



SAFETY

Components Guidebook

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KESD Series Safety Interlock Switch

Door opening/closing detection in equipment






Solenoid detection

Insert key in five directions

Wrist wear key(KSK-KCW) compatible with KSK safety selector switch

Heat protection to prevent malfunction

Certificates

-  UL 60947-5-1
-  cUL CSA C22.2 NO. 60947-5-1-14
-  EN 60947-5-1
-  S1-G-1-2009
-  KS S IEC 60947-5-1

KESD Series Safety Interlock Switch



Feature

- Built-in solenoid.
- You can easily check the door status with the lock & monitor function
- Emergency lock (operation key) can be released via manual lever
- The keyhead shutter can prevent arbitrary key manipulation
- The operation key insertion may be adjusted in five directions

Selection guide



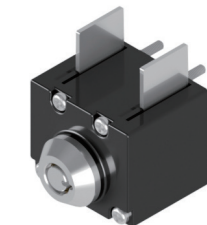
	Classification	Code	Safety interlock switch
①	Manufacturer	K	Koino
	Product name	ESD	Electric Safety Door Switch
②	Door Lock / Release type	M	Mechanical lock / Solenoid release (DC 24V)
③	Contact(Lock after key insertion)	A	2NC(locking)+1NO(Door)+1NO(Solenoid)
		B	2NC(locking)+1NC(Door)+1NO(Solenoid)
		C	2NC(locking)+1NC/NO(Door)
④	Operation key	H	Horizontal
		V	Vertical
		C	Adjustable

Accessories



	Code	Slide unit
① Manufacturer	K	Koino
② P/N	ESD	Electric Safety Door Switch
③ Sliding unit	SU	Sliding unit
	SKU	Sliding unit with key shutter
④ Release lever	None	Without release lever
	L	With release lever

* When using the sliding unit, the horizontal operation key (H) should be used.



	Code	Key shutter unit
① Manufacturer	K	Koino
② P/N	ESD	Electric Safety Door Switch
③ Key shutter unit	KU	Key shutter unit

* Contains key (KSK-KCW).



	Code	Key shutter unit
① Manufacturer	K	Koino
② P/N	ESD	Electric Safety Door Switch
③ Release lever	L	Release lever

Product type

Lock / Release	Indicator	Contact configuration (Lock after key insertion)	Cable inlet	P/N
Mechanical lock / Solenoid release	Solenoid DC24V / LED(Green) DC24V	A TYPE: 2NC ⊖ (Lock monitoring) + 1NO (Door monitoring) + 1NO (Solenoid monitoring)	G1/2	KESD-MA
		B TYPE: 2NC ⊖ (Lock monitoring) + 1NC ⊖ (Door monitoring) + 1NO (Solenoid monitoring)		KESD-MB
		C TYPE: 2NC ⊖ (Lock monitoring) + 1NC/1NO (Solenoid monitoring)		KESD-MC

⊖ Direct Opening

Specification

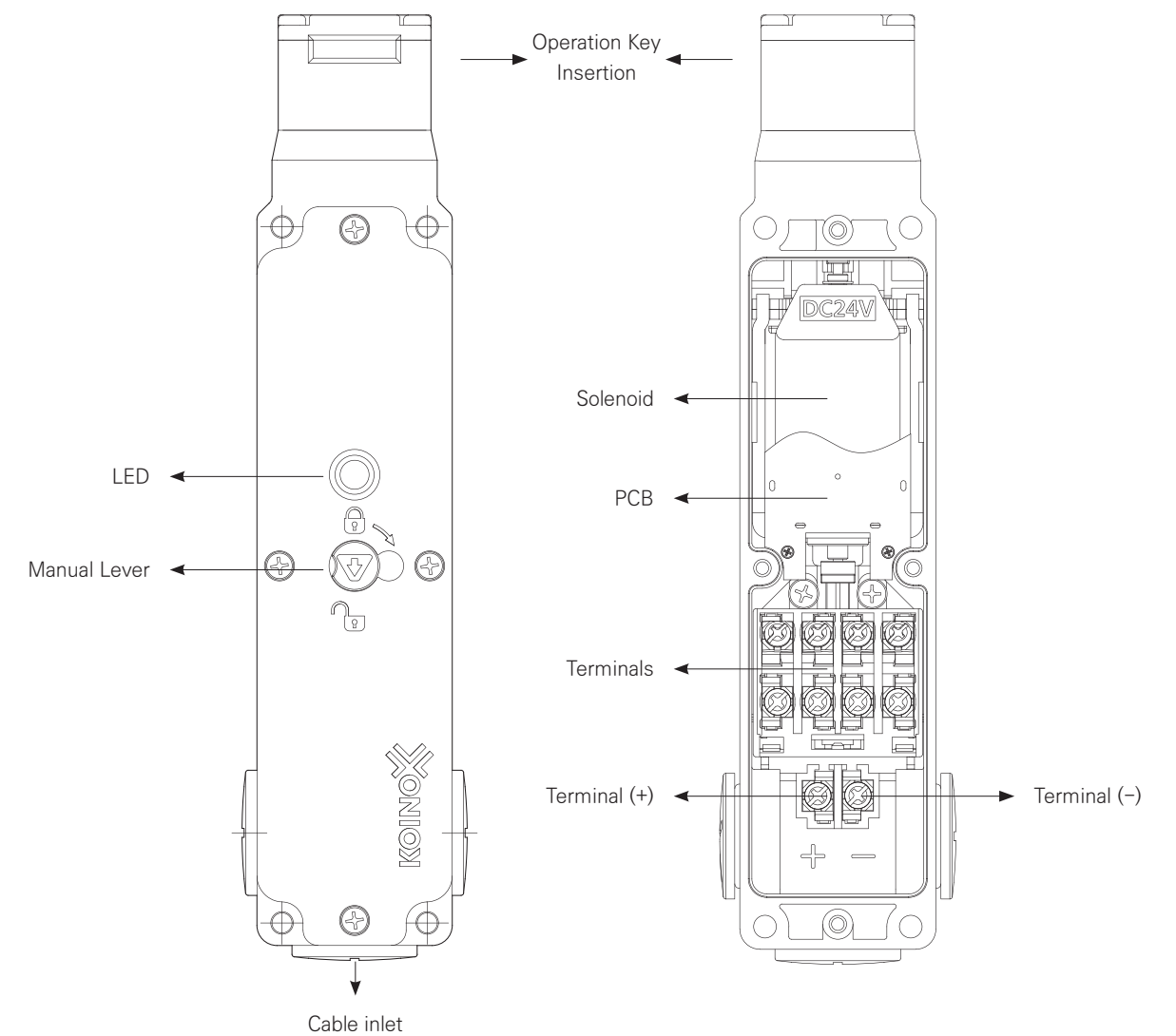
		KESD Series
Contact rating		250VAC 3A, 125VDC 0.55A (AC-15, DC-13)
Insulation resistance		100MΩ+ (with DC500V Insulation resistance meter)
Contact resistance		25 mΩ maximum (initial value)
Dielectric strength		250V
Vibration resistance		10 to 50Hz amplitude 1.5mm from X,Y,Z axis
Shock resistance		Minimum 30G
Operating ambient temperature		-10 ~ +55 °C
Operating ambient humidity		Maximum 95% RH
Durability		Mechanical: 1M / Electrical: 0.5M operations
Operation frequency		Maximum 30 operations per 1 minute
Locking force		Minimum 1,000N
Minimal open force		60N
Minimum direct opening distance		Minimum 13mm
Rated open thermal current		2.5A (EN 60947-5-1)
Protection		Body: IP67(NEMA 4X) / Actuator: IP00
IEC protection classes		Class II
Pollution degree		3 (EN60947-5-1)
Impulse Withstand Voltage	Between terminals of same poles	2.5KV (EN60947-5-1)
	Between live and dead parts	2.5KV (EN60947-5-1)
Conditional Short-circuit Current		100A
*Solenoid overcurrent protection		Overcurrent limit above 800 mA
*Recommended Short-Circuit Protection Device		5A
Altitude		Maximum 2000m
Solenoid	Rated voltage	DC 24V ± 10%
	Power consumption	In operation : 300mA ± 10%, Idle: (10 seconds after Power on) : 150mA
	Insulation classes	Class E
Indicator		DC24V , 18mA (Green LED)

