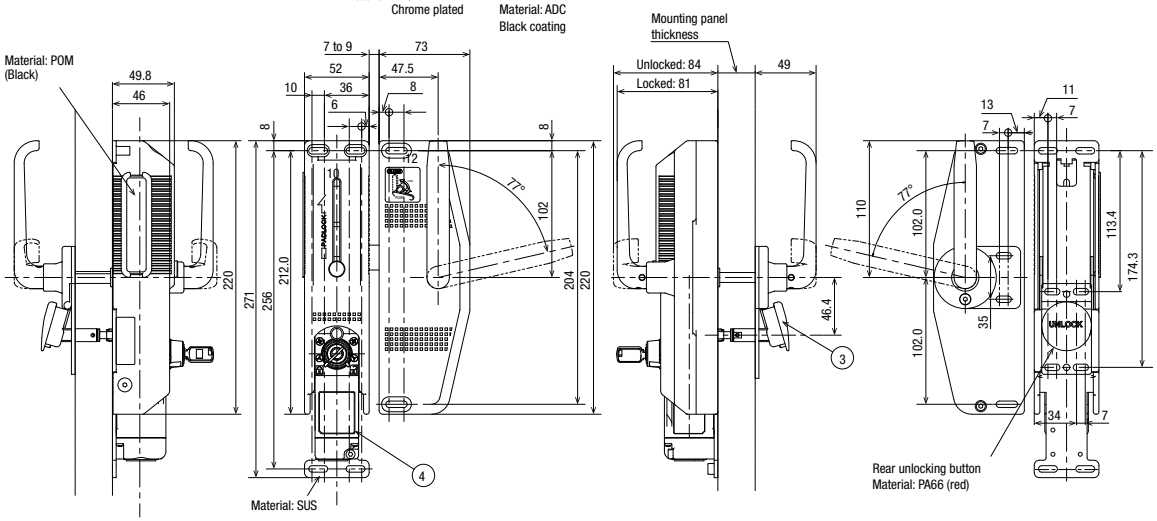
Accessories

Door handle actuator
HS9Z-DH5RH (for right-opening door) and HS5L-K interlock switch



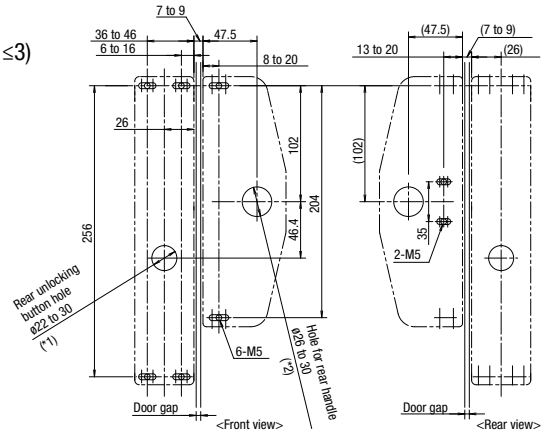
Legend	Name
1	Handle unit for right-opening door (HS9Z-DH5RH)
2	Switch cover unit (HS9Z-DH5C2)
3	Rear unlocking button kit for frame mounting (HS9Z-FL5*)
4	HS5L-K key interlock switch (sold separately)

- Handle unit for left-opening door handle unit (HS9Z-DH5LH) is also available.

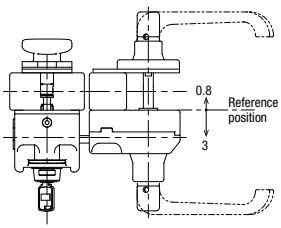


Panel cut-out for door handle actuator
Right-opening door handle unit (HS9Z-DH5RH)

