



General Catalogue 2006/2007

Operation Switches

Foreign standards






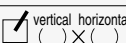
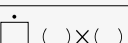


















Mark	Description	
<div><div>RECOGNITION MARK</div></div>	Certified by UL Standards	For the foreign standard, refer to "STANDARDS CHART" on the end of catalog.
<div><div>Certification</div><div>Component Acceptance</div></div>	Certified by CSA Standards	
	Certified by TÜV Standards	

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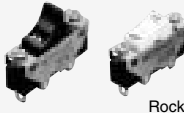












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SELECTOR CHART

Selection item	Symbol			
Load	• Medium-to-high-capacity loads	Enter maximum rated capacity in table below.	• Low-level circuit load	<div>Low-level circuit</div>
Mounting method	• Mounting panel with round holes <div></div>	• Snap-in mounting into panel with square holes <div></div> <div>vertical horizontal () × ()</div>	• Screw mounting panel with square holes <div></div>	• PC board mounting <div></div>
Protect construction	• Sealed construction <div><div>S</div></div>	(Please refer to each catalog for details about seal grades.)		• General construction (Non-sealed type) <div><div>General</div></div>
Standard	• International standards	UL (C-UL), CSA, VDE, TÜV, etc.		

Type		Product name	Load	Mounting method	Construction	Standards	Page
NS Series	Mounting hole 16mm dia. type	<div> Illuminated pushbutton/Indicator/Pushbutton switches</div> <div> Selector switches</div> <div> Key selector switches</div>	0.3A 250V AC <div>Low-level circuit</div> 1mA 5V AC/DC	<div>16 dia.</div>	<div>S</div> (at front panel)	UL CSA CE	P. 7
	ND Series	Mounting hole 16mm dia. type	<div> Illuminated pushbutton/Indicator/Pushbutton switches</div> <div> Selector switches</div> <div> Key selector switches</div> <div> Emergency pushbutton switches</div> <div> Buzzers</div>	3A 250V AC <div>Low-level circuit</div> 1mA 5V AC/DC	<div>16 dia.</div>	<div>S</div> (at front panel)	UL CSA EN standard CE
Mounting hole 22mm dia. type		<div> Illuminated pushbutton/Indicator/Pushbutton switches</div> <div> Selector switches</div> <div> Key selector switches</div> <div> Buzzers</div>	3A 250V AC <div>Low-level circuit</div> 1mA 5V AC/DC	<div>22 dia.</div>	<div>S</div> (at front panel)	UL CSA EN standard CE	P. 41
Turquoise snap switches (AJN1/2)		<div></div>	<div>Low-level circuit</div> 0.1μA 1mV DC	<div>PC</div> <div></div>	<div>S</div>	UL, CSA	P. 61
AJ1 (J1)/AJ2 (J2) Toggle and Rocker switches		<div> AJ1 (J1) and AJ2 (J2) types are the same shape.</div>	AJ1 (J1) type: 7A 125V AC AJ2 (J2) type: <div>Low-level circuit</div> 1mA 5V DC	AJ1 (J1) and AJ2 (J2) types: <div>PC</div> <div></div> (Toggle switch) 16.4 × 13.3 (Tumbler and Rocker switches)	<div>General</div> (Only the terminal section is sealed.) <div>S</div> Toggle panel of AJ1 (J1) and AJ2 (J2) types is waterproof.	AJ1 (J1) and AJ2 (J2) types: UL, CSA	P. 71
AJ4 (J4) Toggle switches		<div></div>	Single and 2-poles: 10A 250V AC 4-poles: 6A 250V AC	<div>12 dia.</div>	<div>General</div> (Only the terminal section is sealed.)	—	P. 91

SELECTOR CHART

Type		Product name	Load	Mounting method	Construction	Standards	Page
T-15 Series switches	15A High snap switches Toggle type		15A 250V AC 15A 30V DC	12 dia.	General S	UL/C-UL (Depending on type)	P. 97
	15A High snap switches Rocker type		15A 250V AC 15A 30V DC	 (Standard type)  (Sealed type)	General S	UL/C-UL (Depending on type)	P. 97
	15A High snap switches Pushbutton type		Alternate: 15A 250V AC 15A 30V DC Momentary: 10A 250V AC 8A 30V DC	12 dia.	General S	UL/C-UL (Depending on type)	P. 97
T-10 Series 10A Snap switches			15A 125V AC 10A 250V AC 8A 30V DC	12 dia.	General	UL/C-UL	P.114
T-06/T-03 Series 6A/3A Snap switches		 6A type 3A type	6A type: 6A 125V AC 3A type: 3A 125V AC	12 dia.	General	—	P. 117
Tumbler/Rocker switches (WD2/WD3)		 Tumbler switch Rocker switch	10A 250V AC 6A 30V DC	1-channel  9.5 × 20.5 2-channels  19 × 20.5	General	UL/C-UL (Depending on type)	P. 120
AB2 type push-button switches			3A 125V AC Low-level circuit 1mA 24V DC	6 dia.	General	—	P. 123
Ace push-button switches (AB5)			15A 250V AC 15A 125V AC 0.6A 125V DC	12 dia.	General	—	P. 126
Power switches	AJ8 switches with trip function upgraded type		16A 125V AC 10A 250V AC	 22 × 31.1 (Panel thickness 1.8 to 2.3)	General	Refer to "STANDARDS CHART".	P. 128
	AJ7 (J7) switches	 10A type/6A type Standard actuator Wide actuator type	10A type: 10A 250V AC 6A type: 6A 250V AC	Standard actuator type  12.9 × 19.4 (Panel thickness 1.25 to 2.0) Remark: As for wide actuator, please refer to the catalog.	General	Refer to "STANDARDS CHART".	P. 133
	AJ8 (J8) switches	 Standard actuator type Wide actuator type	16A 250V AC	Standard actuator type  12.9 × 19.4 (Panel thickness 1.25 to 2.0) Remark: As for wide actuator, please refer to the catalog.	General		P. 141
	AJ9 (J9) switches		16A 250V AC	 12.6 × 34.4 (Panel thickness 1.25 to 2.0)	General	Refer to "STANDARDS CHART".	P. 147

TECHNICAL TERMINOLOGY & CAUTIONS FOR USE

TECHNICAL TERMINOLOGY

1. Rated values

Values indicating the characteristics and performance guarantee standards of the switches. The rated current and rated voltage, for instance, assume specific conditions.

2. Electrical life

The service life when the rated load is connected to the contact and switching operations are performed.

3. Mechanical life

The service life when operated at a preset operating frequency without passing electricity through the contacts.

4. Withstand voltage

Threshold limit value that a high voltage can be applied to a predetermined measuring location for one minute without causing damage to the insulation.

5. Insulation resistance

This is the resistance value at the same place the withstand voltage is measured.

6. Contact resistance

This indicates the electrical resistance at the contact part. Generally, this resistance includes the conductor resistance of the spring and terminal portions.

7. Vibration resistance

Vibration range where a closed contact does not open for longer than a specified time due to vibrations during use of the snap-action switches.

8. Shock resistance

Max. shock value where a closed contact does not open for longer than a specified time due to shocks during use of the switches.

9. Allowable switching frequency

This is the maximum switching frequency required to reach the end of mechanical life (or electrical life).

10. Temperature rise value

This is the maximum temperature rise value that heats the terminal portion when the rated current is flowing through the contacts.

11. Actuator strength

When applying a static load for a certain period on the actuator in the operation direction, this is the maximum load it can withstand before the switch loses functionality.

12. Terminal strength

When applying a static load for a certain period (in all directions if not stipulated) on a terminal, this is the maximum load it can withstand before the terminal loses functionality (except when the terminal is deformed).

TYPES OF LOAD

1. Resistance load

Resistance load is a power factor of 1 ($\cos\phi = 1$) where the load is only for the resistance portion. The displayed switch rating indicates the current capacity when using alternating current.

2. DC load

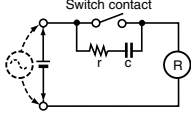
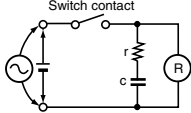
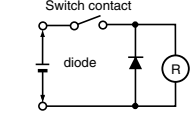
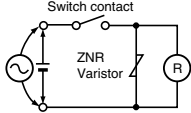
Differing from AC, since the direction of current is fixed for DC, the continuous arc time lengthens when the same voltage is applied.

3. Incandescent lamp load

Since an inrush current of 10 to 15 times the rated current flows for an instant when the switch is turned on for the lamp, adhesion of the contacts may occur. Therefore, please take into consideration this transient current when selecting a switch.

4. Induction load

Since arc generation due to reverse voltage can cause contact failure to occur when there is an induction load (in relays, solenoids and buzzers, etc.), we recommend you insert a suitable spark quenching circuit (see figure below).

Circuit diagram	Notes
	1. $r =$ more than 10 ohms 2. In an AC circuit, impedance of R is to be slightly smaller than impedance of r and c .
	Can be used for both AC and DC circuits. Impedance of r is nearly equal to impedance of R. C: 0.1 μ F
	For DC circuits only.
	Can be used for both AC and DC circuits.

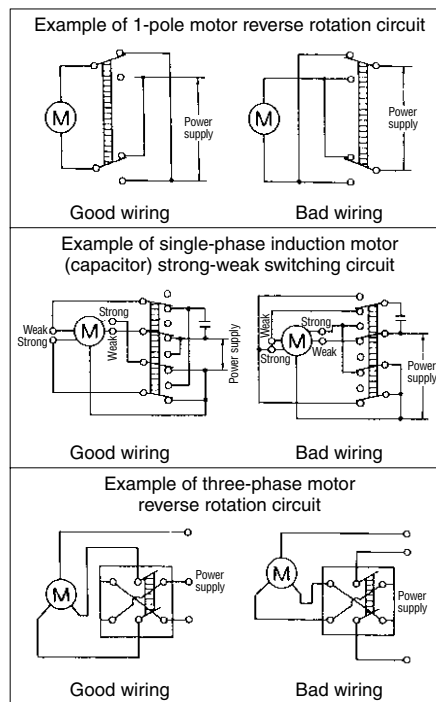
5. Motor load

Contacts may adhere due to the starting current at the start of motor operation which is three to eight times the steady-state current. Although it differs depending on the motor, since a current flows that is several times that of the nominal current, please select a switch taking into consideration the values in the table below. To make the motor rotate in reverse, use an ON-OFF-ON switch and take measures to prevent a multiplier current (starting current + reverse current) from flowing.

Motor type	Type	Starting current
Three-phase induction motor	Squirrel-cage	Approx. 5 to 8 times current listed on nameplate
	Split-phase-start	Approx. 6 times current listed on nameplate
Single-phase induction motor	Capacitor-start	Approx. 4 to 5 times current listed on nameplate
	Repulsion-start	Approx. 3 times current listed on nameplate

TECHNICAL TERMINOLOGY & CAUTIONS FOR USE

A current that is approximately two times that of the starting current will flow when reverse rotation is caused during operation. Also, when using for a load that will cause transient phenomena such as when operating the motor in reverse rotation or switching the poles, an arc short (circuit short) may occur due to the time lag between poles when switching. Please be careful.



6. Capacitor load

In the case of mercury lamps, florescent lamps and the capacitor loads of capacitor circuits, since an extremely large inrush current flows when the switch is turned on, please measure that transient value with the actual load and then either use the product keeping within the range of the rated current or after verifying the actual load.

PRECAUTIONS WHEN USING

1. If you are using with minute loads or when frequency of use is extremely low

Please note that silver or silver alloy is used for the contacts of switches listed in this catalog unless otherwise specified. Since sulfuration of the contact surfaces occurs easily due to change over time and ambient factors, contact may become unstable. For this reason, please use the products below that use Au plating or are Au clad when minute currents are used or the frequency of use is low.

- Turquoise snap switches
- AJ2 (J2) toggle and rocker switches
- ND series low-level circuit type operation switches

2. Environment of use

1) Please consult us when using under the following conditions:

- Environments where hydrogen sulfide or other corrosive gases are present.
- Environments where gasoline, thinner or other flammable, explosive gases are present.
- Dusty environments (for non-seal type snap action switches).
- Use in environments not in the prescribed temperature or humidity range.
- Places with low air pressure.

2) Unless specified the product will not be constructed to withstand water, oil or explosions. Please inquire if you intend to use the product in special applications.

3. Usage, storage, and transport conditions

1) During usage, storage, or transportation, avoid locations subject to direct sunlight and maintain normal temperature, humidity, and pressure conditions.

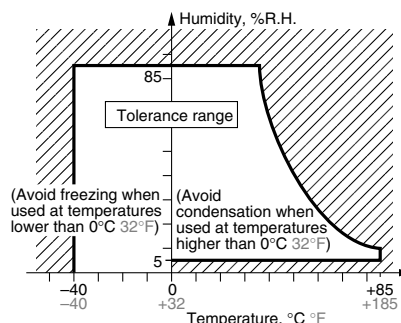
2) The allowable specifications for environments suitable for usage, storage, and transportation are given below.

(1) Temperature: The allowable temperature range differs for each switch, so refer to the switch's individual specifications.

(2) Humidity: 5 to 85% R.H.

(3) Pressure: 86 to 106 kPa

The humidity range varies with the temperature. Use within the range indicated in the graph below.



(The allowable temperature depends on the switch.)

- Condensation will occur inside the switch if there is a sudden change in ambient temperature when used in an atmosphere of high temperature and high

humidity. This is particularly likely to happen when being transported by ship, so please be careful of the atmosphere when shipping. Condensation is the phenomenon whereby steam condenses to cause water droplets that adhere to the switch when an atmosphere of high temperature and humidity rapidly changes from a high to low temperature or when the switch is quickly moved from a low humidity location to one of high temperature and humidity. Please be careful because condensation can cause adverse conditions such as deterioration of insulation, coil cutoff, and rust.

- Condensation or other moisture may freeze on the switch when the temperatures is lower than 0°C 32°F. This causes problems such as sticking of movable parts or operational time lags.
- The plastic becomes brittle if the switch is exposed to a low temperature, low humidity environment for long periods of time.

• Storage for extended periods of time (including transportation periods) at high temperatures or high humidity levels or in atmospheres with organic gases or sulfide gases may cause a sulfide film or oxide film to form on the surfaces of the contacts and/or it may interfere with the functions. Check out the atmosphere in which the units are to be stored and transported.

- In terms of the packing format used, make every effort to keep the effects of moisture, organic gases and sulfide gases to the absolute minimum.

TECHNICAL TERMINOLOGY & CAUTIONS FOR USE

4. Wiring

1) When using a PC board terminal switch as soldering terminals, use thin lead wires and be sure to wind them on the terminals before soldering.

2) Cautions when soldering

Perform soldering quickly in accordance with the specified conditions. Be careful not to let flux flow into the product. When no instruction is specified, use a 60 W soldering iron (350°C) and complete soldering within five seconds. Do not pull on the lead wires immediately after soldering. Wait some time before verifying.

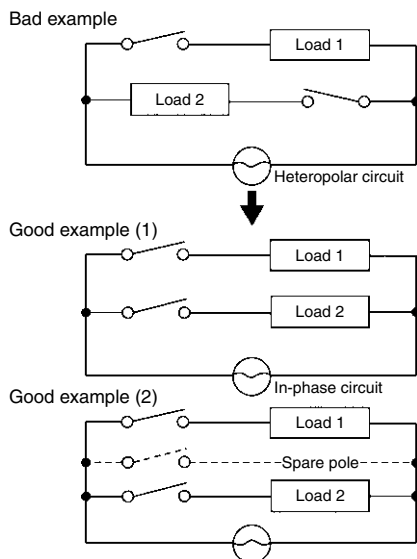
5. Others

1) Failure modes of switches include short-circuiting, open-circuiting and temperature rises. If this switch is to be used in equipment where safety is a prime consideration, examine the possible effects of these failures on the equipment concerned, and ensure safety by providing protection circuits or protection devices. In terms of the systems involved, make provision for redundancy in the design and take steps to achieve safety design.

2) The ambient operating temperature (and humidity) range quoted is the range in which the switch can be operated on a continuous basis: it does not mean that using the switch within the rating guarantees the durability performance and environment withstanding performance of the switch. For details on the performance guarantee, check the specifications of each product concerned.

3) Even if 2-pole, 3-pole or 4-pole switches are used as single-pole switches in order to increase contact reliability, please keep the maximum current no higher than the rated value.

4) If there is the possibility of a short between poles, please use an in-phase circuit as shown below or provide a spare pole.



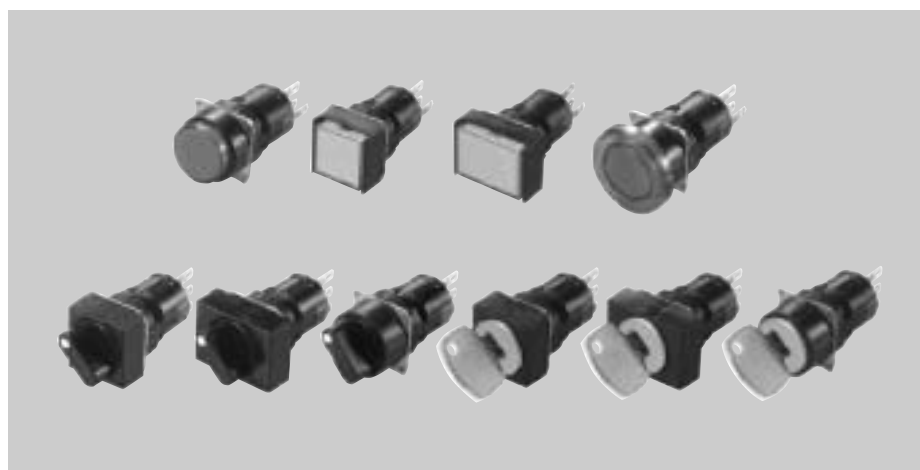
Due to their super miniature size, please be particularly careful with AJ1 (J1) and AJ2 (J2) toggle and rocker switches since sufficient distance between poles cannot be achieved.

5) Be careful not to drop the product as this may cause loss of functionality.

6) Do not apply an unreasonable vertical force against the direction of operation of the product.

7) Use your hand to operate the actuator. (Operation using a tool such as a screwdriver or hammer can cause breakdown.)

Full lineup to meet varied market needs Integrated 30 mm short body



FEATURES

1. Unique Fine-mechanism high performance contact construction realizes fine-touch comfortable operation feel.
Covers wide range applications from consumer devices to FA equipment.
2. LED illuminating unit has built-in resistor and diode for controlling current inside the LED bulb.
3. Splashproof type protective construction (IP65).
4. Contacts made of cadmium-free material. (Gold-clad contact)
5. UL and CSA certified.

RoHS Directive compatibility information
<http://www.nais-e.com/>

ORDERING INFORMATION

1. Illuminated pushbutton switches (LED illumination) and indicators (indicator lamps)

<p>Flange shapes (With transparent button type) 2: 18 dia. projecting type 3: 18 square flat type 4: 18 × 24 flat type (With mushroom button type) 0: 24 dia.</p> <p>Protective construction 2: IP65</p> <p>No. of poles and operating characteristics 0: Indicator (indicator lamp) 1: Single-pole (1 Form C) momentary 2: Double-pole (2 Form C) momentary 3: Single-pole (1 Form C) alternate 4: Double-pole (2 Form C) alternate</p> <p>Contact material 0: Indicator (indicator lamp) (No contact) 2: Low-level circuit type (Gold-clad contact)</p> <p>LED voltages and pushbutton colors</p> <table border="1"> <thead> <tr> <th colspan="2" rowspan="2">Pushbutton color</th><th colspan="6">Color</th></tr> <tr> <th>Red</th><th>Orange</th><th>Yellow</th><th>Green</th><th>Blue</th><th>White (LED: opaque)</th></tr> </thead> <tbody> <tr> <td rowspan="3">LED voltage</td><td>5 V DC</td><td>1R</td><td>4J</td><td>4Y</td><td>7G</td><td>7L</td><td>4X</td></tr> <tr> <td>12 V AC/DC</td><td>2R</td><td>5J</td><td>5Y</td><td>8G</td><td>8L</td><td>5X</td></tr> <tr> <td>24 V AC/DC</td><td>3R</td><td>6J</td><td>6Y</td><td>9G</td><td>9L</td><td>6X</td></tr> </tbody> </table> <p>Color cap types Nil: Regular K: Mushroom button type * There is no mushroom button type in the indicator (indicator lamp).</p>	Pushbutton color		Color						Red	Orange	Yellow	Green	Blue	White (LED: opaque)	LED voltage	5 V DC	1R	4J	4Y	7G	7L	4X	12 V AC/DC	2R	5J	5Y	8G	8L	5X	24 V AC/DC	3R	6J	6Y	9G	9L	6X	<p>ACEA</p> <p>2</p>	<p></p> <p></p> <p></p> <p></p> <p></p> <p></p>	<p></p> <p></p> <p></p> <p></p> <p></p> <p></p>	<p></p> <p></p> <p></p> <p></p> <p></p> <p></p>	<p></p> <p></p> <p></p> <p></p> <p></p> <p></p>	<p></p> <p></p> <p></p> <p></p> <p></p> <p></p>	<p></p> <p></p> <p></p> <p></p> <p></p> <p></p>
Pushbutton color			Color																																								
		Red	Orange	Yellow	Green	Blue	White (LED: opaque)																																				
LED voltage	5 V DC	1R	4J	4Y	7G	7L	4X																																				
	12 V AC/DC	2R	5J	5Y	8G	8L	5X																																				
	24 V AC/DC	3R	6J	6Y	9G	9L	6X																																				

NS Series (ACEA, ACBA, ACSA, ACKA)

2. Pushbutton switches (non-illuminated types and transparent buttons However, the mushroom button type is not clear.)

ACBA

2

2

Flange shapes
(With transparent button type)
2: 18 dia. projecting type
3: 18 square flat type
4: 18 × 24 flat type
(With mushroom button type)
0: 24 dia.

Protective construction
2: IP65

No. of poles and operating characteristics
5: Single-pole (1 Form C) momentary
6: Double-pole (2 Form C) momentary
7: Single-pole (1 Form C) Alternate
8: Double-pole (2 Form C) Alternate

Contact material
2: Low-level circuit type (Gold-clad contact)

Types of color caps
0: Transparent button K: Mushroom button

Pushbutton colors

Pushbutton color	Red	Orange	Yellow	Green	Blue	White	Black
Part No.	R	J	Y	G	L	X	B

Note: Mushroom button type is not available in orange.