*Solenoid overcurrent protection : In case of overcurrent operation over 500mA, the product power is cut off by current limitation, and the product can be operated again after power reset when the product returns to normal operation. (Overcurrent limit consumption may vary depending on temperature)

*Recommended Short Circuit Protection Device (SCPD) : Use a gG or gL fuse conforming to IEC 60269 as a short circuit protection device. The main unit does not have a built-in fuse.

Internal and external structures

KESD-M

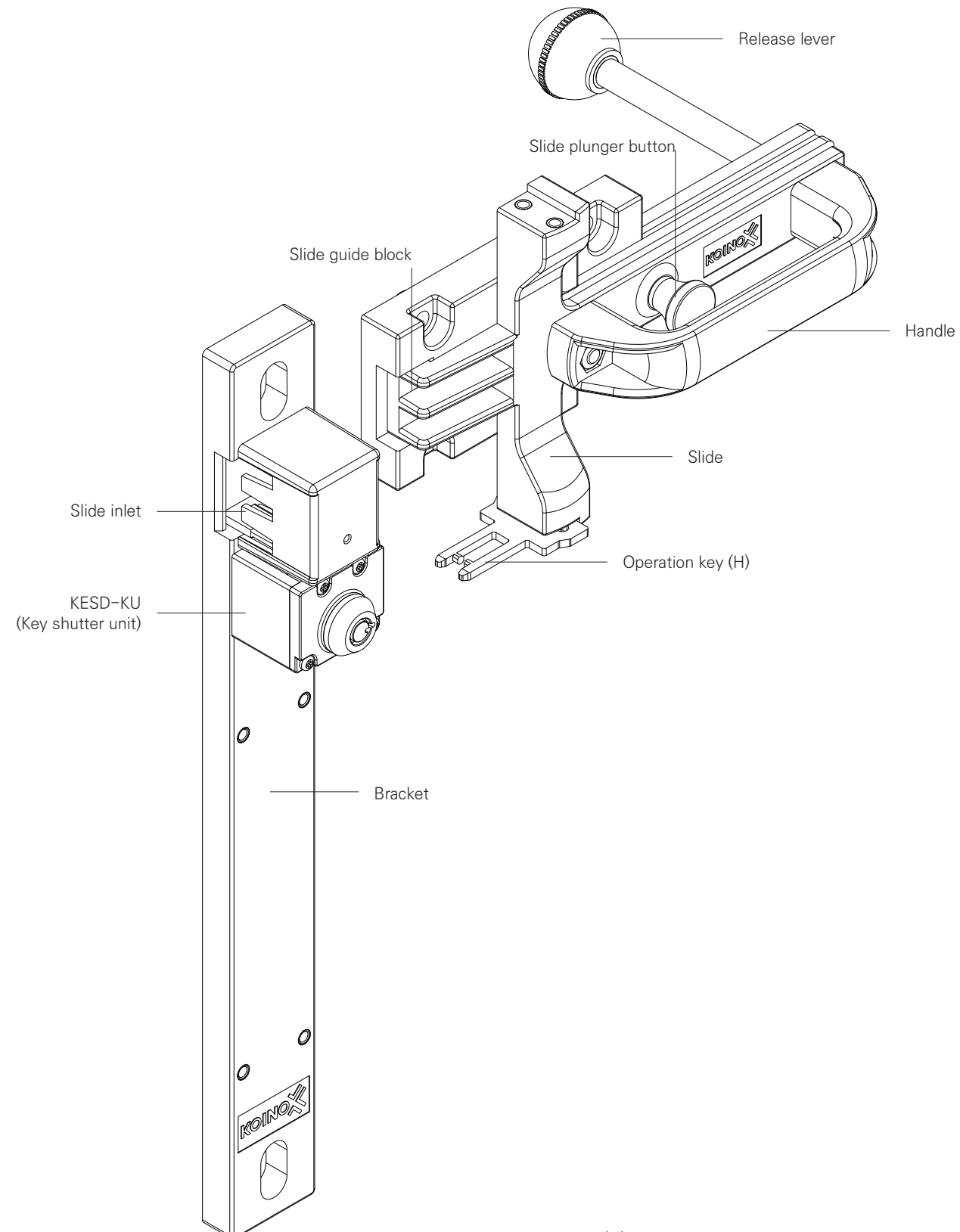


Terminal array

A type	B type	C type																																				
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Internal and external structures

