Knob-type Selector Switch (Detachable) (Cylindrical 16-dia.)

# A165S/W

# 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.

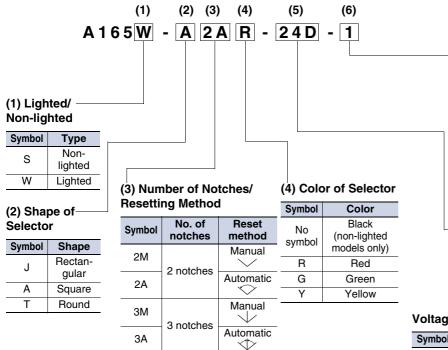
# **List of Models**

	Model						
	Rectangular	Square	Round				
Solder terminals	A165-J Series	A165-A Series	A165-T Series				
Voltage- reduction lighting	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.



#### (6) Contact Configuration

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

Note: 1. Only DPDT contacts are available with 3-notch models and Screw-less Clamp

models. 2. PCB terminals are available only with

2-notch models.

#### (5) Light Source

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

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

Symbol	Туре	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.

Model A165W-A2M -24D-1

A165S-A2M-1

A165S-A2A-1

A165S-A2M-2

A165S-A2A-2

A165S-A3M-2

A165W-A2A -24D-1

A165W-A2M -24D-2

A165W-A2A -24D-2

A165W-A3M -24D-2

# **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** 



No. of notches	Output	Reset method	Lighting method	Model
2 notches		Manual 🔨	LED	A165W-J2M -24D-1
	SPDT		Non-lighted	A165S-J2M-1
		Automatic 🛇	LED	A165W-J2A -24D-1
			Non-lighted	A165S-J2A-1
2 notories	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 V	LED	A165W-J3M -24D-2
5 HOLCHES	DFDI	Manual V	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.

A165□-J

Square A165 - A **Oil-resistant IP65** No. of notches Output **Reset method** Lighting method LED Manual Non-lighted SPDT LED Automatic  $\checkmark$ Non-lighted 2 notches LED Manual Non-lighted DPDT LED Automatic  $\sim$ Non-lighted LED 3 notches DPDT Manual  $\checkmark$ Non-lighted

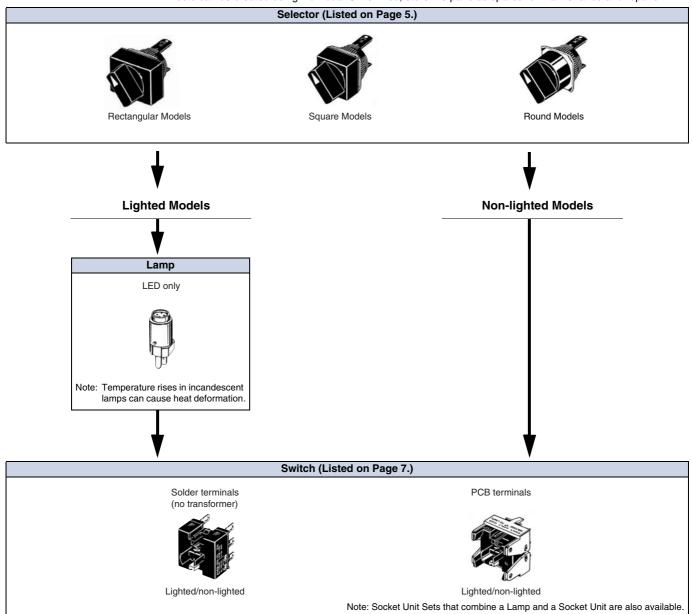
Note: Enter the desired color symbol for the Selector in 🗆: R (red); Y (yellow); G (green). The Selector for non-lighted models is black.



