

SPATTER-GUARDED SWITCHES



- Effective countermeasures against the adhesion of spatter.
- UL/CSA/GB(CCC marking)-approved. (excluding some models)



ORDER GUIDE

Actuator		Operating characteristics			Basic catalog listing W2	Options			
Name	Shape	Max. O.F. (operating force)	Max. P.T. (pretravel)	Min. T.T. (total travel)		With LED lamp, 12 to 125 Vac/dc WC	With neon lamp, 100/200 Vac W	Double seal SW2	Double seal + LED SWC
Roller lever type		8.9 N	Standard type, 20°	High overtravel 75°	1LS61-JW2	1LS61-JWC	1LS61-JW	—	—
			High sensitivity type, 10°	High overtravel 72°	1LS71-JW2	1LS71-JWC	1LS71-JW	1LS71-JSW2	1LS71-JSWC
			High sensitivity type, 10°	High overtravel 72° and lever with double nut	1LS74-JW2	1LS74-JWC	1LS74-JW	—	—
Boot seal roller plunger type		15.7 N	1.7 mm	7.3 mm	—	5LS7-JWC	5LS7-JW	—	5LS7-JSWC

■ UL/CSA/GB(CCC marking) approved.

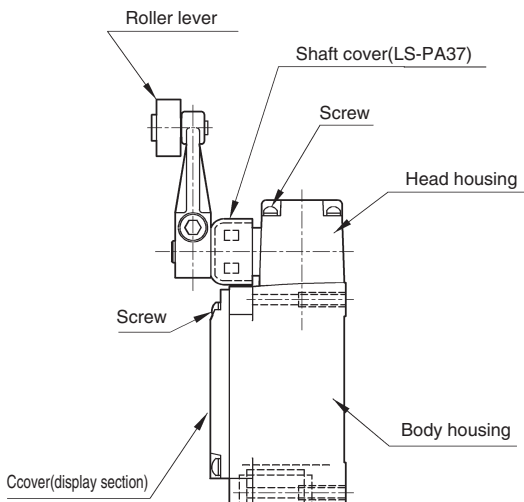
Quick Lock type

Actuator		Operating characteristics			catalog listing
Name	Shape	Max. O.F. (operating force)	Max. P.T. (pretravel)	Min. T.T. (total travel)	with LED lamp
Roller lever type		8.9N	Standard type, 20°	High overtravel 80°	1LS61-JWC-SD03
			High sensitivity type, 10°		1LS71-JWC-SD03
Double-nut roller lever type			High sensitivity type, 10°		1LS74-JWC-SD03
Boot seal roller plunger type		15.7N	1.7 mm	7.3mm	5LS7-JWC-SD03

Compatible with OMRON Smartclick connectors.

Smartclick is a registered trademark of OMRON Corporation.

COUNTERMEASURES FOR PREVENTING ADHESION OF SPATTER



Location	Countermeasures
Cover	<ul style="list-style-type: none"> • Heat-resistant resin is used in the cover screen to scatter spatter. • Heat-resistant paint is used.
Head	<ul style="list-style-type: none"> • Spatter-resistant Teflon is used as the shaft coating material. • The gap between the housing and lever on the head has been eliminated.
Screw roller	<ul style="list-style-type: none"> • Spatter-resistant stainless steel is used on screws and roller, and slotted • Phillips head +- screws are used for easy removal of spatter.
Paint	<ul style="list-style-type: none"> • Paint is heat-resistant to 120°C.

