

Lighted Pushbutton Switch

A3C

Cylindrical 12-dia. Series with Superb Operability, High Visibility, and Compact Housing

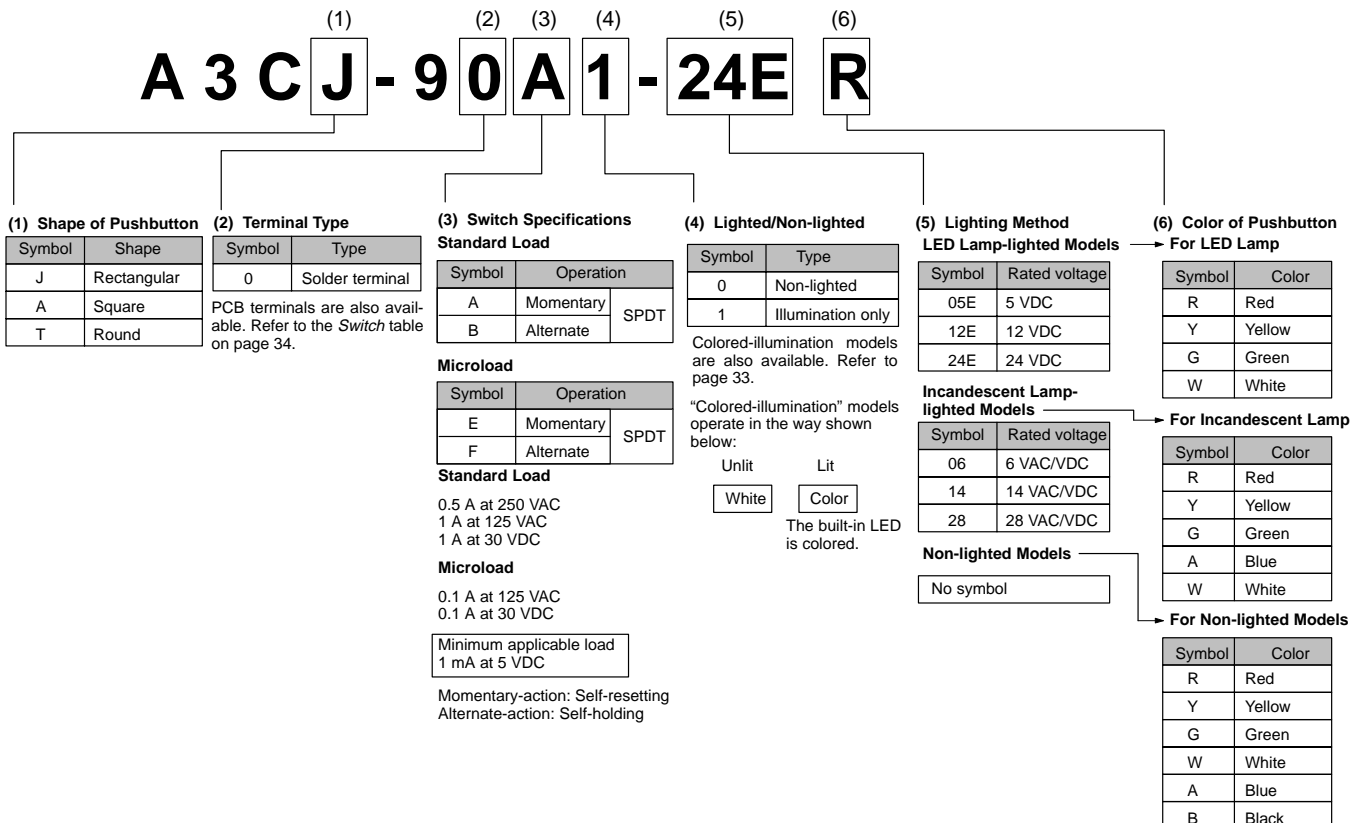
- Three models of Pushbuttons (round, square, and rectangular), two types of light-emitting elements (LED lamp and incandescent lamp), and two types of Switches (switching standard loads and microloads) available.
- Models that can be used as an indicator also available.
- Requires only 20 mm mounting depth
- Efficiency in wiring improved by terminals arranged on the same surface.
- All LED lamps, incandescent lamps, caps, and legends replaceable without tools.
- UL (E41515) and CSA (LR45258) approved.



Ordering Information

Model Number Legend

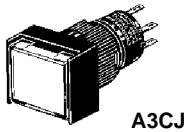
When placing your order, specify the individual component part model numbers of the Pushbutton, Lamp (lighted models only), and Switch, as listed in the ordering tables below.



■ Ordering as a Set

The model numbers used to order sets of Units are given in the following tables. One set comprises the Pushbutton, Lamp (lighted models only), and Switch.