3. Selector switches

ACSA

2

6

4

Flange shapes
3: 18 square flat type
4: 18 × 24 flat type
5: 18 dia. flat type

Protective construction
2: IP65

Operation methods
1: 2-notch manual reset
3: 3-notch manual reset

No. of poles
6: 2 Form C

Contact material
4: Low-level circuit type (Gold-clad contact)

NS Series (ACEA, ACBA, ACSA, ACKA)

4. Key selector switches

ACKA		2			2	4	1
Flange shapes 3: 18 square flat type 4: 18 × 24 flat type 5: 18 dia. flat type							
Protective construction 2: IP65							
Operation methods and key removal positions 11: 2-notch manual reset: OFF position 12: 2-notch manual reset: ON position 13: 2-notch manual reset: Both ON and OFF positions 21: 2-notch automatic reset: OFF position 37: 3-notch manual reset (Key can be removed at all 3 positions)							
No. of poles 2: 2 Form C							
Contact material 4: Low-level circuit type (Gold-clad contact)							
Key type 1: Standard key							

TYPES

1. Illuminated pushbutton switches (LED illumination)



18 dia. projecting type



18 square flat type



18 × 24 flat type



24 dia. mushroom button type

Mounting hole	Form	No. of poles	Contact material	Splashproof type (IP65)	
				Momentary	Alternate
				Part No.	Part No.
16mm dia.	18 dia. projecting type	Single pole	Low-level circuit type (Gold-clad contact)	ACEA2212□※	ACEA2232□※
		Double poles		ACEA2222□※	ACEA2242□※
	18 square flat type	Single pole		ACEA3212□※	ACEA3232□※
		Double poles		ACEA3222□※	ACEA3242□※
	18 × 24 flat type	Single pole		ACEA4212□※	ACEA4232□※
		Double poles		ACEA4222□※	ACEA4242□※
	24 dia. mushroom button type	Single pole		ACEA0212□※K	ACEA0232□※K
		Double poles		ACEA0222□※K	ACEA0242□※K

Notes) 1. The following combinations of numbers and letters are entered in the square and in the ※ symbol to indicate the LED voltage and pushbutton color.

Pushbutton color		Color					
		Red	Orange	Yellow	Green	Blue	White (Opaque LED)
LED voltage	5 V DC	1R	4J	4Y	7G	7L	4X
	12 V AC/DC	2R	5J	5Y	8G	8L	5X
	24 V AC/DC	3R	6J	6Y	9G	9L	6X

2. The white type has a colorless transparent cap.

NS Series (ACEA, ACBA, ACSA, ACKA)

2. Indicators (indicator lamps)



18 dia. projecting type



18 square flat type



18 x 24 flat type

Mounting hole	Form	Splashproof type (IP65)
		Part No.
16mm dia.	18 dia. projecting type	ACEA2200□※
	18 square flat type	ACEA3200□※
	18 x 24 flat type	ACEA4200□※

Notes) 1. The following combinations of numbers and letters are entered in the square and in the ※ symbol to indicate the LED voltage and pushbutton color.

Pushbutton color		Color					
		Red	Orange	Yellow	Green	Blue	White (Opaque LED)
LED voltage	5 V DC	1R	4J	4Y	7G	7L	4X
	12 V AC/DC	2R	5J	5Y	8G	8L	5X
	24 V AC/DC	3R	6J	6Y	9G	9L	6X

2. The white type has a colorless transparent cap.

3. Pushbutton switches (non-illuminated types and transparent buttons However, the mushroom button type is not clear.)



18 dia. projecting type



18 square flat type



18 x 24 flat type



24 dia. mushroom button type

Mounting hole	Form	No. of poles	Contact material	Splashproof type (IP65)	
				Momentary	Alternate
				Part No.	Part No.
16mm dia.	18 dia. projecting type	Single pole	Low-level circuit type (Gold-clad contact)	ACBA22520※	ACBA22720※
		Double poles		ACBA22620※	ACBA22820※
	18 square flat type	Single pole		ACBA32520※	ACBA32720※
		Double poles		ACBA32620※	ACBA32820※
	18 x 24 flat type	Single pole		ACBA42520※	ACBA42720※
		Double poles		ACBA42620※	ACBA42820※
	24 dia. Mushroom button	Single pole		ACBA0252K※	ACBA0272K※
		Double poles		ACBA0262K※	ACBA0282K※

Notes) 1. The following letter indicating the pushbutton color is entered in place of the ※ symbol.

Pushbutton color	Red	Orange	Yellow	Green	Blue	White	Black
Part No.	R	J	Y	G	L	X	B

2. The white type has a colorless transparent cap.

3. The mushroom button type is not available in orange.

NS Series (ACEA, ACBA, ACSA, ACKA)

4. Selector switches



18 square flat type



18 x 24 flat type



18 dia. flat type

1) 2-notch manual reset type

Mounting hole	Form	No. of poles	Contact material	Splashproof type (IP65)
				Part No.
16mm dia.	18 square flat type	Double poles	Low-level circuit type (Gold-clad contact)	ACSA32164
	18 x 24 flat type			ACSA42164
	18 dia. projecting type			ACSA52164

2) 3-notch manual reset type

Mounting hole	Form	No. of poles	Contact material	Splashproof type (IP65)
				Part No.
16mm dia.	18 square flat type	Double poles	Low-level circuit type (Gold-clad contact)	ACSA32364
	18 x 24 flat type			ACSA42364
	18 dia. projecting type			ACSA52364

5. Key selector switches



18 square flat type



18 x 24 flat type



18 dia. flat type

1) 2-notch manual reset type

Mounting hole	Form	No. of poles	Contact material	Splashproof type (IP65)		
				Key removed in OFF position Part No.	Key removed in ON position Part No.	Key removed in both OFF and ON positions Part No.
16mm dia.	18 square flat type	Double poles	Low-level circuit type (Gold-clad contact)	ACKA3211241	ACKA3212241	ACKA3213241
	18 x 24 flat type			ACKA4211241	ACKA4212241	ACKA4213241
	18 dia. flat type			ACKA5211241	ACKA5212241	ACKA5213241

2) 2-notch automatic reset type

Mounting hole	Form	No. of poles	Contact material	Splashproof type (IP65)		
				Key removed in OFF position Part No.		
16mm dia.	18 square flat type	Double poles	Low-level circuit type (Gold-clad contact)	ACKA3221241		
	18 x 24 flat type			ACKA4221241		
	18 dia. flat type			ACKA5221241		

3) 3-notch manual reset type

Mounting hole	Form	No. of poles	Contact material	Splashproof type (IP65)		
				Key removed in all 3 positions Part No.		
16mm dia.	18 square flat type	Double poles	Low-level circuit type (Gold-clad contact)	ACKA3237241		
	18 x 24 flat type			ACKA4237241		
	18 dia. flat type			ACKA5237241		

NS Series (ACEA, ACBA, ACSA, ACKA)

SPECIFICATIONS

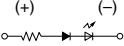
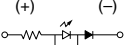
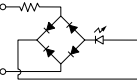
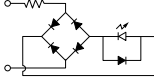



1. Contact rating

1) Gold-clad contact

Load	AC rating	DC rating
Resistive load	0.3 A 250 V AC	1.0 A 30 V DC
Minute load	1 mA 5 V AC/DC*	

Note) The usable range for the minute load indicated by the asterisk may fluctuate depending on the usage conditions and the type of load.

2. LED rating

Rated operating voltage	Operating voltage range	Rated current	LED life (reference value)	Equivalence circuit	Lighted colors
5 V DC	5 V DC±5%	8 mA	Approx. 50,000 hours (with full direct current lighting at 50% of initial intensity)		Red, orange, yellow, opaque
					Green, blue
12 V AC/DC	12 V AC/DC±10%	9 mA/8 mA			Red, orange, yellow, green, blue, opaque
24 V AC/DC	24 V AC/DC±10%	9 mA/8 mA		 <div> LED chip  Protective diode  Zener diode</div>	

Note) The current limiting resistor and protective diode are built into the LED bulb.

3. Characteristics

Item		Specifications
Standard usage condition		Ambient temperature: -25 to +55°C (Not freezing) (Storage temperature: -30 to +80°C) Relative humidity: 45 to 85%
Contact resistance		Max. 50 mΩ (initial)
Insulation resistance		Min. 100 MΩ (500 V DC megger)
Dielectric strength	Switch section	Between metal charging part and non-metal charging part: 2,000 V AC for 1 min. Between terminals with unlike poles: 2,000 V AC for 1 min. Between terminals with like poles: 1,000 V AC for 1 min. Between contact terminals and lamp terminals: 1,500 V AC for 1 min.
	Illuminating section	Between charging part and ground: 2,000 V AC for 1 min.
Vibration resistance	Malfunctioning	10 to 55 Hz at single amplitude of 0.75 mm
Shock resistance	Durability	500 m/s ²
	Malfunctioning	200 m/s ²
Expected life	Mechanical	Momentary: Min. 10 ⁶ times Alternate: Min. 10 ⁵ times Selector switch (incl. those with keys): Min. 2.5 × 10 ⁵ times
	Electrical	Min. 10 ⁵ times, switching frequency 1,200 times/hr. Alternate: Min. 5 × 10 ⁴ times
Protective construction		Splashproof and oil resistance type IP65 (IEC60529)

DIMENSIONS (unit: mm)

1. Illuminated pushbutton switches and indicators



18 dia. projecting type



18 square flat type

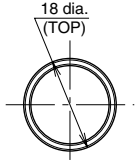


18 x 24 flat type

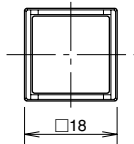


24 dia. mushroom button type

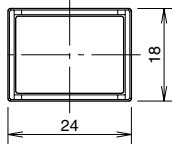
18 dia. projecting type



18 square flat type



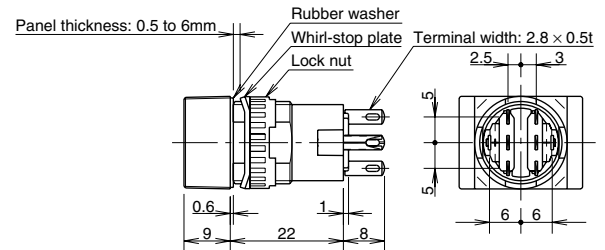
18 x 24 flat type



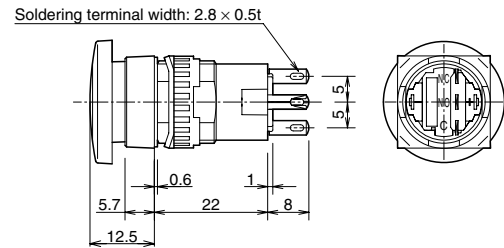
24 dia. mushroom button type



(Illuminated pushbutton switches and indicators)



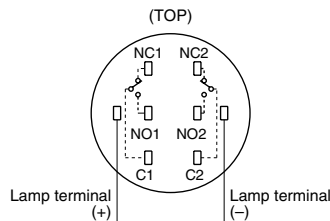
(24 dia. mushroom button type)



- Notes) 1. Indicators have only lamp terminals, and do not have contact terminals.
2. There is no mushroom button type in the indicator.

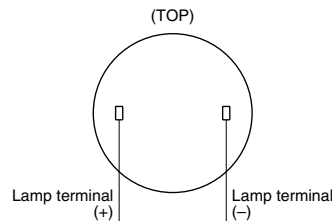
WIRING DIAGRAM (BOTTOM VIEW)

(Illuminated pushbutton switches)



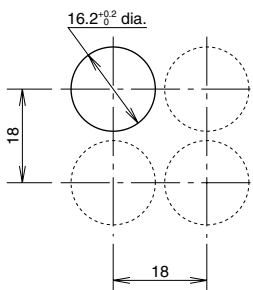
(Single pole "1 Form C" types have only the left terminal.)

(Indicators)

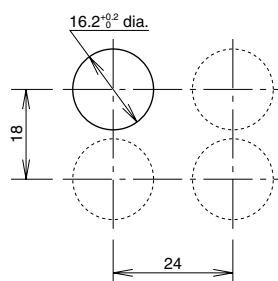


Mounting hole diagram, and recommended minimum mounting pitch

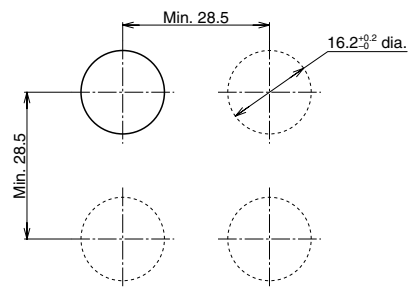
18 dia. projecting and
18 square flat types



18 x 24 flat type



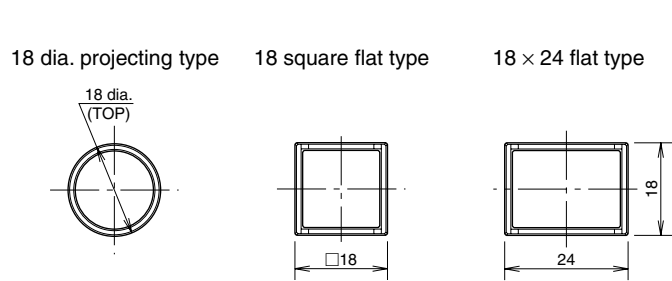
Mushroom button type



Note) Operability should be taken into consideration when deciding the mounting pitch.

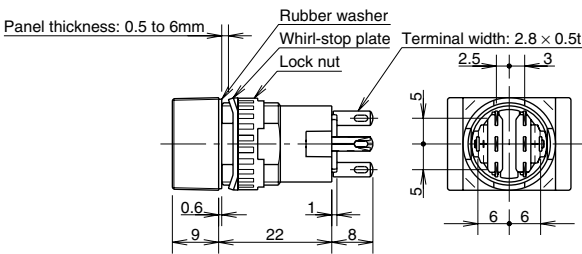
NS Series (ACEA, ACBA, ACSA, ACKA)

2. Pushbutton switches

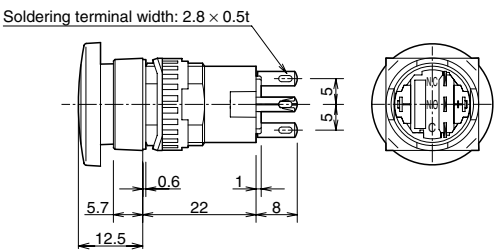


Note) Pushbutton switches have only contact terminals, and do not have lamp terminals.

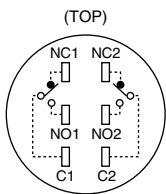
(Illuminated pushbutton switches and indicators)



(24 dia. mushroom button type)

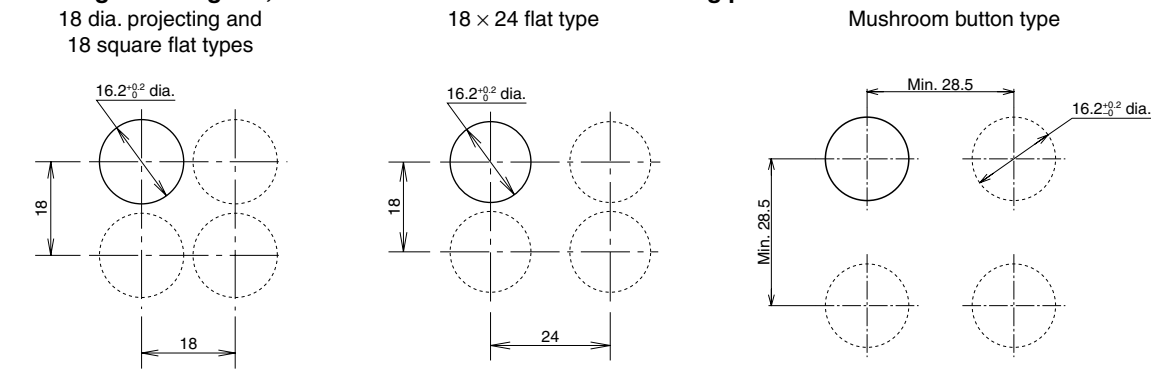


WIRING DIAGRAM (BOTTOM VIEW) (Pushbutton switches)



(Single pole “1 Form C” types have only the left terminal.)

Mounting hole diagram, and recommended minimum mounting pitch



Note) Operability should be taken into consideration when deciding the mounting pitch.

NS Series (ACEA, ACBA, ACSA, ACKA)

3. Selector switches/Key selector switches

1) Selector switches



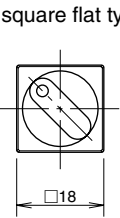
18 square flat type



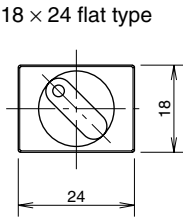
18 x 24 flat type



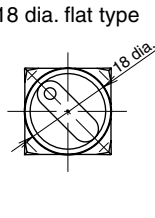
18 dia. flat type



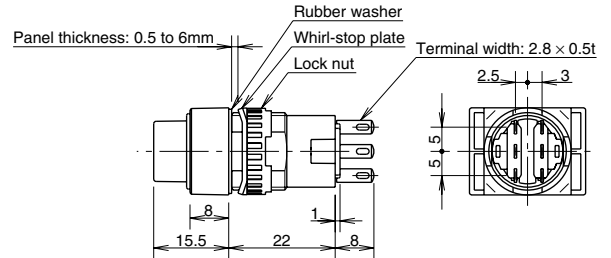
18 square flat type



18 x 24 flat type



18 dia. flat type



2) Key selector switches



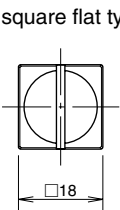
18 square flat type



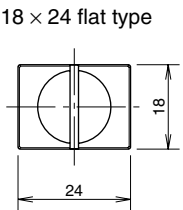
18 x 24 flat type



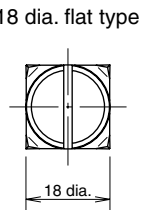
18 dia. flat type



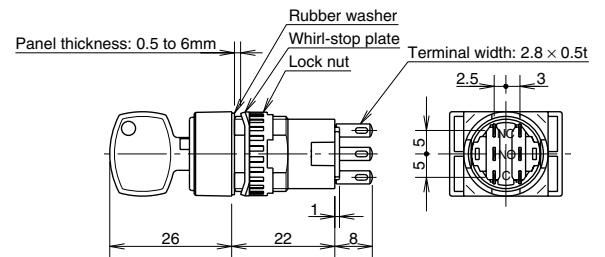
18 square flat type



18 x 24 flat type

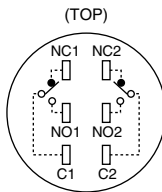


18 dia. flat type



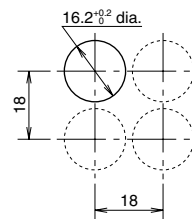
WIRING DIAGRAM (BOTTOM VIEW)

(Selector switches/Key selector switches)

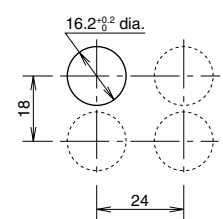


Mounting hole diagram, and recommended minimum mounting pitch

18 dia. projecting and
18 square flat types



18 x 24 flat type



Note) Operability should be taken into consideration when deciding the mounting pitch.

Internal circuit diagram

Notch positions (TOP VIEW)

Notch specifications		Contact arrangement	1 (left)	0 (center)	2 (right)
90°— 2-notch	 Stopping at each position	2 contacts (2 Form C)	Left contact NO NC C1		Right contact NO NC C1
			Right contact NO NC C1		Left contact NO NC C1
45°— 3-notch	 Stopping at each position	2 contacts (2 Form C)	Left contact NO NC C1	Left contact NO NC C1	Right contact NO NC C1
			Right contact NO NC C1		Left contact NO NC C1

NS Series Accessories and maintenance items

Ring tightener



Part No.	ACDL1800
Specifications	Metal
Unit	1 pc.

RoHS Directive compatibility information
<http://www.nais-e.com/>

- This tool is convenient for tightening the lock nuts used when mounting the unit on a panel.
- When tightening rings, the torque should be between 0.68 and 0.88 N·m (7.0 to 9.0 kgf·cm).

Lamp replacement tool



Part No.	ACDA1802
Specifications	For illuminated pushbuttons and indicators
Unit	1 pc.

- This tool is used to replace lamps when LEDs are being installed or removed.

Removal tool



Part No.	ACDL1804
Specifications	Metal
Unit	1 pc.

- This tool is used to pull off the operating parts (color cap, inscribed plate, and holder) of illuminated pushbuttons, indicators, and pushbutton switches.

LEDs (parts for maintenance)



Part No.	ACDA1861□※	ACDA1861□※	ACDA1861□※
Rated operating voltage	5 V DC±5%	12 V AC/DC±10%	24 V AC/DC±10%
Rated current	8 mA	9 mA/8 mA	9 mA/8 mA
Unit	10 pcs.		

Note) The following number/letter combinations indicating the LED voltage and pushbutton color should be entered in the square indicated by the asterisk after the part number.

Pushbutton color		Red	Orange	Yellow	Green	Blue	White
							Opaque LED
LED voltage	5 V DC	1R	4J	4Y	7G	7L	4X
	12 V AC/DC	2R	5J	5Y	8G	8L	5X
	24 V AC/DC	3R	6J	6Y	9G	9L	6X

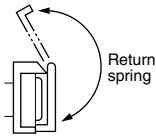
- For illuminated pushbuttons and indicators (indicator lamps), the LED is built-in. These LEDs should be ordered only if spares are required.
- The asterisk in the pack part number is where the letter to indicate the lamp color is inserted.

Maintenance parts should be installed by an engineer with specialized expertise in electrical components. When placing orders, please specify the number of marketing units.

Protective cover



- This cover is designed to prevent erroneous operation.
- The cover opens 180°, and closes by means of a return spring.
- Protective construction: Spray-resistant type (IP65)

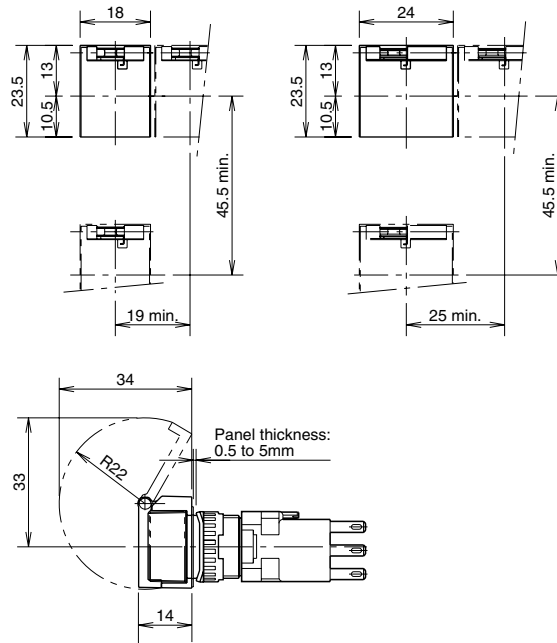


Type	For 18 dia./ 18 square	For 18 × 24
Part No.	ACDL1810	ACDL1811
Unit	10 pcs.	

