A165S/W

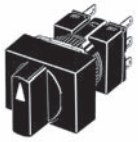
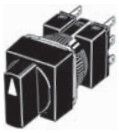
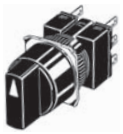
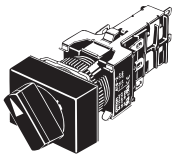
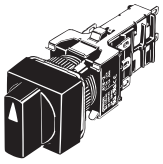
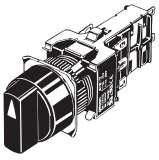
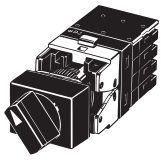
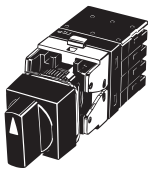
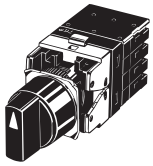
CSM_A165S_W_DS_E_4_6

Separate Construction with Cylindrical 16-dia. Body

- Same separate construction as the A16-series Pushbuttons with Miniature Design of 28.5 mm
- The same contacts can be used for both standard loads and microloads.
- Oil-resistant IP65 models
- Conforms to EN60947-5-1.

⚠ Refer to *Safety Precautions for All Pushbutton Switches/ Indicators* and *Safety Precautions* on page 15.

List of Models

	Model		
	Rectangular	**Square**	**Round**
Solder terminals/ tab terminals	 A165□-J Series	 A165□-A Series	 A165□-T Series
Voltage-reduction lighting Solder terminals/ tab terminals	 A165□-J Series	 A165□-A Series	 A165□-T Series
Screw-less clamp connector	 A165□-J Series	 A165□-A Series	 A165□-T Series

Model Number Structure

Model Number Legend ..... The model numbers used to order sets of Units are illustrated below. One set comprises the Selector, Lamp (lighted models only), and Switch.
For information on combinations, refer to *Ordering Information* on page 3.

(1) (2) (3) (4) (5) (6)

A165W - A 2A R - 24D - 1

(1) Lighted/ Non-lighted

Symbol	Type
S	Non-lighted
W	Lighted

(2) Shape of Selector

Symbol	Shape
J	Rectan-gular
A	Square
T	Round

(3) Number of Notches/ Resetting Method

Symbol	No. of notches	Reset method
2M	2 notches	Manual
2A		Automatic
3M	3 notches	Manual
3A		Automatic

(4) Color of Selector

Symbol	Color
No symbol	Black (non-lighted models only)
R	Red
G	Green
Y	Yellow

(5) Light Source

Symbol	Type
No symbol	Non-lighted
24D	24-V LED

(6) Contact Configuration

Symbol	Type	Terminal
1	SPDT	Solder terminal
2	DPDT	
1P	SPDT	PCB terminal
2P	DPDT	
2S	DPDT	Screw-less Clamp

Note: 1. Solder terminals and tab terminals (#110 t=0.5) are commonly used for terminals.
2. Only DPDT contacts are available with 3-notch models and Screw-less Clamp models.
3. PCB terminals are available only with 2-notch models.

Voltage Reduction Unit (24-V Built-in LED)

Symbol	Type	Operating voltage	Rated voltage
T1	LED	100/110 VAC/VDC	110 VAC/VDC
T2		200/220 VAC/VDC	220 VAC/VDC

Note: 1. Solder terminals are only available with 100-V models.
2. The Voltage Reduction Unit is not available for models with PCB terminals.
3. "T2" is available only for the Screw-less Clamp type.

Ordering Information

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

Solder Terminals

Rectangular

Oil-resistant IP65

A165□-J

No. of notches	Output	Reset method	Lighting method	Model
2 notches	SPDT	Manual	LED	**A165W-J2M□-24D-1**
			Non-lighted	**A165S-J2M-1**
		Automatic	LED	**A165W-J2A□-24D-1**
			Non-lighted	**A165S-J2A-1**
	DPDT	Manual	LED	**A165W-J2M□-24D-2**
			Non-lighted	**A165S-J2M-2**
		Automatic	LED	**A165W-J2A□-24D-2**
			Non-lighted	**A165S-J2A-2**
3 notches	DPDT	Manual	LED	**A165W-J3M□-24D-2**
			Non-lighted	**A165S-J3M-2**

Note: Enter the desired color symbol for the Selector in □: R (red); Y (yellow); G (green). The Selector for non-lighted models is black.

Square

Oil-resistant IP65

A165□-A

No. of notches	Output	Reset method	Lighting method	Model
2 notches	SPDT	Manual	LED	**A165W-A2M□-24D-1**
			Non-lighted	**A165S-A2M-1**
		Automatic	LED	**A165W-A2A□-24D-1**
			Non-lighted	**A165S-A2A-1**
	DPDT	Manual	LED	**A165W-A2M□-24D-2**
			Non-lighted	**A165S-A2M-2**
		Automatic	LED	**A165W-A2A□-24D-2**
			Non-lighted	**A165S-A2A-2**
3 notches	DPDT	Manual	LED	**A165W-A3M□-24D-2**
			Non-lighted	**A165S-A3M-2**

Note: Enter the desired color symbol for the Selector in □: R (red); Y (yellow); G (green). The Selector for non-lighted models is black.

Round

Oil-resistant IP65

A165□-T

No. of notches	Output	Reset method	Lighting method	Model
2 notches	SPDT	Manual	LED	**A165W-T2M□-24D-1**
			Non-lighted	**A165S-T2M-1**
		Automatic	LED	**A165W-T2AG-24D-1**
			Non-lighted	**A165S-T2A-1**
	DPDT	Manual	LED	**A165W-T2M□-24D-2**
			Non-lighted	**A165S-T2M-2**
		Automatic	LED	**A165W-T2A□-24D-2**
			Non-lighted	**A165S-T2A-2**
3 notches	DPDT	Manual	LED	**A165W-T3M□-24D-2**
			Non-lighted	**A165S-T3M-2**

Note: Enter the desired color symbol for the Selector in □: R (red); Y (yellow); G (green). The Selector for non-lighted models is black.