Rectangular Models



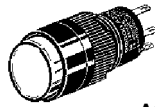
A3CJ

Square Models



A3CA

Round Models



A3CT

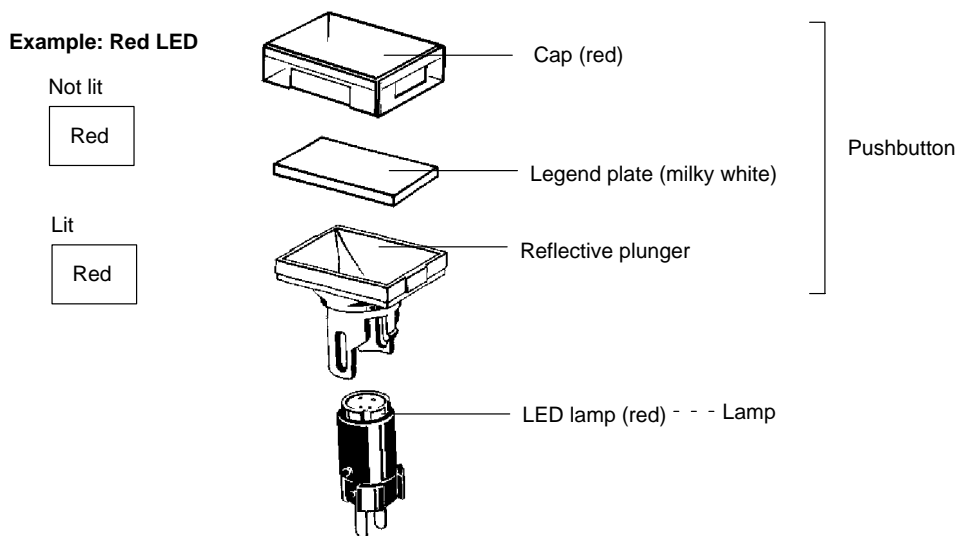
Lighted Pushbutton Switches (SPST-NO+SPST-NC Solder Terminals)

Shape	Contact type Operation Lighting	Standard load		Microload	Pushbutton color symbol	
		Momentary operation (Self-resetting)	Alternate operation (Self-holding)	Momentary operation (Self-resetting)		
Rectangular (A3CJ)	LED lamp	A3CJ-90A1-05E□	A3CJ-90B1-05E□	A3CJ-90E1-05E□	R: red Y: yellow G: green W: white	
		A3CJ-90A1-12E□	A3CJ-90B1-12E□	A3CJ-90E1-12E□		
		A3CJ-90A1-24E□	A3CJ-90B1-24E□	A3CJ-90E1-24E□		
	Incandescent lamp	A3CJ-90A1-06□	A3CJ-90B1-06□	A3CJ-90E1-06□	R: red Y: yellow G: green W: white A: blue B: black (See note 3.)	
		A3CJ-90A1-14□	A3CJ-90B1-14□	A3CJ-90E1-14□		
		A3CJ-90A1-28□	A3CJ-90B1-28□	A3CJ-90E1-28□		
	Non-lighted	A3CJ-90A0-□	A3CJ-90B0-□	A3CJ-90E0-□		
	Square (A3CA)	LED lamp	A3CA-90A1-05E□	A3CA-90B1-05E□	A3CA-90E1-05E□	R: red Y: yellow G: green W: white
			A3CA-90A1-12E□	A3CA-90B1-12E□	A3CA-90E1-12E□	
A3CA-90A1-24E□			A3CA-90B1-24E□	A3CA-90E1-24E□		
Incandescent lamp		A3CA-90A1-06□	A3CA-90B1-06□	A3CA-90E1-06□	R: red Y: yellow G: green W: white A: blue B: black (See note 3.)	
		A3CA-90A1-14□	A3CA-90B1-14□	A3CA-90E1-14□		
		A3CA-90A1-28□	A3CA-90B1-28□	A3CA-90E1-28□		
Non-lighted		A3CA-90A0-□	A3CA-90B0-□	A3CA-90E0-□		
Round (A3CT)		LED lamp	A3CT-90A1-05E□	A3CT-90B1-05E□	A3CT-90E1-05E□	R: red Y: yellow G: green W: white
			A3CT-90A1-12E□	A3CT-90B1-12E□	A3CT-90E1-12E□	
	A3CT-90A1-24E□		A3CT-90B1-24E□	A3CT-90E1-24E□		
	Incandescent lamp	A3CT-90A1-06□	A3CT-90B1-06□	A3CT-90E1-06□	R: red Y: yellow G: green W: white A: blue B: black (See note 3.)	
		A3CT-90A1-14□	A3CT-90B1-14□	A3CT-90E1-14□		
		A3CT-90A1-28□	A3CT-90B1-28□	A3CT-90E1-28□		
	Non-lighted	A3CT-90A0-□	A3CT-90B0-□	A3CT-90E0-□		