DIMENSIONS (unit: mm)

18 dia. 18 square (ACDL1810)

18 × 24 (ACDL1811)



Protective cover installation diagram

Dustproof cover



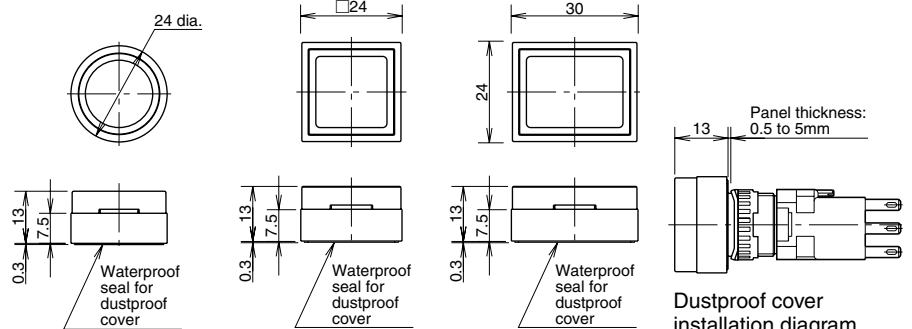
- The minimum installation pitch will be different if the dustproof cover is being used.
- Ambient usage temperature: -10 to +55°C
- Material: Elastomer (front/transparent) and polypropylene (back/non-transparent black)

DIMENSIONS (unit: mm)

18 dia.
(ACDL1812)

18 square
(ACDL1813)

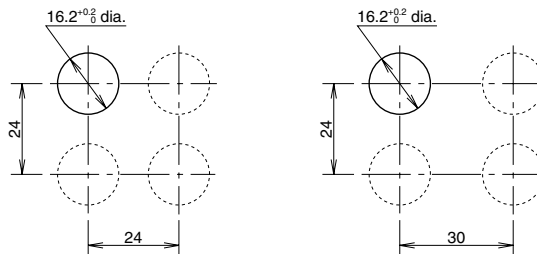
18 × 24
(ACDL1814)



Dustproof cover installation diagram

(Minimum mounting pitch)

- 18 dia. and 18 square types
- 18 × 24 type



Note) When deciding the mounting pitch, make sure the cover has enough room to operate properly.

Type	For 18 dia.	For 18 square	For 18 × 24
Part No.	ACDL1812	ACDL1813	ACDL1814
Unit	10 pcs.		

NS Series Accessories and maintenance items

Insulating terminal cover

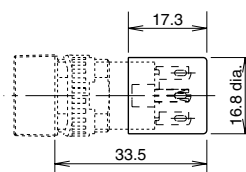


- This terminal cover is made of an opaque nylon material.

Note) When wiring the terminal, insert the lead into the hole in the insulating terminal cover before soldering it.

Part No.	ACDA1850
Specifications	Opaque nylon
Unit	10 pcs.

DIMENSIONS (unit: mm)



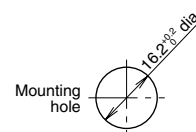
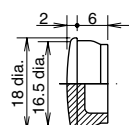
Dimension at inner back of panel when mounting insulating terminal cover: 47 mm

Mounting hole plug (rubber)



Part No.	ACDL1820
Specifications	Nitrile rubber (black) Protective construction: IP65
Unit	10 pcs.

DIMENSIONS (unit: mm)

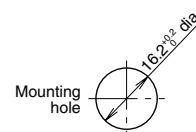
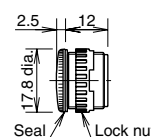


Mounting hole plug (metal)



Part No.	ACDL1821
Specifications	Made of metal; protective construction: IP65
Unit	10 pcs.

DIMENSIONS (unit: mm)



Inscribed plate (maintenance part)



Shape	Round	Square	Rectangular
Part No.	ACDL1830	ACDL1831	ACDL1832
Unit	1 pack (5 plates)		

- Color: Opaque
- Material: Methacrylic resin

Maintenance parts should be installed by an engineer with specialized expertise in electrical components.
When placing orders, please specify the number of marketing units.

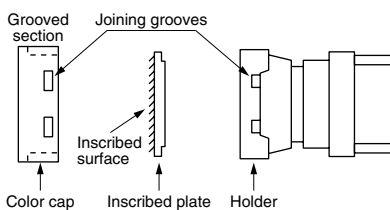
Cautions For Use of the NS Series

Cautions For Use

1. Mounting and removing the color cap and inscribed plate

1) Removing

Grip the grooved part of the color cap with the removal tool (ACDL1804), and pull it towards you to remove the operating parts (the color cap, inscribed plate and lens holder). The inscribed plate can be removed by pushing the color cap outward from the back side, freeing the grooved section that joins it to the holder. The plate is inscribed on one surface, as shown below, and not on the other side.



2) Mounting

Place the inscribed plate in the holder, line up the grooves in the color cap and the holder, and press them together. When doing this, make sure the inscribed plate is facing the correct direction. After the inscribed plate and color cap have been mounted in the holder, insert the assembled unit in the main unit, making sure it faces the correct direction.

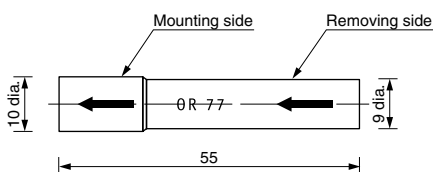
2. Mounting and removing LEDs

[Removing the LED]

Use a lamp replacement tool to remove the LED. Do not use pliers.

[Mounting the LED]

Install using a lamp replacement tool. Be sure that the orientation is correct when mounting.



3. Precautions when mounting the panel

Use a separately sold ring tightener when mounting to a panel. The use of needle-nose pliers or similar and the application of excessive tightening force can cause damage to the ring. The recommended ring tightening torque is 0.88 N·m.

4. Precautions when connecting wiring

Terminals should be soldered at 20 W for less than 5 seconds, or at 260°C for less than 3 seconds, without applying external force. When doing this work, make sure the soldering iron does not come in contact with the switch itself, and that, when connecting the wiring, no tensile force is applied to the terminal. Avoid bending the terminal or subjecting it to excessive force. Non-corroding liquid resin flux should be used.

5. Caution regarding LED service voltage

A service voltage of 5 V DC indicates a perfect direct current value.

6. Handling and Usage Precautions

1) Aggregate tight mounting

Please be aware that heat caused by aggregate tight mounting of indicator lamps and illuminated pushbutton switches or continuously lit lamps can cause the ambient temperature to exceed the prescribed amount. Measures must be taken to ventilate or lower the operation voltage if the mounting panel is not metal or if the product is being used in a sealed control panel.

2) Replacement of buttons (illuminating and non-illuminating)

Do not replace alternate type buttons (illuminating and non-illuminating) when they are locked. (Replacing while locked might damage the internal mechanism.) You must release the locks before replacing.

3) Storage and place of use

(1) Please use within the working ambient temperature and humidity ranges given on the ratings display.

(2) When using in a location where oil, water and dirt are present, install a dust cover so that foreign substances cannot enter the sliding part of the pushbutton.

4) Contact (microswitch)

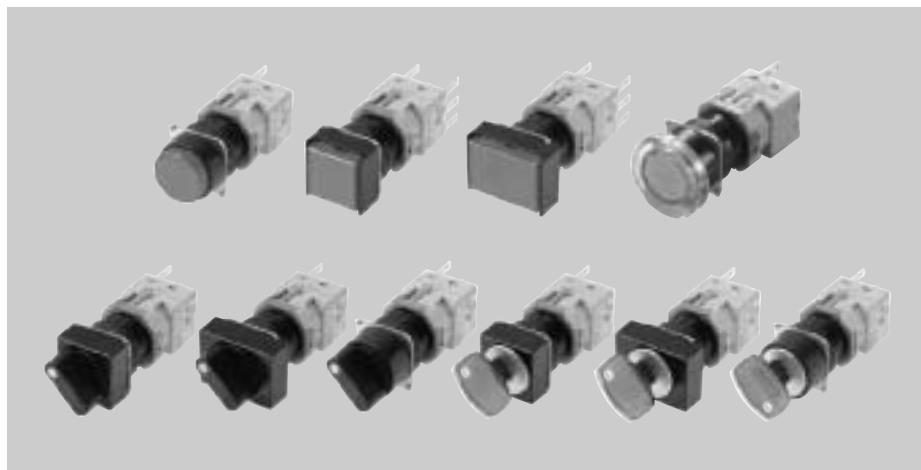
When using identical NC (normal close) and NO (normal open) microswitch contacts, do not connect to the wrong voltage or to the wrong type of power supply. Doing so will cause a dead short.

5) Oil resistance

The product has been evaluated with commonly used standard machining oil and cooling oil. Please inquire about other oils, since use of some special oils may not be possible.

**Bright, clear illumination (ultra-high intensity LED used)
Separate mounting model features removable lock lever**

Tight, space-saving mounting



FEATURES

1. Bright, clear LED illumination

- 1) Uses brilliantly illuminating LEDs that are much brighter than incandescent bulbs.
- 2) Brightness greatly increased for vastly improved recognition and safety. Yellow and green are particularly easy to distinguish.

Makers who are especially concerned about product liability laws and worker safety and sanitation are calling for machines that are designed and manufactured based on the ISO12100 series of international safety standards (general regulations governing basic conceptual design for machine safety). With the ISO12100 series, the man-machine interface must be designed so that the status of the machine can be recognized clearly and correctly by anyone running the machine, without special training or expertise. For that reason, display lamp colors are standardized under IEC60073, IEC60204-1 and other standards cited in the ISO12100 series, and are covered by JIS standards as well. The LED illumination of the ND type meets safety needs such as these, and beyond.

Note) IEC60073:
JIS C 0448 Colors for Display Units and Operation Devices
IEC60204-1:
JIS B 9960-1 Safety of Machines and Electrical Units of Machines

Display lamp colors and meanings indicating machine status (taken from International Electrical Standards Conference IEC-60073 and 60204-1)

Color	Meaning	Explanation	Operator action
Red	Emergency	Hazardous situation	Action appropriate to hazardous situation
Yellow	Caution	Problem status/urgent or critical situation	Visual monitoring and (or) intervention
Green	Normal	Normal status	As appropriate
Blue	Obligatory	Displays status of action required by operator	Obligatory action
White	Neutral	Any other status; Can be used when using red, yellow, green, or blue might be interpreted erroneously.	Visual monitoring

3) Power consumption greatly reduced (12 V type).

The power consumption has been reduced by 60% in the 12 V type (mounting hole 16 dia. type).

4) Continuous illumination with no need for replacement for 5 years (50,000 hours).

5) Products available in 6 illuminated colors: red, orange, yellow, green, blue, and white.

	Rated current	
	Mounting hole 16 dia. type	Mounting hole 22 dia. type
12 V AC/DC type	8 mA (20 mA in previous model)	10 mA (20 mA in previous model)

2. Emergency pushbutton switches equipped with safety lock mechanism. Contacts have forced contact separation mechanism. Two button diameters available, 25 and 40.

1) Safety lock mechanism

A safety lock mechanism is used in which the contact does not move until the pushbutton has completely locked. Because the contact does not operate unless the button has been pressed all the way down, there is no danger of the machine suddenly stopping because of a malfunction caused by something coming in contact with the button, and no loss from such situations.

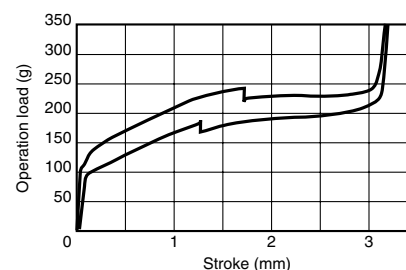


2) Forced contact separation mechanism
The mechanism is designed so that the button operation force is used, as is, as the contact separation force. Therefore, the circuit will shut off perfectly even if a problem happens to occur such as the contact welding shut. (Conforms to EN60947-5-1 Annex K.)

3) Two button diameters available, 25 and 40.

3. Nice, light switching feel. Light operation load due to snap action mechanism. Short stroke type.

Relationship between operation load and stroke (Mounting hole 16 dia. type: 1 Form C contact momentary action)



1) Stroke: 3 mm

2) Mechanical life
(mounting hole 16 dia. type)
Momentary type: Min. 2×10^6
(4 times better than previous)
Alternate type: Min. 2.5×10^5
(2.5 times better than previous)

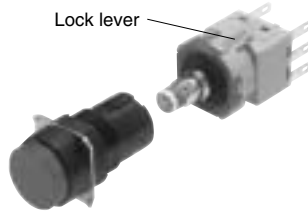
ND Series: 16 dia. types (ACEL, ACBL, ACSL, ACKL)

4. Removal/installation type with lock lever system.

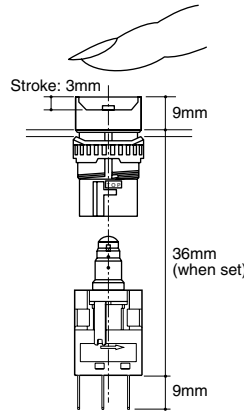
Smooth installation now possible.

- 1) New tight mounting type added. Space saving realized with small installation area.
- 2) It is easy to install in tight spaces and maintenance is easy.
- 3) Operation efficiency is greatly increased since surface installation and wiring operations can be carried out separately.

Mounting hole 16 dia. type



Mounting hole 16 dia. type exterior configuration diagram



5. Mushroom button type for easier operation.

6. Splashproof type protective construction (IP65).

Conforms to IEC 60529.

7. Safety standard

- 1) UL and CSA certified (excluding buzzer).
- 2) Conforms to EN standard (excluding buzzer), has received CE marking.

8. Durability

Thermoplastic materials are used for durability in the outer casing and installation points.

9. Contacts made of cadmium-free material.

RoHS Directive compatibility information
<http://www.nais-e.com/>

ORDERING INFORMATION

1. Illuminated pushbutton switches (LED illumination) and indicators (display lamps)

Illumination type
 EL: LED type

Mounting holes and flange shapes
 (With transparent button type)

Mounting hole	Flange shape
2: 16 dia.	18 dia. projecting type
3: 16 dia.	18 square flat type
4: 16 dia.	18 × 24 flat type

(With mushroom button type)

Mounting hole	Flange shape
0: 16 dia.	24 dia.
5: 16 dia.	30 dia.

Protective construction
 2: Splashproof type (IP65)

No. of poles and operating characteristics

- | | |
|-------------------------------------|-------------------------------------|
| 0: Indicator (indicator lamp) | 3: Single-pole (1 Form C) alternate |
| 1: Single-pole (1 Form C) momentary | 4: Double-pole (2 Form C) alternate |
| 2: Double-pole (2 Form C) momentary | |

Contact material

- | | |
|--|---|
| 0: Indicator (indicator lamp) (No contact) | 2: Low-level circuit type (Gold-clad contact) |
| 1: Standard type (Silver contact) | |

LED voltages and pushbutton colors

Pushbutton color		Color					
		Red	Orange	Yellow	Green	Blue	White (LED: opaque)
LED voltage	5 V DC	1R	4J	4Y	7G	7L	4X
	12 V AC/DC	2R	5J	5Y	8G	8L	5X
	24 V AC/DC	3R	6J	6Y	9G	9L	6X

Terminal shape and mounting dimensions

- Nil: solderable tab terminal, tight mounting
 3: Terminal for PC board and tight mounting (only gold contact)

Color cap types

- Nil: Regular K: Mushroom button type * There is no mushroom button type in the indicator (indicator lamp).

ACEL 2

ND Series: 16 dia. types (ACEL, ACBL, ACSL, ACKL)

2. Pushbutton switches (non-illuminated types and transparent buttons)

ACBL

2

Mounting holes and flange shapes
(With transparent button type)
Mounting hole Flange shape
2: 16 dia. 18 dia. projecting type
3: 16 dia. 18 square flat type
4: 16 dia. 18 × 24 flat type
(With mushroom button type)
Mounting hole Flange shape
0: 16 dia. 24 dia.
5: 16 dia. 30 dia.

Protective construction
2: Splashproof type (IP65)

No. of poles and operating characteristics
5: Single-pole (1 Form C) momentary 7: Single-pole (1 Form C) Alternate
6: Double-pole (2 Form C) momentary 8: Double-pole (2 Form C) Alternate

Contact material
1: Standard type (Silver alloy contact) 2: Low-level circuit type (Gold-clad contact)

Types of color caps
0: Transparent button K: Mushroom button

Pushbutton colors

Transparent button (Mushroom button: not clear)	R	J	Y	G	L	X	B
	Red	Orange	Yellow	Green	Blue	White	Black

Note: Mushroom button type is not available in orange.

Terminal shape and mounting dimensions
Nil: solderable tab terminal, tight mounting
3: Terminal for PC board and tight mounting (only gold contact)

3. Selector switches

ACSL

2

Mounting holes and flange shapes
<Mounting hole Flange shape>
3: 16 dia. 18 square flat type
4: 16 dia. 18 × 24 flat type
5: 16 dia. 18 dia. flat type

Protective construction
2: Splashproof type (IP65)

Operation methods
1: 2-notch manual reset Note) Manual reset: Switch is rotated to turn it on and remains on when released.
3: 3-notch manual reset (Double poles only) Automatic reset: Switch is rotated to turn it on and goes off when released.

No. of poles
5: Single pole (2-notch only) 6: Double poles

Contact material
3: Standard type (Silver contact) 4: Low-level circuit type (Gold-clad contact)

Note: Terminals for PC board are also possible.

22

ND Series: 16 dia. types (ACEL, ACBL, ACSL, ACKL)

4. Key selector switches

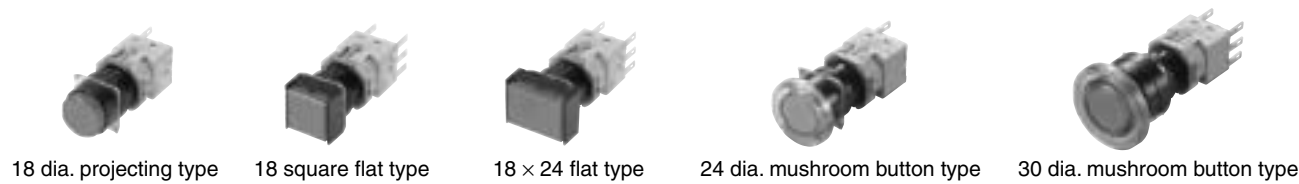
	ACKL		2					1
Mounting holes and flange shapes <Mounting hole Flange shape> 3: 16 dia. 18 square flat type 4: 16 dia. 18 × 24 flat type 5: 16 dia. 18 dia. flat type								
Protective construction 2: Splashproof type (IP65)								
Operation methods and key removal positions 11: 2-notch manual reset: OFF position 12: 2-notch manual reset: ON position 13: 2-notch manual reset: Both ON and OFF positions 21: 2-notch automatic reset: OFF position (mounting hole 16 dia. type only) 37: 3-notch manual reset (no single pole; double poles only) (Key can be removed at all 3 positions)								
No. of poles 1: Single pole 2: Double poles								
Contact material 3: Standard type (Silver contact) 4: Low-level circuit type (Gold-clad contact)								
Key type 1: Standard key								

Note: Terminals for PC board are also possible.

ND Series: 16 dia. types (ACEL, ACBL, ACSL, ACKL)

TYPES

1. Illuminated pushbutton switches (LED illumination)



Form	No. of poles	Contact material	Splashproof type (IP65)	
			Momentary	Alternate
			Part No.	Part No.
18 dia. projecting type	Single pole	Standard type (Silver contact)	ACEL2211□*	ACEL2231□*
		Low-level circuit type (Gold-clad contact)	ACEL2212□*	ACEL2232□*
	Double poles	Standard type (Silver contact)	ACEL2221□*	ACEL2241□*
		Low-level circuit type (Gold-clad contact)	ACEL2222□*	ACEL2242□*
18 square flat type	Single pole	Standard type (Silver contact)	ACEL3211□*	ACEL3231□*
		Low-level circuit type (Gold-clad contact)	ACEL3212□*	ACEL3232□*
	Double poles	Standard type (Silver contact)	ACEL3221□*	ACEL3241□*
		Low-level circuit type (Gold-clad contact)	ACEL3222□*	ACEL3242□*
18 × 24 flat type	Single pole	Standard type (Silver contact)	ACEL4211□*	ACEL4231□*
		Low-level circuit type (Gold-clad contact)	ACEL4212□*	ACEL4232□*
	Double poles	Standard type (Silver contact)	ACEL4221□*	ACEL4241□*
		Low-level circuit type (Gold-clad contact)	ACEL4222□*	ACEL4242□*
24 dia. mushroom button type	Single pole	Standard type (Silver contact)	ACEL0211□*K	ACEL0231□*K
		Low-level circuit type (Gold-clad contact)	ACEL0212□*△K	ACEL0232□*△K
	Double poles	Standard type (Silver contact)	ACEL0221□*K	ACEL0241□*K
		Low-level circuit type (Gold-clad contact)	ACEL0222□*△K	ACEL0242□*△K
30 dia. mushroom button type	Single pole	Standard type (Silver contact)	ACEL5211□*K	ACEL5231□*K
		Low-level circuit type (Gold-clad contact)	ACEL5212□*△K	ACEL5232□*△K
	Double poles	Standard type (Silver contact)	ACEL5221□*K	ACEL5241□*K
		Low-level circuit type (Gold-clad contact)	ACEL5222□*△K	ACEL5242□*△K

Notes) 1. The following combinations of numbers and letters are entered in the square and in the * symbol to indicate the LED voltage and pushbutton color.

Pushbutton color		Red	Orange	Yellow	Green	Blue	White
							Opaque LED
LED voltage	5 V DC	1R	4J	4Y	7G	7L	4X
	12 V AC/DC	2R	5J	5Y	8G	8L	5X
	24 V AC/DC	3R	6J	6Y	9G	9L	6X

2. The white type has a colorless transparent cap.
3. If you would like PC board terminals, please add a "3" to the end of the part number when ordering. However, this only applies to gold contacts. Please inquire for details. Also, if you would like mushroom button type PC board terminals, please add a "3" in the position marked by a triangle.

2. Indicators (indicator lamps)



Form	Splashproof type (IP65)
	Part No.
18 dia. projecting type	ACEL2200□*
18 square flat type	ACEL3200□*
18 × 24 flat type	ACEL4200□*

Notes) 1. The following combinations of numbers and letters are entered in the square and in the * symbol to indicate the LED voltage and pushbutton color.

Pushbutton color		Red	Orange	Yellow	Green	Blue	White
							Opaque LED
LED voltage	5 V DC	1R	4J	4Y	7G	7L	4X
	12 V AC/DC	2R	5J	5Y	8G	8L	5X
	24 V AC/DC	3R	6J	6Y	9G	9L	6X

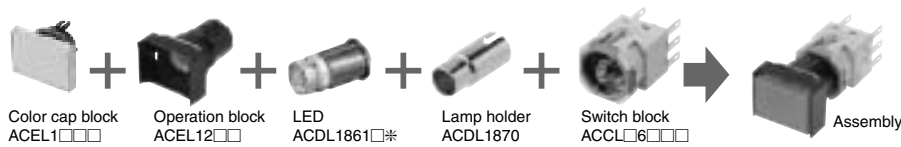
2. The white type has a colorless transparent cap.
3. There is no mushroom button type in the indicator (indicator lamp).
4. If you would like PC board terminals, please add a "3" to the end of the part number when ordering.

ND Series: 16 dia. types (ACEL, ACBL, ACSL, ACKL)

3. Ordering block items

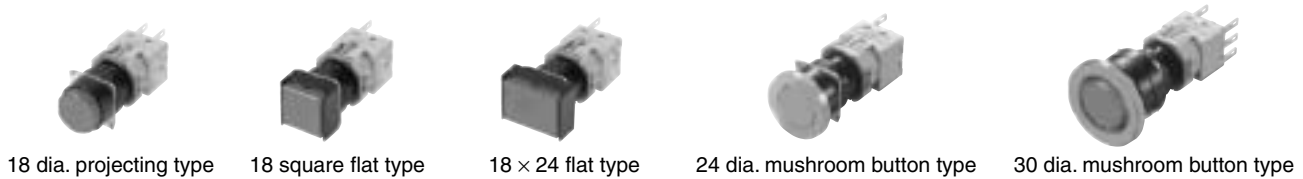
Please refer to the configuration diagram below.