PERFORMANCE

Catalog listing		1LS61-J□□, 1LS71-J□□, 1LS74-J□□, 5LS7-J□□		
Standards	Compliance	NECA C 4508/JIS C 8201-5-1		
	Certification	UL/CSA/GB140485, 2001		
Structure	Contact form	2-circuit double break		
	Terminal shape	M4 screw (switch terminal screw)		
	Contact type	Rivet		
	Protective structure	IP67 (IEC 60529, JIS C 0920)		
Electrical performance	Electrical rating	See Table 1.		
	Dielectric strength	Between each terminal and non-live metal part	1,000 Vac, 50/60 Hz for 1 minute	
		Between non-continuous terminals	2,000 Vac, 50/60 Hz for 1 minute	
	Insulation resistance	100 MΩ min. (by 500 Vdc megger)		
	Initial contact resistance	Silver: max. 50 mΩ(6 to 8 Vdc, thermal current 1A, voltage drop method) Gold-plated: max. 100 mΩ(6 to 8 Vdc, thermal current 0.1A, voltage drop method)		
	Recommended min. contact operating voltage/current	Silver: 24V 10 mA, 12V 20 mA		
Gold-plated: 5V 10 mA				
Mechanical performance	Actuator strength	Withstands load 5 times O.F. (operating direction for 1 minute)		
	Terminal strength	Withstand tightening torque of 1.5 N·m for 1 minute		
	Impact resistance	Contact opening for 1 ms max. at 300 m/s ² in free position and total travel positions		
	Vibration resistance	1.5 mm peak-to-peak amplitude, frequency 10 to 55 Hz, for 2 continuous hours, contact opening for 1 ms max. in free position and total travel positions		
	Allowable operating speed	1LS type: 1.7 mm/s to 0.5 m/s 5LS7-J□□: 0.2 mm/s to 0.5 m/s		
Life	Operating frequency	Max. 120 operations/minute		
	Mechanical	Min. 10 million operations		
	Electrical	Model	Standard load internal switch	Standard load double seal internal switch
		Life (at rated load)	Min. 500,000 operations	Min. 200,000 operations
Above conditions must be satisfied at 20 operations/minute.				
Ambient operating conditions	Temperature	Standard type: -10 to +70°C (freezing not allowed) Double seal type: -5 to +70°C		
	Humidity	Max. 98% RH		
Recommended tightening torque	Body	5 to 6 N·m (M5 hexagon socket head bolt)		
	Cover	1.3 to 1.7 N·m (M4 screw)		
	Head	0.8 to 1.2 N·m (M3.5 screw)		
	Lever	4 to 5.2 N·m (M5 hexagon socket head bolt)		
	Terminal	1.0 to 1.4 N·m (M4 binding head machine screw)		

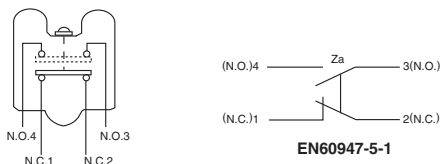
● Table 1. Electrical rating

Type of indicator lamp	None		100/200 Vac neon lamp		12 to 125 Vac/dc LED lamp	
	Catalog listing	Electrical rating	Catalog listing	Electrical rating	Catalog listing	Electrical rating
Standard	1LS61-JW2	125, 250, 480 Vac 10A 125 Vac 1/2HP 250 Vac 1HP 125 Vdc 0.8A 250 Vdc 0.4A	1LS61-JW 5LS7-JW	125, 250 Vac 5A	1LS61-JWC 5LS7-JWC	125 Vac 5A 125 Vdc 0.8A
Standard, with double seal	—	—	—	—	5LS7-JSWC	125 Vac 5A 125 Vdc 0.8A
High sensitivity	1LS7□-JW2	125, 250, 480 Vac 10A 125 Vac 1/8HP 250 Vac 1/4HP 125 Vdc 0.4A 250 Vdc 0.2A	1LS7□-JW	125, 250 Vac 5A	1LS7□-JWC	125 Vac 5A
High sensitivity with double seal	1LS71-JSW2	125, 250 480 Vac 5A 125 Vac 1/8HP 250 Vac 1/4HP	—	—	1LS71-JSWC	125 Vac 5A