No. of notches	Output	Reset method	Lighting method	Model
		Manual 🗸	LED	A165W-T2M□-24D-1
	SPDT		Non-lighted	A165S-T2M-1
	3601	Automatic 🛇	LED	A165W-T2A -24D-1
2 notches		Automatic	Non-lighted	A165S-T2A-1
2 notches	DPDT	Manual V	LED	A165W-T2M□-24D-2
			Non-lighted	A165S-T2M-2
			LED	A165W-T2A -24D-2
		Automatic 🏷	Non-lighted	A165S-T2A-2
0 notoboo		Monuel	LED	A165W-T3M -24D-2
3 notches	DPDT	Manual V	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**



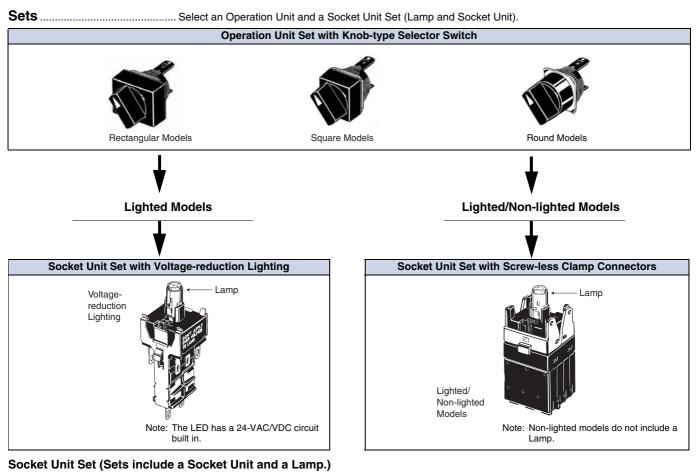
# **Ordering Information**

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)		Manual	LED	A165W-J2M	
	2 notches	Manual	Non-lighted	A165S-J2M	Estantia de Sur de stan
	2 notches	Automatic 🕥	LED	A165W-J2A	Enter the desired color symbol for the Selec-
		Automatic 🕥	Non-lighted	A165S-J2A	tor in $\Box$ .
		Manual	LED	A165W-J3M	R (red),
	3 notches	Ivialiual	Non-lighted	A165S-J3M	Y (yellow), G (green)
	3 holones	Fully	LED	A165W-J3A	G (green)
		automatic	Non-lighted	A165S-J3A	
Square	2 notches Aut 3 notches	Manual	LED	A165W-A2M	
(A165□-A)		Ividitudi	Non-lighted	A165S-A2M	
		Automatic 🕥	LED	A165W-A2A	Enter the desired color symbol for the Selec-
A			Non-lighted	A165S-A2A	tor in .
		Manual	LED	A165W-A3M	R (red),
		Ivialiual	Non-lighted	A165S-A3M	Y (yellow), G (green)
		Fully	LED	A165W-A3A	G (green)
		automatic	Non-lighted	A165S-A3A	
Round	Questioner	Manual	LED	A165W-T2M	
(A165□-T)		IVIAITUAI	Non-lighted	A165S-T2M	Enter the desired color
A	2 notches	Automatic 🕥	LED	A165W-T2A	symbol for the Selec-
		Automatic 🕥	Non-lighted	A165S-T2A	tor in $\Box$ .
		Manual	LED	A165W-T3M	R (red),
	3 notches	IVIAITUAI	Non-lighted	A165S-T3M	Y (yellow), G (green)
	3 HOLCHES	Fully	LED	A165W-T3A	G (green)
		automatic (1)	Non-lighted	A165S-T3A	

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

# **Ordering Information**



Appearance	Number of notches	Classification			Model
9	2 notches	SPDT	24 V	Solder terminals	A16W-2N□-24D-1
		DPDT			A16W-2N□-24D-2
	3 notches	DPDT		Concerterminais	A16W-3N□-24D-2

## Socket Unit Set with Voltage Reduction Unit (Solder Terminal)

Appearance	Classification			Operating voltage	Model
	Standard loads and	2 notches	SPDT	100/110 \/ACM/DC	A16L-□-T1-1
	microloads	2 notches	DPDT	— 100/110 VAC/VDC	A16L-□-T1-2
		3 notches	DFDI		A16W-3N□-T1-2