16 dia. mounting hole type illuminated pushbutton switch configuration diagram



- Notes: 1. For LEDs, please see the page on accessories and maintenance parts.
 2. Indicators are also combined as shown above. Please use a dedicated indicator for the switch block.
 3. For the pushbutton switch (non-illuminating), please combine the color cap, operation block and switch block from the blocks above.
 4. Please use a dedicated 30 dia. mushroom button type for a 30 dia. mushroom button operation block.

4. Pushbutton switches (non-illuminated types and transparent buttons However, the mushroom button type is not clear.)



Color cap	Form	No. of poles	Contact material	Splashproof type (IP65)	
				Momentary	Alternate
				Part No.	Part No.
Transparent button	18 dia. projecting type	Single pole	Standard type (Silver contact)	ACBL22510※	ACBL22710※
			Low-level circuit type (Gold-clad contact)	ACBL22520※	ACBL22720※
		Double poles	Standard type (Silver contact)	ACBL22610※	ACBL22810※
			Low-level circuit type (Gold-clad contact)	ACBL22620※	ACBL22820※
	18 square flat type	Single pole	Standard type (Silver contact)	ACBL32510※	ACBL32710※
			Low-level circuit type (Gold-clad contact)	ACBL32520※	ACBL32720※
		Double poles	Standard type (Silver contact)	ACBL32610※	ACBL32810※
			Low-level circuit type (Gold-clad contact)	ACBL32620※	ACBL32820※
	18 x 24 flat type	Single pole	Standard type (Silver contact)	ACBL42510※	ACBL42710※
			Low-level circuit type (Gold-clad contact)	ACBL42520※	ACBL42720※
		Double poles	Standard type (Silver contact)	ACBL42610※	ACBL42810※
			Low-level circuit type (Gold-clad contact)	ACBL42620※	ACBL42820※
Mushroom button	24 dia.	Single pole	Standard type (Silver contact)	ACBL0251K※	ACBL0271K※
			Low-level circuit type (Gold-clad contact)	ACBL0252K※	ACBL0272K※
		Double poles	Standard type (Silver contact)	ACBL0261K※	ACBL0281K※
			Low-level circuit type (Gold-clad contact)	ACBL0262K※	ACBL0282K※
	30 dia.	Single pole	Standard type (Silver contact)	ACBL5251K※	ACBL5271K※
			Low-level circuit type (Gold-clad contact)	ACBL5252K※	ACBL5272K※
		Double poles	Standard type (Silver contact)	ACBL5261K※	ACBL5281K※
			Low-level circuit type (Gold-clad contact)	ACBL5262K※	ACBL5282K※

Notes) 1. The following letter indicating the pushbutton color is entered in place of the ※ symbol.

Pushbutton color	Red	Orange	Yellow	Green	Blue	White	Black
Product no.	R	J	Y	G	L	X	B

2. The white type has a colorless transparent cap.
 3. The mushroom button type is not available in orange.
 4. If you would like PC board terminals, please add a "3" to the end of the part number when ordering. However, this only applies to gold contacts.
 Please inquire for details.

ND Series: 16 dia. types (ACEL, ACBL, ACSL, ACKL)

5. Selector switches



18 square flat type



18 x 24 flat type



18 dia. flat type



2-notch manual reset



3-notch manual reset

1) 2-notch manual reset type

Form	No. of poles	Contact material	Splashproof type (IP65)
			Part No.
18 square flat type	Single pole	Standard type (Silver contact)	ACSL32153
		Low-level circuit type (Gold-clad contact)	ACSL32154
	Double poles	Standard type (Silver contact)	ACSL32163
		Low-level circuit type (Gold-clad contact)	ACSL32164
18 x 24 flat type	Single pole	Standard type (Silver contact)	ACSL42153
		Low-level circuit type (Gold-clad contact)	ACSL42154
	Double poles	Standard type (Silver contact)	ACSL42163
		Low-level circuit type (Gold-clad contact)	ACSL42164
18 dia. flat type	Single pole	Standard type (Silver contact)	ACSL52153
		Low-level circuit type (Gold-clad contact)	ACSL52154
	Double poles	Standard type (Silver contact)	ACSL52163
		Low-level circuit type (Gold-clad contact)	ACSL52164

2) 3-notch manual reset type

Form	No. of poles	Contact material	Splashproof type (IP65)
			Part No.
18 square flat type	Double poles	Standard type (Silver contact)	ACSL32363
		Low-level circuit type (Gold-clad contact)	ACSL32364
18 x 24 flat type	Double poles	Standard type (Silver contact)	ACSL42363
		Low-level circuit type (Gold-clad contact)	ACSL42364
18 dia. flat type	Double poles	Standard type (Silver contact)	ACSL52363
		Low-level circuit type (Gold-clad contact)	ACSL52364

Note: If you would like PC board terminals, please add a "3" to the end of the part number when ordering. However, this only applies to gold contacts.

6. Key selector switches



18 square flat type



18 x 24 flat type




18 dia. flat type

1) 2-notch manual reset type


Form	No. of poles	Contact material	Splashproof type (IP65)		
			Key removed in OFF position	Key removed in ON position	Key removed in both OFF and ON positions
18 square flat type	Single pole	Standard type (Silver contact)	ACKL3211131	ACKL3212131	ACKL3213131
		Low-level circuit type (Gold-clad contact)	ACKL3211141	ACKL3212141	ACKL3213141
	Double poles	Standard type (Silver contact)	ACKL3211231	ACKL3212231	ACKL3213231
		Low-level circuit type (Gold-clad contact)	ACKL3211241	ACKL3212241	ACKL3213241
18 x 24 flat type	Single pole	Standard type (Silver contact)	ACKL4211131	ACKL4212131	ACKL4213131
		Low-level circuit type (Gold-clad contact)	ACKL4211141	ACKL4212141	ACKL4213141
	Double poles	Standard type (Silver contact)	ACKL4211231	ACKL4212231	ACKL4213231
		Low-level circuit type (Gold-clad contact)	ACKL4211241	ACKL4212241	ACKL4213241
18 dia. flat type	Single pole	Standard type (Silver contact)	ACKL5211131	ACKL5212131	ACKL5213131
		Low-level circuit type (Gold-clad contact)	ACKL5211141	ACKL5212141	ACKL5213141
	Double poles	Standard type (Silver contact)	ACKL5211231	ACKL5212231	ACKL5213231
		Low-level circuit type (Gold-clad contact)	ACKL5211241	ACKL5212241	ACKL5213241

ND Series: 16 dia. types (ACEL, ACBL, ACSL, ACKL)

2) 2-notch automatic reset type

Form	No. of poles	Contact material	Splashproof type (IP65)
			 Key removed in OFF position
			Part No.
18 square flat type	Single pole	Standard type (Silver contact)	ACKL3221131
		Low-level circuit type (Gold-clad contact)	ACKL3221141
	Double poles	Standard type (Silver contact)	ACKL3221231
		Low-level circuit type (Gold-clad contact)	ACKL3221241
18 × 24 flat type	Single pole	Standard type (Silver contact)	ACKL4221131
		Low-level circuit type (Gold-clad contact)	ACKL4221141
	Double poles	Standard type (Silver contact)	ACKL4221231
		Low-level circuit type (Gold-clad contact)	ACKL4221241
18 dia. flat type	Single pole	Standard type (Silver contact)	ACKL5221131
		Low-level circuit type (Gold-clad contact)	ACKL5221141
	Double poles	Standard type (Silver contact)	ACKL5221231
		Low-level circuit type (Gold-clad contact)	ACKL5221241

3) 3-notch manual reset type

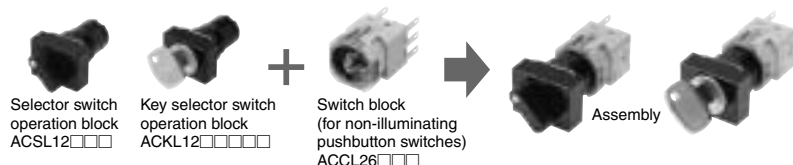
Form	No. of poles	Contact material	Splashproof type (IP65)
			 Key removed in all 3 positions
			Part No.
18 square flat type	Double poles	Standard type (Silver contact)	ACKL3237231
		Low-level circuit type (Gold-clad contact)	ACKL3237241
18 × 24 flat type	Double poles	Standard type (Silver contact)	ACKL4237231
		Low-level circuit type (Gold-clad contact)	ACKL4237241
18 dia. flat type	Double poles	Standard type (Silver contact)	ACKL5237231
		Low-level circuit type (Gold-clad contact)	ACKL5237241

Note: If you would like PC board terminals, please add a "3" to the end of the part number when ordering. However, this only applies to gold contacts.

7. Ordering block items

Selector switches with 16 dia. mounting holes and key selector switches consist of the two blocks below.

Block items are given on a separate page.



ND Series: 16 dia. types (ACEL, ACBL, ACSL, ACKL)

SPECIFICATIONS

1. Contact rating

1) Gold-clad contact

Load	Rating
Resistive load	0.1 A 125 V AC 0.1 A 30 V DC
Minute load	1 mA 5 V AC/DC*

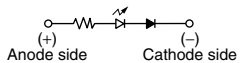
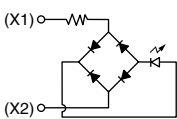
Note) The usable range for the minute load indicated by the asterisk may fluctuate depending on the usage conditions and the type of load.

2) Silver contact

Load	AC rating	DC rating
Resistive load	3 A 250 V AC 3 A 125 V AC	0.4 A 125 V DC 2 A 30 V DC
Induction load*	1.5 A 250 V AC 2 A 125 V AC	0.2 A 125 V DC 1 A 30 V DC

Note) The values for the induction load indicated by the asterisk are as follows: The alternating current induction load is PF = 0.6 to 0.7, and the direct current induction load is L/R = 7 ms and less.

2. LED rating

Rated operating voltage	Operating voltage range	Rated current	LED life (reference value)	Equivalence circuit	Lighted colors	
5 V DC	5 V DC±5%	8 mA	Approx. 50,000 hours (with full direct current lighting at 50% of initial intensity)		Red, orange, yellow, green, blue, opaque	
12 V AC/DC	12 V AC/DC±10%	8 mA				
24 V AC/DC	24 V AC/DC±10%	8 mA				

Note) The current limiting resistor and protective diode are built into the LED bulb.

3. Characteristics

Item		Specifications
Standard usage condition		Ambient temperature: -25 to +55°C (Not freezing) (Storage temperature: -30 to +80°C) Relative humidity: 45 to 85%
Contact resistance		Max. 50 mΩ (initial)
Insulation resistance		Min. 100 MΩ (500 V DC megger)
Dielectric strength	Switch section	Between charging part and ground: 2,500 V AC for 1 min. Between terminals with unlike poles: 2,500 V AC for 1 min. Between terminals with like poles: 1,000 V AC for 1 min.
	Illuminating section	Between charging part and ground: 2,500 V AC for 1 min.
Vibration resistance	Malfunctioning	10 to 55 Hz at double amplitude of 1.5 mm
Shock resistance	Durability	1,000 m/s ²
	Malfunctioning	196 m/s ²
Expected life	Mechanical	Momentary: Min. 2 x 10 ⁶ times, switching frequency 1,200 times/hr. Alternate: Min. 2.5 x 10 ⁵ times, switching frequency 1,200 times/hr. Selector switch (incl. those with keys): Min. 2.5 x 10 ⁵ times, switching frequency 1,200 times/hr.
	Electrical	Momentary: Min. 10 ⁵ times, switching frequency 1,200 times/hr. Alternate: Min. 10 ⁵ times, switching frequency 1,200 times/hr. Selector switch (incl. those with keys): Min. 10 ⁵ times, switching frequency 1,200 times/hr.
Protective construction		Splashproof type IP65 (IEC60529)
Terminal shape		110 terminal with tab that doubles for soldering use

ND Series: 16 dia. types (ACEL, ACBL, ACSL, ACKL)

DIMENSIONS (unit: mm)

1. Illuminated pushbutton switches, indicators, and pushbutton switches



18 dia. projecting type



18 square flat type



18 x 24 flat type

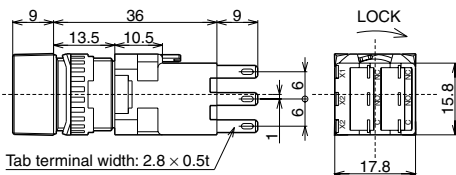
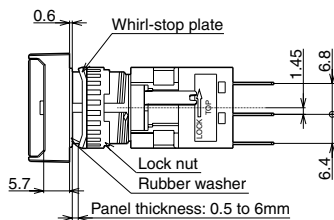


24 dia. mushroom button type



30 dia. mushroom button type

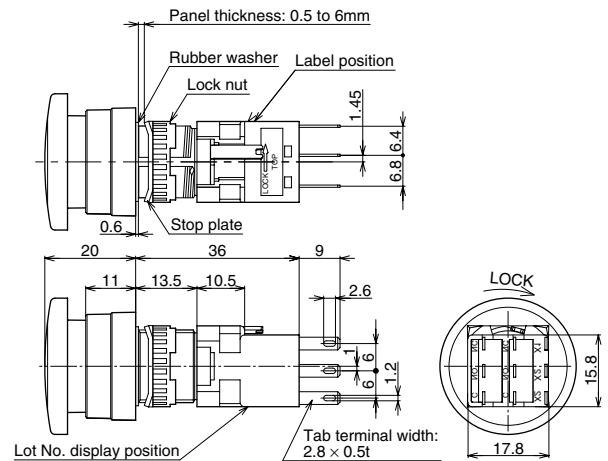
(Tight mounting type illuminated pushbutton switches)



(Indicators)

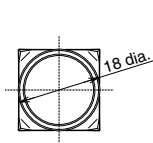
(Pushbutton switches)

30 dia. mushroom button type

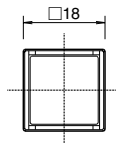


External dimensions

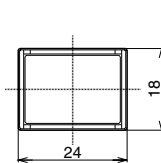
18 dia. projecting type



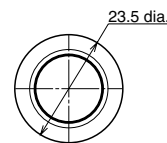
18 square flat type



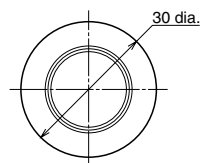
18 x 24 flat type



24 dia. mushroom button type

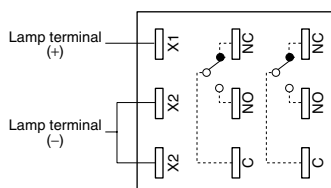


30 dia. mushroom button type



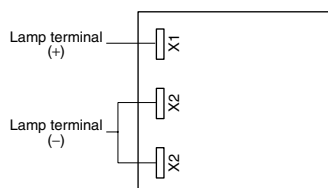
- Notes) 1. Pushbutton switches have only contact terminals, and do not have lamp terminals.
2. Indicators have only lamp terminals, and do not have contact terminals.
3. There is no mushroom button type in the indicator.
4. Please inquire regarding external dimensions of the PC board terminal type.

WIRING DIAGRAM (BOTTOM VIEW) (Illuminated pushbutton switches)

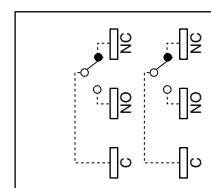


(Single pole types have only the right terminal.)

(Indicators)



(Pushbutton switches)



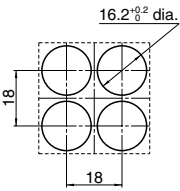
(Single pole types have only the right terminal.)

- Notes: 1. "X2" terminals have two terminals in order to make cross wiring easy.
2. Two "X2" terminals are connected internally.

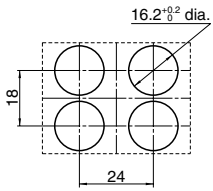
ND Series: 16 dia. types (ACEL, ACBL, ACSL, ACKL)

Tight mounting type, mounting hole diagram, and recommended minimum mounting pitch
Change to tight mounting type was from production lot of March, 2002.

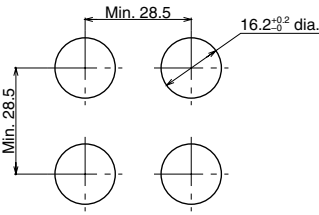
18 dia. projecting and
18 square flat types



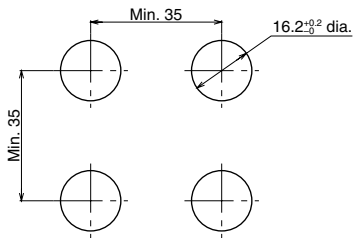
18 × 24 flat type



24 dia. mushroom button type



30 dia. mushroom button type



Note) Operability should be taken into consideration when deciding the mounting pitch.

2. Selector switches/Key selector switches

1) Selector switches



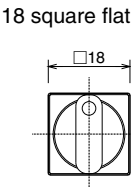
18 square flat type



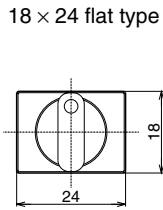
18 × 24 flat type



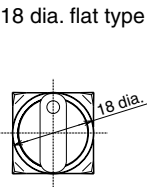
18 dia. flat type



18 square flat type

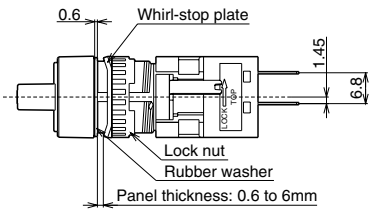


18 × 24 flat type

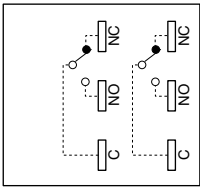


18 dia. flat type

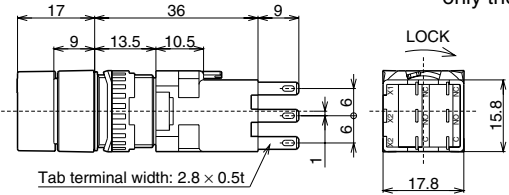
External dimensions



Wiring diagram (BOTTOM VIEW)



(Single pole types have only the right terminal.)



2) Key selector switches



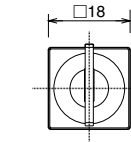
18 square flat type



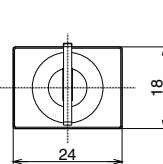
18 × 24 flat type



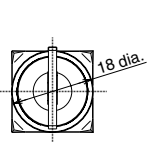
18 dia. flat type



18 square flat type

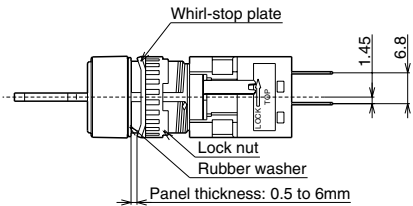


18 × 24 flat type

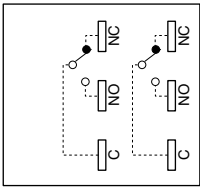


18 dia. flat type

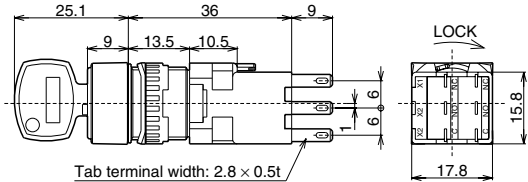
External dimensions



Wiring diagram (BOTTOM VIEW)



(Single pole types have only the right terminal.)

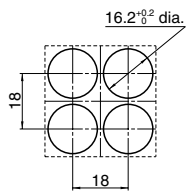


ND Series: 16 dia. types (ACEL, ACBL, ACSL, ACKL)

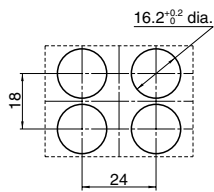
Tight mounting type, mounting hole diagram, and recommended minimum mounting pitch

Change to tight mounting type was from production lot of March, 2002.

18 dia. projecting and
18 square flat types



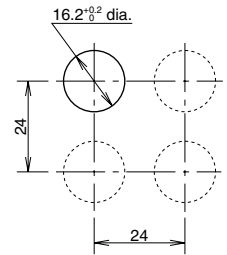
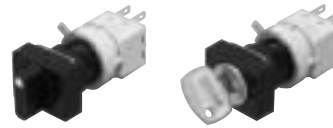
18 × 24 flat type



24 x 24 mounting pitch type, mounting hole diagram, and recommended minimum mounting pitch

The mounting hole diagram below applies to products up to the production lot of February 2002.

24 × 24 mounting pitch type



Note) Operability should be taken into consideration when deciding the mounting pitch.

Note) Operability should be taken into consideration when deciding the mounting pitch.

Internal circuit diagram

Notch specifications		Contact arrangement	Notch positions (TOP VIEW)		
			1 (left)	0 (center)	2 (right)
90° -2-notch		1 Form C			
		2 Form C			
45° -3-notch		2 Form C			

Emergency pushbutton switches

ND Series

(mounting hole 16 dia. type)



25 dia. button type



40 dia. button type

FEATURES

1. Equipped with a safety lock mechanism that prevents emergency stops caused by erroneous operation

1) Safety lock mechanism
A safety lock mechanism is used in which the contact does not move until the pushbutton has completely locked. Because the contact does not operate unless the button has been pressed all the way down, there is no danger of the machine suddenly stopping because of a malfunction caused by something coming in contact with the button, and no loss from such situations.

2. Forced contact separation mechanism used as the contact mechanism. Has received CE marking.

1) Forced contact separation mechanism
The mechanism is designed so that the button operation force is used, as is, as the contact separation force. Therefore, the circuit will shut off perfectly even if a problem happens to occur such as the contact welding shut. (Conforms to EN60947-5-1 Annex K.)
UL and CSA certified.
Conforms to EN (European) standards. (Meets EN60947-1, EN60947-5-1, and DEMKO standards.)

3. Two button diameters available, 25 and 40

RoHS Directive compatibility information
<http://www.nais-e.com/>

ORDERING INFORMATION

Emergency pushbutton switches (push to lock, turn to reset)

Mounting holes shape
Mounting hole
2: 16 dia.

Protective construction/Contact method
5: Splashproof type (IP65)/Form B contact, forced contact separation type

No. of poles
1: Single pole
2: Double poles

Contact material
1: Standard type (Silver contact)

Color cap shapes
1: 40 dia.
2: 25 dia.

Color cap color
R: Red

ACHL 2 5 1 R

TYPES

Mounting hole	Contact arrangement	Color cap	Splashproof type (IP65)/Form B contact, forced contact separation type
			Part No.
16 mm dia.	1 Form B	40 dia.	ACHL25111R
		25 dia.	ACHL25112R
	2 Form B	40 dia.	ACHL25211R
		25 dia.	ACHL25212R

Note: Emergency pushbutton switches are not sold as block items.