Ordering Information

Ordering Individually ..... Selectors, 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.

Selector (Listed on Page 5.)

Rectangular Models

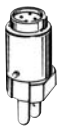
Square Models

Round Models

Lighted Models

Lamp

LED only

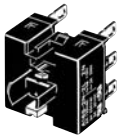


Note: Temperature rises in incandescent lamps can cause heat deformation.

Non-lighted Models

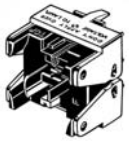
Switch (Listed on Page 7.)

Solder terminals
(no transformer)



Lighted/non-lighted

PCB terminals



Lighted/non-lighted

Note: Switch Units that combine a Lamp and a Switch are also available.

Ordering Information

Ordering Individually ..... Selectors, Lamps, and Switches (Sockets) 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.

Selectors (Oil-resistant IP65 Models Only)

Appearance	Number of notches	Reset method	Lighting method	Model	Selector color symbol
Rectangular (A165□-J)	2 notches	Manual	LED	**A165W-J2M□**	Enter the desired color symbol for the Selector in □. R (red), Y (yellow), G (green)
			Non-lighted	**A165S-J2M**	
		Automatic	LED	**A165W-J2A□**	
			Non-lighted	**A165S-J2A**	
	3 notches	Manual	LED	**A165W-J3M□**	
			Non-lighted	**A165S-J3M**	
		Fully automatic	LED	**A165W-J3A□**	
			Non-lighted	**A165S-J3A**	
Square (A165□-A)	2 notches	Manual	LED	**A165W-A2M□**	Enter the desired color symbol for the Selector in □. R (red), Y (yellow), G (green)
			Non-lighted	**A165S-A2M**	
		Automatic	LED	**A165W-A2A□**	
			Non-lighted	**A165S-A2A**	
	3 notches	Manual	LED	**A165W-A3M□**	
			Non-lighted	**A165S-A3M**	
		Fully automatic	LED	**A165W-A3A□**	
			Non-lighted	**A165S-A3A**	
Round (A165□-T)	2 notches	Manual	LED	**A165W-T2M□**	Enter the desired color symbol for the Selector in □. R (red), Y (yellow), G (green)
			Non-lighted	**A165S-T2M**	
		Automatic	LED	**A165W-T2AG**	
			Non-lighted	**A165S-T2A**	
	3 notches	Manual	LED	**A165W-T3M□**	
			Non-lighted	**A165S-T3M**	
		Fully automatic	LED	**A165W-T3A□**	
			Non-lighted	**A165S-T3A**	

Note: The selector for non-lighted models is black.

Ordering Information

Sets ..... Select an Operation Unit and a Switch Unit (Lamp and Switch).

Operation Unit Set with Knob-type Selector Switch

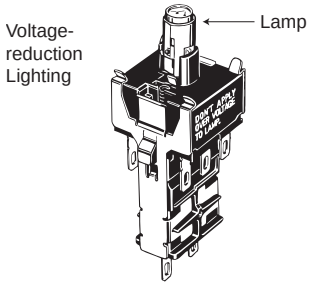
Rectangular Models

Square Models

Round Models

Lighted Models

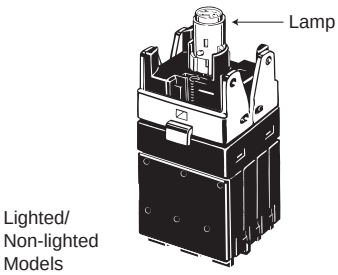
Switch Unit with Voltage-reduction Lighting



Note: The LED has a 24-VAC/VDC circuit built in.

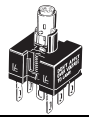
Lighted/Non-lighted Models

Switch Unit with Screw-less Clamp Connectors

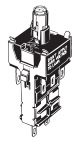


Note: Non-lighted models do not include a Lamp.

Switch Units (A Switch Unit includes a Switch and a Lamp.)

Appearance	Number of notches	Classification			Model
	2 notches	SPDT	24 V	Solder terminals	**A16W-2N□-24D-1**
		DPDT			**A16W-2N□-24D-2**
	3 notches	DPDT			**A16W-3N□-24D-2**

Switch Units with Voltage Reduction Units (Solder Terminals)

Appearance	Classification			Operating voltage	Model
	Standard loads and microloads	2 notches	SPDT	100/110 VAC/VDC	**A16L-□-T1-1**
		2 notches	DPDT		**A16L-□-T1-2**
		3 notches			**A16W-3NY-T1-2**

Note: The LED has a 24-VAC/VDC circuit built in.

Insert one of the following letters into the box (□).

Symbol	Light color
R	Red
Y	Yellow
G	Green

Ordering Information

Switch Units with Screw-less Clamp Connectors

Appearance	Classification					Model	Remarks
	Standard loads and microloads	2 notches DPDT	Non-lighted			**A16-2S**	Used for Pushbutton Switches and Knob-type Selector Switches.
			Lighted	No voltage-reduction lighting		**A16L-Δ-□-2S**	
				Voltage-reduction lighting	100/110 VAC/VDC	**A16L-Δ-T1-2S**	
					200/220 VAC/VDC	**A16L-Δ-T2-2S**	
		3 notches DPDT	Non-lighted			**A16S-3N-2LS**	
			Lighted	No voltage-reduction lighting		**A16W-3NΔ-24D-2S**	
				Voltage-reduction lighting	200/220 VAC/VDC	**A16W-3N-Δ-T2-2S**	

Note: The 100-V models and 200-V models have a 24-VAC/VDC circuit built in.

Insert symbols in Δ and □.