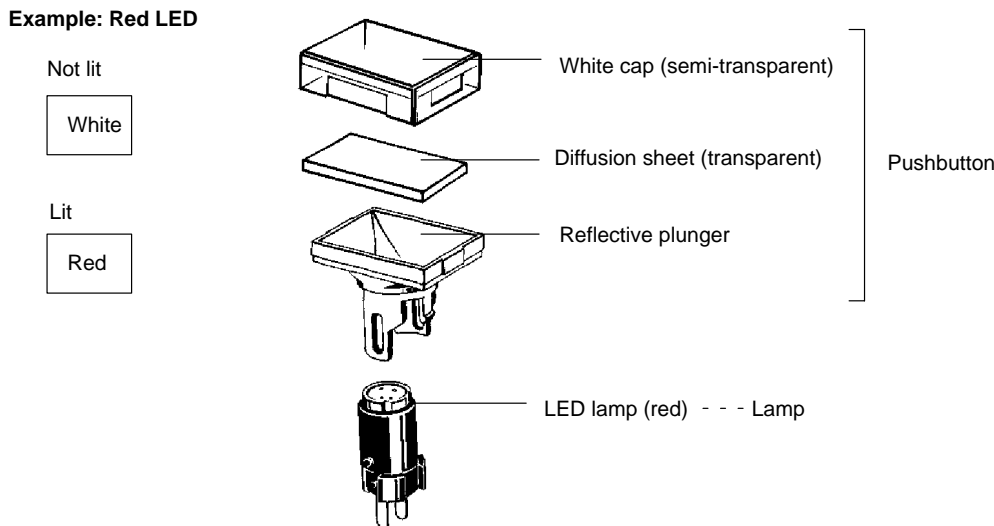
- Note:**
1. Enter the desired color symbol for the Pushbutton in the □ at the end of the model number.
 2. There are also alternate-operation models that can be used for microloads. Refer to the *Switch* table on page 34.
 3. Black ("B") Pushbuttons are only available for non-lighted models.

■ Illumination-only and Colored-illumination LED Models

“Illumination only” describes LED models for which the screen color is the same whether the LED is lit or not. The screen simply becomes brighter when the LED lights.



“Colored illumination” describes LED models for which the screen color is white when the LED is not lit and changes to the color of the LED lamp when the LED is lit.



Ordering: With colored-illumination models, order the Pushbutton, Lamp, and Switch as shown in the following table.

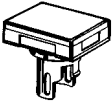
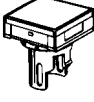

Illuminated color	Pushbutton	Lamp (LED)	Switch
Red	IP40 A3C□-500W	A16-□DR	Enter one of the following symbols in □. 5: 5 VDC 12: 12 VDC 24: 24 VDC
Yellow	Enter one of the following symbols in □. J: Rectangular A: Square T: Round	A16-□DY	
Green		A16-□DG	

Refer to the following information. Order the Switch that is appropriate for the Pushbutton.

■ Ordering Individually

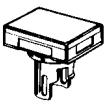
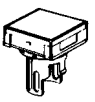

Pushbuttons, Lamps, and Switches can be ordered separately. Combinations that are not available as sets can be created using individual Units. Also, store the parts as spares for maintenance and repairs.

Pushbuttons
LED Lamp

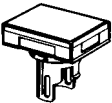
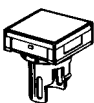

Button color	Rectangular	Square	Round
			
Red	A3CJ-500R	A3CA-500R	A3CT-500R
Yellow	A3CJ-500Y	A3CA-500Y	A3CT-500Y
Green	A3CJ-500GY	A3CA-500GY	A3CT-500GY
White	A3CJ-500W	A3CA-500W	A3CT-500W

Note: The red, yellow, and white Pushbuttons listed above can be used with either LED lamp-lighted models or incandescent lamp-lighted models.

Non-lighted Models

Button color	Rectangular	Square	Round
			
Red	A3CJ-500R	A3CA-500R	A3CT-500R
Yellow	A3CJ-500Y	A3CA-500Y	A3CT-500Y
Green	A3CJ-500G	A3CA-500G	A3CT-500G
White	A3CJ-500W	A3CA-500W	A3CT-500W
Blue	A3CJ-500A	A3CA-500A	A3CT-500A
Black	A3CJ-501B	A3CA-501B	A3CT-501B

Incandescent Lamp

Button color	Rectangular	Square	Round
			
Red	A3CJ-500R	A3CA-500R	A3CT-500R
Yellow	A3CJ-500Y	A3CA-500Y	A3CT-500Y
Green	A3CJ-500G	A3CA-500G	A3CT-500G
White	A3CJ-500W	A3CA-500W	A3CT-500W
Blue	A3CJ-500A	A3CA-500A	A3CT-500A

Lamps (Same as A16)




LED Lamp

Color	Rated voltage		
	5 VDC	12 VDC	24 VDC
Red	A16-5DR	A16-12DR	A16-24DR
Yellow	A16-5DY	A16-12DY	A16-24DY
Green	A16-5DG	A16-12DG	A16-24DG
White	A16-5DW	A16-12DW	A16-24DW





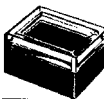

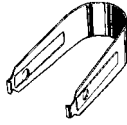
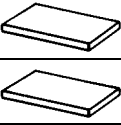
Incandescent Lamp