● Electrical rating of products conforming to GB standards

	Application category	Rating			Rated operational current (Ith)
		Without indicator	With LED lamp	With neon lamp	
Standard load type	AC-15	3.0A-240V AC	3.0A-125V AC	3.0A-240V AC	10A
	DC-12	0.4A-30V DC	0.4A-30V DC	—	10A

● Circuit diagram

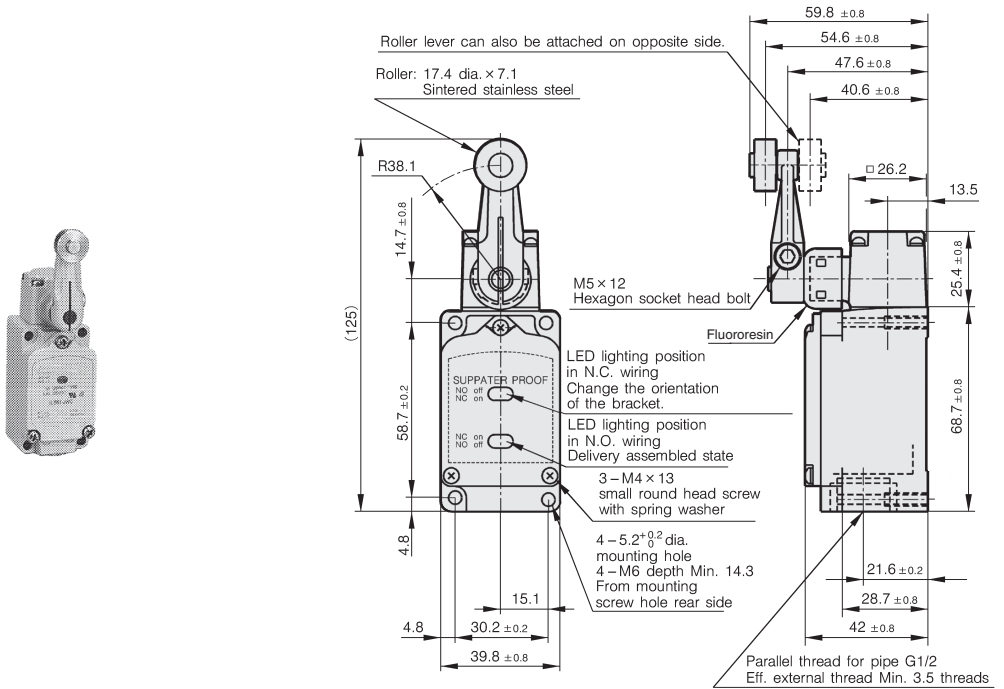


INDICATOR LAMPS

Option	Without indicator lamp	With 100/200 Vac neon lamp	With 12 to 125V AC-DC LED lamp	
Catalog listing	□LS□□-JW2	□LS□□-JW	□LS□□-JWC	
Lamp cover front side	—			
Circuit diagrams				
Notes	—	To ensure lighting of the neon lamp, use at a minimum of 75 Vac.	The power for the indicator lamp (red LED) is 12 to 125V. The indicator lamp operates on either AC or DC power.	
Lamp cover catalog listing (replacement part)		LS-9PAW	LS-9PAWC	
Specifications	Operating voltage	100 to 200 Vac	12 to 125V, AC/DC	
	Thermal current	100 Vac	200 Vac	12V to 125V
	Resistance	Approx. 0.5 mA	Approx. 1.5 mA	0.6 mA max
		100 kΩ	33 kΩ	