Δ

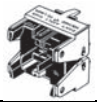
Symbol	Light color
R	Red
Y	Yellow
G	Green

□

Symbol	Type	Operating voltage
5D	LED	5 VDC
12D		12 VAC/VDC
24D		24 VAC/VDC

Ordering Individually

Switches

Appearance	Classification					Model
	Lighted	Switches (without voltage-reduction lighting)	2 notches	SPDT	Solder terminal	**A16S-2N-1L**
				DPDT		**A16S-2N-2L**
			3 notches	DPDT		**A16S-3N-2L**
	Non-lighted		2 notches	SPDT		**A16S-2N-1**
				DPDT		**A16S-2N-2**
			3 notches	DPDT		**A16S-3N-2**
	Lighted		2 notches	SPDT	PCB terminal	**A16S-2N-1LP**
				DPDT		**A16S-2N-2LP**
	Non-lighted			SPDT		**A16S-2N-1P**
				DPDT		**A16S-2N-2P**

Lamps

Operating voltage / Light color	Super-bright		
	5 VDC	12 VAC/VDC	24 VAC/VDC
Red	**A16-5DSR**	**A16-12DSR**	**A16-24DSR**
Yellow	**A16-5DSY**	**A16-12DSY**	**A16-24DSY**
Green	**A16-5DSG**	**A16-12DSG**	**A16-24DSG**

Accessories and Tools (Order Separately)

Accessories

Name	Appearance	Classification	Model	Remarks
Panel Plugs		Rectangular	**A16ZJ-3003**	Used for covering the panel cut-outs for future panel expansion. Degree of protection: IP40
		Square	**A16ZA-3003**	
		Round	**A16ZT-3003**	

Tools

Name	Appearance	Model	Applicable types					Remarks
			Pushbutton Switch	Knob-type Selector Switch	Key-type Selector Switch	Emergency Stop Switch	Indicator	
Screw Fitting		**A16Z-3004**	Yes	Yes	Yes	Yes	Yes	Convenient for ganged installation. Tighten to a torque of 0.39 N·m min.
Extractor		**A16Z-5080**	Yes	Yes	Yes	Yes	Yes	Convenient for extracting the Switches and Lamps.

Ordering as a Set: Refer to page 3.

■ Specifications and dimensions: Refer to pages 8 to 10.
■ Accessories, replacements, and tools: Refer to this page

Specifications

Approved Standard Ratings

UL, cUL (File No. E41515)

5 A at 125 VAC, 3 A at 250 VAC (general use)
3 A at 30 VDC (resistive)

Note: Certification has been obtained for the Switch. For detailed information on individual products that have received certification, consult your supplier.

TÜV (EN60947-5-1) (Low Voltage Directive)

3 A at 250 VAC
3 A at 30 VDC

CCC (GB/T14048.5)

5 A at 125 VAC
3 A at 250 VAC
3 A at 30 VDC

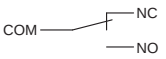
Ratings

Switch Ratings

Rated voltage	Resistive load
125 VAC	5 A
250 VAC	3 A
30 VDC	3 A

Minimum applicable load: 1 mA at 5 VDC
Rated values are obtained from tests conducted under the following conditions.
1. Load: Resistive load
2. Mounting conditions: No vibration and no shock
3. Temperature: 20±2°C
4. Operating frequency: 20 times/min

Contact Form

Name	Contact form
SPDT	

Super-bright LED

Rated voltage	Rated current	Operating voltage	Internal limiting resistor
5 VDC	8 mA	5 VDC±5%	Red, yellow: 300 Ω Green: 160 Ω
12 VAC/VDC		12 VAC/VDC±5%	Red, yellow: 1 kΩ Green: 910 Ω
24 VAC/VDC		24 VAC/VDC±5%	2.4 kΩ

Characteristics

Socket Unit

Item	Type	Knob-type Selector Switch
Allowable operating frequency	Mechanical	20 operations/minute max.
	Electrical	10 operations/minute max.
Insulation resistance		100 MΩ min. (at 500V DC)
Contact resistance		100 mΩ max. (initial value)
Dielectric strength	Between terminals of same polarity	1,000 VAC, 50/60 Hz for 1 min
	Between terminals of different polarity	2,000 VAC, 50/60 Hz for 1 min
	Between each terminal and ground	2,000 VAC, 50/60 Hz for 1 min
	Between lamp terminals	1,000 VAC, 50/60 Hz for 1 min*
Vibration resistance	Malfunction	10 to 55 Hz, 1.5-mm double amplitude (malfunction within 1 ms)
Shock resistance	Destruction	500 m/s^2 max.
	Malfunction	150 m/s^2 max. (malfunction within 1 ms)
Durability	Mechanical	250,000 operations min.
	Electrical	100,000 operations min.
Electric shock protection class		Class II
PTI (tracking characteristic)		175
Degree of contamination		3 (IEC60947-5-1)
Weight		Approx. 13 g (in the case of a lighted DPDT switch)
Ambient operating temperature		−10°C to 55°C (with no icing or condensation)
Ambient operating humidity		35% to 85%RH
Ambient storage temperature		−25°C to 65°C (with no icing or condensation)

* With LED not mounted.
(Perform testing with the LED not mounted.)

