

## Lighted Pushbutton Switch

### A3A

### Compact Switch Allows Signal and Power Switching with the Same Model

- Compact, high-capacity push-button switch that has contacts with a 3-mm gap and is ideal as a power switch.
- Capable of switching within the range of 1 mA, 5 VDC to 6 A, 125 VAC.
- Requires only 14.5 mm behind the panel.
- Options include the following:
  - Round or square
  - Momentary or alternate
  - Surface illumination or non-lighted
- UL and CSA approved.



### Ordering Information

#### Model Number Legend

**A 3 A A - 9 0 K 1 - 00E R**

(1) Shape

| Symbol | Protection |
|--------|------------|
| A      | Square     |
| T      | Round      |

(2) Terminal

| Symbol | Type   |
|--------|--------|
| 0      | Solder |
| 1      | PCB    |

(3) Switch

| Symbol       | Operation | Contact type |
|--------------|-----------|--------------|
| A (See note) | Momentary | SPDT         |
| B (See note) | Alternate |              |
| K            | Momentary | SPST-NO      |
| L            | Alternate |              |

(4) Illumination

| Symbol | Operation            |
|--------|----------------------|
| 00     | Non-lighted          |
| 00E    | Surface illumination |

(5) Color

Pushbutton (Non-lighted Models)

| Symbol | Color             |
|--------|-------------------|
| L      | Light gray        |
| R      | Red (See note)    |
| Y      | Yellow (See note) |
| G      | Green (See note)  |
| A      | Blue              |
| B      | Black             |
| D      | Dark gray         |
| H      | Gray              |

LED (Surface Illumination Models)

| Symbol | Color  |
|--------|--------|
| R      | Red    |
| Y      | Yellow |
| G      | Green  |

**Note:** Common to both lighted and non-lighted models.

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## ■ List of Models

### SPST-NO

| Appearance                                                                                                                            | Terminal | Action    | Illumination         | Model          | Color                    |
|---------------------------------------------------------------------------------------------------------------------------------------|----------|-----------|----------------------|----------------|--------------------------|
| <b>Square</b><br>A3AA-9□□1-00□<br>A3AA-9□□1-00E□<br> | Solder   | Momentary | Non-lighted          | A3AA-90K1-00□  | (Non-lighted)            |
|                                                                                                                                       |          |           | Surface illumination | A3AA-90K1-00E□ | R: red                   |
|                                                                                                                                       |          | Alternate | Non-lighted          | A3AA-90L1-00□  | Y: yellow                |
|                                                                                                                                       |          |           | Surface illumination | A3AA-90L1-00E□ | G: green                 |
|                                                                                                                                       | PCB      | Momentary | Non-lighted          | A3AA-91K1-00□  | L: light gray (see note) |
|                                                                                                                                       |          |           | Surface illumination | A3AA-91K1-00E□ | A: blue (see note)       |
|                                                                                                                                       |          | Alternate | Non-lighted          | A3AA-91L1-00□  | B: black (see note)      |
|                                                                                                                                       |          |           | Surface illumination | A3AA-91L1-00E□ | D: dark gray (see note)  |
| <b>Round</b><br>A3AT-9□□1-00□<br>A3AT-9□□1-00E□<br>  | Solder   | Momentary | Non-lighted          | A3AT-90K1-00□  | H: gray (see note)       |
|                                                                                                                                       |          |           | Surface illumination | A3AT-90K1-00E□ | (Lighted)                |
|                                                                                                                                       |          | Alternate | Non-lighted          | A3AT-90L1-00□  | R: red                   |
|                                                                                                                                       |          |           | Surface illumination | A3AT-90L1-00E□ | Y: yellow                |
|                                                                                                                                       | PCB      | Momentary | Non-lighted          | A3AT-91K1-00□  | G: green                 |
|                                                                                                                                       |          |           | Surface illumination | A3AT-91K1-00E□ |                          |
|                                                                                                                                       |          | Alternate | Non-lighted          | A3AT-91L1-00□  |                          |
|                                                                                                                                       |          |           | Surface illumination | A3AT-91L1-00E□ |                          |

