OMRON

Lighted Pushbutton Switch | A3D

Lighted Pushbutton Switch with Cylindrical 18-mm × 8-dia. Body

- Good illumination with even surface brightness.
- Cylindrical body means panel cutouts can be made easily.
- Combines miniature design with excellent operating sensitivity.

Ordering Information

■ Model Number Legend:

The model numbers used to order sets of Units are illustrated below. One set comprises the Pushbutton (LED lamp built-in) and Switch.

(1) (2) (3)

A 3 D J - 9 0 A 1 - 0 0 E R

(1) Shape of Pushbutton

Symbol	Shape
J	Rectangular
A	Square
T	Round

(2) Switch Specifications
Microload (30 VDC, 0.1 A)

Symbol	Terminals	Operation	Contact
A	Solder	Momentary	SPST-NO
B		Alternate	

Minimum applicable load: 1 mA at 5 VDC

Standard load models are not available.

If PCB terminals are required, use the Socket given under *Accessories* on page 22.

Momentary operation: Self-resetting
Alternate operation: Self-holding

(3) Color of Pushbutton

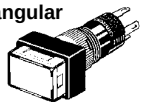
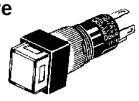
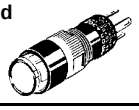
Symbol	Color
R	Red
Y	Yellow
G	Green
W	White

All models are illumination only. Colored-illumination models are not available.

Non-lighted models are not available.

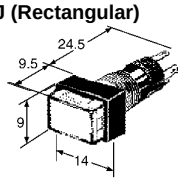
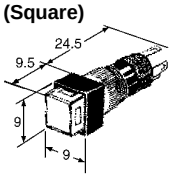
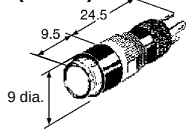
An external resistor is required. (Refer to page 28.)

■ List of Models

Appearance	Model
Rectangular 	A3DJ
Square 	A3DA
Round 	A3DT

■ Ordering as a Set

The model numbers used to order sets of Units are given in the following table. One set comprises the Pushbutton (LED lamp built-in), and Switch.

Appearance	Degree of protection	Operation	Model number	Color symbol for Pushbutton
A3DJ (Rectangular) 	IP40	Momentary	A3DJ-90A1-00E□	R, Y, G, W
		Alternate	A3DJ-90B1-00E□	
A3DA (Square) 		Momentary	A3DA-90A1-00E□	
		Alternate	A3DA-90B1-00E□	
A3DT (Round) 		Momentary	A3DT-90A1-00E□	
		Alternate	A3DT-90B1-00E□	

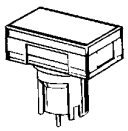
Note: 1. Enter the desired color symbol for the Pushbutton in □.

2. All the above are solder-terminal, microload, SPST-NO, LED lamp-lighted models.

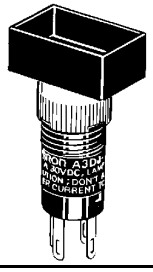
■ Ordering Individually

Pushbuttons 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.

Pushbutton (LED built-in)



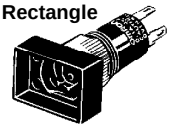
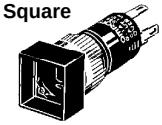
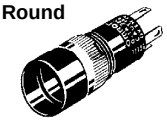
Switch



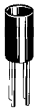
Pushbutton (All Lighted with LED Built-in)

Appearance / Color	Rectangular 	Square 	Round 
Red	A3DJ-500R	A3DA-500R	A3DT-500R
Yellow	A3DJ-500Y	A3DA-500Y	A3DT-500Y
Green	A3DJ-500GY	A3DA-500GY	A3DT-500GY
White	A3DJ-500W	A3DA-500W	A3DT-500W

Switch

Contact type	Operating action	Terminal type	Sealing: IP40 — Rectangle 	Square 	Round 
SPST-NO	Momentary	Solder terminals	A3DJ-7111	A3DA-7111	A3DT-7111
	Alternative	Solder terminals	A3DJ-7121	A3DA-7121	A3DT-7121