SPECIFICATIONS

1. Contact rating

Load	AC rating	DC rating
Resistive load	3 A 250 V AC 5 A 125 V AC (AC-12)	0.2 A 250 V DC 0.4 A 125 V DC 2 A 30 V DC (DC-12)
Induction load*	1.5 A 250 V AC 3 A 125 V AC (AC-15)	0.1 A 250 V DC 0.22 A 125 V DC 1 A 30 V DC (DC-13)

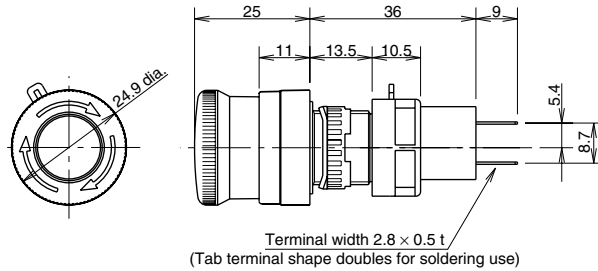
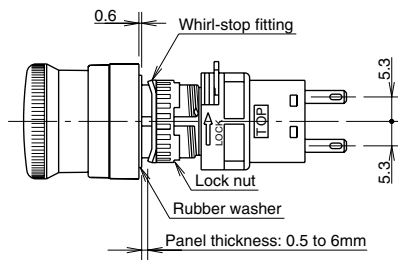
Note) The values for the induction load indicated by the asterisk are as follows: The alternating current induction load is PF = 0.6 to 0.7, and the direct current induction load is L/R = 7 ms and less.

2. Characteristics

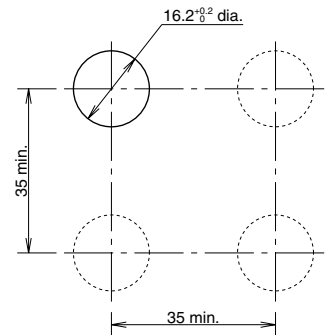
Item	Specifications
Standard usage condition	Ambient temperature: -25 to +55°C (Not freezing) (Storage temperature: -30 to +80°C) Relative humidity: 45 to 85%
Contact resistance	Max. 50 mΩ (initial)
Insulation resistance	Min. 100 MΩ (500 V DC megger)
Dielectric strength	Switch section Between charging part and ground: 2,500 V AC for 1 min. Between terminals with unlike poles: 2,500 V AC for 1 min. Between terminals with like poles: 1,000 V AC for 1 min.
Vibration resistance	Malfunctioning 10 to 55 Hz at double amplitude of 1.5 mm
Shock resistance	Durability 1,000 m/s ² Malfunctioning 196 m/s ²
Expected life	Mechanical Min. 2.5 × 10 ⁵ Electrical Min. 10 ⁵ , switching frequency 1,200 times/hr.
Protective construction	Splashproof type IP65 (IEC 60529)
Terminal shape	110 terminal with tab that doubles for soldering use

DIMENSIONS (unit: mm)

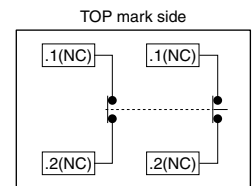
1) 25 dia. button type



Panel mounting dimension

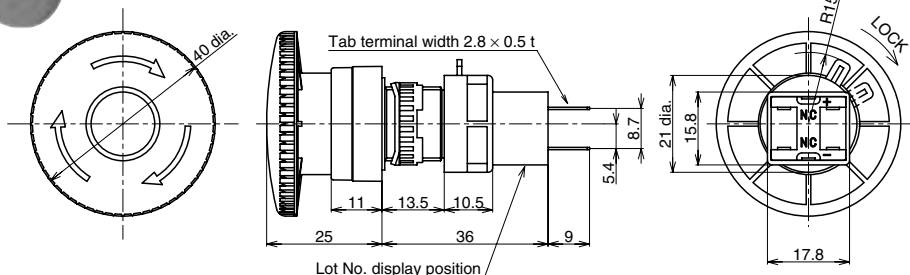


Wiring Diagram (BOTTOM VIEW)

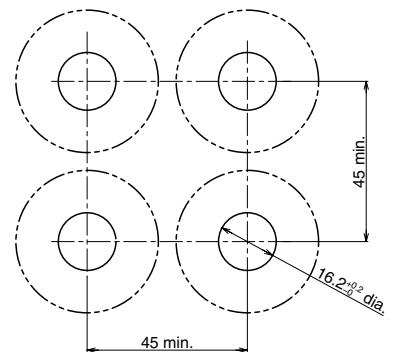


Note) The 1 Form B contact type has a contact only on the left side.

2) 40 dia. button type



Panel mounting dimension





FEATURES

The user can select a continuous buzzing sound, a long intermittent sound, or a short intermittent sound, using a slide switch inside the terminal part.

RoHS Directive compatibility information
<http://www.nais-e.com/>

TYPES

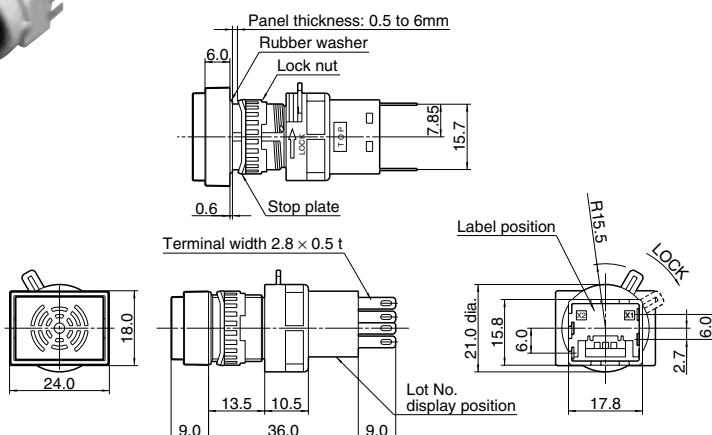
Mounting hole	Shape of panel front	Usage voltage	Part No.
16 mm dia.	18 × 24	12 to 24 V AC/DC ±10%	ACZL4100

Notes: 1. The user can select a continuous buzzing sound, a long intermittent sound, or a short intermittent sound, using a slide switch inside the terminal part.
 2. Buzzers are not sold as block items.

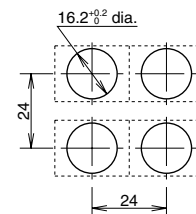
SPECIFICATIONS

Rated insulating voltage	60 V AC/DC
Rated operating voltage	12 to 24 V AC/DC ±10%
Current consumption	DC: 7 mA, AC: 20 mA
Sound pressure (at 0.1 m)	Min. 80 dB for continuous sound (at rated voltage)
Sound frequency	2 kHz ±500 Hz
Buzzer repetitions	Long intermittent: 55 times/min. ±10% Short intermittent: 600 times/min. ±10%
Standard usage conditions	Ambient temperature: -20 to +55°C (Not freezing) Relative humidity: 45 to 85%
Insulation resistance	Min. 100 MΩ (500 V DC megger)
Dielectric strength	Between charging and non-charging parts: 1,000 V AC for 1 min.
Vibration resistance (malfunctioning)	5 to 55 Hz at unilateral amplitude of 0.5 mm
Shock resistance (durability)	1,000 m/s ²
Expected life	1,000 hours min.
Protective construction	Enclosed type (JEM 1030)
Terminal shape	110 terminal with tab that doubles for soldering use

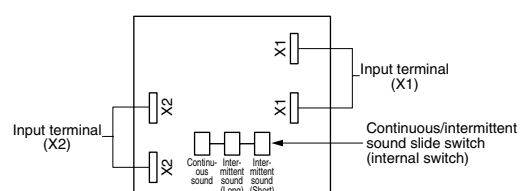
DIMENSIONS (unit: mm)



Panel mounting dimension



Wiring Diagram (BOTTOM VIEW)



Accessories and maintenance items (16 dia.)

Ring tightener



Part No.	ACDL1800
Specifications	Metal
Unit	1 pc.

RoHS Directive compatibility information
<http://www.nais-e.com/>

- This tool is convenient for tightening the lock nuts used when mounting the unit on a panel.
- When tightening rings, the torque should be between 0.68 and 0.88 N·m (7.0 to 9.0 kgf·cm).

Lamp replacement tool



Part No.	ACDL1802
Specifications	For illuminated pushbuttons and indicators
Unit	10 pcs.

- This tool is used to replace lamps when LEDs are being installed or removed.

Removal tool



Part No.	ACDL1804
Specifications	Metal
Unit	1 pc.

- This tool is used to pull off the operating parts (color cap, inscribed plate, and holder) of illuminated pushbuttons, indicators, and pushbutton switches.

LEDs (parts for maintenance)



Part No.	ACDL1861□※	ACDL1861□※	ACDL1861□※
Rated operating voltage	5 V DC±5%	12 V AC/DC±10%	24 V AC/DC±10%
Rated current	8 mA	8 mA	8 mA
Unit	10 pcs.		

Note) The following number/letter combinations indicating the LED voltage and pushbutton color should be entered in the square indicated by the asterisk after the part number.

Pushbutton color		Red	Orange	Yellow	Green	Blue	White Opaque LED
LED voltage	5 V DC	1R	4J	4Y	7G	7L	4X
	12 V AC/DC	2R	5J	5Y	8G	8L	5X
	24 V AC/DC	3R	6J	6Y	9G	9L	6X

- For illuminated pushbuttons and indicators (indicator lamps), the LED is built-in. These LEDs should be ordered only if spares are required.
- The asterisk in the pack part number is where the letter to indicate the lamp color is inserted.

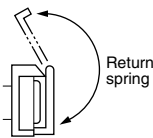
Maintenance parts should be installed by an engineer with specialized expertise in electrical components. When placing orders, please specify the number of marketing units.

Accessories and maintenance items (16 dia.)

Protective cover



- This cover is designed to prevent erroneous operation.
- The cover opens 180°, and closes by means of a return spring.
- Protective construction: Spray-resistant type (IP65)

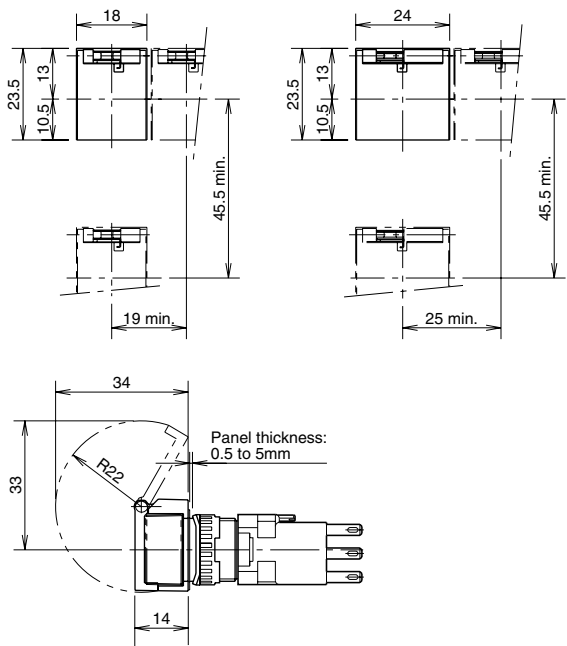


Type	For 18 dia./ 18 square	For 18 × 24
Part No.	ACDL1810	ACDL1811
Unit	10 pcs.	

DIMENSIONS (unit: mm)

18 dia. 18 square (ACDL1810)

18 × 24 (ACDL1811)



Protective cover installation diagram

Dustproof cover



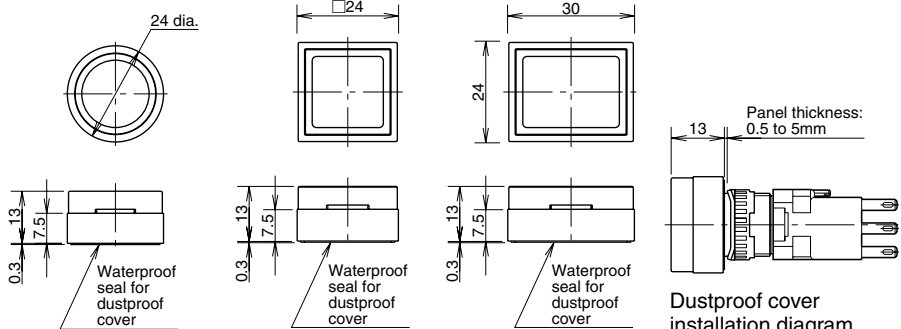
- The minimum installation pitch will be different if the dustproof cover is being used.
- Ambient usage temperature: -10 to +55°C
- Material: Elastomer (front/transparent) and polypropylene (back/non-transparent black)

DIMENSIONS (unit: mm)

18 dia.
(ACDL1812)

18 square
(ACDL1813)

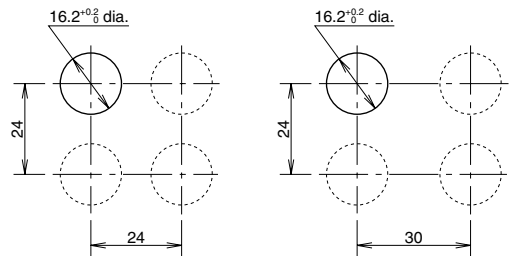
18 × 24
(ACDL1814)



Dustproof cover installation diagram

(Minimum mounting pitch)

- 18 dia. 18 square type
- 18 × 24 type

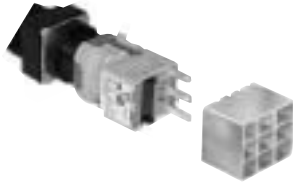


Note) When deciding the mounting pitch, make sure the cover has enough room to operate properly.

Type	For 18 dia.	For 18 square	For 18 × 24
Part No.	ACDL1812	ACDL1813	ACDL1814
Unit	10 pcs.		

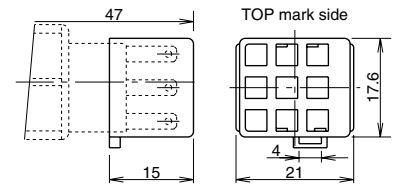
Maintenance parts should be installed by an engineer with specialized expertise in electrical components. When placing orders, please specify the number of marketing units.

Insulating terminal cover



Part No.	ACDL1850
Specifications	Opaque nylon material
Unit	10 pcs.

DIMENSIONS (unit: mm)



- This terminal cover is made of an opaque nylon material.

Note) When wiring the terminal, insert the lead into the hole in the insulating terminal cover before soldering it.

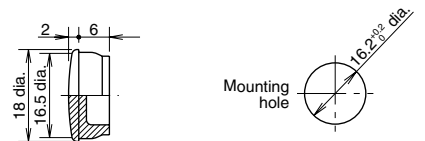
Dimension at inner back of panel when mounting insulating terminal cover: 47 mm

Mounting hole plug (rubber)



Part No.	ACDL1820
Specifications	Nitrile rubber (black) Protective construction: IP65
Unit	10 pcs.

DIMENSIONS (unit: mm)

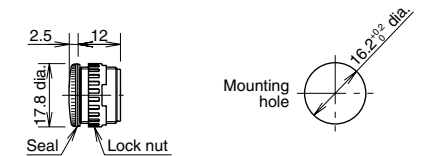


Mounting hole plug (metal)



Part No.	ACDL1821
Specifications	Made of metal Protective construction: IP65
Unit	10 pcs.

DIMENSIONS (unit: mm)



Maintenance parts should be installed by an engineer with specialized expertise in electrical components.
When placing orders, please specify the number of marketing units.

Inscribed plate (maintenance part)



Shape	Round	Square	Rectangular	24 dia. mushroom button type	30 dia. mushroom button type
Part No.	ACDL1830	ACDL1831	ACDL1832	ACDL1835	ACDH1836
Unit	1 pack (5 plates)				

- Color: Opaque
- Material: Methacrylic resin
- ACDL1835 and ACDH1836 for mushroom buttons are for illuminating pushbuttons.

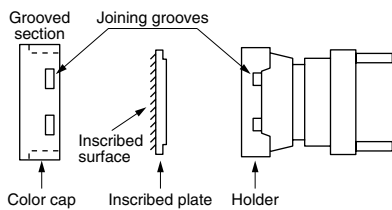
Cautions For Use of the ND Series (16 dia.)

Cautions For Use

1. Mounting and removing the color cap and inscribed plate

1) Removing

Grip the grooved part of the color cap with the removal tool (Part No. ACDL1804), and pull it towards you to remove the operating parts (the color cap, inscribed plate and holder). The inscribed plate can be removed by pushing the color cap outward from the back side, freeing the grooved section that joins it to the holder. The plate is inscribed on one surface, as shown below, and not on the other side.



2) Mounting

Place the inscribed plate in the holder, line up the grooves in the color cap and the holder, and press them together. When doing this, make sure the inscribed plate is facing the correct direction. After the inscribed plate and color cap have been mounted in the holder, insert the assembled unit in the main unit, making sure it faces the correct direction.

3) Precautions when mounting the operating part (non-illuminated type) Like the illuminated pushbutton switch, the pushbutton switch (non-illuminated type) also has an inscribed plate. When mounting and removing the operating part, make sure the plate is mounted in the same way as that of the illuminated pushbutton switch.

2. Mounting and removing LEDs

LEDs can be mounted and removed from the front of the panel, using the lamp replacement tool, but can also be done from the back, by removing the switch block.

1) Mounting and removing the LED from the front of the panel

[Removing the LED]

(1) Insert the lamp replacement tool in the lamp housing, and turn it slightly to the left while pressing lightly on it, to remove the LED cap.

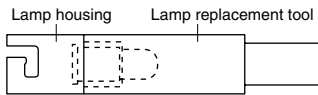


(2) Press on the head of the LED to remove it from the lamp housing.

[Mounting the LED]

(1) First, insert the LED into the lamp housing. Make sure the LED has been pressed firmly all the way into the lamp housing. (This is done more easily using the lamp replacement tool on the side on which the LED is gripped.)

(2) Insert the lamp replacement tool to the position in the lamp housing shown below, and hold it at that position.



(3) If the tool is inserted so that the insertion guide inside the lamp housing is facing the same direction as the TOP mark on the switch block, the mounting base in the switch block will be facing the same direction as the insertion guide in the lamp housing. When these are aligned correctly, turn the tool to the right while pressing lightly on it to install the LED.

2) Removing and mounting the LED by removing the switch block

The LED can be mounted or removed without using any tools if the switch block is removed.

3. Panel mounting



Separate the operation block and switch block and attach the operation block to the panel hole from the front of the panel. Then insert the whirl-stop plate from the back of the panel, and tighten it with the lock nut. Finally, mount the switch block.

1) Mounting and removing the switch block

(1) Move the lock lever of the switch block in the direction opposite the arrow to pull the switch block off of the operation block.
(2) When mounting the switch block, align the TOP marks on the operation block and the switch block, and move the lever in the direction of the arrow to lock the switch block in place.

2) Precautions when mounting the panel



To tighten the ring when mounting the operation block panel, use the special tool (ring tightener, Part No. ACDL1800, sold separately), and tighten the ring to a torque between 0.68 N·m (7 kgf·cm) and 0.88 N·m (9.0 kgf·cm). Using radio pliers to tighten the ring, or tightening it beyond the required torque, can damage the ring, so be careful to tighten it correctly.

4. Inscribed display

With the ND series manual operating illuminated pushbutton switches and indicators (indicator lamps) with 16 dia. mounting holes, the internal inscribed plate can be engraved. The range and depth of the engraving are as shown below. Insertion of inscribed film is not possible due to the internal construction.

Engraving dimensions for ND series with 16 dia. mounting hole

Shape	Plate prod. no.	Outer dimension	Thick-ness	Engraving range	Engraving depth
Round	ACDL1830	13.7 dia.	0.8	11.8 dia.	Depth 0.5 max.
Square	ACDL1831	13.7 square	0.8	12.0 square	Depth 0.5 max.
Rectan-gular	ACDL1832	19.7 x 13.7	0.8	18.0 x 12.0	Depth 0.5 max.

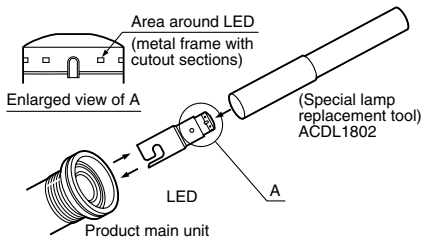
Note) Material: Opaque methacrylic resin
Do not insert film or any other foreign substances between the color cap and the inscribed plate.

5. Precautions when working with blue and green LEDs

With illuminated pushbutton switches and indicators (indicator lamps), the LED has already been installed, but if green or blue LEDs are being replaced, be careful that no static electricity comes in direct contact with the part of the metal frame around the LED module that has the cutouts in it (see illustration below). If static electricity is applied to this part, it can destroy the LED element. When mounting the LED in the main unit, use the special lamp replacement tool (Part No. ACDL1802) designed for that purpose.

Cautions For Use of the ND Series (16 dia.)

For instructions on mounting and removing LEDs, please see “2. Mounting and removing the LEDs”.



6. Precautions when connecting wiring

1) Terminals should be soldered at 20 W for less than 5 seconds, or at 260°C for less than 3 seconds, without applying external force. When doing this work, make sure the soldering iron does not come in contact with the switch itself, and that, when connecting the wiring, no tensile force is applied to the terminal. Avoid bending the terminal or subjecting it to excessive force.

2) Non-corroding liquid resin flux should be used.

7. Handling the insulating terminal cover

Align the TOP marks on the main unit and the insulating terminal cover, and insert the cover.

Note) When connecting the wiring, insert the lead into the hole in the insulating terminal cover before soldering it.

8. Connections

Positive Lock connectors (made by AMP Co.) and Easy Lock connectors (made by Nichifu Co.) may be used for the tab terminals. The table below shows the recommended models of connectors.

Item	Positive Lock connectors (by AMP Co.)	Easy Lock connectors (by Nichifu Co.)
Terminal	0.2 to 0.5 mm ²	0.2 to 0.3 mm ²
	175412-1	OSS-62852F3
Terminal	0.5 to 1.25 mm ²	0.5 to 1.25 mm ²
	174778-1	OSS-62815F3
Housing	174779-1	NET1-28-1P

9. When using LED illumination

LEDs are configured of semiconductors, and if they are used at a voltage exceeding the maximum operating voltage, the LED element can deteriorate because of irregular heat generation, causing a noticeable drop in the intensity, discoloration, failure to light, and other problems. External noise, transient voltage, and transient current applied to the circuit can cause the same types of problems. With LED illuminated types that have a rated voltage of 5 VDC, 12 V AC/DC, or 24 V AC/DC in particular, the following items should be given careful consideration when using the LED.

1) Power supplies of LED blocks with a rated voltage of 5 V DC, 12 V AC/DC, or

24 V AC/DC

LED blocks used with a rated voltage of 12 V AC/DC, or 24 V AC/DC can use both alternating and direct current, and either alternating current or direct current power supplies can be used with these. The voltage used should be within a range of $\pm 10\%$ of the rated voltages for both the alternating and direct current. (if using 5 V DC, the range is $\pm 5\%$)

2) Direct current power supplies

(1) Constant-voltage power supplies for switching and other power supplies
These are ideal power supplies. They should be used within the operating voltage range of the LED block.

(2) Batteries

When charging, and immediately after charging, please be aware that the voltage may exceed the operating voltage for the LED in some cases. Make sure the voltage is within a range of $\pm 10\%$ of the rated voltage for the LED ($\pm 5\%$ for a rated voltage of 5 V).