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

# Insert one of the following letters into the box ( $\Box$ ).

Symbol	Light color
R	Red
Y	Yellow
G	Green

# **Ordering Information**

## Screw-less Clamp Connector Socket Unit Set

Appearance			Clas	sification	Model	Remarks	
				Non-lighted		A16-2S	Used for Pushbutton
_		2 notches		No voltage-reductio	n lighting	A16L-∆-□-2S	Switches and
		DPDT	Lighted	. onago roadonom	100/110 VAC/VDC		Knob-type Selector
	Standard loads and				200/220 VAC/VDC	A16L-∆-T2-2S	Switches.
	microloads		Non-lighted		A16S-3N-2LS		
		3 notches		No voltage-reductio	n lighting	A16W-3N∆-□-2S	
		DPDT	DPDT Lighted	Voltage-reduction	oltage-reduction 100/110 VAC/VDC	A16W-3N-∆-T1-2S	
			lighting		200/220 VAC/VDC	A16W-3N-∆-T2-2S	

Δ

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

Insert symbols in  $\Delta$  and  $\Box$ .

		l			
Symbol	Light color		Symbol	Туре	Operating voltage
R	Red		5D		5 VDC
Y	Yellow		12D	LED	12 VAC/VDC
G	Green		24D		24 VAC/VDC

\_

## Ordering Individually Switches

Appearance			Classification			Model		
			2 notches	SPDT		A16S-2N-1L		
~	Lighted		2 noiches	DPDT		A16S-2N-2L		
-To-A			3 notches	DPDT	Colder terminal	A16S-3N-2L		
			2 notches	SPDT	<ul> <li>Solder terminal</li> </ul>	A16S-2N-1		
	Non-lighted	Socket (without		DPDT		A16S-2N-2		
		voltage-reduction lighting)	3 notches	DPDT		A16S-3N-2		
600	Linhted	iiginiiig)		SPDT		A16S-2N-1LP		
	Lighted	Lighted	0 matakaa	DPDT		A16S-2N-2LP		
	CASE -	Non lighted		New Robbert	2 notches	SPDT	PCB terminal	A16S-2N-1P
	Non-lighted		-	DPDT		A16S-2N-2P		

## Lamps

Operating voltage	Super-bright				
Light color	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)

esso	

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

#### Tools

				A	pplicable type	s		
Name	Appearance	Model	Pushbutton Switch	Knob-type Selector Switch	Key-type Selector Switch	Emergency Stop Switch	Indicator	Remarks
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.
- $\blacksquare$  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 Socket Unit. For detailed information on individual products that have received certification, consult your supplier.

## 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

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

3 A at 250 VAC 3 A at 30 VDC

## CCC (GB14048.5)

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

## **Contact Form**

Name	Contact form
SPDT	

### Super-bright LED

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

## Screw-less Clamp

Item	Туре	Screw-less Clamp				
Recommended wire size		0.5 mm <sup>2</sup> twisted wire or 0.8 mm-dia. solid wire				
Usable	Twisted wire	0.3 mm <sup>2</sup>	0.5 mm <sup>2</sup>	0.75 mm <sup>2</sup>	1.25 mm <sup>2</sup>	
wires and tensile	Solid wire	0.5 mm dia.	0.8 mm dia.	1.0 mm dia.		
strength	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**

Туре	Knob-type Selector Switch			
Characteristics	2 notches	3 notches		
Operating force (OF) max.	0.1 N·m			
Set position (SP)	90±5°	45°+10 0		

Character	istics
Socket Unit	

#### Socket Unit

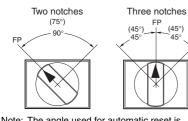
Item Type		Knob-type Selector Switch	
Allowable	Mechanical	20 operations/minute max.	
operating frequency	Electrical	10 operations/minute max.	
Insulation resistance		100 M $\Omega$ min. (at 500V DC)	
Contact resistance		100 m $\Omega$ max. (initial value)	
	Between termi- nals of same polarity	1,000 VAC, 50/60 Hz for 1 min	
Dielectric strength	Between ter- minals of dif- ferent polarity	2,000 VAC, 50/60 Hz for 1 min	
Strength	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	Destruction	500 m/s <sup>2</sup> max.	
resistance	Malfunction	150 m/s <sup>2</sup> max. (malfunction within 1 ms)	
Durability	Mechanical	250,000 operations min.	
Durability	Electrical	100,000 operations min.	
Electric shock protection class PTI (tracking characteristic) Degree of contamination Weight		Class II	
		175	
		3 (IEC60947-5-1)	
		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.)