KESD-SKU-L (Sliding unit + Key shutter unit + Release lever)

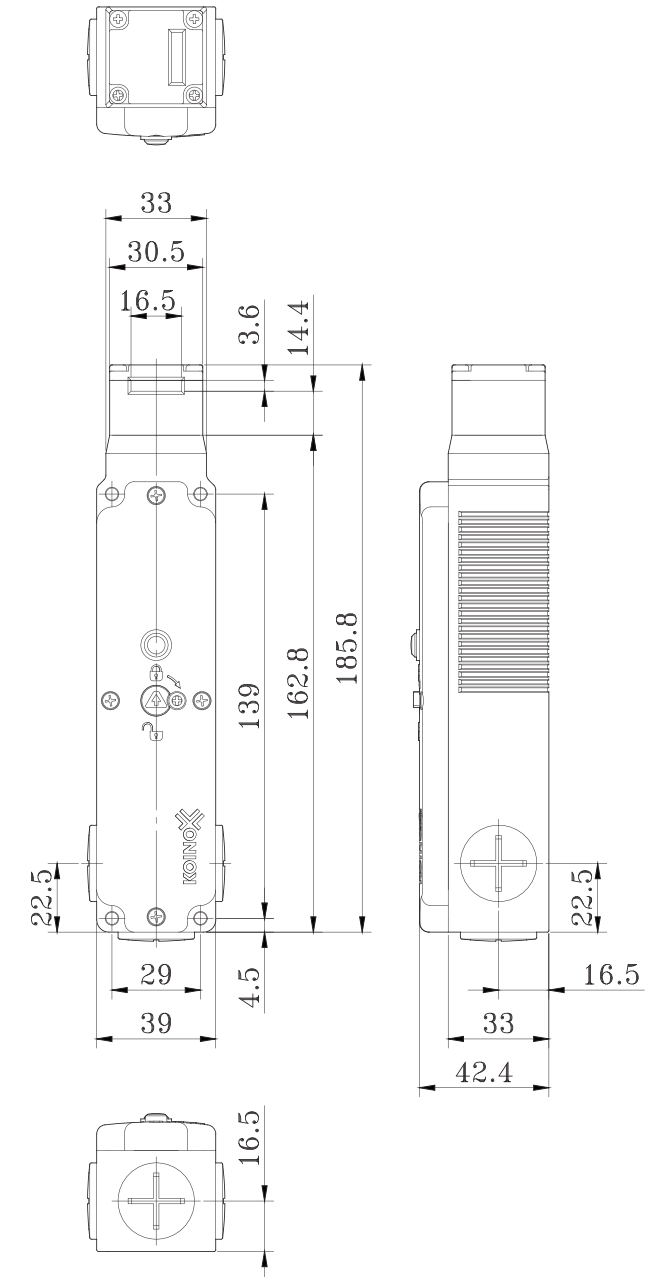


※ When using the sliding unit, you must use the horizontal operation key (H)

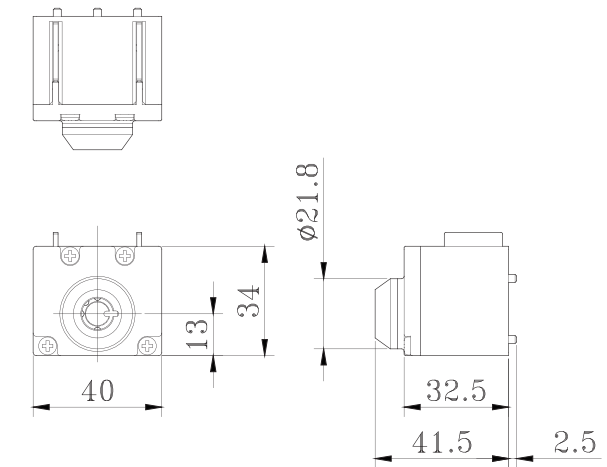
※ Slide handles can be installed in both directions