**Note:** The above models each have a SPST-NO contact that can switch 6 A at 125 VAC, 2 A at 250 VAC, and 4 A at 30 VDC. When ordering any of the above models, replace □ of the model number with a code to indicate the pushbutton color of the model (i.e., replace □ with R, Y, G, L, A, B, D, H, and L). The pushbutton of an A3A does not illuminate if the color of the pushbutton is dark gray, gray, light gray, blue, or black.

### SPDT

| Appearance                                                                                                                              | Terminal | Action    | Illumination         | Model          | Color                    |
|-----------------------------------------------------------------------------------------------------------------------------------------|----------|-----------|----------------------|----------------|--------------------------|
| <b>Square</b><br>A3AA-9□□1-00□<br>A3AA-9□□1-00E□<br> | Solder   | Momentary | Non-lighted          | A3AA-90A1-00□  | R: red                   |
|                                                                                                                                         |          |           | Surface illumination | A3AA-90A1-00E□ | Y: yellow                |
|                                                                                                                                         |          | Alternate | Non-lighted          | A3AA-90B1-00□  | G: green                 |
|                                                                                                                                         |          |           | Surface illumination | A3AA-90B1-00E□ | L: light gray (see note) |
|                                                                                                                                         | PCB      | Momentary | Non-lighted          | A3AA-91A1-00□  | A: blue (see note)       |
|                                                                                                                                         |          |           | Surface illumination | A3AA-91A1-00E□ | B: black (see note)      |
|                                                                                                                                         |          | Alternate | Non-lighted          | A3AA-91B1-00□  | D: dark gray (see note)  |
|                                                                                                                                         |          |           | Surface illumination | A3AA-91B1-00E□ | H: gray (see note)       |
| <b>Round</b><br>A3AT-9□□1-00□<br>A3AT-9□□1-00E□<br>  | Solder   | Momentary | Non-lighted          | A3AT-90A1-00□  | (Lighted)                |
|                                                                                                                                         |          |           | Surface illumination | A3AT-90A1-00E□ | R: red                   |
|                                                                                                                                         |          | Alternate | Non-lighted          | A3AT-90B1-00□  | Y: yellow                |
|                                                                                                                                         |          |           | Surface illumination | A3AT-90B1-00E□ | G: green                 |
|                                                                                                                                         | PCB      | Momentary | Non-lighted          | A3AT-91A1-00□  |                          |
|                                                                                                                                         |          |           | Surface illumination | A3AT-91A1-00E□ |                          |
|                                                                                                                                         |          | Alternate | Non-lighted          | A3AT-91B1-00□  |                          |
|                                                                                                                                         |          |           | Surface illumination | A3AT-91B1-00E□ |                          |

**Note:** The above models each have a SPDT contact that can switch 3 A at 125 VAC and 2 A at 30 VDC. When ordering any of the above models, replace □ of the model number with a code to indicate the pushbutton color of the model (i.e., replace □ with R, Y, G, L, A, B, D, H, and L). The pushbutton of an A3A does not illuminate if the color of the pushbutton is dark gray, gray, light gray, blue, or black.

## ■ Accessories (Order Separately)

### Flange

Select according to panel color.

| Name   | Shape                                                                                                    | Classification                    |            | Model   |
|--------|----------------------------------------------------------------------------------------------------------|-----------------------------------|------------|---------|
| Flange | Square, 12.7 x 12.7<br> | Flange alone                      | Black      | A3A-241 |
|        |                                                                                                          |                                   | Light gray | A3A-242 |
|        | Round, 12.7 dia.<br>    |                                   | Black      | A3A-251 |
|        |                                                                                                          |                                   | Light gray | A3A-252 |
|        |                         | Leaf spring                       |            | A3A-200 |
|        | Square, 12.7 x 12.7<br> | Flange and leaf spring (one each) | Black      | A3A-211 |
|        |                                                                                                          |                                   | Light gray | A3A-212 |
|        | Round, 12.7 dia.<br>    |                                   | Black      | A3A-221 |
|        |                                                                                                          |                                   | Light gray | A3A-222 |