Screw-less Clamp

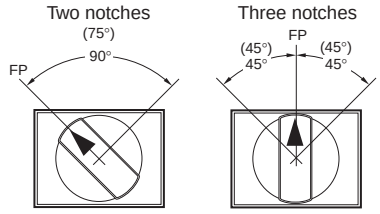
Item	Type	Screw-less Clamp			
Recommended wire size		0.5 mm^2 twisted wire or 0.8 mm-dia. solid wire			
Usable wires and tensile strength	Twisted wire	0.3 mm^2	0.5 mm^2	0.75 mm^2	1.25 mm^2
	Solid wire	0.5 mm dia.	0.8 mm dia.	1.0 mm dia.	---
	Tensile strength	10 N	20 N	30 N	40 N
Length of exposed wire		10 ±1 mm			
Compliant standards		JIS C 2811 Terminal Blocks for Industrial Use			

Operating Characteristics

Characteristics \ Type	Knob-type Selector Switch	
	2 notches	3 notches
Operating torque (OF) max.	0.1 N·m	
Set position (SP)	90±5°	45° $^{+10}_{0}$

Specifications

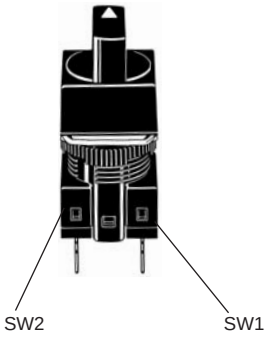
Operation Angle



Note: The angle used for automatic reset is shown in parentheses.
FP: Free Position

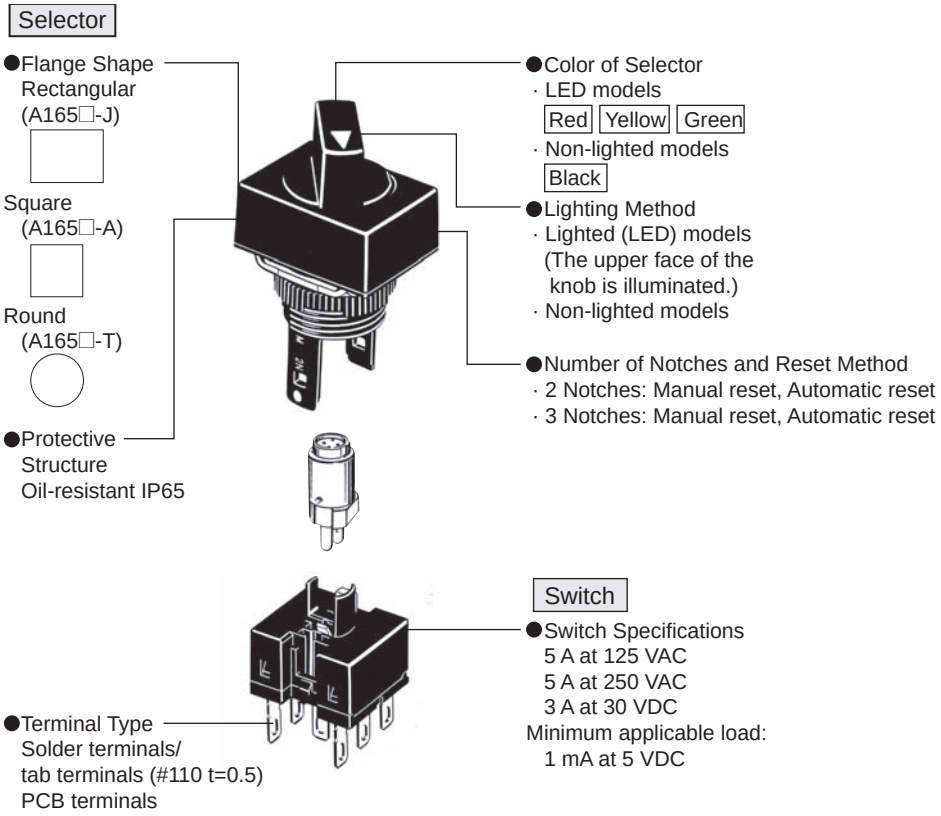
Contact Form

No. of notches	Contact from				
	SPDT		DPDT		
	Position	SW	Position	SW2	SW1
2 notches					
3 notches	---				



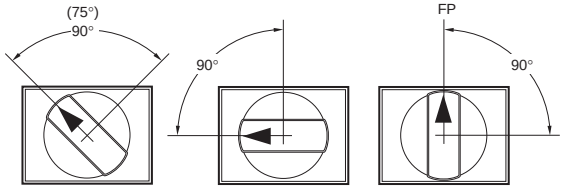
Nomenclature

Model structure



The flange can be rotated to easily change the operation angle of the knob.

For information on rotating the flange, refer to page 14.
Example: Knob-type Selector Switch with Two Notches

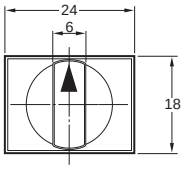


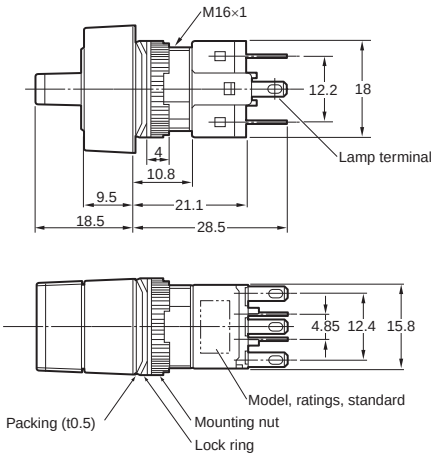
(Standard condition when shipped)
Note: The angle is 75° for self-resetting models.

Dimensions

• The Dimension shows 2-switch outputs. • The lamp terminal is not provided with non-lighted models. **(Unit: mm)**

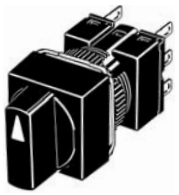
Rectangular A165□-J Solder terminals/ tab terminals (#110 t=0.5)

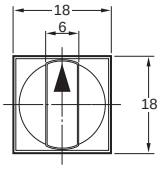


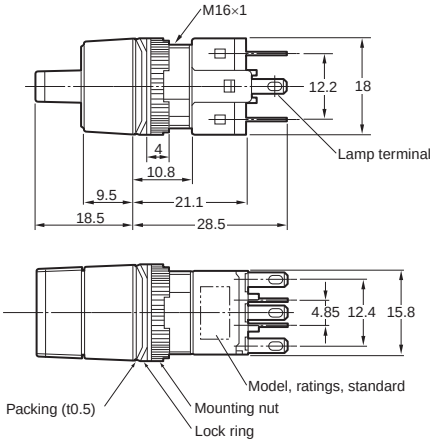


Note: See page 12 for panel cutouts.