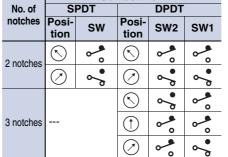
# Specifications

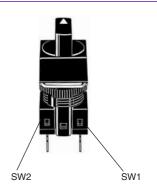
# **Operation Angle**



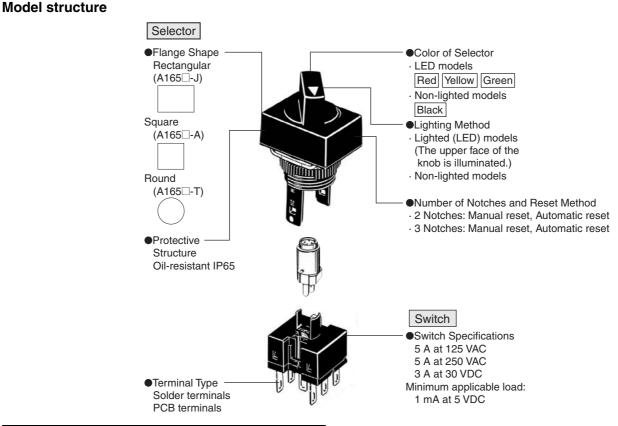
Note: The angle used for automatic reset is shown in parentheses. FP: Free Position

Contact Form							
		Contact from					
No. of		SPDT		DP			
	notches	Posi-		Posi-			



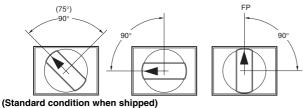


# Nomenclature



# 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



Note: The angle is 75° for self-resetting models.

Model, ratings, standard

Mounting nut

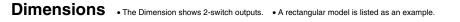
Lock ring

Packing (t0.5)

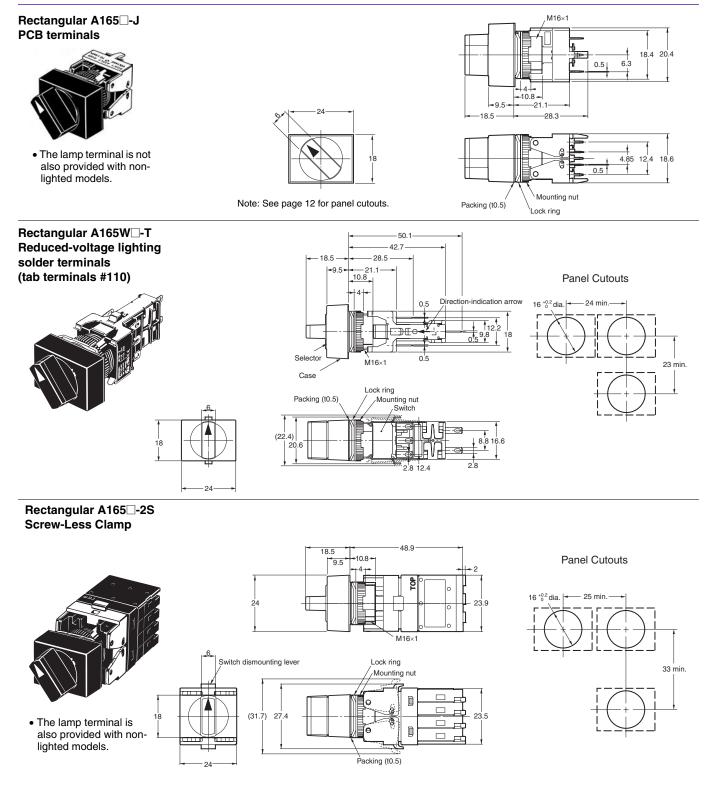
Dimensions • The Dimension shows 2-switch outputs. • The lamp terminal is not provided with non-lighted models.