■ Accessories (Order Separately)

Name	Appearance	Classification	Model	Application precautions
Socket		Wire-wrap terminal	A3D-4101	Cannot be used together with Insulation Cover.
		PCB terminal	A3D-4102	
		Solder terminal	A3D-4103	
Insulation Cover		---	A3D-3002	Cannot be used together with the Socket.
Tightening Tool		---	A3D-3004	Do not tighten to a torque exceeding 0.29 N·m.
Legend Plate		Rectangular	A3DJ-5201	One milky-white Legend Plate is included with standard products.
		Square	A3DA-5201	
		Round	A3DT-5201	

Specifications

■ Ratings

Contact Rating: 30 VDC, 0.1 A (Minimum Applicable Load: 5 VDC, 1 mA)

The above ratings conform to JIS C4505, for testing under the following conditions.

1. Load: Resistive load
2. Mounting conditions: No vibration or shock
3. Ambient temperature: 20 ±2°C.
4. Operating frequency: 20 times/min.

Built-in LED Lamp

Item		Color		
		Red	Yellow (White) (See note 4.)	Green
Forward voltage, V_F	Reference value (See note 3.)	1.7 V	2.2 V	2.1 V
	Maximum value	2.0 V	2.5 V	2.5 V
Forward current, I_F	Reference value	20 mA	20 mA	20 mA
	Absolute maximum value	50 mA	50 mA	50 mA
Permissible dissipation, PD	Absolute maximum value	100 mW	125 mW	122 mW
Reverse voltage, V_R	Absolute maximum value	4 V	4 V	4 V

Note: 1. The above ratings are for an ambient temperature of 25°C.
2. The built-in LED lamp has no limiting resistor and so it is necessary to connect an external resistor within the range shown in the above table. (For details of calculation formulas, refer to page 28.)
3. Refer to the characteristic graphs of $V_F - I_F$ on page 24.
4. The same LED lamp is used for both yellow illumination and white illumination and so the ratings are the same.

■ Characteristics

Operating frequency	Mechanical: 120 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
	2,000 VAC, 50/60 Hz for 1 minute between terminals of different polarity, and between each terminal and ground
	1,000 VAC, 50/60 Hz for 1 minute between lamp terminals (See note 2.)
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5 mm double amplitude (See note 3.)
Shock resistance	Destruction: 500 m/s^2 Malfunction: 150 m/s^2 (See note 3.)
Life expectancy	Mechanical: Momentary operation models: 1,000,000 operations min. Alternate operation models: 100,000 operations min. (One operation consists of set and reset operations.)
	Electrical: 100,000 operations min.
Weight	Approx. 3 g
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	IP40
Electric shock protection class	Class II
PTI (proof tracking index)	175
Pollution degree	3 (IEC947-5-1)

Note: 1. With alternate operation models, 60 operations/minute max. One operation cycle consists of set and reset operations.
2. The figure for dielectric strength between lamp terminals is for when the LED lamp is not mounted.
3. “Malfunction” in the above table indicates malfunctions of less than 1 ms.

■ Operating Characteristics

OF max.	2.45 N
RF min.	0.196 N
TT	Approx. 3.5 mm
LTA min. (See note.)	0.5 mm
PT max.	2.5 mm

Note: The figure for LTA in the table applies only to models with alternate operation.

■ Contact Form

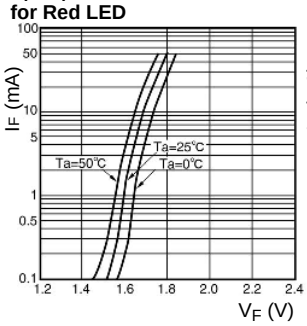
Contact name	Contact form
SPST-NO	COM NO