Square A165□-A Solder terminals/ tab terminals (#110 t=0.5)

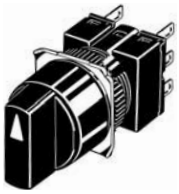


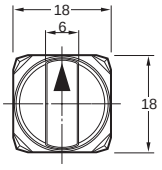


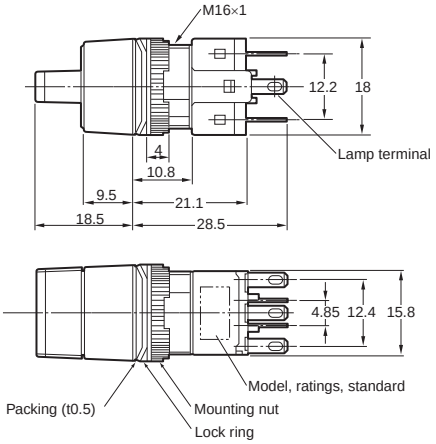


Note: See page 12 for panel cutouts.

Round A165□-T Solder terminals/ tab terminals (#110 t=0.5)





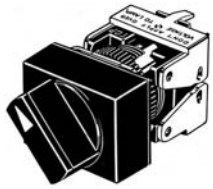


Note: See page 12 for panel cutouts.

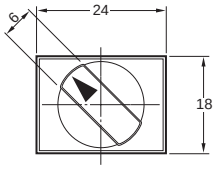
Dimensions

• The Dimension shows 2-switch outputs. • A rectangular model is listed as an example. **(Unit: mm)**

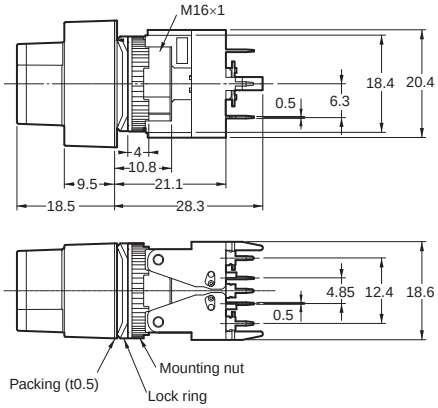
Rectangular A165□-J PCB terminals



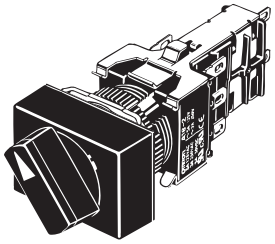
• The lamp terminal is not also provided with non-lighted models.

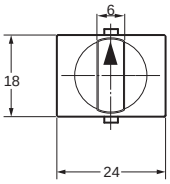


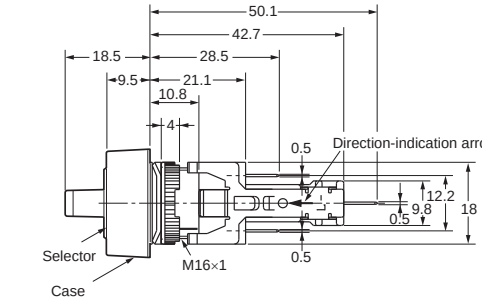
Note: See page 12 for panel cutouts.

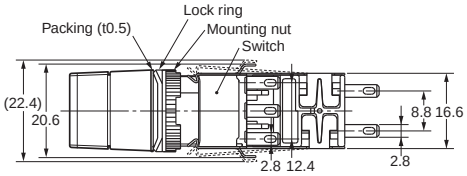


Rectangular A165W□-T Reduced-voltage lighting solder terminals/ tab terminals (#110 t=0.5)

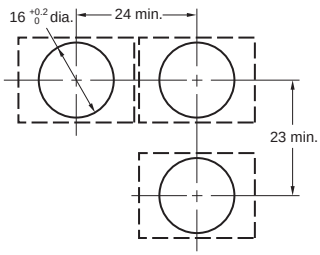




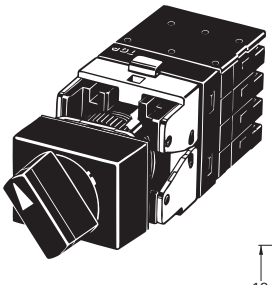




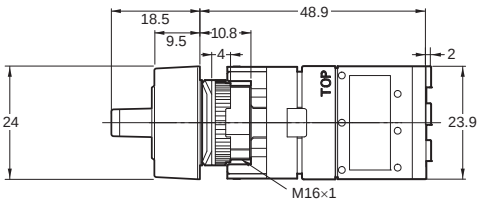
Panel Cutouts

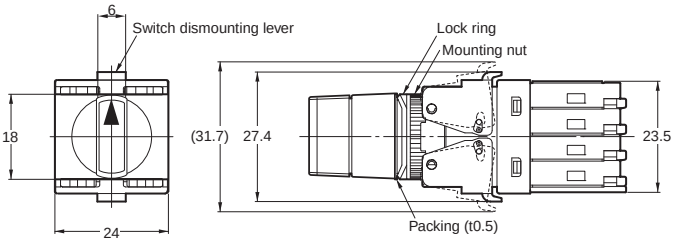


Rectangular A165□-2S Screw-Less Clamp

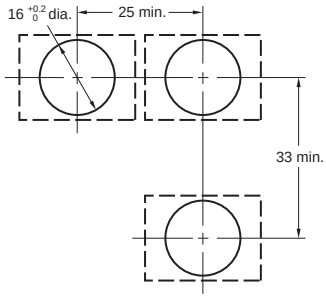


• The lamp terminal is also provided with non-lighted models.