Dimension

KESD-M

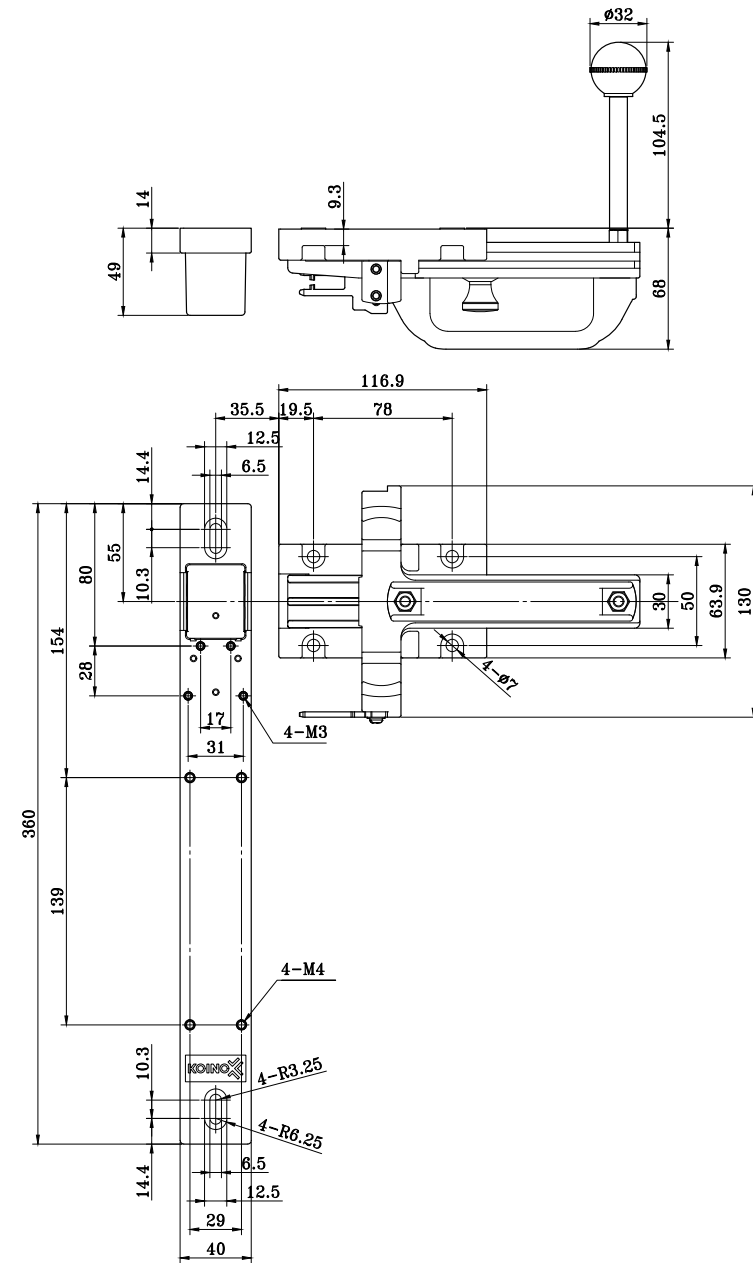


KESD-KU(Key shutter unit)



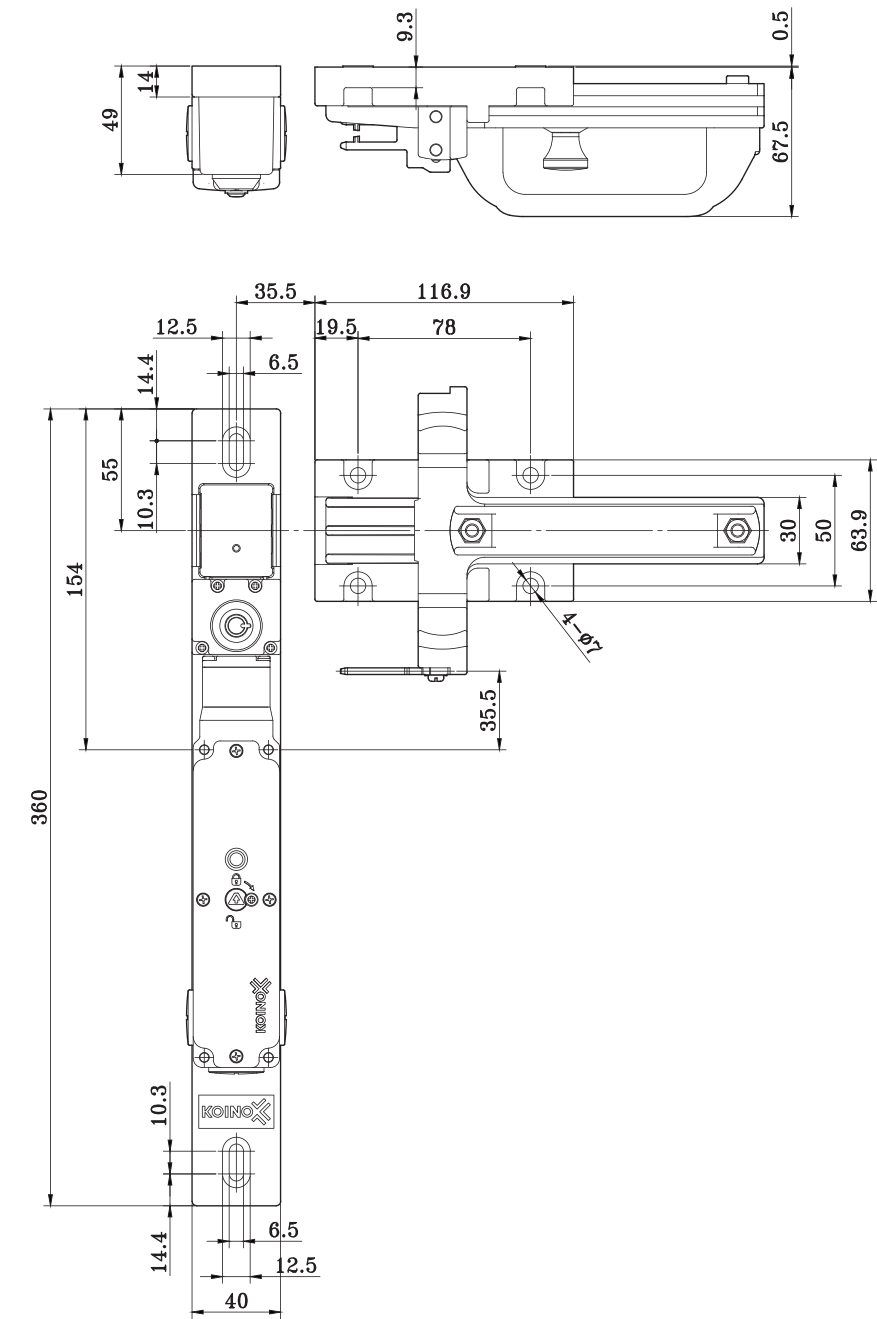
Dimension

KESD-SU (Slide unit)



Dimension

KESD-M + KESD-SKU (Interlock switch + Key shutter slide unit)