Rated voltage	6 VAC/VDC	14 VAC/VDC	28 VAC/VDC
Model	A16-5	A16-12	A16-24

Switches

Configuration	Contact	Switch action	Terminal	Degree of protection: IP40		
				Rectangular	Square	Round
Standard	SPST-NO+ SPST-NC	Momentary	Solder			
				A3CJ-7011	A3CA-7011	A3CT-7011
Alternate			A3CJ-7021	A3CA-7021	A3CT-7021	
Microload		Momentary	Solder	A3CJ-7111	A3CA-7111	A3CT-7111
				PCB	A3CJ-7112	A3CA-7112
		Alternate	Solder	A3CJ-7121	A3CA-7121	A3CT-7121
	PCB			A3CJ-7122	A3CA-7122	A3CT-7122

Accessories (Order Separately)

Name	Appearance	Classification	Model	Remarks
Socket		Wire-wrap terminal	A3C-4101	Cannot be used with Insulation Cover.
		PCB terminal	A3C-4102	
		Solder terminal	A3C-4103	
Insulation Cover		---	A3C-3002	Cannot be used with Socket.
Switch Guard		For rectangular models	A3CJ-5050	Cannot be used with Dust Cover.
		For square, round models	A3CA-5050	
Dust Cover		For rectangular models	A3CJ-5060	Cannot be used with Switch Guard.
Tightening Tool		---	A3C-3004	The tightening torque is 0.20 to 0.39 N·m.
Extractor		---	A3PJ-5080	---
Legend Plate		For rectangular models	A3CJ-5201	One Legend Plate is supplied per standard Switch.
		For square models	A3CA-5201	
		For round models	A3CT-5201	

Specifications

■ Contact Ratings

Model	Item	
	AC resistive load	DC resistive load
Standard load	0.5 A at 250 VAC 1 A at 125 VAC	1 A at 30 VDC
Microload (See note 1.)	0.1 A at 125 VAC	0.1 A at 30 VDC

- Note:**
- The minimum permissible load is 1 mA, 5 VDC.
 - The above ratings are for testing under the following conditions:
 - Load: Resistive load
 - Mounting conditions: No vibrations or shock
 - Temperature: 20°C ± 2°C
 - Operation frequency: 20 operations/minute

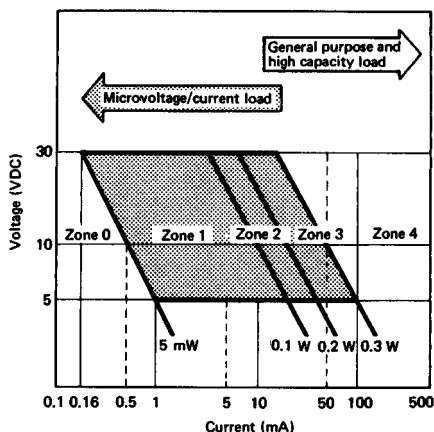
■ LED Lamp Ratings

Rated voltage	Rated current	Operating voltage	Internal limiting resistance
5 VDC	30 mA	5 VDC±5%	33 Ω
12 VDC	15 mA	12 VDC±5%	270 Ω
24 VDC	10 mA	24 VDC±5%	1,600 Ω

■ Incandescent Lamp Ratings

Rated voltage	Rated current	Operating voltage
6 VAC/VDC	60 mA	5 VAC/VDC
14 VAC/VDC	40 mA	12 VAC/VDC
28 VAC/VDC	24 mA	24 VAC/VDC

Applicable Load Range



NOTE: The load range shown above is applicable only during the standard conditions.

■ Characteristics

Operating frequency	Mechanical: Momentary-action models: 120 operations/minute max. Alternate-action models: 60 operations/minute max. (See note 1.) Electrical: 20 operations/minute max.
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 minute between terminals of same polarity and between lamp terminals (See note 2.) 2,000 VAC, 50/60 Hz for 1 minute between terminals of different polarity and also between each terminal and ground
Vibration	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (No malfunctions for more than 1 s.)
Shock	Destruction: 500 m/s ² Malfunction: 150 m/s ² (No malfunctions for more than 1 s.)
Life expectancy	Mechanical: Momentary-action models: 1,000,000 operations min. Alternate-action models: 100,000 operations min. (see note 1) Electrical: 100,000 operations min.
Weight	Approx. 5 g (See note 3.)
Ambient operating temperature	-10°C to 55°C (with no icing or condensation)
Ambient operating humidity	35% to 85%
Ambient storage temperature	-25°C to 65°C
Degree of protection	IP00
Electric shock protection class	Class II
PTI (proof tracking index)	175
Pollution degree	3 (IEC947-5-1)

- Note:
1. With alternate-operation models, one operation cycle consists of set and reset operations.
 2. The figure given above for the dielectric strength between lamp terminals is for when there is no LED lamp or incandescent lamp mounted.
 3. The weight indicated here applies to the lighted models (SPST-NO+SPST-NC).

■ Operating Characteristics

OF max.	2.45 N
RF min.	0.29 N
TT	Approx. 3.5 mm
LTA min. (See note.)	0.5 mm
PT max.	2.5 mm

Note: The value for LTA min. applies to alternate-operation models only.