Panel Cutouts

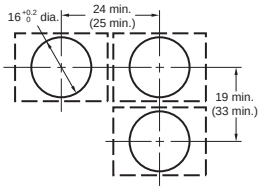
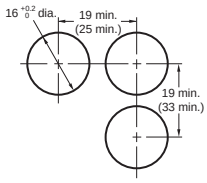


Dimensions

(Unit: mm)

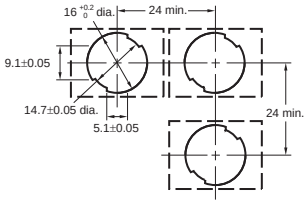
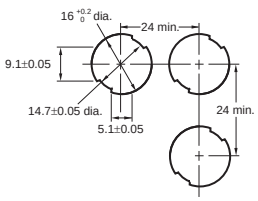
Panel Cutouts

Models with Solder Terminals and Models with Screw-less Clamp Connectors

Rectangular A165□-J	Square A165□-A, Round A165□-T
(Top View)  	(Top View) 

Note: 1. Make sure the thickness of the mounting panel is 0.5 to 3.2 mm.
2. If the panel is to be finished with coating, etc., make sure that the panel meets the specified dimensions after coating.
3. Figures in parentheses are for screw-less clamp connectors.

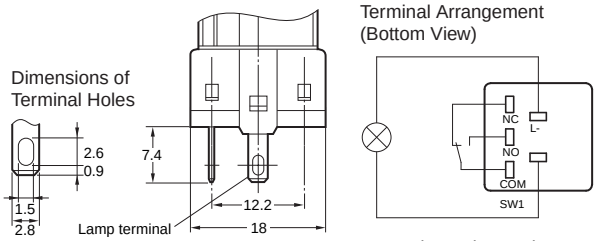
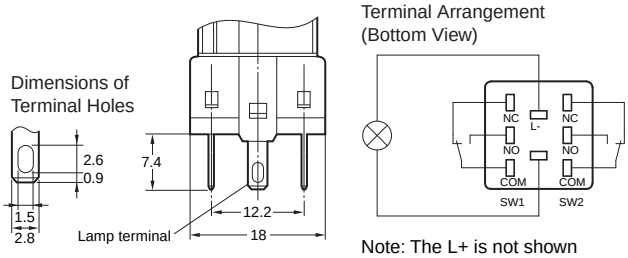
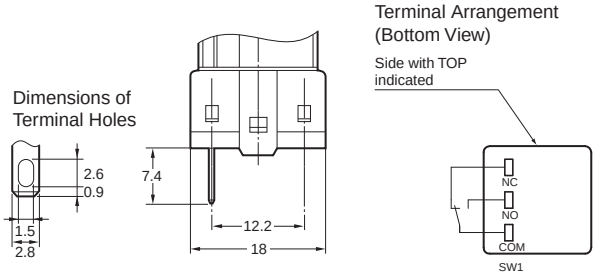
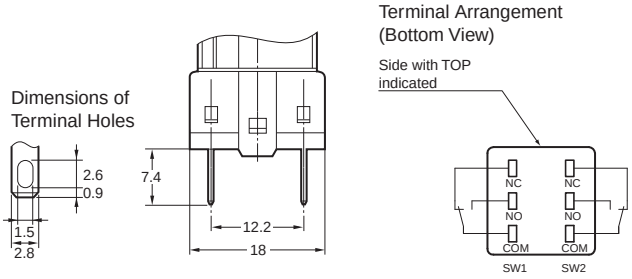
Models with PCB Terminals

Rectangular A165□-J	Square A165□-A, Round A165□-T
(Top View)  	(Top View) 

Note: 1. Ensure that the variation in the distance between the centers of neighboring mounting holes is less than ±0.1 mm.
2. Make sure the thickness of the mounting panel is 0.5 to 3.2 mm. If, however, a Switch Guard or Dust Cover is used, the thickness of the mounting panel must be 0.5 to 2 mm.
3. If the panel is to be finished with coating, etc., make sure that the panel meets the specified dimensions after coating.

Terminal Arrangement

Models with Solder Terminals without Reduced-voltage Lighting (Lamp terminals are not provided with the Non-lighted Knob-type Selector Switches and Key-type Selector Switches.)

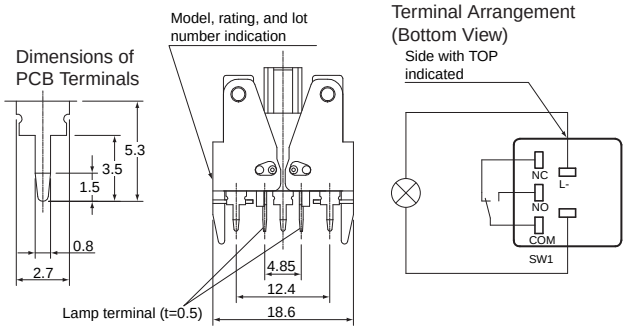
Lighted SPDT Switches	Lighted DPDT Switches
 Note: The L+ is not shown on the Switch.	 Note: The L+ is not shown on the Switch.
Non-lighted SPDT Switches	**Non-lighted DPDT Switches**
 	

Dimensions

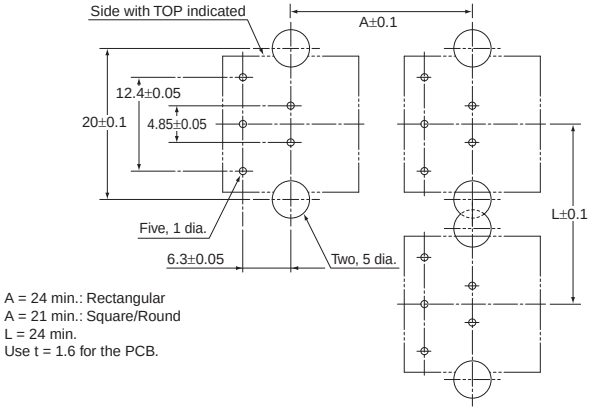
(Unit: mm)