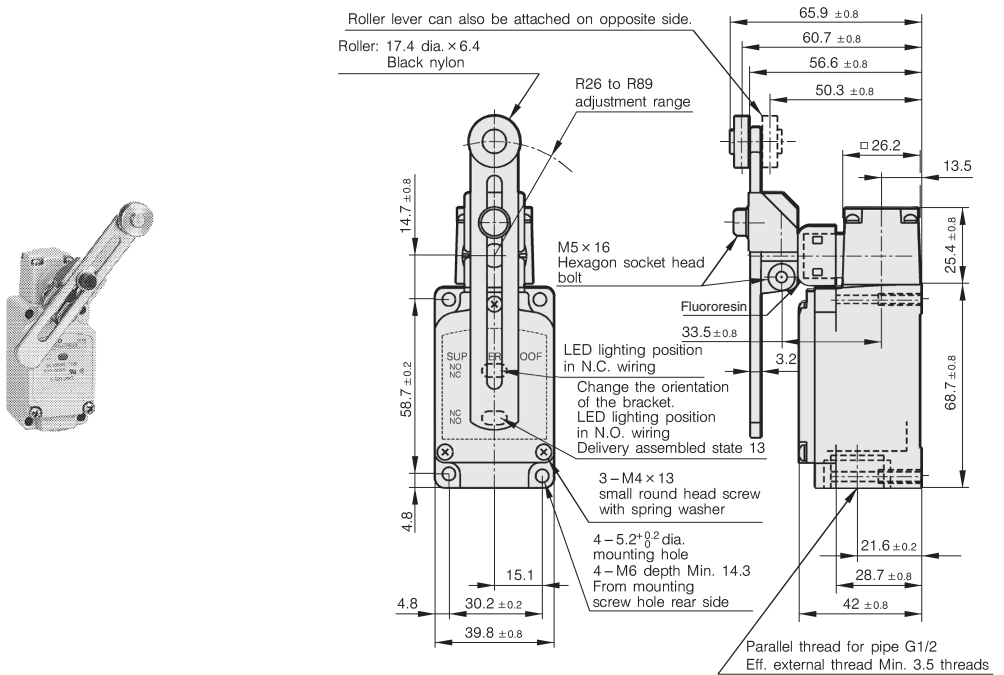
Roller lever type

Standard roller lever type



*Dimensional tolerance is ±0.4 unless otherwise specified.

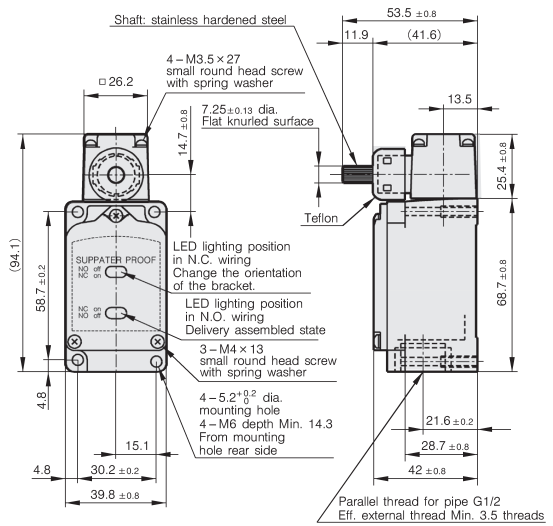
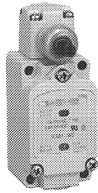
Adjustable roller lever type



*Dimensional tolerance is ±0.4 unless otherwise specified.

Side rotary type (without lever)

(unit: mm)



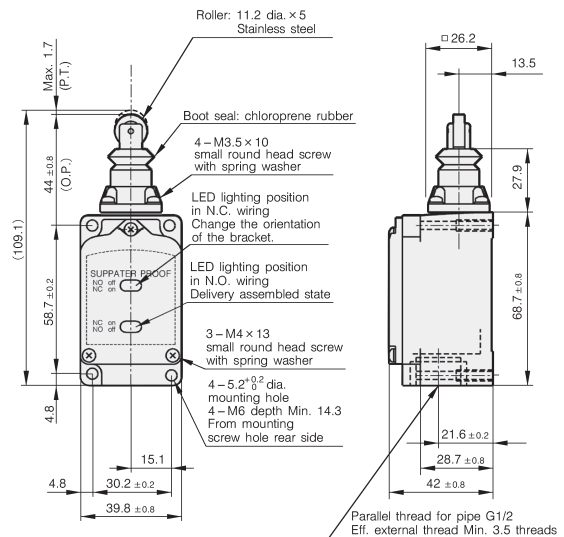
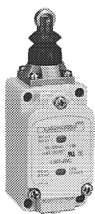
*Dimensional tolerance is ±0.4 unless otherwise specified.