(3) Full-wave rectification

Since both alternating and direct current can be used, there is no need for rectification using a diode bridge. Please be aware that, if full-wave rectification using a diode bridge is used, the rectifying diode may cause the voltage to drop, resulting in decreased intensity.

(4) Single-phase half-wave rectification

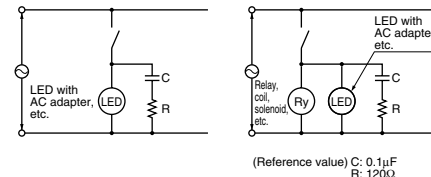
This is not appropriate as the power supply for the LED block. We recommend using a direct current constant-voltage power supply.

3) Noise

External noise can cause the LED element to deteriorate, causing a noticeable drop in the intensity, discoloration, failure to light, and other problems. In situations where this may occur, the preventive measures noted below should be considered. An element such as a CR element or surge absorber should be used to prevent adverse effects caused by noise.

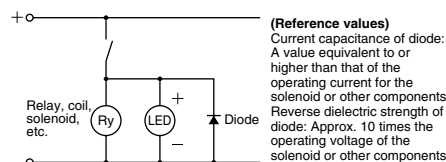
(Circuit example 1)

Alternating current cases



(Circuit example 2)

Directing current cases



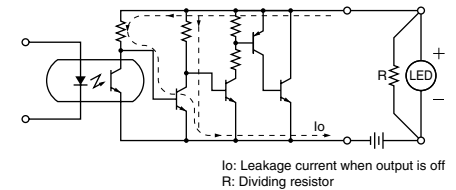
4) Corrective action for dark illumination

(1) Leakage current

Leakage current from the non-contact switch that lights the LED block or from the contact protective circuit can cause the LED block to light faintly in some cases even if the output is off. If this happens, the following corrective steps should be taken.

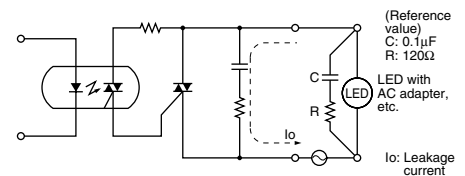
[1] If the LED block (direct-current type) is being lighted by a transistor output type of non-contact switch, insert a dividing resistor in parallel with the LED block.

(Circuit example)



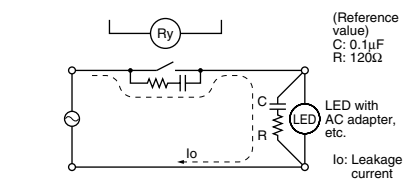
[2] If the LED block (alternating-current type) is being lighted by a TRIAC output type of non-contact switch built into a CR element, insert a CR element in parallel with the LED block.

(Circuit example)



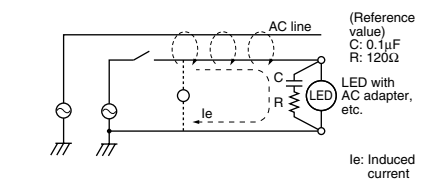
[3] If the LED block (alternating-current type) is being lighted by a relay output to which a CR element that protects the contact has been connected in parallel, insert a CR element in parallel with the LED block.

(Circuit example)



(2) Induction

When using units with AC adaptors, induction from the surrounding AC line may cause the lamp to light dimly. Corrective action: Insert a CR element in parallel with the LED block.



Cautions For Use of the ND Series (16 dia.)

9. Handling and Usage Precautions

1) Aggregate tight mounting

Please be aware that heat caused by aggregate tight mounting of indicator lamps and illuminated pushbutton switches or continuously lit lamps can cause the ambient temperature to exceed the prescribed amount. Measures must be taken to ventilate or lower the operation voltage if the mounting panel is not metal or if the product is being used in a sealed control panel.

2) Replacement of buttons (illuminating and non-illuminating)

Do not replace alternate type buttons (illuminating and non-illuminating) when they are locked. (Replacing while locked might damage the internal mechanism.) You must release the locks before replacing.

3) Storage and place of use

(1) Please use within the working ambient temperature and humidity ranges given on the ratings display.

(2) When using in a location where oil, water and dirt are present, install a dust cover so that foreign substances cannot enter the sliding part of the pushbutton.

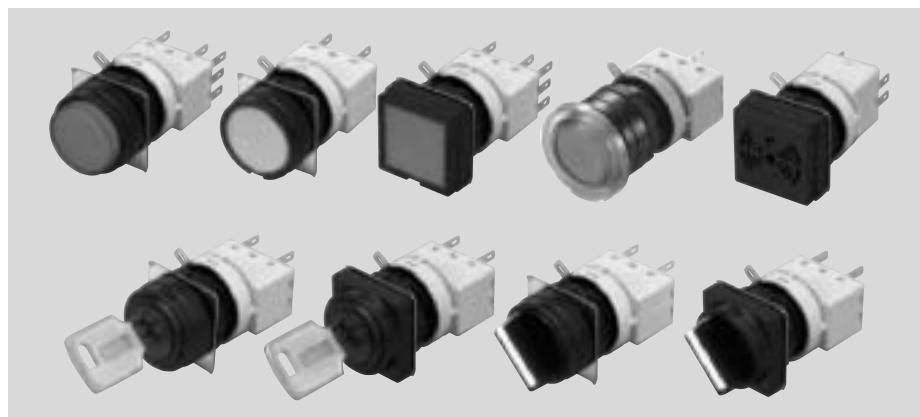
4) Contact (microswitch)

When using identical NC (normal close) and NO (normal open) microswitch contacts, do not connect to the wrong voltage or to the wrong type of power supply. Doing so will cause a dead short.

5) Oil resistance

The product has been evaluated with commonly used standard machining oil and cooling oil. Please inquire about other oils, since use of some special oils may not be possible.

Bright, clear illumination (ultra-high intensity LED used)
Separate mounting model features removable lock lever
Addition of mushroom button type



FEATURES

1. Bright, clear LED illumination

- 1) Uses brilliantly illuminating LEDs that are much brighter than incandescent bulbs.
- 2) Brightness greatly increased for vastly improved recognition and safety. Yellow and green are particularly easy to distinguish.

Makers who are especially concerned about product liability laws and worker safety and sanitation are calling for machines that are designed and manufactured based on the ISO12100 series of international safety standards (general regulations governing basic conceptual design for machine safety). With the ISO12100 series, the man-machine interface must be designed so that the status of the machine can be recognized clearly and correctly by anyone running the machine, without special training or expertise. For that reason, display lamp colors are standardized under IEC60073, IEC60204-1 and other standards cited in the ISO12100 series, and are covered by JIS standards as well. The LED illumination of the ND type meets safety needs such as these, and beyond.

Note) IEC60073:
JIS C 0448 Colors for Display Units and Operation Devices
IEC60204-1:
JIS B 9960-1 Safety of Machines and Electrical Units of Machines

Display lamp colors and meanings indicating machine status (taken from International Electrical Standards Conference IEC-60073 and 60204-1)

Color	Meaning	Explanation	Operator action
Red	Emergency	Hazardous situation	Action appropriate to hazardous situation
Yellow	Caution	Problem status/urgent or critical situation	Visual monitoring and (or) intervention
Green	Normal	Normal status	As appropriate
Blue	Obligatory	Displays status of action required by operator	Obligatory action
White	Neutral	Any other status; Can be used when using red, yellow, green, or blue might be interpreted erroneously.	Visual monitoring

3) Power consumption greatly reduced (12 V type).

The power consumption has been reduced by 50% in the 12 V type (mounting hole 22 dia. type).

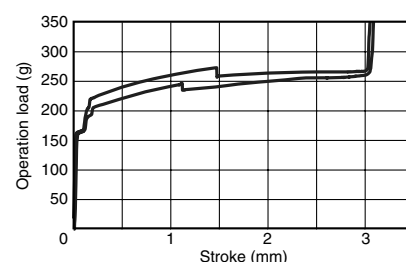
4) Continuous illumination with no need for replacement for 5 years (50,000 hours).

	Rated current	
	Mounting hole 16 dia. type	Mounting hole 22 dia. type
12 V AC/DC type	8 mA (10 mA in previous model)	10 mA (20 mA in previous model)

5) Products available in 6 illuminated colors: red, orange, yellow, green, blue, and white.

2. Nice, light switching feel. Light operation load due to snap action mechanism. Short stroke type.

Relationship between operation load and stroke (Mounting hole 22 dia. type: 1 Form C contact momentary action)



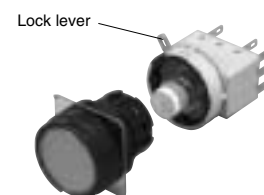
- 1) Stroke: 3 mm
- 2) Mechanical life
(mounting hole 22 dia. type)
Momentary type: Min. 10^6
(Twice that of earlier products)
Alternate type: Min. 5×10^5
(5 times better than previous)

3. Removal/installation type with lock lever system.

Smooth installation now possible.

- 1) It is easy to install in tight spaces and maintenance is easy.
- 2) Operation efficiency is greatly increased since surface installation and wiring operations can be carried out separately.

Mounting hole 22 dia. type



4. Mushroom button type for easier operation.

5. Wiring work simplified thanks to screw terminal type.

6. Splashproof type protective construction (IP65).

Conforms to IEC 60529.

7. Safety standard

- 1) UL and CSA certified (excluding buzzer).
- 2) Conforms to EN standard (excluding buzzer), has received CE marking.

ND Series: 22 dia. types (ACEL, ACBL, ACSL, ACKL, ACZL)

8. Durability

Thermoplastic materials are used for durability in the outer casing and installation points.

9. Contacts made of cadmium-free material.

RoHS Directive compatibility information
<http://www.nais-e.com/>

ORDERING INFORMATION

1. Illuminated pushbutton switches (LED illumination) and indicators (indicator lamps)

ACEL

2

Illumination type
EL: LED type

Mounting holes and flange shapes
Mounting hole Flange shape
6: 22 dia. 25.8 dia. projecting type
 (illuminated pushbutton switches only)
7: 22 dia. 25.8 dia. flat type
8: 22 dia. 25.8 square flat type
 (With mushroom button only)
9: 22 dia. 30 dia.

Protective construction
2: Splashproof type (IP65)

No. of poles and operating characteristics
0: Indicator (indicator lamp) 3: Single-pole (1 Form C) alternate
1: Single-pole (1 Form C) momentary 4: Double-pole (2 Form C) alternate
2: Double-pole (2 Form C) momentary

Contact material
0: Indicator (indicator lamp) (No contact) 2: Low-level circuit type (Gold-clad contact)
1: Standard type (Silver alloy contact)

LED voltages and pushbutton colors

Pushbutton color		Color					
		Red	Orange	Yellow	Green	Blue	White (LED: opaque)
LED voltage	5 V DC	1R	4J	4Y	7G	7L	4X
	12 V AC/DC	2R	5J	5Y	8G	8L	5X
	24 V AC/DC	3R	6J	6Y	9G	9L	6X

Terminal shape and mounting dimensions
Nil: Standard mounting
1: Terminal for PC board and standard mounting (only gold contact)
4: Screw terminal (2 Form C only)

Color cap types
Nil: Regular K: Mushroom button type *There is no mushroom button type in the indicator (indicator lamp).

ND Series: 22 dia. types (ACEL, ACBL, ACSL, ACKL, ACZL)

2. Pushbutton switches (non-illuminated types and transparent buttons)

		ACBL	<input type="text"/>	2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Mounting holes and flange shapes										
Mounting hole	Flange shape									
6: 22 dia.	25.8 dia. projecting type									
7: 22 dia.	25.8 dia. flat type									
8: 22 dia.	25.8 square flat type									
(With mushroom button type)										
Mounting hole	Flange shape									
9: 22 dia.	30 dia.									
Protective construction										
2: Splashproof type (IP65)										
No. of poles and operating characteristics										
5: Single-pole (1 Form C) momentary		7: Single-pole (1 Form C) Alternate								
6: Double-pole (2 Form C) momentary		8: Double-pole (2 Form C) Alternate								
Contact material										
1: Standard type (Silver alloy contact)		2: Low-level circuit type (Gold-clad contact)								
Types of color caps										
0: Transparent button K: Mushroom button										
Pushbutton colors										
Transparent button (Mushroom button: not clear)	R	J	Y	G	L	X	B			
	Red	Orange	Yellow	Green	Blue	White	Black			
Note: Mushroom button type is not available in orange.										
Terminal shape and mounting dimensions										
Nil: Solderable tab terminal, standard mounting										
1: Terminal for PC board and standard mounting (only gold contact)										
4: Screw terminal (2 Form C only)										

3. Selector switches

		ACSL	<input type="text"/>	2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Mounting holes and flange shapes										
Mounting hole	Flange shape									
6: 22 dia.	25.8 dia. flat type									
7: 22 dia.	25.8 round square type									
Protective construction										
2: Splashproof type (IP65)										
Operation methods										
1: 2-notch manual reset		Note) Manual reset: Switch is rotated to turn it on and remains on when released.								
3: 3-notch manual reset (Double poles only)										
No. of poles										
5: Single pole (2-notch only)		6: Double poles								
Contact material										
3: Standard type (Silver contact)		4: Low-level circuit type (Gold-clad contact)								
Terminal shape										
Nil: Terminal with tab that doubles for soldering use										
1: Terminal for PC board										
4: Screw terminal (2 Form C only)										

ND Series: 22 dia. types (ACEL, ACBL, ACSL, ACKL, ACZL)

4. Key selector switches

	ACKL		2					1	
Mounting holes and flange shapes									
Mounting hole	Flange shape								
6: 22 dia.	25.8 dia. flat type								
7: 22 dia.	25.8 round square type								
Protective construction									
2: Splashproof type (IP65)									
Operation methods and key removal positions									
11: 2-notch manual reset: OFF position									
12: 2-notch manual reset: ON position									
13: 2-notch manual reset: Both ON and OFF positions									
37: 3-notch manual reset (no single pole; double poles only) (Key can be removed at any position)									
No. of poles									
1: Single pole									
2: Double poles									
Contact material									
3: Standard type (Silver contact)									
4: Low-level circuit type (Gold-clad contact)									
Key type									
1: Standard key									
Terminal shape									
Nil: Terminal with tab that doubles for soldering use									
1: Terminal for PC board									
4: Screw terminal (2 Form C only)									

ND Series: 22 dia. types (ACEL, ACBL, ACSL, ACKL, ACZL)

TYPES

1. Illuminated pushbutton switches (LED illumination)



25.8 dia. projecting type



25.8 dia. flat type



25.8 square flat type



30 dia. mushroom button type

Form	No. of poles	Contact material	Splashproof type (IP65)	
			Momentary	Alternate
			Part No.	Part No.
25.8 dia. projecting type	Single pole	Standard type (Silver contact)	ACEL6211□*	ACEL6231□*
		Low-level circuit type (Gold-clad contact)	ACEL6212□*	ACEL6232□*
	Double poles	Standard type (Silver contact)	ACEL6221□*	ACEL6241□*
		Low-level circuit type (Gold-clad contact)	ACEL6222□*	ACEL6242□*
25.8 dia. flat type	Single pole	Standard type (Silver contact)	ACEL7211□*	ACEL7231□*
		Low-level circuit type (Gold-clad contact)	ACEL7212□*	ACEL7232□*
	Double poles	Standard type (Silver contact)	ACEL7221□*	ACEL7241□*
		Low-level circuit type (Gold-clad contact)	ACEL7222□*	ACEL7242□*
25.8 square flat type	Single pole	Standard type (Silver contact)	ACEL8211□*	ACEL8231□*
		Low-level circuit type (Gold-clad contact)	ACEL8212□*	ACEL8232□*
	Double poles	Standard type (Silver contact)	ACEL8221□*	ACEL8241□*
		Low-level circuit type (Gold-clad contact)	ACEL8222□*	ACEL8242□*
30 dia. mushroom button type	Single pole	Standard type (Silver contact)	ACEL9211□*K	ACEL9231□*K
		Low-level circuit type (Gold-clad contact)	ACEL9212□*△K	ACEL9232□*△K
	Double poles	Standard type (Silver contact)	ACEL9221□*K	ACEL9241□*K
		Low-level circuit type (Gold-clad contact)	ACEL9222□*△K	ACEL9242□*△K

Notes) 1. The following combinations of numbers and letters are entered in the square and in the * symbol to indicate the LED voltage and pushbutton color.

Pushbutton color		Red	Orange	Yellow	Green	Blue	White
							Opaque LED
LED voltage	5 V DC	1R	4J	4Y	7G	7L	4X
	12 V AC/DC	2R	5J	5Y	8G	8L	5X
	24 V AC/DC	3R	6J	6Y	9G	9L	6X

2. The white type has a colorless transparent cap.

3. If you would like PC board terminals, please add a "1" to the end of the part number when ordering. (However, if you would like mushroom button type PC board terminals, please add a "1" in the position marked by a triangle.)

If you would like screw terminal (2 Form C only), please add a "4" to the end of the part number when ordering. (However, if you would like mushroom button type screw terminal (2 Form C only), please add a "4" in the position marked by a triangle.)

However, the PC board terminal only applies to gold contacts.

2. Indicators (indicator lamps)



25.8 dia. flat type



25.8 square flat type

Form	Splashproof type (IP65)
	Part No.
25.8 dia. flat type	ACEL7200□*
25.8 square flat type	ACEL8200□*

Notes) 1. The following combinations of numbers and letters are entered in the square and in the * symbol to indicate the LED voltage and pushbutton color.

Pushbutton color		Red	Orange	Yellow	Green	Blue	White
							Opaque LED
LED voltage	5 V DC	1R	4J	4Y	7G	7L	4X
	12 V AC/DC	2R	5J	5Y	8G	8L	5X
	24 V AC/DC	3R	6J	6Y	9G	9L	6X

2. The white type has a colorless transparent cap.

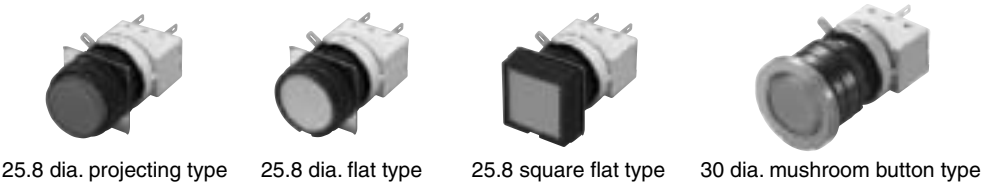
3. If you would like PC board terminals, please add a "1" to the end of the part number when ordering.

4. There is no mushroom button type in the indicator (indicator lamp).

5. There is no screw terminal type.

ND Series: 22 dia. types (ACEL, ACBL, ACSL, ACKL, ACZL)

3. Pushbutton switches (non-illuminated types and transparent buttons)



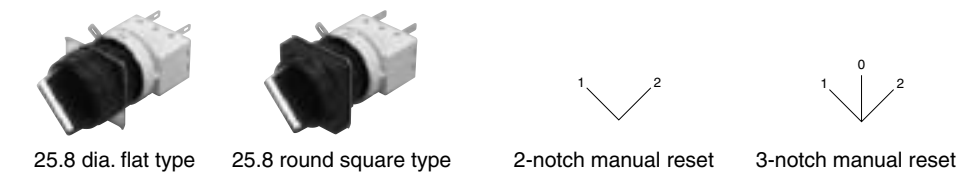
Color cap	Form	No. of poles	Contact material	Splashproof type (IP65)	
				Momentary	Alternate
				Part No.	Part No.
Transparent button	25.8 dia. projecting type	Single pole	Standard type (Silver contact)	ACBL62510※	ACBL62710※
			Low-level circuit type (Gold-clad contact)	ACBL62520※	ACBL62720※
		Double poles	Standard type (Silver contact)	ACBL62610※	ACBL62810※
			Low-level circuit type (Gold-clad contact)	ACBL62620※	ACBL62820※
	25.8 dia. flat type	Single pole	Standard type (Silver contact)	ACBL72510※	ACBL72710※
			Low-level circuit type (Gold-clad contact)	ACBL72520※	ACBL72720※
		Double poles	Standard type (Silver contact)	ACBL72610※	ACBL72810※
			Low-level circuit type (Gold-clad contact)	ACBL72620※	ACBL72820※
	25.8 square flat type	Single pole	Standard type (Silver contact)	ACBL82510※	ACBL82710※
			Low-level circuit type (Gold-clad contact)	ACBL82520※	ACBL82720※
		Double poles	Standard type (Silver contact)	ACBL82610※	ACBL82810※
			Low-level circuit type (Gold-clad contact)	ACBL82620※	ACBL82820※
Mushroom button	30 dia.	Single pole	Standard type (Silver contact)	ACBL9251K※	ACBL9271K※
			Low-level circuit type (Gold-clad contact)	ACBL9252K※	ACBL9272K※
		Double poles	Standard type (Silver contact)	ACBL9261K※	ACBL9281K※
			Low-level circuit type (Gold-clad contact)	ACBL9262K※	ACBL9282K※

Notes) 1. The following letter indicating the pushbutton color is entered in place of the ※ symbol.

Transparent button	Pushbutton color	Red	Orange	Yellow	Green	Blue	White	Black
	Part No.	R	J	Y	G	L	X	B

- 2. The white type has a colorless transparent cap.
- 3. The mushroom button type is not clear.
- 4. The mushroom button type is not available in orange.
- 5. If you would like PC board terminals, please add a "1" to the end of the part number when ordering. If you would like screw terminal (2 Form C only), please add a "4" to the end of the part number when ordering. However, the PC board terminal only applies to gold contacts.

4. Selector switches



1) 2-notch manual reset type

Form	No. of poles	Contact material	Splashproof type (IP65)
			Part No.
25.8 dia. flat type	Single pole	Standard type (Silver contact)	ACSL62153
		Low-level circuit type (Gold-clad contact)	ACSL62154
	Double poles	Standard type (Silver contact)	ACSL62163
		Low-level circuit type (Gold-clad contact)	ACSL62164
25.8 round square type	Single pole	Standard type (Silver contact)	ACSL72153
		Low-level circuit type (Gold-clad contact)	ACSL72154
	Double poles	Standard type (Silver contact)	ACSL72163
		Low-level circuit type (Gold-clad contact)	ACSL72164

Note: The screw terminal (2 Form C only) and terminals for PC board are also possible.

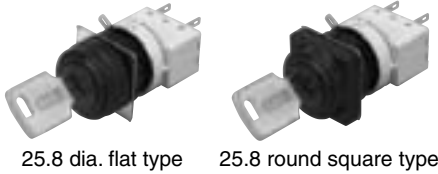
ND Series: 22 dia. types (ACEL, ACBL, ACSL, ACKL, ACZL)

2) 3-notch manual reset type

Form	No. of poles	Contact material	Splashproof type (IP65)
			Part No.
25.8 dia. flat type	Double poles	Standard type (Silver contact)	ACSL62363
		Low-level circuit type (Gold-clad contact)	ACSL62364
25.8 round square type	Double poles	Standard type (Silver contact)	ACSL72363
		Low-level circuit type (Gold-clad contact)	ACSL72364

Note: The screw terminal (2 Form C only) and terminals for PC board are also possible.