Engineering Data

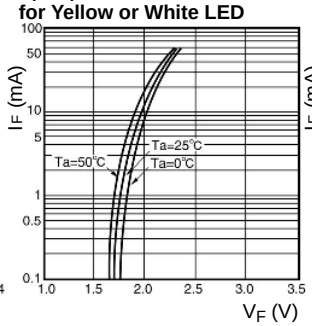
■ LED Characteristics

Ta: Ambient Temperature

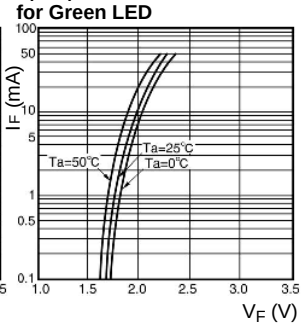
V_F – I_F Characteristic for Red LED



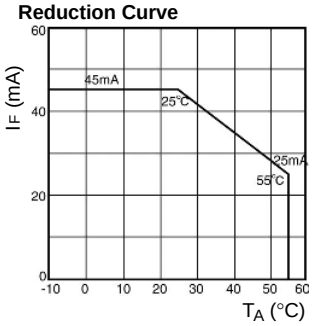
V_F – I_F Characteristic for Yellow or White LED



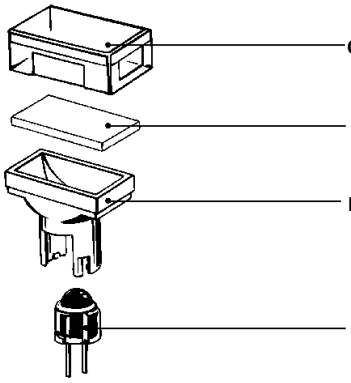
V_F – I_F Characteristic for Green LED



Forward Current Reduction Curve



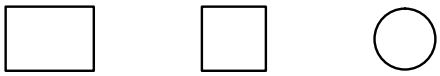
Nomenclature

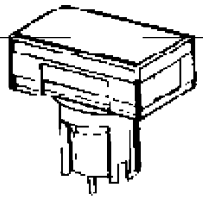


Pushbutton

Shape of Pushbutton

Rectangular (A3DJ) Square (A3DA) Round (A3DT)

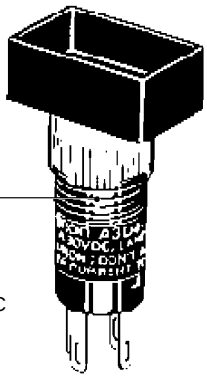




Color of Pushbutton (All models LED-lighted)

Red, yellow, green, white

Note: The LED lamp is built into the Pushbutton.



Switch

Switch Specifications

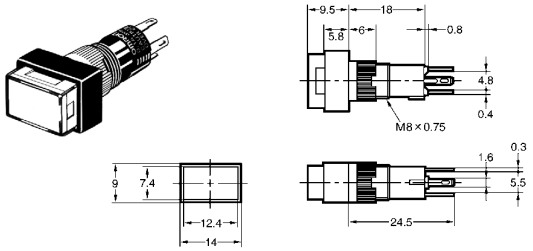
Microload
0.1 A at 30 VDC
Minimum applicable load: 1 mA at 5 VDC

Note: The A3DJ model is shown here as a representative example.

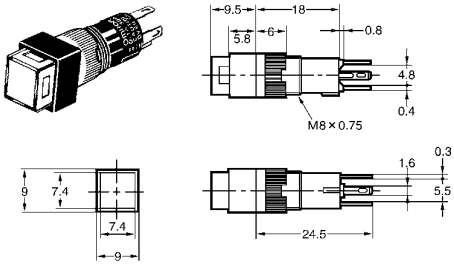
Dimensions

Note: All units are in millimeters unless otherwise indicated.

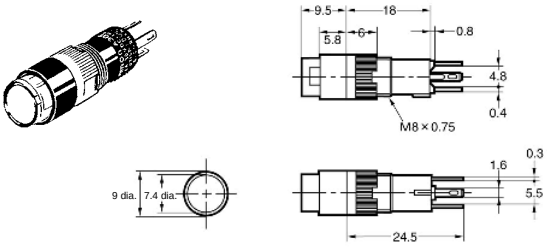
Rectangular Models (A3DJ)



Square Models (A3DA)