■ Approved by Standards

UL (File No. E41515)
CSA (File No. LR45258-31)

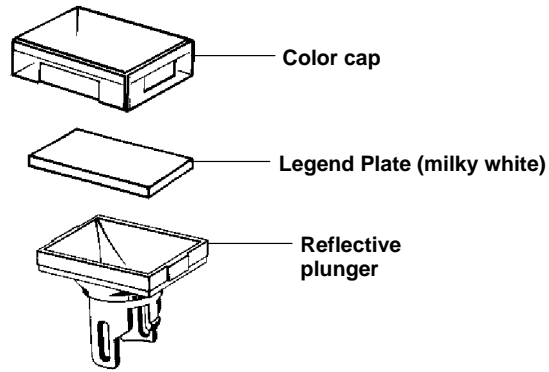
Rating Standard

1 A at 125 VAC
0.5 A at 250 VAC
1 A at 30 VDC

Microload

0.1 A at 125 VAC
0.1 A at 30 VDC

Nomenclature



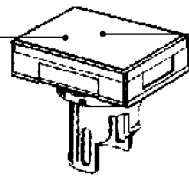
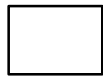
Pushbutton

Shape of Pushbutton

Rectangular (A3CJ)

Square (A3CA)

Round (A3CT)



Color of Pushbutton

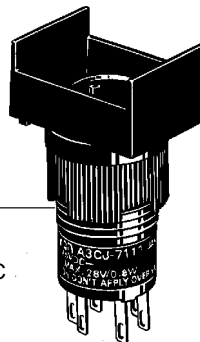
- LED lamp-lighted Models:
Red, yellow, green, white
- Incandescent lamp-lighted Models:
Red, yellow, green, white, blue
- Non-lighted Models:
Red, yellow, green, white, blue, black



Lamp
LED Lamp



Incandescent Lamp



Switch

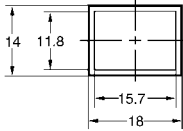
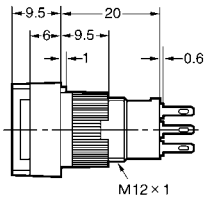
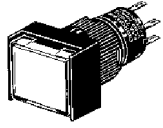
- Standard load:
0.5 A at 250 VAC
1 A at 125 VAC
1 A at 30 VDC
- Microload:
0.1 A at 125 VAC,
0.1 A at 30 VDC
Minimum applicable load: 1 mA at 5 VDC

Note: The A3CJ model is shown here as a representative example.

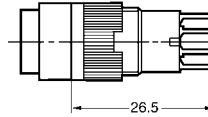
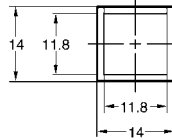
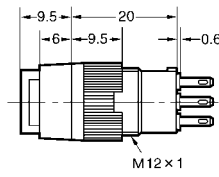
Dimensions

The following dimensions apply to the Switch with SPST-NO+SPST-NC contact configuration, with solder terminals.

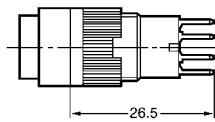
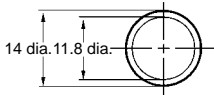
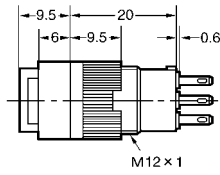
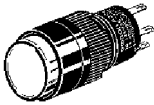
Rectangular Models A3CJ



Square Models A3CA



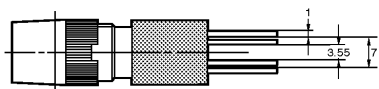
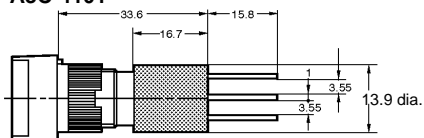
Round Models A3CT



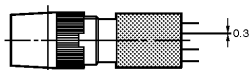
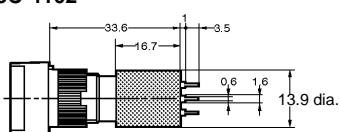
■ Accessory Mounting Dimensions Dimensions with Socket Mounted

The diagrams below show the external dimensions for rectangular models as representative models.

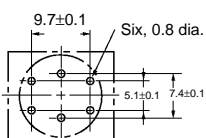
**Wire-wrap Terminal
A3C-4101**



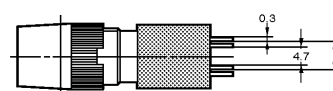
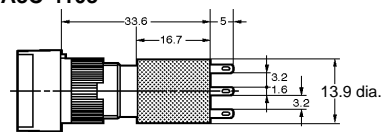
**PCB Terminal
A3C-4102**



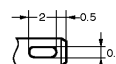
PCB Cutout (bottom view)