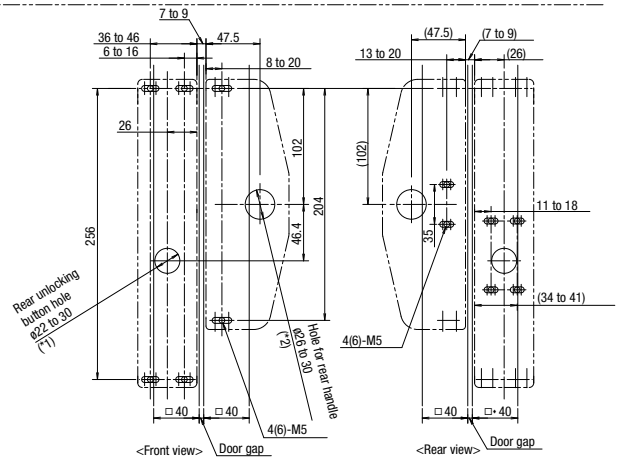
(When mounting panel thickness is ≤3)
- Use the rear unlocking button on the HS5L-K☐ key interlock switch.

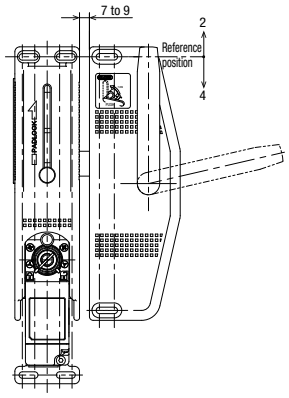


Mounting tolerance range



(When mounting panel thickness is 20 to 50)
- Use with rear unlocking button kit for frame mounting (HS9Z-FL5☐). In the diagram, 40mm frame is used.





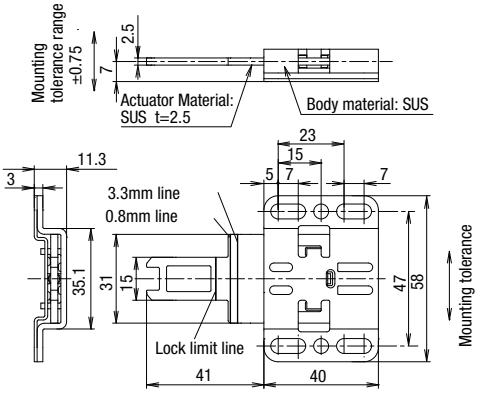
*1) When using HS5L-K☐L, provide a hole for the rear unlocking button.
*2) Mount the product before operation and ensure that rear handle shaft does not interfere with the hole.

Dimensions / Mounting Hole Layout

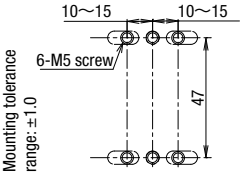
All dimensions in mm.

Accessories

Spring loaded actuator (HS9Z-BA5)

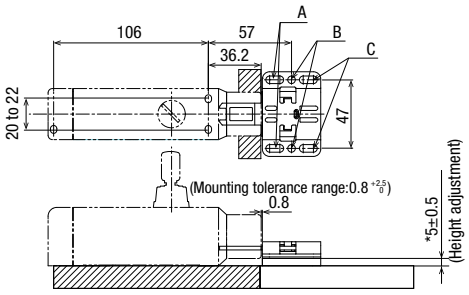


Panel cut-out



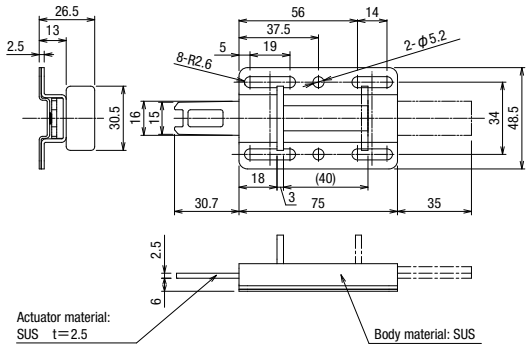
- Fasten at least four parts (either A or C, and B in the drawing on the right) with mounting screws. Always fasten B to prevent movement during use.

When used with HS5L-K key interlock switch

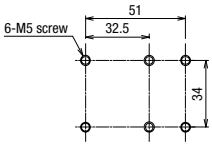


- When the actuator is installed on the same plane as the HS5L-K key interlock switch, because the height of the actuator will be 5mm lower than the interlock switch, adjustment is required by the customer.