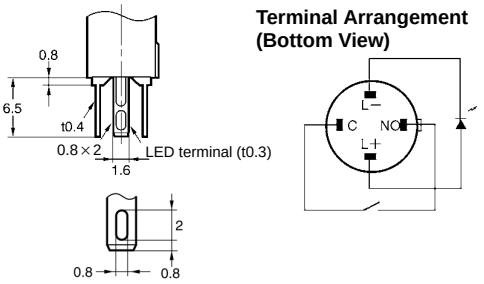


Round Models (A3DT)



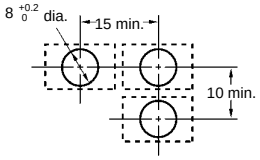
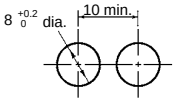
■ Terminals

Solder Terminals of SPST-NO Lighted Models



Terminal Arrangement (Bottom View)

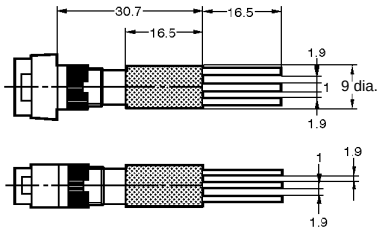
■ Panel Cutouts (Top View)

Rectangular models (A3DJ)	Square models (A3DA) and round models (A3DT)
 **Note:** Recommended panel thickness: 1.0 to 3.2 mm.	 **Note:** Recommended panel thickness: 1.0 to 3.2 mm.

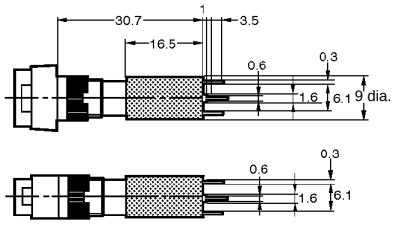
■ Accessory Mounting Dimensions

Socket Mounting Dimensions

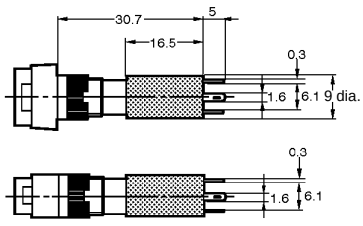
Wire-wrap Terminal A3D-4101



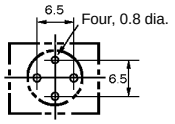
PCB Terminal A3D-4102



Solder Terminal A3D-4103

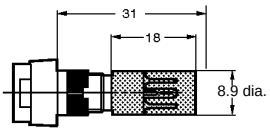


PCB Cutout (bottom view)



Insulation Cover Mounting Dimensions

A3D-3002

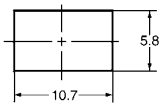


Note: 1. The diagram above shows the rectangular model as a representative example.
2. Unless specified, there is a tolerance of ±0.4 mm for dimensions.

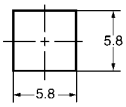
- After securing the Switch to the panel using the mounting nut, pass the lead wires through the holes in the Insulation Cover before performing wiring. Hold the Insulation Cover so that the cylindrical hole is facing the Switch, and insert the lead wires from the end with the barriers.
- After wiring is completed, mount the Insulation Cover by pushing it into the Switch.

Legend Plate Mounting Dimensions

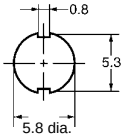
Rectangular
A3DJ-5201



Square
A3DA-5201



Round
A3DT-5201

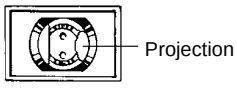


Note: 1. The thickness is 0.8 mm.
2. Since the legend plate is made of polycarbonate, use alcohol-based paints such as melanin, phthalic acid, or acryl paint when marking the legend.

Installation

Mounting and Replacing the Pushbutton

Mounting Direction for the Pushbutton and Switch



Switch

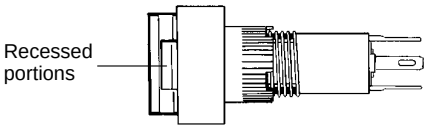
Pushbutton

Align the curved claw on the outside of the protruding part of the Pushbutton with the projection on the upper part of the Switch and insert.

Apply a pressure between 9.8 and 24.5 N.