**Note:** An A3A with solder terminals is provided with a round or square black flange and flat spring for the switching mechanism of the A3A. A round black flange is provided with each A3A having solder terminals and a round pushbutton. A square black flange is provided with each A3A having solder terminals and a square pushbutton.

## Specifications

### ■ Contact Ratings

| Type          | Contact form | Resistive load                   |               |
|---------------|--------------|----------------------------------|---------------|
| High capacity | SPST-NO      | 6 A at 125 VAC<br>2 A at 250 VAC | 4 A at 30 VDC |

- Note:**
1. Minimum allowable load: 5 VDC 1 mA (Resistive)
  2. The ratings given above are for testing under the following conditions:
    1. Ambient temperature: 20 ±2°C
    2. Ambient humidity: 65 ±5%
    3. Operating frequency: 20 times/minute

### ■ LED Ratings

| Item                  |                     | Surface illumination |        |       |
|-----------------------|---------------------|----------------------|--------|-------|
|                       |                     | Red                  | Yellow | Green |
| Forward voltage $V_F$ | Standard value      | 2.1 V                | 2.2 V  | 2.2 V |
|                       | Maximum value       | 2.8 V                |        |       |
| Forward current $I_F$ | Standard value      | 15 mA                |        |       |
|                       | Maximum value       | 25 mA                |        |       |
| Permissible loss PD   | Absolute max. value | 70 mW                |        |       |
| Reverse voltage $V_R$ | Absolute max. value | 3 V                  |        |       |

- Note:**
1. The above built-in LEDs do not have a resistor. Connect to each of the above built-in LEDs a resistor that satisfies the above conditions.
  2. Refer to the  $V_F - I_F$  characteristic graphs on page 244.

## ■ Characteristics

|                                 |                                                                                                                                                                                                     |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating frequency             | Mechanical:<br>Momentary action: 120 operations/minute max.<br>Alternate action: 60 operations/minute max. (See note 1.)<br><br>Electrical: 20 operations/minute max.                               |
| Insulation resistance           | 100 MΩ min. (at 500 VDC)                                                                                                                                                                            |
| Contact resistance              | 100 mΩ max. (initial value)                                                                                                                                                                         |
| Dielectric strength             | 600 VAC, 50/60 Hz for 1 min between terminals of same polarity<br>2,000 VAC, 50/60 Hz for 1 min between each terminal and ground<br>600 VAC, 50/60 Hz for 1 min between LED 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 <sup>2</sup><br>Malfunction: 150 m/s <sup>2</sup> (See note 3.)                                                                                                                |
| Life expectancy                 | Mechanical:<br>Momentary action: 1,000,000 operations min.<br>Alternate action: 50,000 operations min. (See note 1.)<br><br>Electrical: 50,000 operations min.                                      |
| Weight                          | Approx. 3.2 g                                                                                                                                                                                       |
| Ambient temperature             | Operating: -10°C to 55°C (with no icing)<br>Storage: -25°C to 65°C                                                                                                                                  |
| Ambient humidity                | Operating: 35% to 85%                                                                                                                                                                               |
| 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-action models, a setting and resetting is regarded as one operation.
  2. The figure for the dielectric strength between LED terminals in the above table is for when the LED is not installed in the Switch.
  3. The figures for malfunctions in the above table are for malfunctions of at least 1 ms.