**Solder Terminal
A3C-4103**

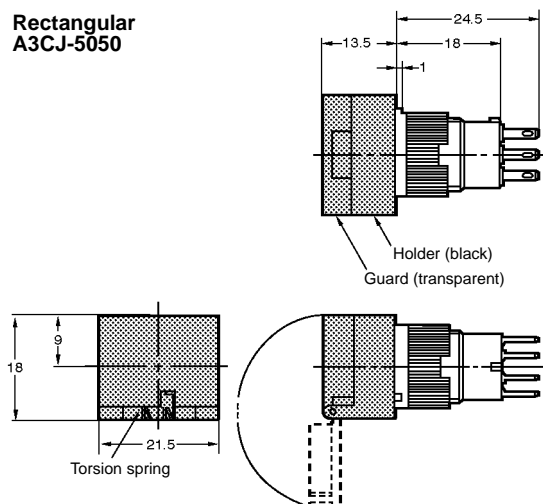


Terminal Hole Dimensions

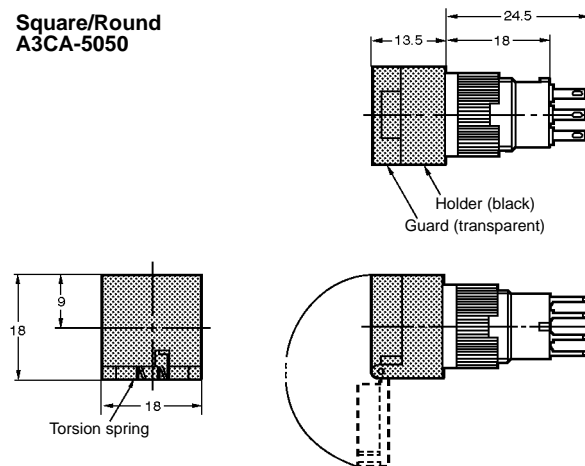


Switch Guard

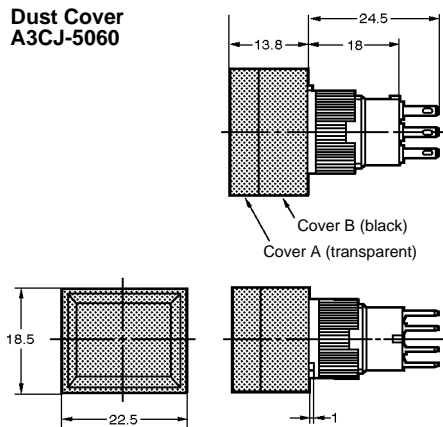
**Rectangular
A3CJ-5050**



**Square/Round
A3CA-5050**

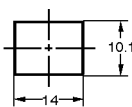


**Dust Cover
A3CJ-5060**

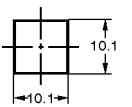


Legend Plate

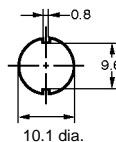
Rectangular



Square

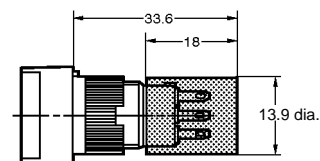


Round

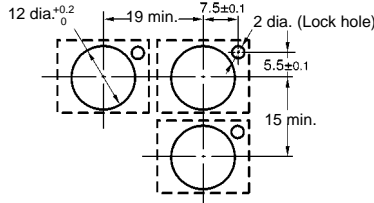
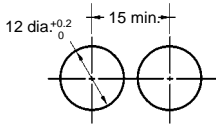
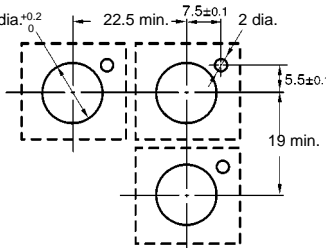
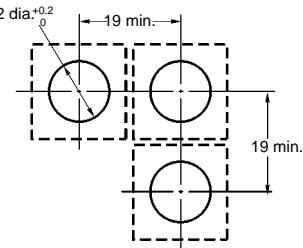
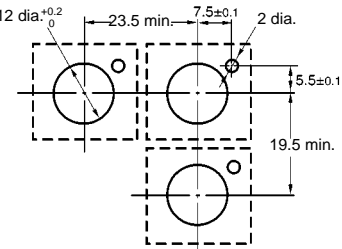


- Note:**
1. The thickness is 0.8 mm.
 2. Since the Legend Plate is made of polycarbonate, use alcohol-based paints such as melanin, phthalic acid, or acryl paint when marking the legend.

**Insulation Cover
A3C-3002**



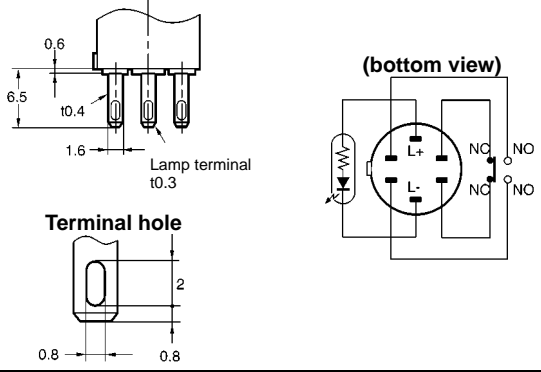
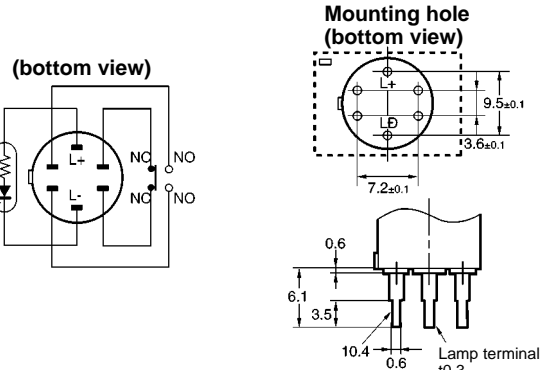
■ Panel Cutout (Top View)

Accessories used	Rectangular/A3CJ	Square/A3CA, Round/A3CT
Switch only	 <p>Note: Recommended panel thickness: 1.0 to 3.2 mm.</p>	 <p>Note: Recommended panel thickness: 1.0 to 3.2 mm.</p>
With Switch Guard		
With Dust Cover		<p>---</p>

Note: If the panel is to be finished (e.g., coated), make sure that the panel meets the specified dimensions after the coating.