Item		Side rotary type	
		High overtravel standard type	High overtravel high sensitivity type
Catalog listing	No indicator lamp	1LS6□-JW2	1LS7□-JW2
	100/200 Vac	1LS6□-JW	1LS7□-JW
	With neon lamps		
	12 to 125 Vac/dc	1LS6□-JWC	1LS7□-JWC
	With LED lamp		
Certification		UL/CSA/GB	
O.F.	(Max. N)	8.9	
R.F.	(Min. N)	0.98	
P.T.	(Max. °)	20	10 ⁺² ₋₁
O.T.	(Min. °)	55	62
M.D.	(Max. °)	12	5

Note: The above values for side rotary switches are for a lever length of 38.1 mm.

Boot seal roller plunger type

(unit: mm)




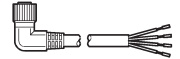
*Dimensional tolerance is ±0.4 unless otherwise specified.

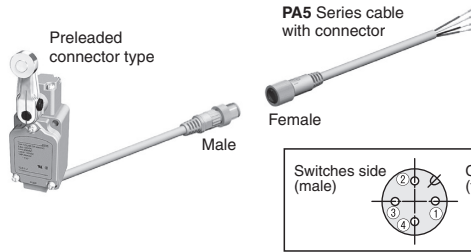
Catalog listing	No indicator lamp	5LS7-JW2
	100/200 Vac	5LS7-JW
	With neon lamps	
	12 to 125 Vac/dc	5LS7-JWC
	With LED lamp	
Certification		UL/CSA/GB
O.F.	(Max. N)	15.7
R.F.	(Min. N)	4.4
P.T.	(Max. mm)	1.7
O.T.	(Min. mm)	5.6
M.D.	(Max. mm)	0.51
R.T.	(Min. mm)	0.38

CONNECTOR WITH CABLE

Be sure to use a PA5 Series connector with cable when connecting a preleaded connector or connector-type switch.

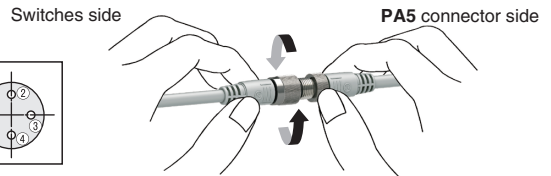
PA5 Series connector with cable

Shape	Power supply	Cord properties	Cord length	Catalog listing	Lead colors
	DC	Vinyl-insulated cord with high resistance to oil and vibration (UL/NFPA79 CM, CL3)	2 m	PA5-4I SX2SK	1: brown, 2: white, 3: blue, 4: black
			5 m	PA5-4I SX5SK	1: brown, 2: white, 3: blue, 4: black
	AC	Vinyl-insulated cord with high resistance to oil and vibration (UL/NFPA79 CM, CL3)	2 m	PA5-4JSX2SK	1: brown, 2: white, 3: blue, 4: black
			5 m	PA5-4JSX5SK	1: brown, 2: white, 3: blue, 4: black




Tightening the connector

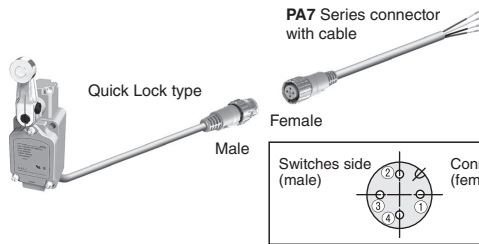
Align the grooves and rotate the fastening nut on the PA5 connector by hand until it fits tightly with the connector on the switches side.