## ■ Approved Standards

UL (File No. E41515)/CSA (File No. LR45258)

6 A at 125 VAC, 2 A at 250 VAC, 4 A at 30 VDC

## ■ Operating Characteristics

|                      |              |
|----------------------|--------------|
| OF max.              | 2.45 N       |
| RF min.              | 0.15 N       |
| TT                   | Approx. 2 mm |
| PT max.              | 1.5 mm       |
| LTA min. (See note.) | 0.5 mm       |

**Note:** The above lock stroke figure applies to A3A alternate operation models only.

# Nomenclature

## Pushbutton

Square (A3AA)



Round (A3AT)



Diffusion sheet (milky white)

Flange

Leaf spring

Color cap

Color

Non-lighted Model

Red, yellow, light gray, gray, dark gray, green blue, black

Surface Illumination Model

Red, yellow, green

## Switch

### Ratings (Standard load)

6 A at 125 VAC  
 2 A at 250 VAC  
 4 A at 30 VDC  
 Minimum applicable load:  
 1 mA at 5 VDC (resistive load)

### Terminals

Solder terminal  
 PCB terminal

## ■ Contact Form

### Contact Type

| Contact form | Contact type |
|--------------|--------------|
| SPST-NO      |              |
| SPDT         |              |

**Note:** 1. The above is for the A3AA.

2. An A3A with solder terminals is provided with a black flange and flat spring for the switching mechanism, however an A3A with PCB terminals is not provided with them. If a black flange and flat spring are required for an A3A with PCB terminals, order them from your OMRON representative.

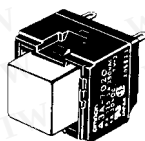
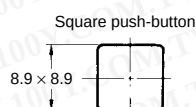
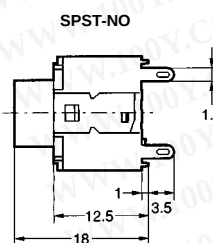
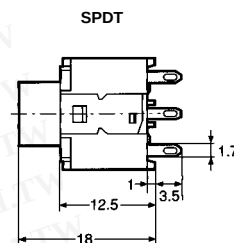
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## Dimensions

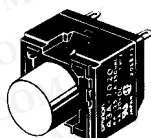
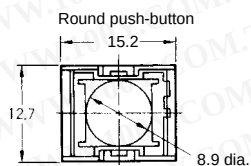
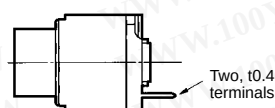
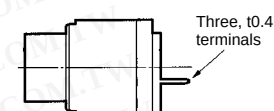
- Note:** 1. All units are in millimeters unless otherwise indicated.  
2. The illustrations below show switches with solder terminals, without a flange or leaf spring.

### Non-lighted Model

#### Square Pushbutton

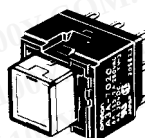
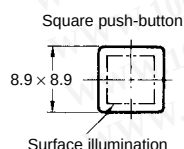
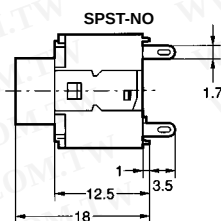
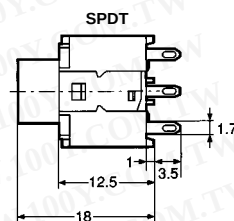


#### Round Pushbutton

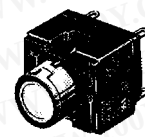
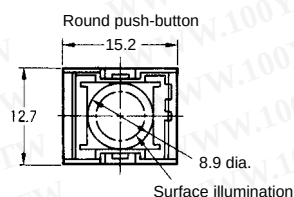
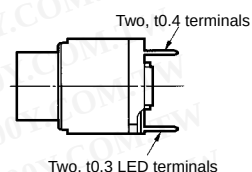
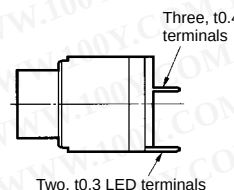