Operation

Terminal Connections

Terminal	Type
Solder terminal	<p style="text-align: center;">SPST-NO+SPST-NC</p> <p>Lighted and non-lighted models</p> 
PCB terminal	<p>Lighted and non-lighted models</p> 

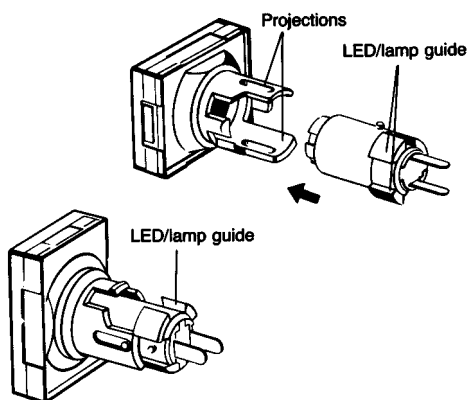
Installation

Mounting and Replacing the Pushbutton

Mounting Direction for the Pushbutton/Display and Lamp

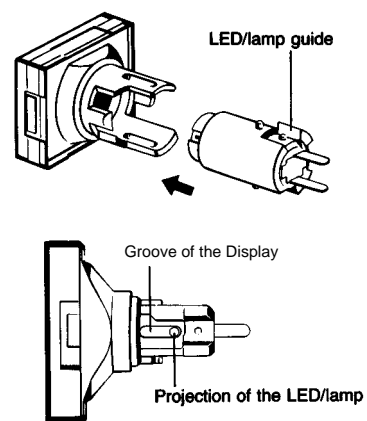
Lighted Pushbutton Switch

- Insert the Lamp (incandescent lamp or LED lamp) into the Pushbutton so that the lamp guide fits into the wider gap between the projections on the Pushbutton.



Indicator

- With Indicators, the Lamp is inserted facing the opposite direction (i.e., at 180°) to that for Lighted Pushbutton Switches.

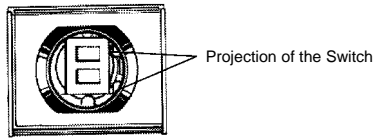


- Note:**
- Push the projections on the Lamp into the grooves on the Pushbutton/Display.
 - The Lamp for Lighted Pushbutton Switches moves, but the Lamp for Indicators is fixed.

Mounting Direction for the Pushbutton/Display and Switch

Insert the Pushbutton/Display into the Switch so that the lamp guide is aligned with the non-projecting part of the Switch.

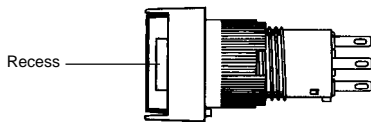
Apply a pressure between 9.8 and 24.5 N.



- Note:**
1. The mounting direction for Indicators is 180° to that for Lighted Pushbutton Switches. Be sure to insert the Legend Plate and other parts with the correct orientation.
 2. If the terminals of the Lamp become bent, it may be impossible to fit them into the lamp terminal holes. Ensure that the terminals are straight when they are inserted.
 3. Take particular care about the mounting direction with the round models (A3CT).

Removing the Pushbutton/Display

Hold the recessed portions on the cap of the Pushbutton and pull.



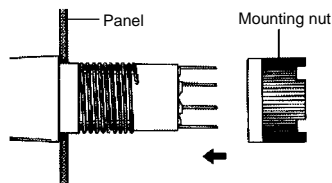
Note: Do not use tools such as pliers to remove the Pushbutton as this may damage the cap.

Panel Mounting

Insert the Switch from the front of the panel. Mount the mounting nut from the terminal end of the Switch and tighten it.

There are projections on the terminal end of the Switch which may, depending on the orientation, block the nut. In this case, turn the nut until until it is possible to mount it. Tighten the nut to a torque between 0.20 and 0.39 N·m.

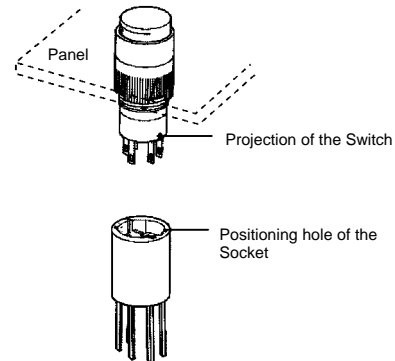
If soldering is used, mount the mounting nut first. Lead wires and mounds of solder may make it impossible to mount the nut after soldering.