M16×1 Rectangular A165 -J Solder terminals (tab terminals #110) m 22 4 Lamp terminal 10.8 9.5 -21.1 18.5 28.5-24 -6-15.8 12.4 4.85 Model, ratings, standard Packing (t0.5) Mounting nut Note: See page 12 for panel cutouts. Lock ring /M16×1 Square A165 -A Solder terminals (tab terminals #110) П 2 4 Lamp terminal 10.8 9.5 -21.1 18.5 18 28.5 6 ð 4.85 12.4 15.8 ⋽ Model, ratings, standard Packing (t0.5) Mounting nut Note: See page 12 for panel cutouts. Lock ring Round A165 -T /M16×1 Solder terminals (tab terminals #110) -П 12.2 18 4 Lamp terminal 10.8 \_9.5 -21.1 18.5 -28.5 15.8 2.4

Note: See page 12 for panel cutouts.



(Unit: mm)

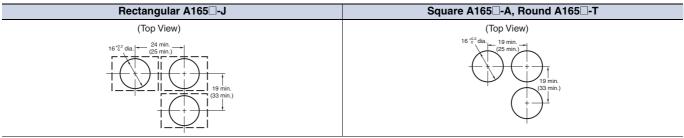


# Dimensions

(Unit: mm)

# **Panel Cutouts**

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

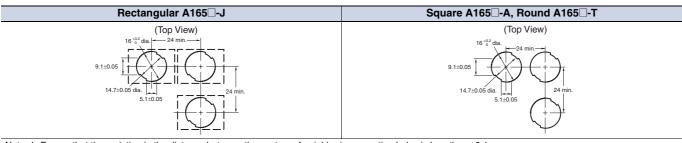


Note: 1. Make sure the thickness of the mounting panel is 0.5 to 3.2 mm.

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

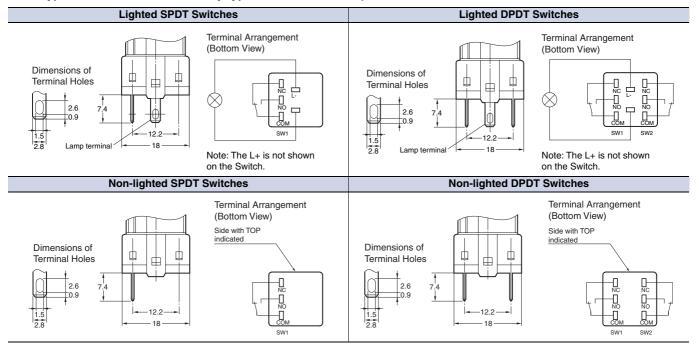


Note: 1. Ensure that the variation in the distance between the centers of neighboring mounting holes is less than ±0.1 mm. 2. Make sure the thickness of the mounting panel is 0.5 to 3.2 mm. If, however, a Switch Guard or Dust Cover is used, the thickness of the mounting panel must be 0.5 to 2 mm.

3. If the panel is to be finished with coating, etc., make sure that the panel meets the specified dimensions after coating.

## **Terminal Arrangement**

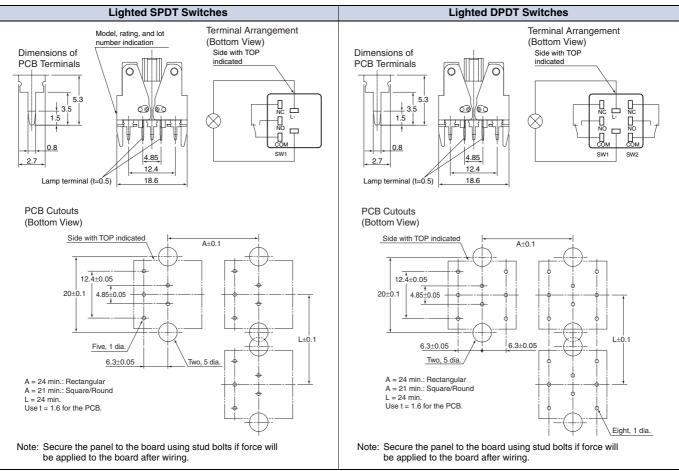
Models with Solder Terminals without Reduced-voltage Lighting (Lamp terminals are not provided with the Non-lighted Knob-type Selector Switches and Key-type Selector Switches.)