### Surface Illumination Model

#### Square Pushbutton



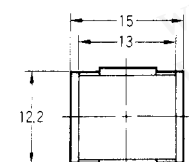
#### Round Pushbutton



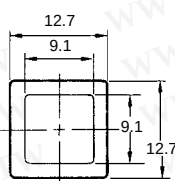
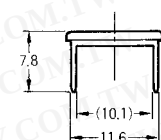
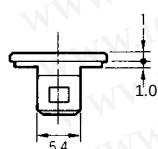
### Accessories (Order Separately)

**Note:** Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

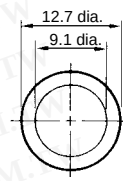
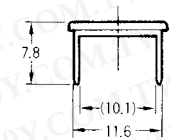
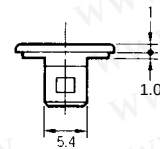
#### Leaf Spring A3A-200



#### Flange (Square) A3A-24

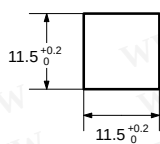


#### Flange (Round) A3A-25

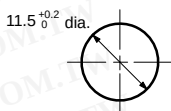


## ■ Panel Cutouts

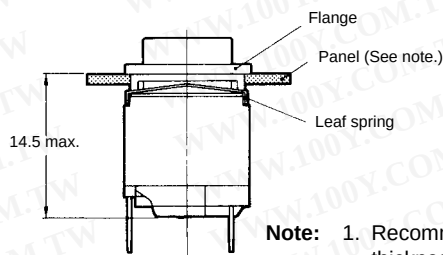
### Square Pushbutton



### Round Pushbutton



### Panel Mounting Dimensions



- Note:**
1. Recommended panel thickness: 1 to 1.6 mm
  2. The diagram shows the lighted SPST-NO model.

### For Side-by-side Mounting

| Mounting                     | Square pushbutton | Round pushbutton |
|------------------------------|-------------------|------------------|
| Horizontal multiple mounting |                   |                  |
| Vertical multiple mounting   |                   |                  |

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## ■ Terminals

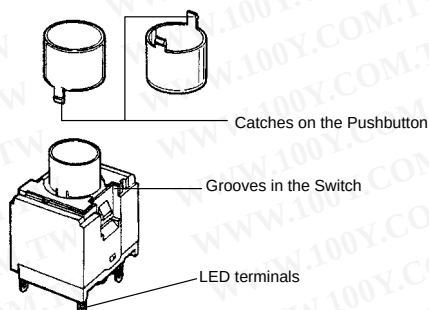
|         | Solder terminal                                                                                                | PCB terminal                                                                                                                                              |
|---------|----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| SPST-NO | <p><b>Non-lighted Models</b></p> <p><b>Lighted Models</b></p> <p><b>Terminal Arrangement (Bottom View)</b></p> | <p><b>Non-lighted Models</b></p> <p><b>Lighted Models</b></p> <p><b>Terminal Arrangement (Bottom View)</b></p> <p><b>PCB Dimensions (Bottom View)</b></p> |
| SPDT    | <p><b>Non-lighted Models</b></p> <p><b>Lighted Models</b></p> <p><b>Terminal Arrangement (Bottom View)</b></p> | <p><b>Non-lighted Models</b></p> <p><b>Lighted Models</b></p> <p><b>Terminal Arrangement (Bottom View)</b></p> <p><b>PCB Dimensions (Bottom View)</b></p> |

## Installation

### Mounting and Replacing the Pushbutton

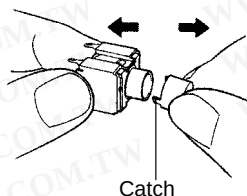
#### Mounting Direction for the Pushbutton and Switch

- Insert the catches of the Pushbutton into the grooves of the Switch and push down on the Pushbutton until it is fixed securely to the Switch.
- With lighted models, the LED is built into the Switch and cannot be replaced.