Models with PCB Terminals

Lighted SPDT Switches



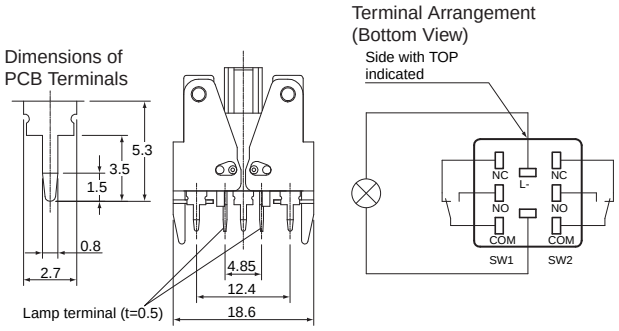
PCB Cutouts
(Bottom View)



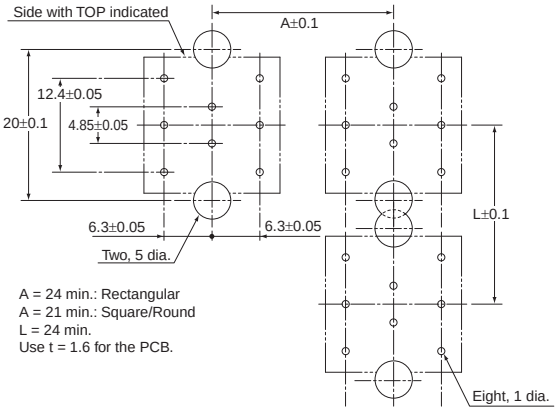
A = 24 min.: Rectangular
A = 21 min.: Square/Round
L = 24 min.
Use t = 1.6 for the PCB.

Note: Secure the panel to the board using stud bolts if force will be applied to the board after wiring.

Lighted DPDT Switches



PCB Cutouts
(Bottom View)



A = 24 min.: Rectangular
A = 21 min.: Square/Round
L = 24 min.
Use t = 1.6 for the PCB.

Note: Secure the panel to the board using stud bolts if force will be applied to the board after wiring.

Note: For details of the terminal arrangement for Screw-Less Clamps, refer to the corresponding section for the A16.

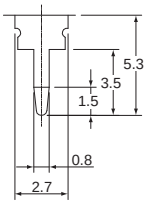
Dimensions

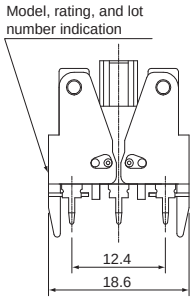
(Unit: mm)

Non-lighted Models with PCB Terminals (Lamp terminals are not provided with the Non-lighted Knob-type Selector Switches and Key-type Selector Switches.)

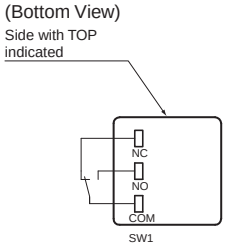
Non-lighted SPDT Switches

Dimensions of PCB Terminals

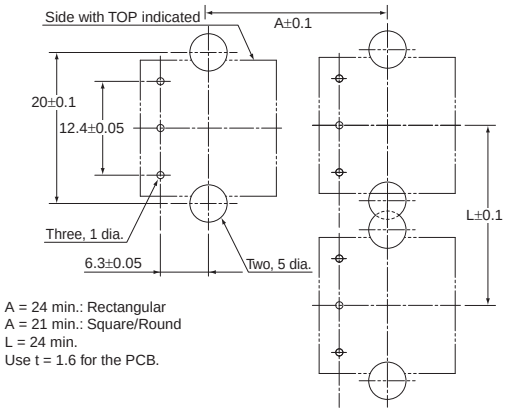




Terminal Arrangement (Bottom View)



PCB Cutouts (Bottom View)

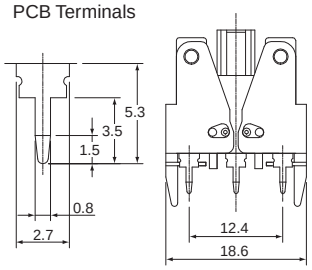


A = 24 min.: Rectangular
A = 21 min.: Square/Round
L = 24 min.
Use t = 1.6 for the PCB.

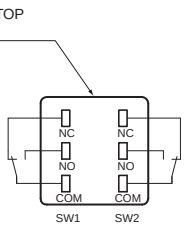
Note: Secure the panel to the board using stud bolts if force will be applied to the board after wiring.

Non-lighted DPDT Switches

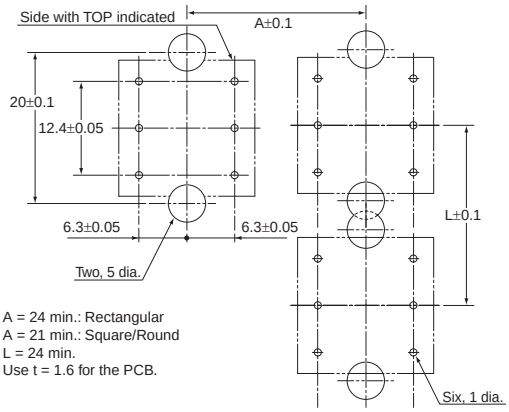
Dimensions of PCB Terminals



Terminal Arrangement (Bottom View)



PCB Cutouts (Bottom View)



A = 24 min.: Rectangular
A = 21 min.: Square/Round
L = 24 min.
Use t = 1.6 for the PCB.

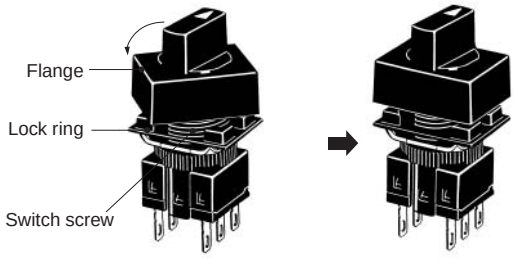
Note: Secure the panel to the board using stud bolts if force will be applied to the board after wiring.