Dimensions

(Unit: mm)

## Models with PCB Terminals

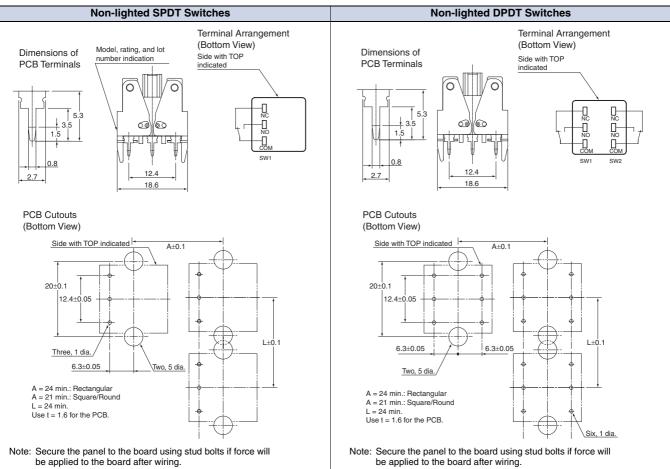


Note: For details of the terminal arrangement for Screw-Less Clamps, refer to the corresponding section for the A16.

(Unit: mm)

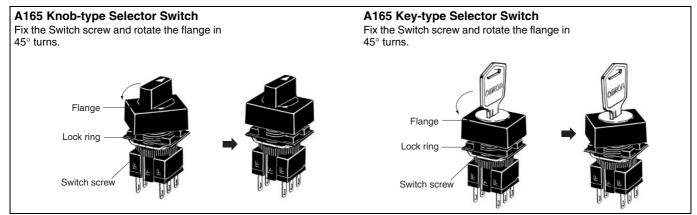
# Dimensions

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



# 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)



# **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 quick-connect terminals (#110) 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<sup>2</sup>). 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
- 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.

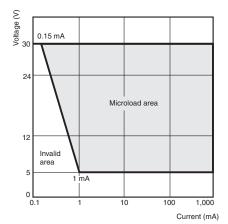
#### **Operating Environment**

• 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% ( $\lambda$  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%.



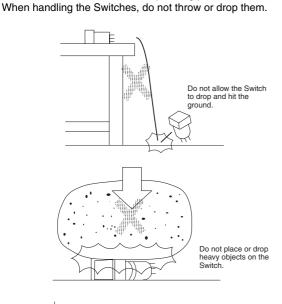
## LED

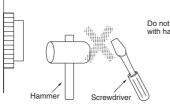
 The LED current-limiting resistor is built-in, so external resistance is not required.

Rated voltage	Internal limiting resistor	
5 VDC	Red, yellow: 300 $\Omega$ Green: 160 $\Omega$	
12 VAC/VDC	Red, yellow: 1 k $\Omega$ Green: 910 $\Omega$	
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.





Do not operate the Switch with hard or sharp objects.

#### **Read and Understand This Catalog**

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

## Warranty and Limitations of Liability

#### WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

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## **Application Considerations**

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OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

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The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- · Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- · Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

#### **PROGRAMMABLE PRODUCTS**

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

#### Disclaimers

#### CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

#### DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

#### PERFORMANCE DATA

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#### ERRORS AND OMISSIONS

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# OMRON Corporation

Industrial Automation Company

In the interest of product improvement, specifications are subject to change without notice.





Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001 Адрес: 105318, г.Москва, ул.Щербаковская д.З, офис 1107

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# Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж: moschip.ru moschip.ru\_4

moschip.ru\_6 moschip.ru\_9