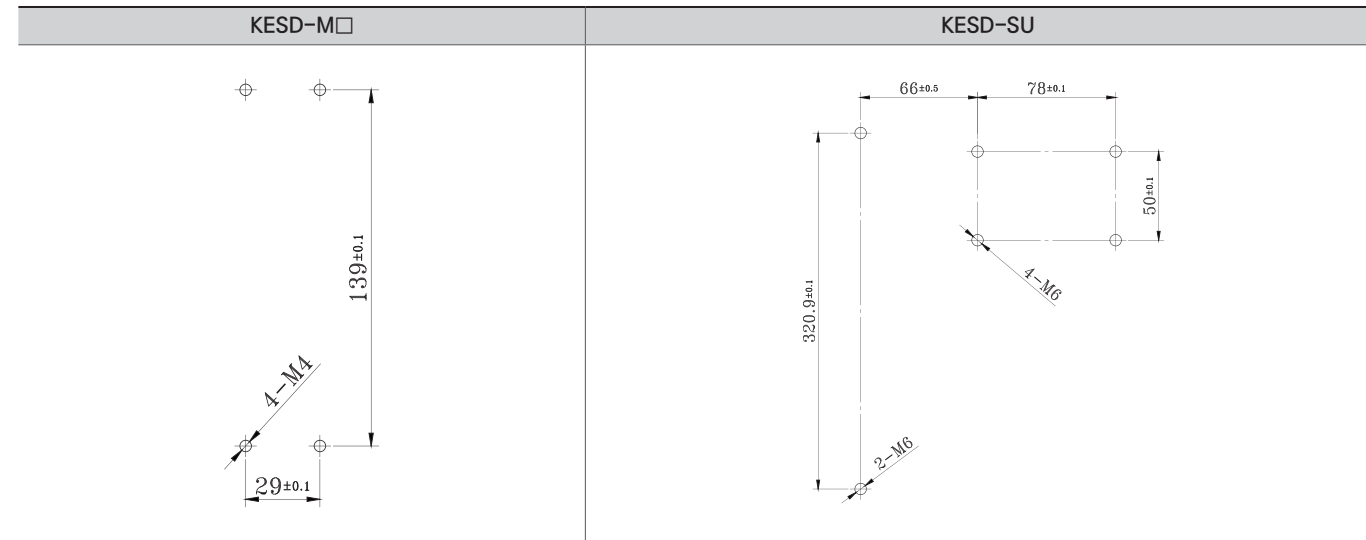


Operation key

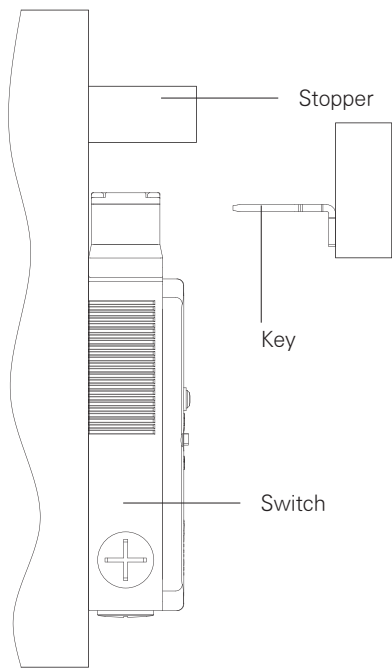
H Type (Horizontal)	V Type (Vertical)	C Type (Adjustable)

Mounting hole

Cut hole

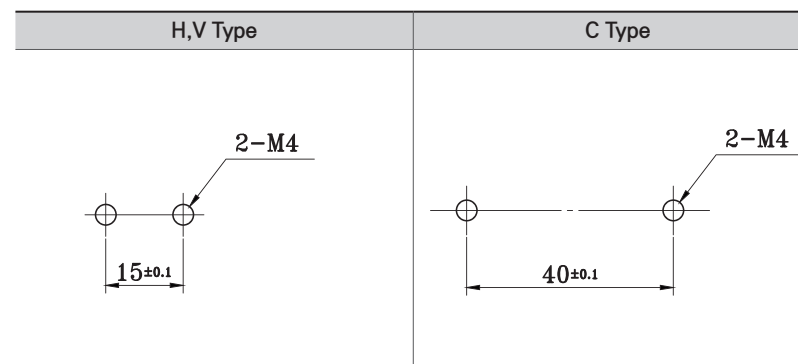


Stopper



- ※ Do not use body as a Stopper
- ※ Install the stopper as shown in the figure above so that the end of the control key does not touch the head

Operation key

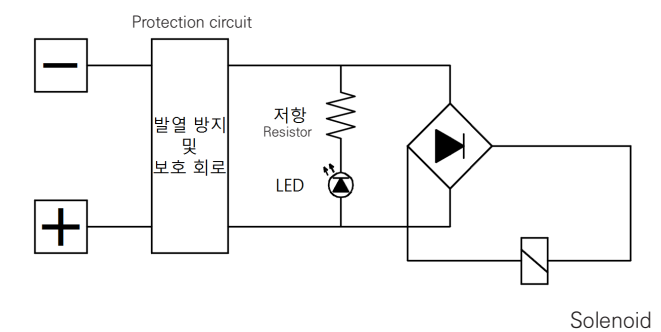


Circuit diagram

	Terminal layout	Circuit	Description
A			2NC ⊖ 11-12,21-22 (Locking monitoring) 1NO 33-34 (Door monitoring) 1NO 43-44 (Solenoid monitoring)
B			2NC ⊖ 11-12,21-22 (Locking monitoring) 1NC ⊖ 31-32 (Door monitoring) 1NO 43-44 (Solenoid monitoring)
C			2NC ⊖ 11-12,21-22 (Locking monitoring) 1NO/1NC 33-34 / 41-42 (Door monitoring)

- ※ Power (+,-) : Connect the power lines
- ※ Direct opening mark ⊖

Internal circuit (Solenoid & Indicator)



Operation characteristics

Status	Door closed / Locked	Door closed / Unlocked	Door opened / Unlocked
MA			
MB			
MC			

※ Power on

※ IN : Key in, OUT : Key out

Forced release using manual lever

- Forced release using manual lever in case of power failure or emergency
- The lock can be released by the manual lever regardless of the solenoid condition
- Only the person in charge should release the auxiliary lock using the manual lever
- Release the manual lever fixing bolt and turn the manual lever 180 degrees with the arrow pointing downward using the manual lever key.
- After the manual lever is released, it must be restored to its original state.