For details on mounting the Switch to a panel, and mounting and dismounting the Switch, refer to installation details for the A16 Pushbutton Switch.

Flange Rotation (All Selector Switches)

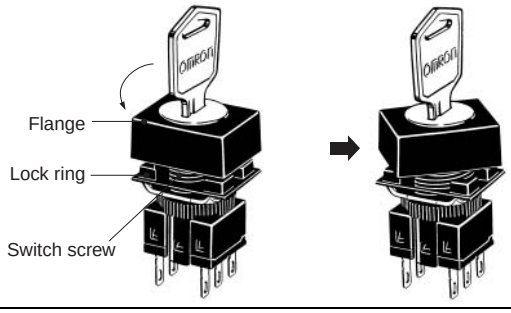
A165 Knob-type Selector Switch

Fix the Switch screw and rotate the flange in 45° turns.



A165 Key-type Selector Switch

Fix the Switch screw and rotate the flange in 45° turns.



Safety Precautions

Refer to *Safety Precautions for All Pushbutton Switches/Indicators*.

⚠ WARNING

Do not apply a voltage between the incandescent lamp and the terminal that is greater than the rated voltage. If the incandescent lamp is broken, the operating part may pop out.

Always turn OFF the power and wait for 10 minutes before replacing the incandescent lamp. If the lamp is replaced immediately after the power is turned OFF, the remaining heat may cause burns.

Precautions for 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 nut more than necessary using tools such as pointed-nose pliers. Doing so will damage the mounting nut.
  The tightening torque is 0.29 to 0.49 N·m.

Wiring

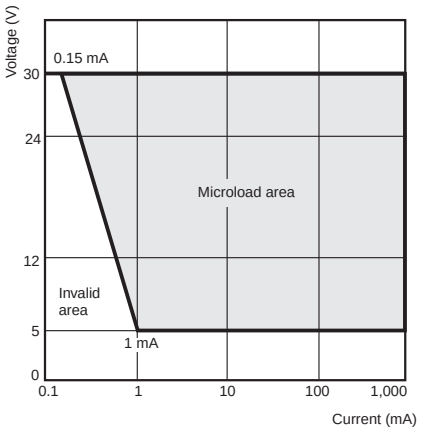
- Solder terminals and tab terminals (#110 t=0.5) are commonly used for terminals.
- Be sure to use electrical wires that are a size appropriate for the applied voltage and carry current (conductor size is 0.5 to 0.75 mm^2). Perform soldering according to the conditions provided below. If the soldering is not properly performed, the lead wires will become detached, resulting in short-circuits.
  1. Hand soldering: 350°C, within 3 s
  2. Dip soldering: 350°C, within 3 s
     Wait for one minute after soldering before exerting any external force on the solder.
- Use non-corrosive resin fluid as the flux.
- Make sure that the electric cord is wired so that it does not touch the Unit. If the electric cord touches the Unit, then electric wires with a heat resistance of 100°C min. must be used.
- After wiring the Switch, maintain an appropriate clearance and creepage distance.

Operating Environment

- The IP65 model is designed with a degree of protection so that it will not sustain damage if it is subjected to water from any direction to the front of the panel.

Using the Microload

- Insert a contact protection circuit, if necessary, to prevent the reduction of life expectancy due to extreme wear on the contacts caused by loads where inrush current occurs when the contact is opened and closed.
- The A16 allows both a standard load (125 V at 5A, 250 V at 3 A) and a microload. If a standard load is applied, however, the microload area cannot be used. If the microload area is used with a standard load, the contact surface will become rough, and the opening and closing of the contact for a microload may become unreliable.
- 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, $\lambda 60 = 0.5 \times 10^{-6}$/operations indicates that the estimated malfunction rate is less than 1/2,000,000 operations with a reliability level of 60%.



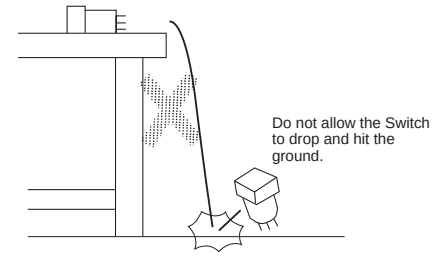
LED

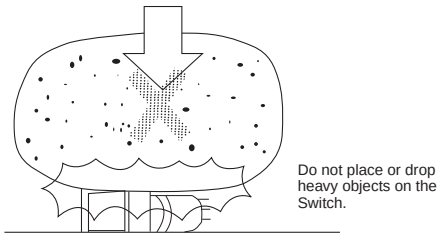
- The LED current-limiting resistor is built-in, so external resistance is not required.

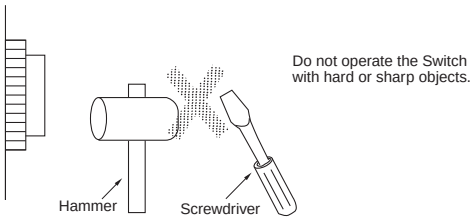
Rated voltage	Internal limiting resistor
5 VDC	Red, yellow: 300 Ω Green: 160 Ω
12 VAC/VDC	Red, yellow: 1 kΩ Green: 910 Ω
24 VAC/VDC	2.4 kΩ

Others

- The oil-resistant IP65 uses NBR rubber and is resistant to general cutting oil and cooling oil. Some particular oils cannot be used with the oil-resistant IP65, however, so contact your OMRON representative for details.
- If the panel is to be finished with coating, etc., make sure that the panel meets the specified dimensions after the coating.
- Do not subject the Switch to extreme shock or vibration. Doing so will cause malfunctions and damage to the Switch.
  Do not let sharp objects come into contact with the Switches that are made of resin. Doing so will damage the Switches, causing scratches on the outside of the operating parts, and malfunction.
  When handling the Switches, do not throw or drop them.







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