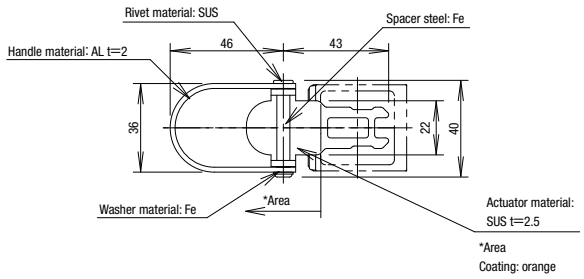
Actuator (straight) (HS9Z-SH5)



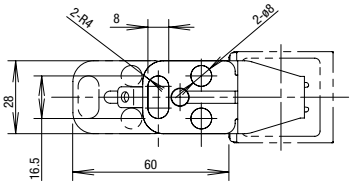
Panel cut-out



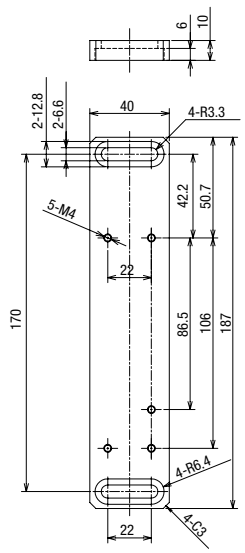
Plug actuator (HS9Z-A5P)



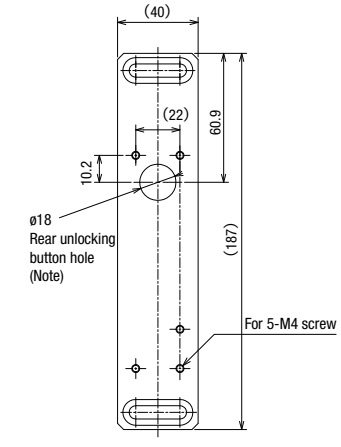
Padlock hasp (HS9Z-PH5)



Mounting plate (HS9Z-SP51)



Hole layout for mounting on mounting plate



- When using the rear unlocking button kit, provide a hole on the mounting plate.

Note) The holes for unlocking the back side are described as the hole diameters that do not contact the holes and the connecting links even if the safety switch is displaced horizontally when fixed.

Safety Precautions

- Installation, removal, wiring, maintenance, and inspection must be performed by a professional authorized by the user, with the power turned off. Failure to turn power off may cause electrical shocks or fire hazards.
- If relays are used in the circuit between the interlock switch and the load, consider the danger and use safety relays, since welding or sticking contacts of standard relays may invalidate the functions of the interlock switch. Perform a risk assessment and establish a safety circuit that satisfies the requirement of the safety category. In the case of standard relays, safety may be impaired due to welding of the contacts.
- Do not place a PLC in the circuit between the interlock switch and the load. Safety can be endangered in the event of a malfunction of the PLC.
- Do not disassemble or modify the product that may intentionally stop the safety function. Otherwise, malfunction or damage may occur.
- Do not install the actuator in a location where the human body may come in contact. Otherwise, an injury may occur.
- 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 a direction change is performed in the LOCK state after wiring, the operator may be in a dangerous situation due to starting of the machine.