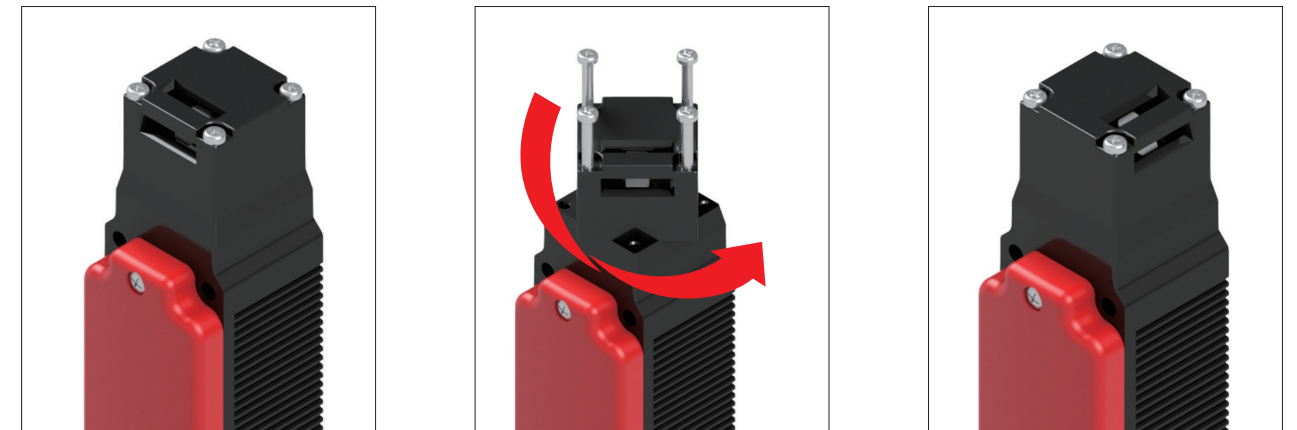


Manual lever



Key for Manual lever

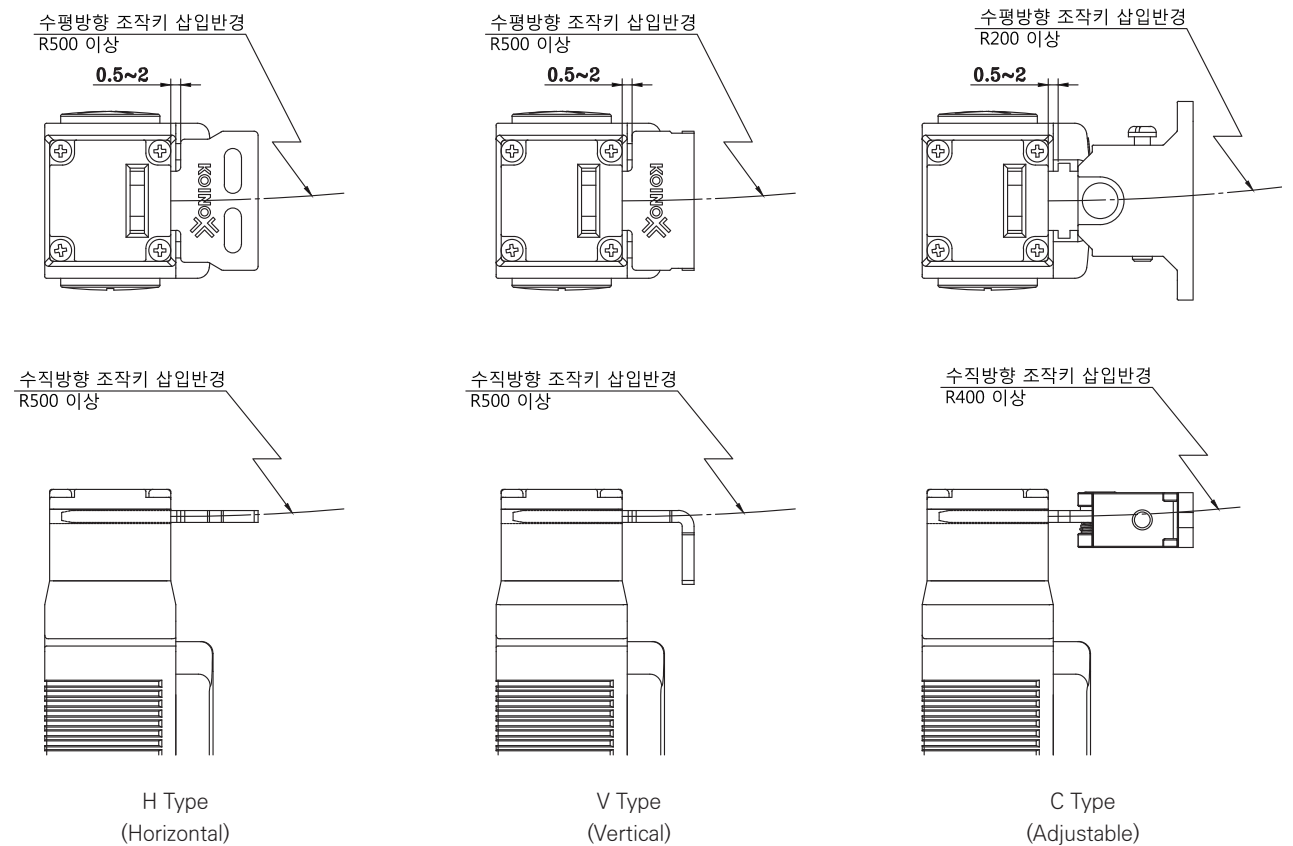
Operation key instruction



- When the head bolts are released, the head orientation can be changed to four directions. Be careful not to get debris stuck.
- Do not disassemble the inside of the head during head direction conversion to prevent malfunction.
- Ensure that the head bolt temporary head is level to avoid load on the inner lock function.
- Make sure that the head bolt tightens to the end of the temporary thread.
- Change the head direction after changing the manual lever to unlock.

Operation key setting

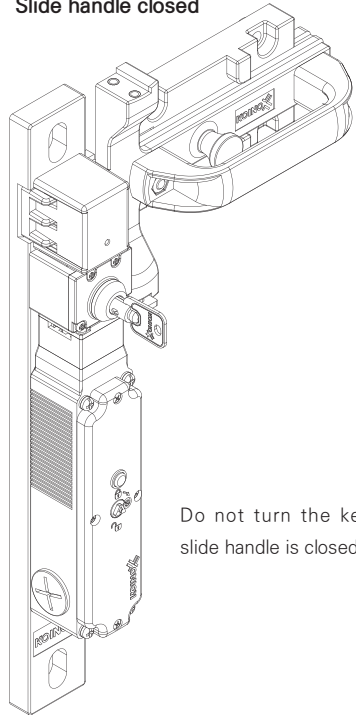
Keep the space between the operation key and the key insertion at 0.5 to 2 mm