5. Key selector switches



25.8 dia. flat type 25.8 round square type

1) 2-notch manual reset type

Form	No. of poles	Contact material	Splashproof type (IP65)		
			Key removed in OFF position Part No.	Key removed in ON position Part No.	Key removed in both OFF and ON positions Part No.
25.8 dia. flat type	Single pole	Standard type (Silver contact)	ACKL6211131	ACKL6212131	ACKL6213131
		Low-level circuit type (Gold-clad contact)	ACKL6211141	ACKL6212141	ACKL6213141
	Double poles	Standard type (Silver contact)	ACKL6211231	ACKL6212231	ACKL6213231
		Low-level circuit type (Gold-clad contact)	ACKL6211241	ACKL6212241	ACKL6213241
25.8 round square type	Single pole	Standard type (Silver contact)	ACKL7211131	ACKL7212131	ACKL7213131
		Low-level circuit type (Gold-clad contact)	ACKL7211141	ACKL7212141	ACKL7213141
	Double poles	Standard type (Silver contact)	ACKL7211231	ACKL7212231	ACKL7213231
		Low-level circuit type (Gold-clad contact)	ACKL7211241	ACKL7212241	ACKL7213241

Note: The screw terminal (2 Form C only) and terminals for PC board are also possible.

2) 3-notch manual reset type

Form	No. of poles	Contact material	Splashproof type (IP65)
			Key removed in all 3 positions Part No.
25.8 dia. flat type	Double poles	Standard type (Silver contact)	ACKL6237231
		Low-level circuit type (Gold-clad contact)	ACKL6237241
25.8 round square type	Double poles	Standard type (Silver contact)	ACKL7237231
		Low-level circuit type (Gold-clad contact)	ACKL7237241

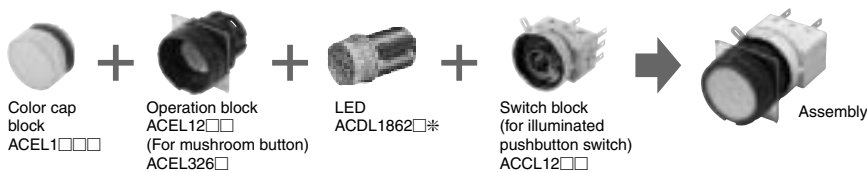
Note: The screw terminal (2 Form C only) and terminals for PC board are also possible.

6. Ordering block items

1) 22 dia. mounting hole type illuminated pushbutton switches

The 22 dia. mounting hole type illuminated pushbutton switches consist of the four blocks below.

Block items are given on a separate page.



Notes: 1. For LED, please see the page on accessories and maintenance parts.

2. Indicators (indicator lamps) are also combined as shown above. Please use a dedicated indicator for the color cap and switch block.

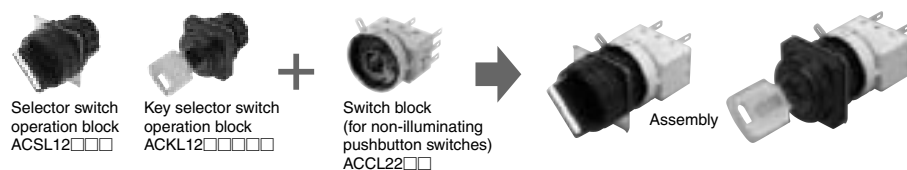
3. For the pushbutton switch (non-illuminating), please combine the color cap, operation block and switch block from the blocks above.

ND Series: 22 dia. types (ACEL, ACBL, ACSL, ACKL, ACZL)

2) Selector switches with 22 dia. mounting holes and key selector switches

Selector switches with 22 dia. mounting holes and key selector switches consist of the two blocks below.

Block items are given on a separate page.



SPECIFICATIONS

1. Contact rating

1) Gold-clad contact

Load	Rating
Resistive load	0.1 A 125 V AC 0.1 A 30 V DC
Minute load	1 mA 5 V AC/DC*

Note) The usable range for the minute load indicated by the asterisk may fluctuate depending on the usage conditions and the type of load.

2) Silver contact

Load	AC rating	DC rating
Resistive load	3 A 250 V AC 3 A 125 V AC	0.4 A 125 V DC 2 A 30 V DC
Induction load*	1.5 A 250 V AC 2 A 125 V AC	0.2 A 125 V DC 1 A 30 V DC

Note) The values for the induction load indicated by the asterisk are as follows: The alternating current induction load is PF = 0.6 to 0.7, and the direct current induction load is L/R = 7 ms and less.

2. LED rating

Rated operating voltage	Operating voltage range	Rated current	Lighted colors
5 V DC	5 V DC±5%	20 mA	Red, orange, yellow, opaque
		10 mA	Green, blue
12 V AC/DC	12 V AC/DC±10%	10 mA	Red, orange, yellow, green, blue, opaque
24 V AC/DC	24 V AC/DC±10%	10 mA	

Note) The current limiting resistor and protective diode are built into the LED bulb.

3. Characteristics

Item	Specifications	
Standard usage condition	Ambient temperature: -25 to +60°C (Not freezing) For LED illumination, however, the ambient temperature is -25 to +50°C. (Storage temperature: -40 to +80°C) Relative humidity: 45 to 85% (with no condensation)	
Contact resistance	Max. 50 mΩ (initial)	
Insulation resistance	Min. 100 MΩ (500 V DC megger)	
Dielectric strength	Switch section	Between charging part and ground: 2,500 V AC for 1 min. Between terminals with unlike poles: 2,500 V AC for 1 min. Between terminals with like poles: 1,000 V AC for 1 min.
	Illuminating section	Between charging part and ground: 2,500 V AC for 1 min.
Vibration resistance	Malfunctioning	10 to 55 Hz at double amplitude of 1.5 mm
Shock resistance	Durability	1,000 m/s ²
	Malfunctioning	196 m/s ²
Expected life	Mechanical	Momentary: Min. 10 ⁶ times, switching frequency 1,200 times/hr. Alternate: Min. 5 x 10 ⁵ times, switching frequency 1,200 times/hr. Selector switch (incl. those with keys): Min. 2.5 x 10 ⁵ times, switching frequency 1,200 times/hr.
	Electrical	Momentary: Min. 10 ⁵ times, switching frequency 1,200 times/hr. Alternate: Min. 10 ⁵ times, switching frequency 1,200 times/hr. Selector switch (incl. those with keys): Min. 10 ⁵ times, switching frequency 1,200 times/hr.
Protective construction	Splashproof type IP65 (IEC60529)	
Terminal shape	110 terminal with tab that doubles for soldering use	

ND Series: 22 dia. types (ACEL, ACBL, ACSL, ACKL, ACZL)

DIMENSIONS (unit: mm)

1. Illuminated pushbutton switches, indicators, and pushbutton switches

The photograph shows the illuminated pushbutton switch.



25.8 dia. projecting type



25.8 dia. flat type



25.8 square flat type



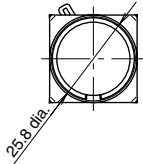
30 dia. mushroom button type

(Illuminated pushbutton switches)

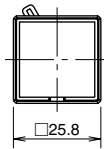
(Indicators)

(Pushbutton switches)

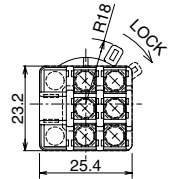
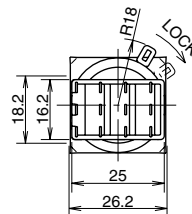
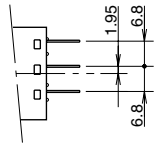
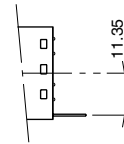
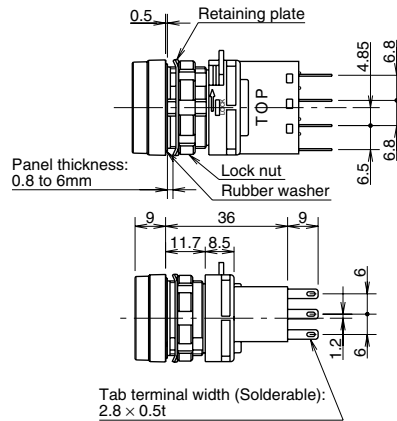
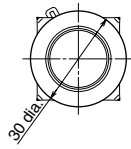
25.8 dia. projecting/flat type



25.8 square flat type

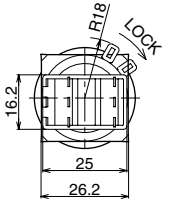
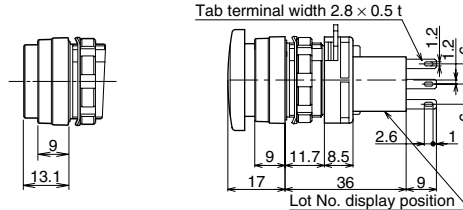


30 dia. mushroom button type

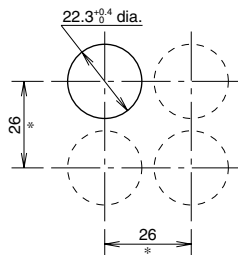


- Notes) 1. Pushbutton switches have only contact terminals, and do not have lamp terminals.
2. Indicators have only lamp terminals, and do not have contact terminals.
3. There is no mushroom button type in the indicator.
4. There is no screw terminal in the indicator (indicator lamp).

(Projecting type)

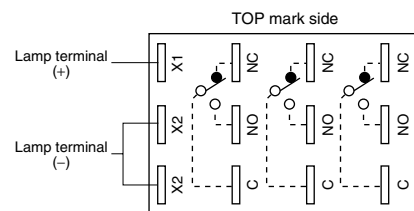


Panel mounting dimension



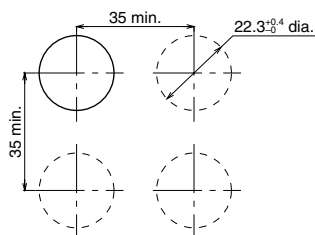
- Notes) 1. The mounting pitch values in the above illustration are applicable when cluster adhesion mounting is used. Operability and other factors should be taken into consideration when the mounting pitch is decided.
Tab terminals that double for soldering:
If there is no terminal cover, allow at least 26 mm in the vertical and horizontal directions.
If there is a terminal cover, allow at least 26 mm in the vertical direction and 27 mm or more in the horizontal direction.
2. Same for all models except mushroom button and screw terminal types.

WIRING DIAGRAM (BOTTOM VIEW)

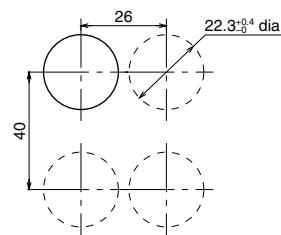


- Notes) 1. Pushbutton switches have only contact terminals, and do not have lamp terminals.
2. Indicators have only lamp terminals, and do not have contact terminals.
3. The 1 Form C contact type has only the center terminal. The 2 Form C contact type has only a terminal on the right side and a terminal on the left side. (There is no center terminal.)

Mushroom button type



Screw terminal type

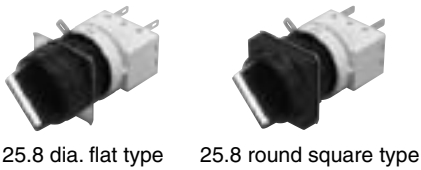


Note) Operability should be taken into consideration when deciding the mounting pitch.

ND Series: 22 dia. types (ACEL, ACBL, ACSL, ACKL, ACZL)

2. Selector switches/Key selector switches

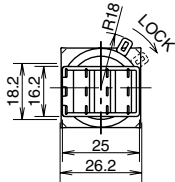
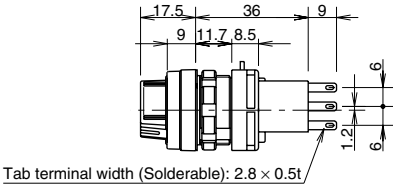
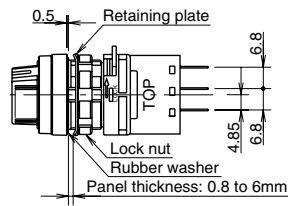
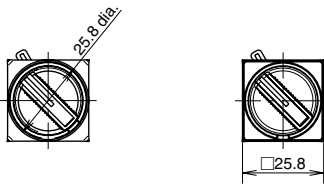
1) Selector switches



25.8 dia. flat type 25.8 round square type

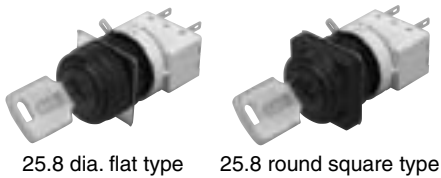
External dimensions

25.8 dia. type 25.8 round square type



Tab terminal width (Solderable): 2.8 × 0.5t

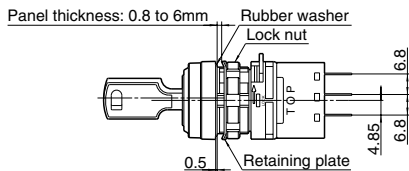
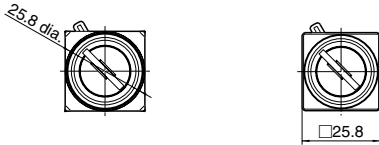
2) Key selector switches



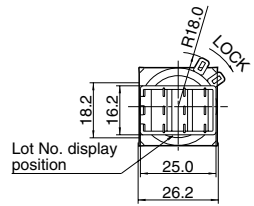
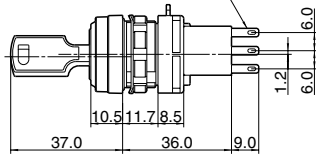
25.8 dia. flat type 25.8 round square type

External dimensions

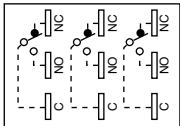
25.8 dia. flat type 25.8 round square type



Tab terminal width (Solderable): 2.8 × 0.5t



- For both selector switches and key selector switches/
WIRING DIAGRAM (BOTTOM VIEW)



- Mounting hole diagram is same as one on previous page for the illuminated pushbutton switch.

Note) The 1 Form C contact type has only the center terminal. The 2 Form C contact type has only a terminal on the right side and a terminal on the left side. (There is no center terminal.)

Internal circuit diagram (common to Selector switches and Key selector switches)

Notch specifications		Contact arrangement	Notch positions (TOP VIEW)		
			1 (left)	0 (center)	2 (right)
90° -2-notch		1 Form C			
		2 Form C			
45° -3-notch		2 Form C			



FEATURES

The user can select a continuous buzzing sound, a long intermittent sound, or a short intermittent sound, using a slide switch inside the terminal part.

RoHS Directive compatibility information
<http://www.nais-e.com/>

TYPES

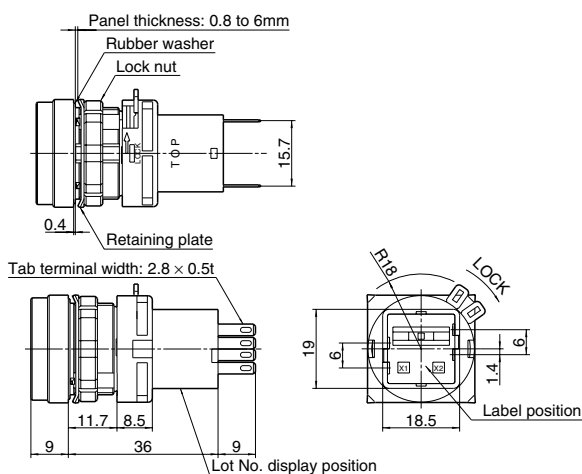
Mounting hole	Shape of panel front	Usage voltage	Part No.
22 mm dia.	25.8 square	12 to 24 V AC/DC $\pm 10\%$	ACZL8100

Note: Buzzers are not sold as block items.

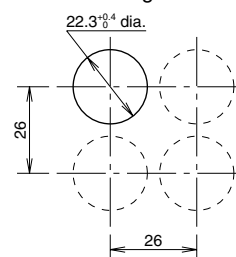
SPECIFICATIONS

Rated insulating voltage	60 V AC/DC
Rated operating voltage	12 to 24 V AC/DC $\pm 10\%$
Current consumption	DC: 7 mA, AC: 20 mA
Sound pressure (at 0.1 m)	Min. 80 dB for continuous sound (at rated voltage)
Sound frequency	2 kHz ± 500 Hz
Buzzer repetitions	Long intermittent: 55 times/min. $\pm 10\%$ Short intermittent: 600 times/min. $\pm 10\%$
Standard usage conditions	Ambient temperature: -20 to $+55^{\circ}\text{C}$ (Not freezing) Relative humidity: 45 to 85%
Insulation resistance	Min. 100 M Ω (500 V DC megger)
Dielectric strength	Between charging and non-charging parts: 1,000 V AC for 1 min.
Vibration resistance (malfunctioning)	5 to 55 Hz at unilateral amplitude of 0.5 mm
Shock resistance (durability)	1000 m/s ²
Expected life	1,000 hours min.
Protective construction	Enclosed type (JEM 1030)
Terminal shape	110 terminal with tab that doubles for soldering use

DIMENSIONS (unit: mm)

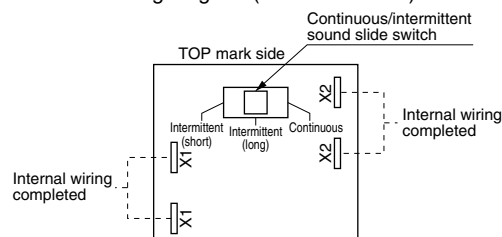


Panel mounting dimension



Note) Wiring operation should be taken into consideration when deciding the mounting pitch.

Wiring diagram (BOTTOM VIEW)



The input terminals are X1 and X2.
 (There is no + or - polarity.)

Accessories and maintenance items (22 dia.)

Ring tightener



Part No.	ACDL1801
Specifications	Metal
Unit	1 pc.

RoHS Directive compatibility information
<http://www.nais-e.com/>

- This tool is convenient for tightening the lock nuts used when mounting the unit on a panel.
- When tightening rings, the torque should be between 1.0 and 1.2 N·m (10.0 to 12.0 kgf·cm).

Maintenance parts should be installed by an engineer with specialized expertise in electrical components. When placing orders, please specify the number of marketing units.

Lamp replacement tool



Part No.	ACDL1803
Specifications	Rubber
Unit	1 pc.

- This is a rubber wrench that makes it easy to remove and install LEDs.

LEDs (parts for maintenance)

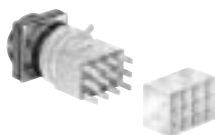


Part No.	ACDL1862□※	ACDL1862□※	ACDL1862□※
Rated operating voltage	5 V DC±5%	12 V AC/DC±10%	24 V AC/DC±10%
Rated current	*20 mA	10 mA	10 mA
	*10 mA		
Unit	10 pcs.		

Notes) 1. The asterisk mark by the rated current of the 5 VDC type indicates the following:
20 mA — Red, orange, yellow, opaque
10 mA — Green, blue
2. The following combinations of numbers and letters are entered in the square and the asterisk of the product number to indicate the LED voltage and pushbutton color.

Pushbutton color		Red	Orange	Yellow	Green	Blue	White Opaque LED
LED voltage	5 V DC	1R	4J	4Y	7G	7L	4X
	12 V AC/DC	2R	5J	5Y	8G	8L	5X
	24 V AC/DC	3R	6J	6Y	9G	9L	6X

Insulating terminal cover



Part No.	ACDL1851
Specifications	Nylon
Unit	10 pcs.

- This terminal cover is made of an opaque nylon material.

Note) When wiring the terminal, insert the lead into the hole in the insulating terminal cover before soldering it.

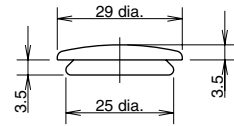
Mounting hole plug (rubber)



- This is used to fill in holes (22.3 dia.) that have been pre-cut in spare panels. The color is black.

Part No.	ACDL1822
Specifications	Rubber
Unit	10 pcs.

DIMENSIONS (unit: mm)



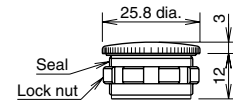
Mounting hole plug (metal)



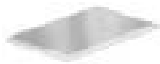
- This is used to fill in unnecessary mounting holes cut in the panel.
- The tightening torque for the lock nuts should be 1.2 N·m or lower.
- Protective construction: IP66

Part No.	ACDL1823
Specifications	Metal
Unit	10 pcs.

DIMENSIONS (unit: mm)



Inscribed plate (maintenance part)



- This product is opaque.
- ACDL1837 for mushroom button is for illuminating pushbutton.

Shape	Round	Square	Mushroom button type
Part No.	ACDL1833	ACDL1834	ACDL1837
Unit	1 pack (5 plates)		

Cautions For Use of the ND Series (22 dia.)

Cautions For Use

1. Mounting and removing the color cap and inscribed plate

1) Removing the cap and plate
(1) Insert a small screwdriver or similar tool into the grooved part of the color cap (the concave part of the flange), and twist it lightly to remove the operating parts (the color cap, inscribed plate and holder).

Removing the operating parts



(2) When the color cap has been removed from the holder, the inscribed plate can be removed. Remove the color cap by pushing from the back on the section that joins the color cap and the holder, in the direction of the color cap.

Removing the color cap



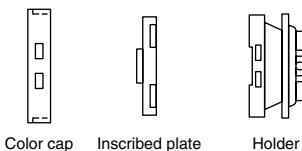
Note) The filter inside the holder is waterproof and cannot be removed.

2) Mounting the cap and plate

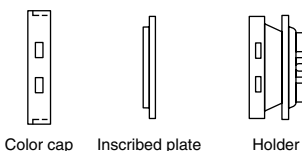
(1) Place the inscribed plate in the color cap, line it up with the section joining the color cap and the holder, and press them together. When doing this, if using the 25.8 dia. type, make sure you align the whirl-stop projection on the inscribed plate with the grooved part of the holder before inserting the plate.

(2) At this point, make sure the inscribed plate is facing the correct direction.

3) When using the 25.8 dia. type



3) When using the 25.8 dia. square type
(Make sure the direction is correct)

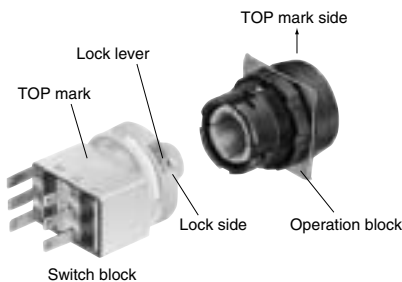


2. Panel mounting

Separate the operation block and switch block and attach the operation block to the panel hole from the front of the panel. Then mount the switch block.

1) Mounting and removing the switch block

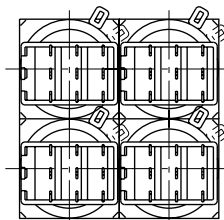
(1) Move the lock lever of the switch block in the direction opposite the arrow to pull the switch block off of the operation block.
(2) When mounting the switch block, align the TOP marks on the operation block and the switch block, and move the lever in the direction of the arrow to lock the switch block in place.