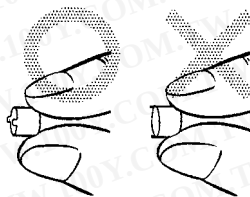


#### Removing the Pushbutton (Non-lighted Models Only)

- To remove the Pushbutton, hold both the Pushbutton and the Switch on the longer sides and pull the Pushbutton away from the Switch. (If the catches on the Pushbutton are bent outwards, it may result in malfunction.)



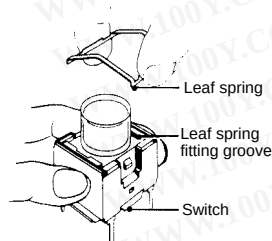
- When replacing the Pushbutton, if the cap is held on the sides with catches, internal components (e.g., plate) may come loose. Be sure to hold the Pushbutton by the sides without catches (i.e., the longer sides of the Switch) when removing.



### Mounting Switch on a Panel

#### Mount Leaf Spring

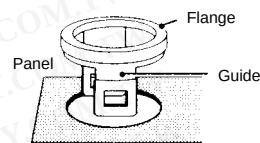
Press the leaf spring into the fitted groove on the upper surface of the Switch. For an easier fitting, first fit one side of the leaf spring, then press the other side into the fitting groove.



**Note:** Be sure to fit the leaf spring exactly into the groove, and do not allow it to slip out of the groove.

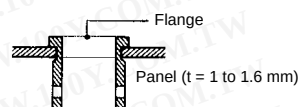
#### Mount Flange on Panel

Insert the flange from the front surface of the panel.



The flange has two opposing guides to facilitate its insertion into the panel cutout hole. Be sure the flange does not remain tilted with respect to the panel surface after being installed.

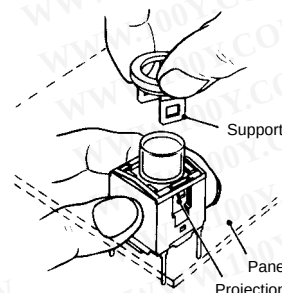
#### Cross Section



**Note:** The mounting direction of the flange determines the orientation of the Switch.

#### Fit Flange with Switch

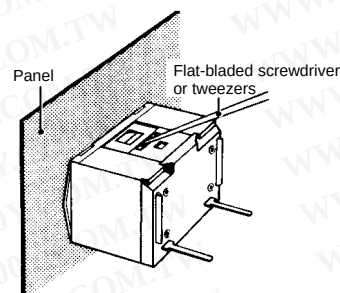
While holding the flange, insert the opposing supports into the gaps between the leaf spring and Switch on the longer sides of the housing, and fit the rectangular hole of the flange with the projections of the switch housing.



**Note:** Completely remove any burrs on the panel cutout surface; otherwise, the flange and Switch will not attach solidly.

#### Removing Switch

Insert a small flat-bladed screwdriver or tweezers into the flange support exposed on the rear of the panel. Pry up on each side to pull out the Switch.



**Note:** Do not pry up the flange support more than necessary or the switch holding portions may be damaged.

## Precautions

### Operation

When operating an A3A, make sure that the A3A has a pushbutton. Do not operate the A3A with a screwdriver or tweezers without mounting a pushbutton to the A3A, otherwise the A3A may malfunction.

### Mounting

When opening a hole on a panel to mount an A3A to the panel, make sure that the hole has no burr.

When mounting a flange to the switching mechanism of an A3A, make sure that the flange and the casing of the switching mechanism are engaged securely.

### Wiring

When soldering the terminals of an A3A, refer to the following.

1. For manual soldering: Use a soldering iron with an input of 30 W to solder the terminals at a temperature of 280°C maximum within five seconds.
2. For automatic soldering: Solder the terminals at a temperature of 240°C within three seconds. Do not impose any external force on the terminals for one minute after the terminals are soldered. Do not solder the terminals at a temperature of 300°C or more, otherwise the resin casing of the A3A will deform and the location of the terminals will change.