Operation example

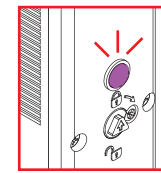
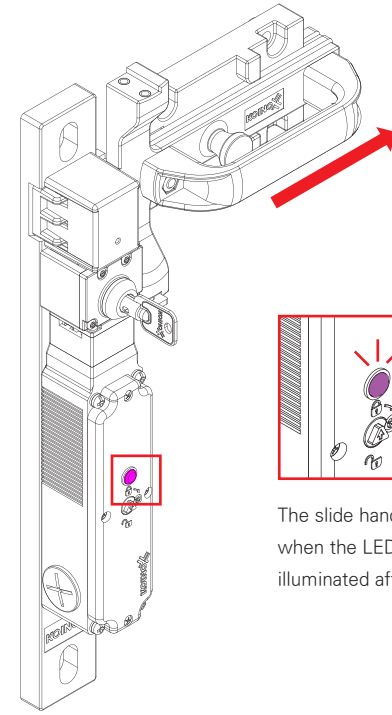
Lockout key to prevent entrapment

1. Door closing lock (solenoid non-energizing) Slide handle closed



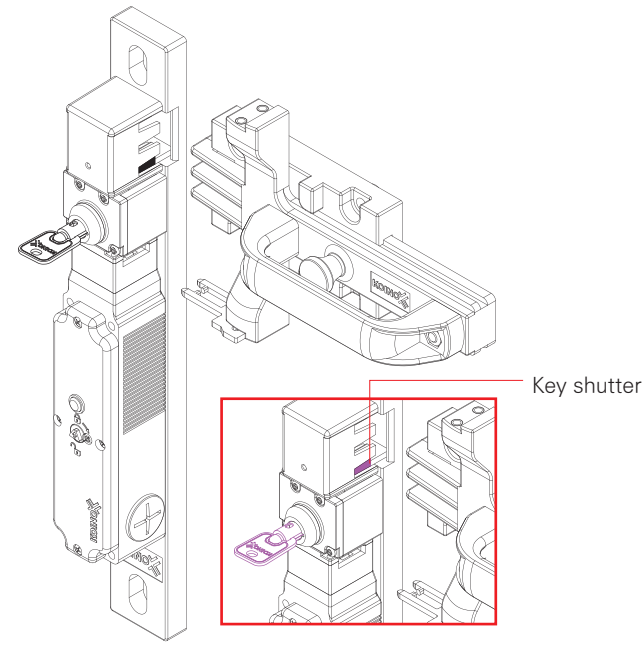
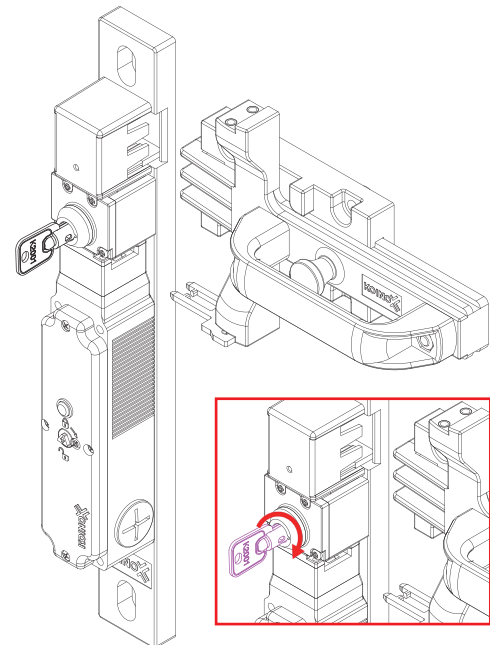
Do not turn the key when slide handle is closed

2. Door closing lock (solenoid non-energizing) Slide handle closed



The slide handle can be opened when the LED indicator is illuminated after powering on

3. Door Open – Slide Handle Open



- The lockout key can be turned when the slide handle is open.
- Turning the lockout key clockwise raises the key shutter (Lock status) and blocks the slide inlets to prevent insertion of the operating key
- Once the lockout key is removed, the door cannot be locked from the outside

Precautions

Usage Environment

- This product is for indoor use only. Outdoor use is prohibited.
- Do not use in places where temperature changes and vibrations are severe, where humidity is high or condensation is likely, where chemicals, metal powders, processing chips are affected, where solvents such as thinner and detergents are affected, or where explosive gases are present.
- Do not use in oil, water or in an environment where oil and water are always in contact. There is a risk of water or oil entering the interior.
- The main body is protected from intrusion of dust, oil, moisture, etc., but use it away from where metal powder, oil, moisture, and medicine are not affected by the key unit or key insertion port.
- When opening and closing the door, attach the operating key to a place that does not come into contact with the body to avoid a risk of injury.
- Keep away from fire and direct heat.
- Keep away from gas, dust, and hot and humid places when storing the products

Precautions for installation

- Do not drop the product as the switch may not function properly and may cause injury.
- Do not use KESD body as a door stopper.
- When installing the cover after wiring, install the KOINO logo on the cover facing down to avoid internal part breakage`
- Do not use metal connector or metal pipe to avoid part breakage and electric shock. Make sure to change the manual lever to unlock when changing the direction
- Install hinged door opening/closing door close to handle. If installed close to the hinge, a load greater than or equal to the operating force is applied to the lock of the product, causing damage to the lock function.

Functional check points

- Make sure that there are no people in the dangerous area before performing a functional check.
- Mechanical function check: Make sure that the operation key is easily inserted into the head.
- Electrical function check: When inserting the operation key, the operation key must not be removed even if the machine inside the door is operated automatically.
- Solenoid check : The operating key must not be released when the solenoid power is turned off during door lock conditions
- Insert the operation key three to four times and check the operation of the contact point
- If the sealing rubber is biased or foreign substances are attached, the sealing property will be degraded, so check if there is any problem.
- The durability of the KESD depends on the pull strength and opening travel distance, so be sure to use it within the number of openings and closings that meet the conditions of use and do not cause performance issues.

Precautions for Use

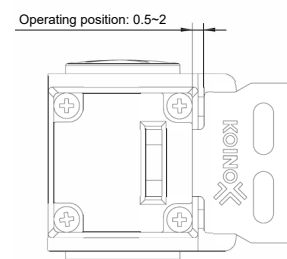
- When installing, be sure to check that the safety functions are working properly before operation. Safety functions may not operate properly due to wiring errors, incorrect function settings, switch failures, etc.
- Do not disassemble or modify the product
- Do not force the slide handle to move when the lockout key is removed or when the door is locked. It can cause a problem with the behavior of the product.
- The solenoid must be energized to open the door. If the solenoid is de-energized, forcing the door open can cause it to malfunction.