Note: If the terminals of the LED lamp become bent, it may be impossible to fit them into the LED lamp terminal holes. Ensure that the terminals are straight when they are inserted. Be sure to insert the lamp terminals for round models with the correct orientation. Inserting the terminals with the reverse orientation will result in damage.

Removing the Pushbutton



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.

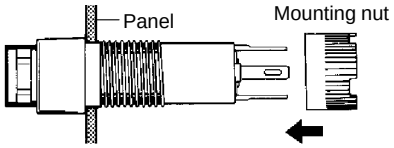
Panel Mounting

Using the Mounting Nut

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

Tighten the nut to a torque 0.20 to 0.39 N·m.

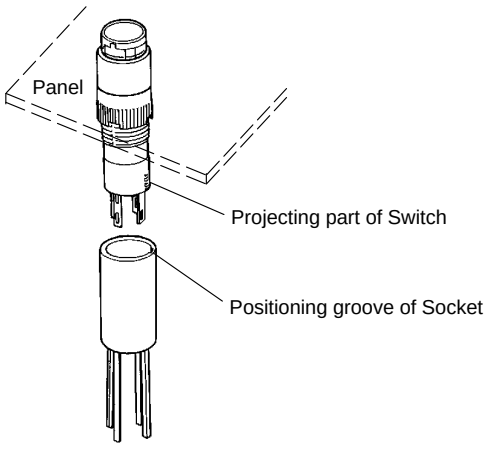
If soldering is used, mount the mounting nut first. Lead wires and mounds of solder may make it impossible to mount the nut after soldering.



Socket Mounting

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

When inserting the Socket, align the positioning groove of the Socket with the projecting part of the Switch.



Precautions

Refer to the *Common Precautions* for Pushbutton Switches on page 14.

Correct Use

Mounting

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

Do not tighten the mounting ring excessively using pliers or a similar tool. Excessive tightening may damage the mounting ring. (Tightening torque: 0.20 to 0.29 N·m)

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.

LED

The polarity of the LED is indicated on the back of the Switch. Wire the LED correctly according to the polarity.

The built-in LED does not have a limiting resistor. Connect a limiting resistor.

Make sure that the limiting resistor satisfies the characteristics of the built-in LED. The forward current of the built-in LED must be 8 mA minimum.

The resistance can be calculated by using the following expression.

$R = (E - V_F)/I_F\ (\Omega)$

E: Operating voltage (V)
V_F: LED forward voltage (V)
I_F: LED forward current (A)

Recommended Values for Limiting Resistance

Voltage	Red	Yellow (White)	Green
5 VDC	165 Ω	140 Ω	145 Ω
12 VDC	515 Ω	490 Ω	495 Ω
24 VDC	1,100 Ω	1,090 Ω	1,095 Ω

Note: The above values are calculated values that can be used as reference.

Calculation Example for Limiting Resistance

Conditions: Red LED with an I_F of 20 mA at 24 V and a Ta of 25°C. From the red LED characteristic given previously, V_F will be 1.7 V when I_F is 20 mA. Therefore, R = (24 V – 1.7 V)/0.02 A = 1,100 Ω. Thus the recommended resistance is 1.1 kΩ at 1 W ($2 \times I_F^2 R$). (see note)

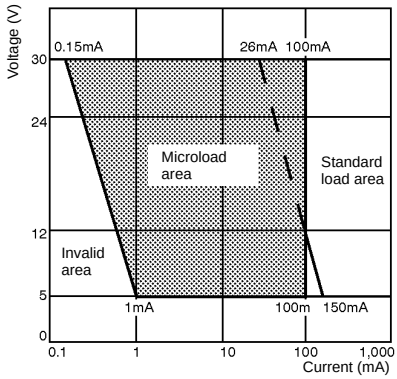
Note: A factor of 2 is applied because the permissible wattage of the resistor must be twice as large as the required wattage.

Operating Environment

Ensure that dust, metal powder, or oil do not enter the interior of the Switch.

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, $\lambda\ 60 = 0.5 \times 10^{-4}$/times indicates that the estimated malfunction rate is less than 1/2,000,000 with a reliability level of 60%.



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

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