Be sure to use a PA7 Series connector with cable when connecting Quick Lock type switch.

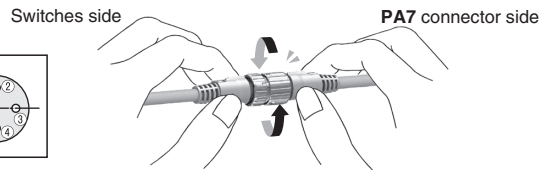
PA7 Series connector with cable

Shape	Power supply	Cord properties	Cord length	Catalog listing	Lead colors
	DC	Vinyl-insulated cord with high resistance to oil and vibration (UL/NFPA79 CM)	2 m	PA7-4I SX2SK	1: brown, 2: white, 3: blue, 4: black
			5 m	PA7-4I SX5SK	1: brown, 2: white, 3: blue, 4: black



Tightening the connector

Align the triangle mark and mate the male and female connector then rotate 45 degree to match the keys on the rings by hand.



Compatible with OMRON Smartclick connectors.

Smartclick is a registered trademark of OMRON Corporation.

CONNECTOR SPECIFICATIONS^{*1}

Item	Preleaded connector type	Quick Lock connector type
Operating voltage/current	For AC: min. 5V 5 mA, max. 250V 3A For DC: min. 5V 5 mA, max. 125V 3A	
Insulation resistance	Max. 100 MΩ (by 500 Vdc megger)	Max. 50 MΩ (by 500 Vdc megger)
Dielectric strength	1,500 Vac for 1 minute (between contacts, and between contact and connector housing)	
Initial contact resistance	Max. 40 mΩ (with 3A current to connected male and female connectors. Semiconductor lead-specific resistance not included.)	
Mating/unmating force	0.4 to 4.0 N per contact	
Mating cycles	50	
Connector nut tightening torque	Min. 0.8 N·m ^{*1}	
Cable pullout strength	Min. 100 N	
Vibration resistance	10 to 55 Hz, 1.5 mm peak-to-peak amplitude, for 2 hours each in X, Y and Z directions	
Impact resistance	300 m/s ² , 3 times each in X, Y and Z directions	980 m/s ² , 10 times each in X, Y and Z directions
Protective structure	IP67	
Ambient operating temperature	-10 to +70°C	
Ambient storage temperature	-20 to +80°C	
Ambient operating humidity	Max. 95% RH	
Material	Contacts	Gold-plated brass
	Contact holder	Glass-lined polyester resin
	Housing	Polyester elastomer
	Coupling	Brass (DC type: Ni-plated. AC type: orange-colored)
	O-ring	NBR

*1. The recommended tightening torque is 0.4 to 0.6 N·m. If the connector is not tightened firmly, IP67 protection may be lost, or the connector may come loose. Tighten firmly by hand.

PRECAUTIONS FOR USE

1. Connecting switches that have indicator lamps

1.1 Series connection

Up to six switches can be connected in series when the power is 100V. The brightness of the LED lamp is fixed regardless of the power, since light is generated by a built-in fixed-current diode.

1.2 PC connection possible

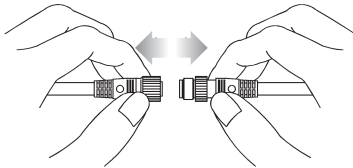
The leakage current when the limit switch is not operating is a maximum of 0.6 mA. The PC will not malfunction due to dim lighting of the LED. Moreover, a fixed-current diode is built in to ensure a fixed LED brightness regardless of the power voltage.

2. Handling of connector and preleaded connector switches

2.1 Tightening the fixing cap ring and outside screw lock ring

If the screw of the mating part is made of resin, the threads can easily be damaged when the connector is first tightened. When assembling the connector, align the center of the cores, push in as far as possible, and then turn to tighten.

Be sure to tighten fully by hand. The recommended tightening torque is 0.4 to 0.6 N·m. Use of a tightening tool may damage the connector. If the connector is not tightened firmly, IP67 protection may be lost, or the connector may come loose.