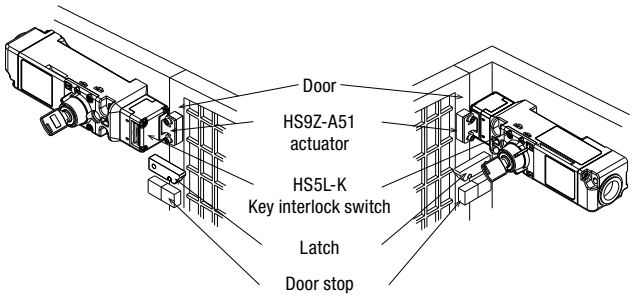
Operating instructions

- Regardless of door types, do not use the interlock switch as a door stop. Install a mechanical doorstop at the end of the door to protect the interlock switch against excessive force.
- Do not apply excessive shock to the interlock switch when opening or closing the door. A shock to the interlock switch exceeding 1,000m/s^2 may cause damage to the interlock switch.
- If the operating atmosphere is contaminated, use a protective cover to prevent the entry of foreign objects into the interlock switch through the actuator entry slots. Entry of foreign objects into the interlock switch may affect the mechanism of the interlock switch and cause a breakdown.
- Using the slot plugs supplied with the interlock switch, plug the unused actuator entry slots.
- Do not store the interlock switches in a dusty, humid, or organic-gas atmosphere, or in an area subjected to direct sunlight.
- Use proprietary actuators only. Using other actuators may damage the interlock switch.
- The actuator retention force is 1,400N. Do not apply a load higher than the rated value. When a higher load is expected, provide an additional system consisting of another interlock switch without lock (such as HS5D interlock switch) or a sensor to detect the door opening and stopping the machine.
- 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.
- Although the HS9Z-A51A and HS9Z-A52A actuators (w/rubber bushings) alleviate the shock when the actuator enters the slot on the interlock switch, make sure that excessive shock is not applied. Excessive shock may cause malfunction. Rubber bushings may deteriorate due to environmental and operating conditions. Replace if deformed or cracked.

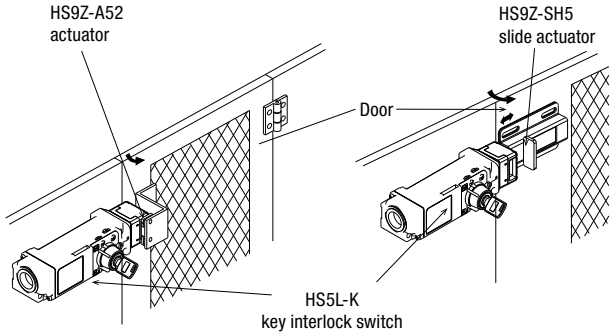
Mounting examples

For mounting, see the diagram below. Mount the interlocks switch to a fixed machine or guard, and mount the actuator on the hinged door. Do not mount both interlock switch and actuator on the hinged doors, otherwise malfunction will occur. This may result in the actuator being inserted at a wrong angle to the interlock switch, resulting in malfunction.

Application on sliding doors



Application on hinged doors

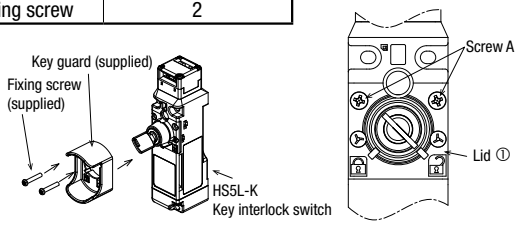


Operating instructions

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). (See figure above)

• 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.

Notes

• 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. Also, discard the removed screws A.

• Recommended tightening torque: 1.0 to 1.2 N·m (M3.5 screw) (*1)

*1) 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.

Be sure to read this manual carefully before performing installation, wiring, or maintenance work.

For details on mounting, wiring, and maintenance, see the instruction manual from the below URL.
URL: https://product.idec.com/?product=HS5L-K

Ordering Terms and Conditions

Thank you for using IDEC Products.

By purchasing products listed in our catalogs, datasheets, and the like (hereinafter referred to as "Catalogs") you agree to be bound by these terms and conditions. Please read and agree to the terms and conditions before placing your order.

1. Notes on contents of Catalogs

(1) Rated values, performance values, and specification values of IDEC products listed in this Catalog are values acquired under respective conditions in independent testing, and do not guarantee values gained in combined conditions.
Also, durability varies depending on the usage environment and usage conditions.

(2) Reference data and reference values listed in Catalogs are for reference purposes only, and do not guarantee that the product will always operate appropriately in that range.

(3) The specifications / appearance and accessories of IDEC products listed in Catalogs are subject to change or termination of sales without notice, for improvement or other reasons.

(4) The content of Catalogs is subject to change without notice.

2. Note on applications

(1) If using IDEC products in combination with other products, confirm the applicable laws / regulations and standards.
Also, confirm that IDEC products are compatible with your systems, machines, devices, and the like by using under the actual conditions. IDEC shall bear no liability whatsoever regarding the compatibility with IDEC products.