Screw tightening torque

Screws	Recommended torque
Terminal (M3)	0.5~0.7N.m
Cover Installation (M3)	0.5~0.7N.m
Operation key head installation(M3)	0.5~0.7N.m
Body insatllation (M4)	0.5~0.7N.m
Key shutter unit installation (M3)	0.5~0.7N.m

Parts installation method and precautions

- KESD switch & operation key
 - Install the KESD switch and the operating key using M4 screws and spring washers at proper tightening torque
 - Operations other than the dedicated operation keys may cause damage to the product, so use the dedicated operation keys for the safety of the device.
 - Use the operating key perpendicular to the key insert at the specified insertion radius
 - Applying or dropping an excessive load on the front of the key with the operating key mounted on the switch body can cause the key to deform or damage to the body
- Secure the door
 - When the door is closed (with the operating key inserted), attempts to push the door (operating key) above the operating position due to the weight of the door, vibration of the machine, cushioning rubber, etc. can cause malfunction. Secure the door with a lock (hook) etc. to fit into the operating position

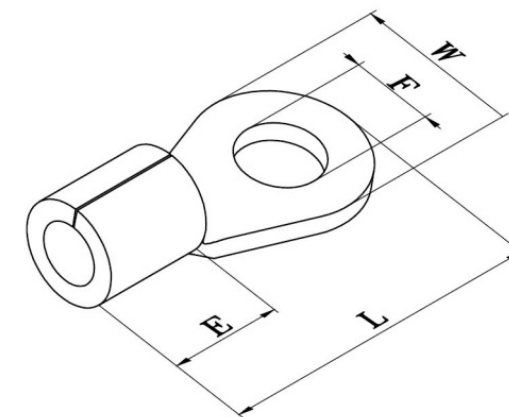


• Solenoid

- As the solenoid is energized, heat is generated. Do not touch the solenoid while operating
- Check the polarity of the terminals and wire them
- Do not open or close the solenoid diode cover to avoid electric shock

• Wiring

- Do not energize during wiring as there is a risk of electric shock.
- As there is a risk of electric shock, be sure to install the cover when wiring is complete and do not energize with the cover open.
- Be careful not to allow foreign objects into the switch body during wiring work and to avoid any foreign objects on the tool (screw driver) or terminals.
- The proper lead wire specification is AWG22-16. If the remaining part of the lead wire comes into contact with the cover, it will cause the cover to float, so wiring the lead wire to an appropriate length.
- Do not over-pull the lead wires as this may cause wiring disconnection.
- When exchanging and maintaining the KESD, make sure to work with the power off.
- Do not insert the compression terminal into the gap inside the case as it can cause damage or deformation of the case.
- Check the polarity of the terminals before connecting the wiring.(E1 : +, E2 : -)



KS standard : R 1.5-3
 W : 5.5
 F : 3.2(+0.2,-0)
 E : 4.1(Minimum)
 L : 12.5(Maximum)

Manufacturer	W	F	E	L
Jeono Electric (JOR 1.5-3)	5.5	3	5	12.5
Kyonsung Electric (KSTR 1.5-3)	5.6	3.5	5.5	15
ES Terminals (ESTE 1.5-3M)	5.6	3	5.5	15

Parts installation method and precautions

- Cable inlet

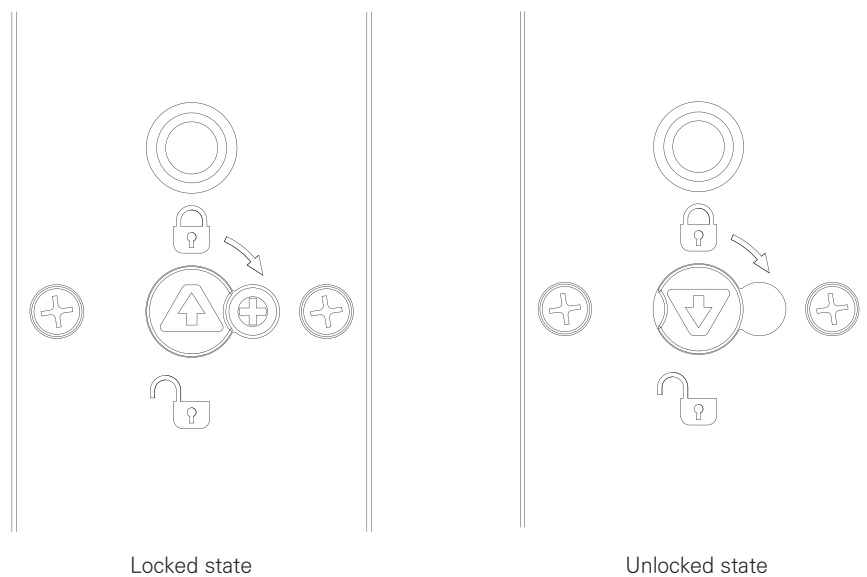
- If you tighten it with excessive torque, it can cause damage to the case, so tighten it with proper tightening torque.
- Use the attached cap screw to tighten the unused inlet to the proper tightening torque.
- Use the cable with the appropriate external diameter required by the connector.

- Recommended connector

- To avoid affecting the internal wiring of the switch case, use connectors with screw length of 10,9 mm or less.
- Use the recommended connector (G1/2, M20) to secure NEMA4X (IP67).

- Manual lever

- Use it to release the lock in case of a power failure or emergency.
- The location of the manual lever is shipped in a locked state.
- Do not use the manual lever for stopping or starting the machine.
- If the direction of the arrow on the manual lever changes from Lock to Unlock, the lock is released to open the door.
- Please make sure to return the manual lever to the lock position before using it.
- To prevent easy unlocking using the manual lever, keep the manual lever locked and tighten screws to prevent movement of the manual lever.
- Do not apply excessive force to the key for the manual lever.
- If the door is locked and the manual lever is in an unlocked state, do not remove the cover as it may malfunction the product.



- Interlock key head & Slide unit

- When using the slide unit, the keyhead can be adjusted in both directions, right and left.
- KESD-SU is exclusively for the KESD series and cannot be used in combination with door switches from other vendors.
- Only use the sliding handle in the direction of the left door or the direction of the right door as shown on the right
- Loose screws can cause premature failure, use spring washers to tighten to proper tightening torque.