Socket Mounting

After securing the Switch to the panel using the mounting nut, insert the Socket into the Switch.

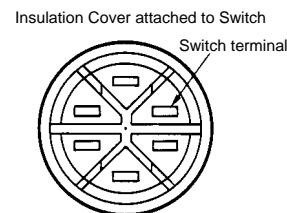
Align the positioning holes of the Socket with the projections of the Switch before inserting the Socket.



Mounting the Insulation Cover

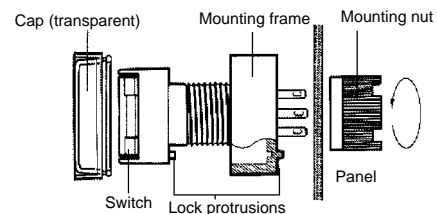
After securing the Switch to the panel using the mounting nut, pass the lead wires through the holes in the Insulation Cover and then perform wiring. Hold the Insulation Cover so that the cylindrical hole is facing the Switch, and insert the lead wires from the end with the barriers.

After wiring is completed, mount the Insulation Cover by pushing it into the Switch.



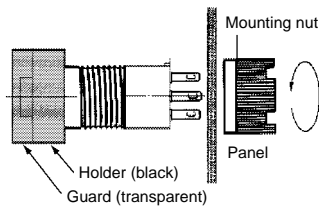
Mounting the Dust Cover

1. The Dust Cover separates into 2 parts: the cap and the mounting frame.
2. Insert the Switch into the mounting frame. (Align the lock projection with the recess on the mounting frame.)
3. Insert the Switch in the state described in step 2 into the panel. (Align the lock protrusion on the mounting frame with the hole in the panel.)
4. Mount the mounting nut from the back of the panel and tighten it.
5. Insert the cap into the mounting frame. Ensure that the entire perimeter of the cap is properly inserted into the mounting frame by pressing down on the cap from different directions.



Mounting the Switch Guard

1. Insert the Switch into the Switch Guard.
2. Insert the Switch into the panel in the state described in step 1.
3. Mount the mounting nut from the back of the panel and tighten it.



Precautions

! Caution

Do not apply a voltage higher than the maximum rated operating voltage between the lamp terminals, as there is a risk that the incandescent lamp or LED lamp will be damaged, and the Pushbutton will be ejected.

When replacing the incandescent lamp, first turn OFF the power supply, and then wait 10 minutes before performing replacement, as the lamp is still hot immediately after the power is turned OFF, so there is a risk of burns.

Refer to the *Common Precautions* for Pushbutton Switches on page 11.

Correct Use

Mounting

Always make sure that the power is turned OFF before mounting, removing, or wiring the Switch, or performing maintenance.

After wiring the Switch, make sure that there is a suitable isolation distance.

Wiring

When wiring, use wires of a size appropriate for the applied voltage and carry current. Perform soldering correctly under the conditions given below. Using the Switch with the wires soldered incorrectly may cause the terminals to become abnormally hot and cause a fire.

1. Hand soldering: At 30 W within 5 seconds.
2. Dip soldering: At 240°C within 3 seconds.

Wait for one minute after soldering before exerting any external force on the solder.

Use a non-corrosive rosin liquid for the flux.

Perform wiring so that the wire sheaths do not come into contact with the Switch. If this is unavoidable, use wires that can withstand temperatures of 100°C min.

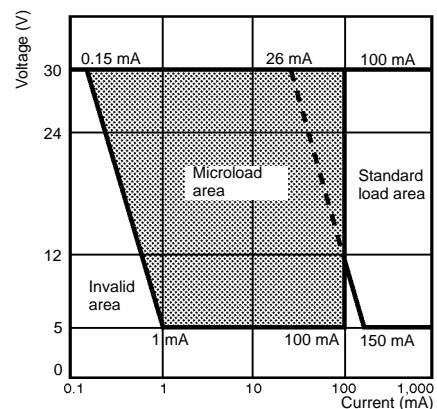
After wiring to the Switch has been completed, ensure an appropriate insulation distance.

Operating Environment

Do not use in locations that are subject to dust, oil, or metal filings as these may penetrate the interior of the Switch and cause malfunction.

Using Microloads

Using a standard load switch for opening and closing a microload circuit may cause wear on the contacts. Use the switch within the operating range. (Refer to the diagram below.) Even when using microload models within the operating range shown below, if inrush current occurs when the contact is opened or closed, it may cause the contact surface to become rough, and so decrease life expectancy. Therefore, insert a contact protection circuit where necessary. The minimum applicable load is the N-level reference value. This value indicates the malfunction reference level for the reliability level of 60% (λ 60) (conforming to JIS C5003). The equation, λ 60 = 0.5×10^{-4} /times indicates that the estimated malfunction rate is less than 1/2,000,000 with a reliability level of 60%.



LED

Resistance to limit the LED current is provided internally and so an external resistance is not required.

Rated voltage	Internal limiting resistance
5 VDC	33 Ω
12 VDC	270 Ω
24 VDC	1600 Ω

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.