(2) The usage examples and application examples listed in Catalogs are for reference purposes only. Therefore, when introducing a product, confirm the performance and safety of the instruments, devices, and the like before use. Furthermore, regarding these examples, IDEC does not grant license to use IDEC products to you, and IDEC offers no warranties regarding the ownership of intellectual property rights or non-infringement upon the intellectual property rights of third parties.

(3) When using IDEC products, be cautious when implementing the following.

i. Use of IDEC products with sufficient allowance for rating and performance

ii. Safety design, including redundant design and malfunction prevention design that prevents other danger and damage even in the event that an IDEC product fails

iii. Wiring and installation that ensures the IDEC product used in your system, machine, device, or the like can perform and function according to its specifications

(4) Continuing to use an IDEC product even after the performance has deteriorated can result in abnormal heat, smoke, fires, and the like due to insulation deterioration or the like. Perform periodic maintenance for IDEC products and the systems, machines, devices, and the like in which they are used.

(5) IDEC products are developed and manufactured as general-purpose products for general industrial products. They are not intended for use in the following applications, and in the event that you use an IDEC product for these applications, unless otherwise agreed upon between you and IDEC, IDEC shall provide no guarantees whatsoever regarding IDEC products.

i. Use in applications that require a high degree of safety, including nuclear power control equipment, transportation equipment (railroads / airplanes / ships / vehicles / vehicle instruments, etc.), equipment for use in outer space, elevating equipment, medical instruments, safety devices, or any other equipment, instruments, or the like that could endanger life or human health

ii. Use in applications that require a high degree of reliability, such as provision systems for gas / waterworks / electricity, etc., systems that operate continuously for 24 hours, and settlement systems

iii. Use in applications where the product may be handled or used deviating from the specifications or conditions / environment listed in the Catalogs, such as equipment used outdoors or applications in environments subject to chemical pollution or electromagnetic interference
If you would like to use IDEC products in the above applications, be sure to consult with an IDEC sales representative.

3. Inspections

We ask that you implement inspections for IDEC products you purchase without delay, as well as thoroughly keep in mind management/maintenance regarding handling of the product before and during the inspection.

4. Warranty

(1) Warranty period

The warranty period for IDEC products shall be one (1) year after purchase or delivery to the specified location. However, this shall not apply in cases where there is a different specification in the Catalogs or there is another agreement in place between you and IDEC.

(2) Warranty scope

Should a failure occur in an IDEC product during the above warranty period for reasons attributable to IDEC, then IDEC shall replace or repair that product, free of charge, at the purchase location / delivery location of the product, or an IDEC service base. However, failures caused by the following reasons shall be deemed outside the scope of this warranty.

i. The product was handled or used deviating from the conditions / environment listed in the Catalogs

ii. The failure was caused by reasons other than an IDEC product

iii. Modification or repair was performed by a party other than IDEC

iv. The failure was caused by a software program of a party other than IDEC

v. The product was used outside of its original purpose

vi. Replacement of maintenance parts, installation of accessories, or the like was not performed properly in accordance with the user's manual and Catalogs

vii. The failure could not have been predicted with the scientific and technical standards at the time when the product was shipped from IDEC

viii. The failure was due to other causes not attributable to IDEC (including cases of force majeure such as natural disasters and other disasters)

Furthermore, the warranty described here refers to a warranty on the IDEC product as a unit, and damages induced by the failure of an IDEC product are excluded from this warranty.

5. Limitation of liability

The warranty listed in this Agreement is the full and complete warranty for IDEC products, and IDEC shall bear no liability whatsoever regarding special damages, indirect damages, incidental damages, or passive damages that occurred due to an IDEC product.

6. Service scope

The prices of IDEC products do not include the cost of services, such as dispatching technicians. Therefore, separate fees are required in the following cases.

(1) Instructions for installation / adjustment and accompaniment at test operation (including creating application software and testing operation, etc.)

(2) Maintenance inspections, adjustments, and repairs

(3) Technical instructions and technical training

(4) Product tests or inspections specified by you

The above content assumes transactions and usage within your region. Please consult with an IDEC sales representative regarding transactions and usage outside of your region. Also, IDEC provides no guarantees whatsoever regarding IDEC products sold outside your region.

IDEC CORPORATION

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

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