Do not pull the terminals of any A3A with a force exceeding 5.34 N, otherwise the joint part of the A3A may be damaged.

When soldering the terminals of an A3A, apply non-corrosive rosin flux to the terminals.

After soldering the terminals of an A3A, do not wash the A3A with any solvent.

When mounting an A3A to a PCB and soldering the terminals of the A3A to the PCB, make sure that the flux will not rise above the surface of the PCB.

### Operating Environment

When using an A3A, make sure that dust, metal powder, or oil will not penetrate into the interior of the A3A.

### LED

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

An A3A with a built-in LED does not have a limiting resistor. Connect a limiting resistor.

The resistance can be calculated by using the following expression.

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

E: Applied voltage (V)

$V_F$ : LED forward voltage (V)

$I_F$ : LED forward current (A)

**Note:** Make sure that the limiting resistor connected to the built-in LED of an A3A satisfies the characteristics of the built-in LED. The mean forward current of the built-in LED must be 8 mA minimum.

### Example

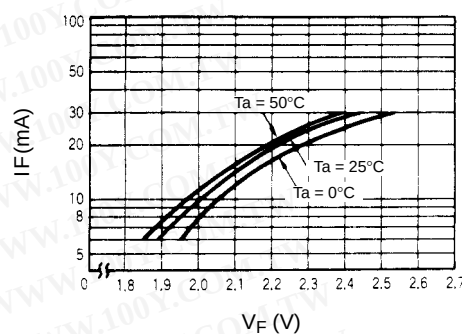
Conditions: Red LED with an  $I_F$  of 10 mA at 24 V and a  $T_a$  of 25°C. From the red LED characteristic below,  $V_F$  will be 2 V when  $I_F$  is 10 mA. Therefore,  $R = (24 \text{ V} - 2 \text{ V}) / 0.01 \text{ A} = 2,200 \Omega$ . Thus the recommended resistance is 2.2 k $\Omega$  at 0.5 W ( $2 \times I_F^2 R$ ).

**Note:** A factor of 2 (marked with an asterisk) is applied because the permissible wattage of the resistor must be twice as large as the required wattage.

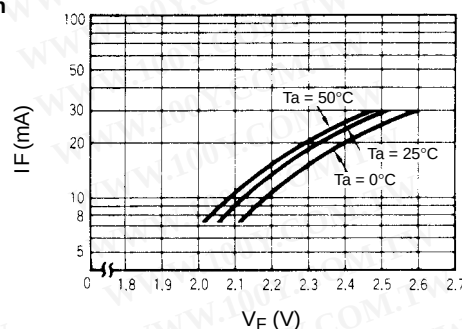
### LED Characteristics ( $V_F - I_F$ Characteristics)

$T_a$ : Ambient Temperature

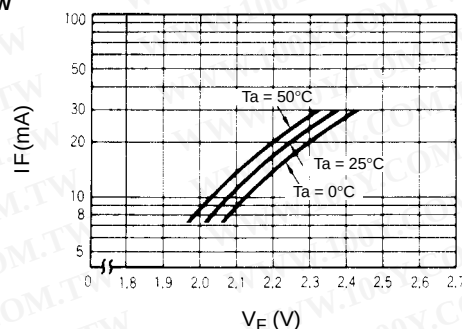
Red



Green



Yellow



### Pushbutton

When exchanging the Pushbutton (except the ones for the mechanical indicator models) with a new one, pull out the Pushbutton from the Switch, holding the Pushbutton in the longitudinal direction.

Do not remove the Pushbutton of the mechanical indicator model.

### Engraving of Pushbutton

Depth of engraving:

0.3 mm max. for illuminating pushbutton

Since the Pushbutton is made of polycarbonate, use an alcohol-based solvent when cleaning the Unit.

### Pressing of Pushbutton

Apply firm pressure to the Pushbutton when operating it. In doing so, however, do not apply a pressure greater than 11.8 N.

**ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.**

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