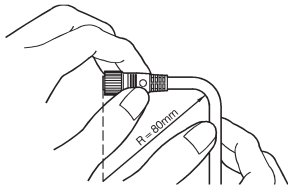


2.2 Inserting and removing connectors

Before inserting or removing connectors, be sure to turn the power OFF. When removing, hold the connector itself—do not pull by the cable.

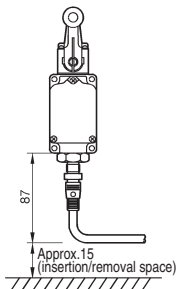
2.3 Cautions when bending cables

The minimum bend radius (R) of the cable is 80 mm. Allow sufficient cable for bends.



2.4 Installation of connector type switches

(unit: mm)



2.5 Cautions when replacing connectors

When removing connectors to replace the switch or cable, wipe the connector and the surrounding area thoroughly to remove any water. After removing the connector, do not allow it to be immersed in chemicals or powder, or to be dropped. If the connector is immersed in a fluid, allow it to fully dry before connecting again. If the connector is dropped in powder,

wipe it off completely before connecting again. Failure to observe these precautions may result in a short circuit or a failed connection.

3. Other

3.1 Protective structure

- IP67 protection does not assure complete waterproofing. Switch should not be in constant contact with water.
- Avoid use where external force is applied at all times on the connecting section of the connector.
- Do not use the body as a step or place heavy objects on top of it.

3.2 Ensuring a good seal

- When general-purpose limit switches are used in locations subject to splashing by water, oil, dirt and dust, or chips, water or oil sometimes enters the switch from the conduit due to capillary action. For this reason, be sure to use a sealed connector compatible with the cable.
- When the screws in the head or covers are loosened to change the operating direction of the switch, or the relationship between switch operation and the indicator lamp (lamp ON during switch standby / during switch operation), tighten the screws to the recommended tightening torque to ensure a good seal.

Recommended tightening torque

Cover: 1.3 to 1.7 N·m (M4 screw)

Head: 0.8 to 1.2 N·m (M3.5 screw)

3.3 Attaching switches

- Tighten each of the parts on the limit switch according to the appropriate tightening torques listed in the performance tables. Overtightening damages screws and other parts. On the other hand, insufficient tightening of screws lowers the effectiveness of the seal and reduces various performance characteristics.
- Do not leave or use covers and conduit parts open. Water, dirt, or dust may enter, which causing malfunction.
- Prevent impact to the lever body and head. Failure to do so might deform the actuator or cause defective switch return.
- Do not use silicone rubber electrical lead insulation, silicone adhesive or grease containing silicone. Doing so might result in defective electrical conductivity.

3.4 Wiring

- Do not perform wiring with the power ON. Doing so might cause electric shock, or the machine may start unexpectedly, causing an accident.
- Use crimp-type terminal lugs with covered insulation for electrical leads to prevent contact with covers and housings. If a crimp-type terminal lug contacts a cover, the cover may no longer shut or a ground fault may occur.
- Use sealed connectors (PA1 Series, etc. sold separately) or flexible tubing (PA3 Series) with IP67 or equivalent seal for conduits.
- Firmly tighten covers and conduits. If covers and conduits are not sufficiently tightened, the seal will be impaired and switch performance will no longer be assured.

3.5 Adjusting switches

- Do not apply excessive force (5 times O.F.) to the actuator beyond the total travel position. Doing so might damage the switch.
- Keep overtravel between 1/3 to 2/3 of the rated value. Small overtravel might cause the contacts to rattle due to vibration and impact, or may result in defective contact.

4. Environment

- Do not use the switch in an environment where strong acid or alkali is directly splashed onto it.

Before use, thoroughly read the "Precautions for use" and "Precautions for handling" in the Technical Guide on pages D-111 to D-122 as well as the instruction manual and product specification for this switch.