2) Precautions when mounting the panel
To tighten the ring when mounting the operation block panel, use the special tool (ring tightener, Part No. ACDL1801, sold separately), and tighten the ring to a torque of between 1.0 N·m and 1.2 N·m. Using radio pliers to tighten the ring, or tightening it beyond the required torque, can damage the ring, so be careful to tighten it correctly.

3) Collective mounting

The ND Series with a 22 dia. mounting hole can be installed and removed using a lock lever. The lock lever can be easily locked and released from the back side, using a screwdriver or similar tool. This enables collective mounting, and also makes it possible to remove any of the units.



3. Inscribed display

With the ND Series illuminated pushbutton switches and indicators (indicator lamps) with 22 dia. mounting holes, the internal inscribed plate can be engraved, and information can be displayed by inserting film.

1) Inscribed plate and inscribing film sizes

Item	25.8 dia. projection/flat type	25.8 dia. square flat type
Size and engraving range for internal inscribed plate	 Note) * This is 4.4 mm if using the 25.8 dia. projecting type.	 (The engraving depth is 0.5 mm max.) Inscribed plate material: Opaque acrylic resin
Applicable size of inscribing film	 Thickness: 0.1 mm x 2 sheets, or 0.2 mm x 1 sheet. Caution: The inscribing film is not built into the unit. Film material: Polyester film (recommended)	 Thickness: 0.1 mm x 2 sheets, or 0.2 mm x 1 sheet. Caution: The inscribing film is not built into the unit. Film material: Polyester film (recommended)

2) Sequence in which the inscribed plate and inscribing film are inserted

25.8 dia. projection/flat type
Note) The inscribing film is not built into the unit.
25.8 square flat type
Note) The inscribing film is not built into the unit. Make sure that the inscribed plate is facing the correct direction.

Cautions For Use of the ND Series (22 dia.)

4. Mounting and removing LEDs

LEDs can be mounted and removed from the front of the panel, using the lamp replacement tool (Part. No. ACDL1803).

[Removing the LED]

Insert the lamp replacement tool in the head of the LED, and turn it slightly to the left while pressing lightly on it, to remove the bulb.

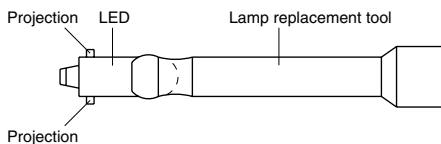


Lamp replacement tool
ACDL1803

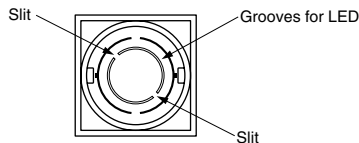


[Mounting the LED]

(1) Insert the lamp replacement tool lightly into the head of the LED, and hold it at that position.



(2) Align the LED's projections with slits of grooves for LED inside the main unit and insert it, turning it to the right while pressing lightly on it to install it.



5. Precautions when connecting wiring

(1) Terminals should be soldered at 20 W for less than 5 seconds, or at 260°C for less than 3 seconds, without applying external force. When doing this work, make sure the soldering iron does not come in contact with the switch itself, and that no tensile force is applied to the terminal.

(2) Non-corroding liquid resin flux should be used.

(3) Positive Lock connectors (made by AMP Co.) and Easy Lock connectors (made by Nichifu Co.) may be used for the tab terminals. The table below shows the recommended models of connectors.

Item	Positive Lock connectors (by AMP Co.)		Easy Lock connectors (by Nichifu Co.)	
Terminal	0.2 to 0.5 mm ²	175412-1	0.2 to 0.3 mm ²	OSS-62852F3
	0.5 to 1.25 mm ²	174778-1	0.5 to 1.25 mm ²	OSS-62815F3
Housing	174779-1		NET1-28-1P	

6. Handling the insulating terminal cover

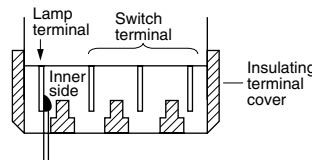
Align the TOP marks on the main unit and the insulating terminal cover, and insert the cover.

Note) When connecting the wiring, insert the lead into the hole in the insulating terminal cover before soldering it.



1) Wiring

When attaching the insulating terminal cover to a switch block with solder/tab terminals, solder the wire to the lamp terminal on the inner side of the terminal (the switch terminal side).



7. When using LED illumination

LEDs are configured of semiconductors, and if they are used at a voltage exceeding the maximum operating voltage, the LED element can deteriorate because of irregular heat generation, causing a noticeable drop in the intensity, discoloration, failure to light, and other problems. External noise, transient voltage, and transient current applied to the circuit can cause the same types of problems. With LED illuminated types that have a rated voltage of 5 VDC, 12 V AC/DC, or 24 V AC/DC in particular, the following items should be given careful consideration when using the LED.

(1) Power supplies of LED illumination with a rated voltage of 12 V AC/DC, or 24 V AC/DC

LED illumination used with a rated voltage of 12 V AC/DC, or 24 V AC/DC can use both alternating and direct current, and either alternating current or direct current power supplies can be used with these. The voltage used should be within a range of $\pm 10\%$ of the rated voltages for both the alternating and direct current.

2) Direct current power supplies

(1) Constant-voltage power supplies for switching and other power supplies These are ideal power supplies. They should be used within the operating voltage range of the LED block.

(2) Batteries

When charging, and immediately after charging, please be aware that the voltage may exceed the operating voltage for the LED in some cases. Make sure the voltage is within a range of $\pm 10\%$ of the rated voltage for the LED ($\pm 5\%$ for a rated voltage of 5 V).

(3) Full-wave rectification

Since both alternating and direct current can be used, there is no need for rectification using a diode bridge. Please be aware that, if full-wave rectification using a diode bridge is used, the rectifying diode may cause the voltage to drop, resulting in decreased intensity.

(4) Single-phase half-wave rectification

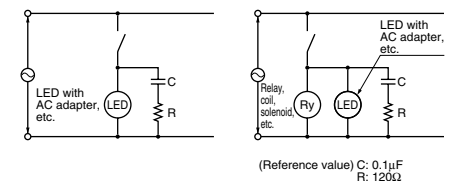
This is not appropriate as the power supply for the LED block. We recommend using a direct current constant-voltage power supply.

(3) Noise

External noise can cause the LED element to deteriorate, causing a noticeable drop in the intensity, discoloration, failure to light, and other problems. In situations where this may occur, the preventive measures noted below should be considered. An element such as a CR element or surge absorber should be used to prevent adverse effects caused by noise.

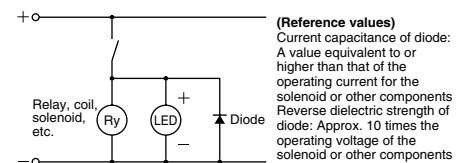
(Circuit example 1)

Alternating current cases



(Circuit example 2)

Direct current case



Cautions For Use of the ND Series (22 dia.)

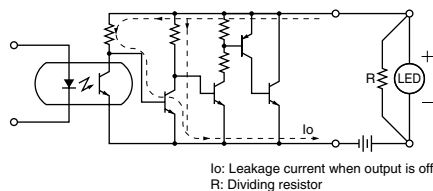
4) Corrective action for dark illumination

(1) Leakage current

Leakage current from the non-contact switch that lights the LED block or from the contact protective circuit can cause the LED block to light faintly in some cases even if the output is off. If this happens, the following corrective steps should be taken.

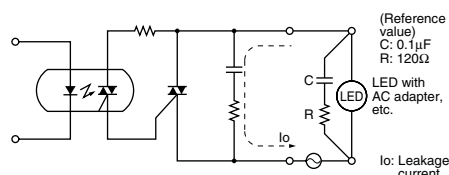
[1] If the LED block (direct-current type) is being lighted by a transistor output type of non-contact switch, insert a dividing resistor in parallel with the LED block.

(Circuit example)



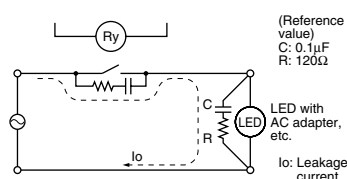
[2] If the LED block (alternating-current type) is being lighted by a TRIAC output type of non-contact switch built into a CR element, insert a CR element in parallel with the LED block.

(Circuit example)



[3] If the LED block (alternating-current type) is being lighted by a relay output to which a CR element that protects the contact has been connected in parallel, insert a CR element in parallel with the LED block.

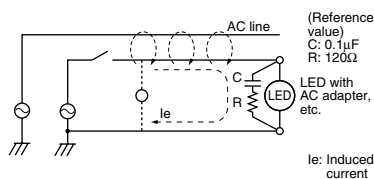
(Circuit example)



(2) Induction

When using units with AC adaptors, induction from the surrounding AC line may cause the lamp to light dimly.

Corrective action: Insert a CR element in parallel with the LED block.



8. Handling and Usage Precautions

1) Aggregate tight mounting

Please be aware that heat caused by aggregate tight mounting of indicator lamps and illuminated pushbutton switches or continuously lit lamps can cause the ambient temperature to exceed the prescribed amount. Measures must be taken to ventilate or lower the operation voltage if the mounting panel is not metal or if the product is being used in a sealed control panel.

2) Replacement of buttons (illuminating and non-illuminating)

Do not replace alternate type buttons (illuminating and non-illuminating) when they are locked. (Replacing while locked might damage the internal mechanism.) You must release the locks before replacing.

3) Storage and place of use

(1) Please use within the working ambient temperature and humidity ranges given on the ratings display.

(2) When using in a location where oil, water and dirt are present, install a dust cover so that foreign substances cannot enter the sliding part of the pushbutton.

4) Contact (microswitch)

When using identical NC (normal close) and NO (normal open) microswitch contacts, do not connect to the wrong voltage or to the wrong type of power supply. Doing so will cause a dead short.

5) Oil resistance

The product has been evaluated with commonly used standard machining oil and cooling oil. Please inquire about other oils, since use of some special oils may not be possible.

ND Series Block Items (16 dia.)

Please see "Ordering block items" for information on combining block items with 16 dia. mounting holes.

TYPES

1. Color cap block

1) For illuminated pushbutton and pushbutton (transparent buttons)



Form		18 dia. projecting type	18 square flat type	18 × 24 flat type
Part No.	Red	ACEL112R	ACEL113R	ACEL114R
	Orange	ACEL112J	ACEL113J	ACEL114J
	Yellow	ACEL112Y	ACEL113Y	ACEL114Y
	Green	ACEL112G	ACEL113G	ACEL114G
	Blue	ACEL112L	ACEL113L	ACEL114L
	White	ACEL112X	ACEL113X	ACEL114X
	Black	ACEL112B	ACEL113B	ACEL114B

Note: "White" is non-colored and transparent.

2) For indicator (indicator lamp) (transparent buttons)

Form		18 dia. projecting type	18 square flat type	18 × 24 flat type
Part No.	Red	ACEL102R	ACEL103R	ACEL104R
	Orange	ACEL102J	ACEL103J	ACEL104J
	Yellow	ACEL102Y	ACEL103Y	ACEL104Y
	Green	ACEL102G	ACEL103G	ACEL104G
	Blue	ACEL102L	ACEL103L	ACEL104L
	White	ACEL102X	ACEL103X	ACEL104X

Note: "White" is non-colored and transparent.

3) Mushroom button

Form		For 24 dia. illuminated pushbutton	For 24 dia. pushbutton	For 30 dia. illuminated pushbutton	For 30 dia. pushbutton
Part No.	Red	ACEL120KR	ACEL130KR	ACEL145KR	ACEL155KR
	Orange	ACEL120KJ	—	ACEL145KJ	—
	Yellow	ACEL120KY	ACEL130KY	ACEL145KY	ACEL155KY
	Green	ACEL120KG	ACEL130KG	ACEL145KG	ACEL155KG
	Blue	ACEL120KL	ACEL130KL	ACEL145KL	ACEL155KL
	White	ACEL120KX	ACEL130KX	ACEL145KX	ACEL155KX
	Black	—	ACEL130KB	—	ACEL155KB

Notes: 1. The button for the illuminated pushbutton is transparent and the one for the pushbutton is non-transparent. Black color is only for the pushbutton and orange is only for the illuminated pushbutton.

2. The inscribed plate (ACDH1836) is included with the 30 dia. mushroom button for the illuminated pushbutton.

2. Operation block

1) For illuminated pushbutton, non-illuminated pushbutton and indicator (indicator lamp)



Form			18 dia. projecting type	18 square flat type	18 × 24 flat type	30 dia. mushroom type
Operation characteristics	Momentary	Part No.	ACEL1221	ACEL1231	ACEL1241	ACEL2251
	Alternate	Part No.	ACEL1222	ACEL1232	ACEL1242	ACEL2252
Indicator (indicator lamp)		Part No.	ACEL1220	ACEL1230	ACEL1240	—

Note: Use the 18 dia. projecting type for the 24 dia. mushroom pushbutton.

ND Series Block Items (16 dia.) (ACEL, ACSL, ACKL, ACCL, ACDL)






2) For selector switches













Form	18 dia. projecting type		18 square flat type		18 × 24 flat type	
Operation methods	2-notch manual reset	3-notch manual reset	2-notch manual reset	3-notch manual reset	2-notch manual reset	3-notch manual reset
Part No.	ACSL12521	ACSL12523	ACSL12321	ACSL12323	ACSL12421	ACSL12423

3) For key selector switches

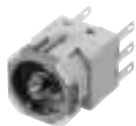


Form	18 square flat type				
Operation methods	2-notch manual reset			2-notch automatic reset	3-notch manual reset
Key removal positions	 OFF position	 ON position	 Both ON and OFF positions	 OFF position	 Key can be removed at all 3 positions
Part No.	ACKL1232111	ACKL1232121	ACKL1232131	ACKL1232211	ACKL1232371

Form	18 × 24 flat type				
Operation methods	2-notch manual reset			2-notch automatic reset	3-notch manual reset
Key removal positions	 OFF position	 ON position	 Both ON and OFF positions	 OFF position	 Key can be removed at all 3 positions
Part No.	ACKL1242111	ACKL1242121	ACKL1242131	ACKL1242211	ACKL1242371

Form	18 dia. flat type				
Operation methods	2-notch manual reset			2-notch automatic reset	3-notch manual reset
Key removal positions	 OFF position	 ON position	 Both ON and OFF positions	 OFF position	 Key can be removed at all 3 positions
Part No.	ACKL1252111	ACKL1252121	ACKL1252131	ACKL1252211	ACKL1252371

3. Switch block (tight mounting type)



Form			For illuminated pushbutton switches	For non-illuminated pushbutton switches	For indicator (indicator lamp)
Standard type (Silver contact)	Single pole	Part No.	ACCL16112	ACCL26112	Part No. ACCL16002
	Double poles	Part No.	ACCL16212	ACCL26212	
Low-level circuit type (Gold-clad contact)	Single pole	Part No.	ACCL16122	ACCL26122	
	Double poles	Part No.	ACCL16222	ACCL26222	

Note: Terminals for PC board are also possible.

4. Lamp holder



Part No.	ACDL1870
Unit	10 pcs.

Note: *Please order lamp holders in units of ten pieces.

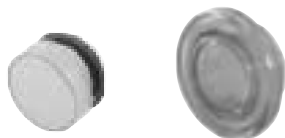
ND Series Block Items (22 dia.)

Please see "Ordering block items" for information on combining block items with 22 dia. mounting holes.

TYPES

1. Color cap block

1) For illuminated pushbutton and pushbutton (transparent buttons)



RoHS Directive compatibility information
<http://www.nais-e.com/>

Form		25.8 dia. projecting type	25.8 dia. flat type	25.8 square flat type
Part No.	Red	ACEL116R	ACEL117R	ACEL118R
	Orange	ACEL116J	ACEL117J	ACEL118J
	Yellow	ACEL116Y	ACEL117Y	ACEL118Y
	Green	ACEL116G	ACEL117G	ACEL118G
	Blue	ACEL116L	ACEL117L	ACEL118L
	White	ACEL116X	ACEL117X	ACEL118X
	Black	ACEL116B	ACEL117B	ACEL118B

Note: "White" is non-colored and transparent.

2) For indicator (indicator lamp) (transparent buttons)

Form		25.8 dia. flat type	25.8 square flat type
Part No.	Red	ACEL107R	ACEL108R
	Orange	ACEL107J	ACEL108J
	Yellow	ACEL107Y	ACEL108Y
	Green	ACEL107G	ACEL108G
	Blue	ACEL107L	ACEL108L
	White	ACEL107X	ACEL108X

Note: "White" is non-colored and transparent.

3) Mushroom button

Form		For 30 dia. illuminated pushbutton	For 30 dia. pushbutton
Part No.	Red	ACEL169KR	ACEL179KR
	Orange	ACEL169KJ	—
	Yellow	ACEL169KY	ACEL179KY
	Green	ACEL169KG	ACEL179KG
	Blue	ACEL169KL	ACEL179KL
	White	ACEL169KX	ACEL179KX
	Black	—	ACEL179KB

Notes: 1. The button for the illuminated pushbutton is transparent and the one for the pushbutton is non-transparent. Black color is only for the pushbutton and orange is only for the illuminated pushbutton.
2. The inscribed plate (ACDL1837) is included with the 30 dia. mushroom button for the illuminated pushbutton.

2. Operation block

1) For illuminated pushbutton, non-illuminated pushbutton and indicator (indicator lamp)



Form			25.8 dia.	25.8 square flat type	30 dia. mushroom type
Operation characteristics	Momentary	Part No.	ACEL1261	ACEL1281	ACEL3291
	Alternate	Part No.	ACEL1262	ACEL1282	ACEL3292
Indicator (indicator lamp)		Part No.	ACEL1260	ACEL1280	—

ND Series Block Items (22 dia.) (ACEL, ACSL, ACKL, ACCL)









2) For selector switches



Form	25.8 dia. flat type		25.8 round square type	
Operation methods	2-notch manual reset	3-notch manual reset	2-notch manual reset	3-notch manual reset
Part No.	ACSL12621	ACSL12623	ACSL12721	ACSL12723

3) For key selector switches



Form	25.8 dia. flat type				25.8 round square type			
Operation methods	2-notch manual reset		3-notch manual reset		2-notch manual reset		3-notch manual reset	
Key removal positions	 OFF position	 ON position	 Both ON and OFF positions	 Key can be removed at all 3 positions	 OFF position	 ON position	 Both ON and OFF positions	 Key can be removed at all 3 positions
Part No.	ACKL1262111	ACKL1262121	ACKL1262131	ACKL1262371	ACKL1272111	ACKL1272121	ACKL1272131	ACKL1272371

3. Switch block



Form			For illuminated pushbutton switches	For non-illuminated pushbutton switches	For indicator (indicator lamp)
Standard type (Silver contact)	Single pole	Part No.	ACCL1211	ACCL2211	Part No. ACCL1200
	Double poles	Part No.	ACCL1221	ACCL2221	
Low-level circuit type (Gold-clad contact)	Single pole	Part No.	ACCL1212	ACCL2212	
	Double poles	Part No.	ACCL1222	ACCL2222	

Note: Terminals for PC board and screw terminals are also possible.



RoHS Directive compatibility information
<http://www.nais-e.com/>

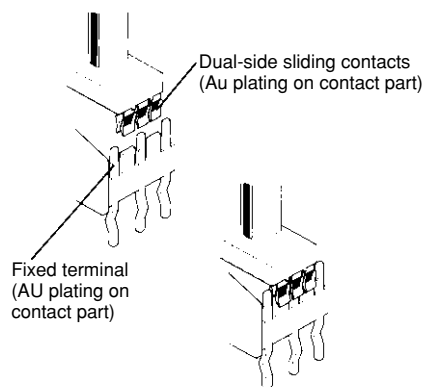
2. Hermetically sealed for superior resistance against adverse environments (dust and gas) and washing

Protective grade: The body is hermetically sealed to the level of IP67 so it can be washed as is (except terminals). Also, there will be no problem when using a standard substitute Freon cleaning solution.

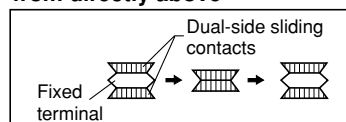
(For details, please inquire.)

3. Low level rating of 0.1 A, 1 mV achieved.

Sliding contacts on both sides are used to ensure high contact reliability.



Contact movement as seen from directly above



4. Resistance to static electricity of up to 20 kV at the lever tip

The operation lever is made with resin to prevent entry of static electricity into the signal circuit. However, 10 kV at the lever tip for bracket types

5. Long electrical and mechanical life achieved.

Electrical: Min. 100,000 times (0.4 VA)

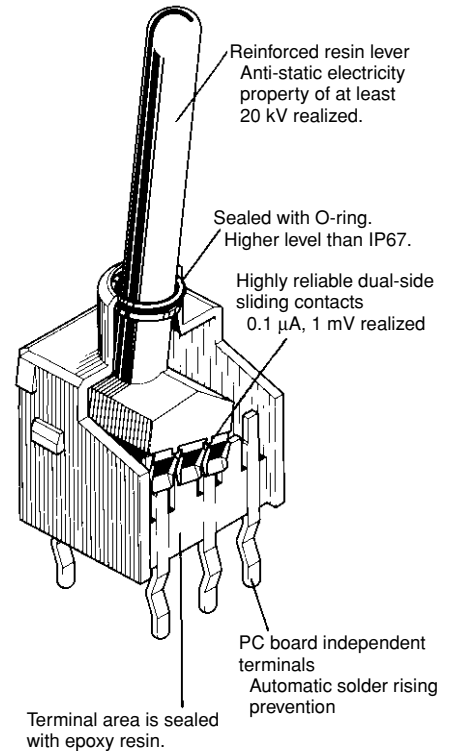
Mechanical: Min. 200,000 times

6. All models use PC board independent terminals

Press fitting is possible to PC board using only light force and the fixing force prevents the switch from rising.

7. Lead free compatibility.

CONSTRUCTION



APPLICATIONS

Office automation equipment (personal computers, printers, etc.), large-scale computers, walky-talkies, professional video cameras, switching equipment, electrical measuring instruments, and control panels (robots, sequencers, elevators, etc.).

FEATURES

1. Designed to be as compatible as possible with other switches.









As shown in the table below this switch is compatible with both the toggle and push-button switches of other companies.

MEW		Other company			
		"N" company		"F" company	
		A series	B series	A series	
	PC board terminal	C		1 P	2 P
	Bracket type	C		N/C	N/C
PC-H terminal	0.2 inch pitch type	C		C	C
	0.3 inch pitch type	—		C	C
	PC-V terminal	C		N/C	N/C

Remark: C: compatible; N/C: not compatible







ASSORTMENT

1. Toggle series

Poles	Handle shape		Kind of operation	Terminal shape	Color of handle
	Body	Colored cap			
1-pole 2-pole	Standard toggle 	Short toggle 	ON-ON ON-OFF-ON ON-<ON> <ON>-OFF-<ON> ON-OFF-<ON>	PC board terminal 	(Body) Black Red White
	Flat lever 	Short flat lever 		Bracket type  PC-H terminal  PC-V terminal 	(Color of cap) Black Red White Light grey Blue Green Yellow

Remarks: The standard handle color is black. Red or white is available for lots of 1,000 or more.
Suffix your order number with "W" for white or "R" for red. Please consult us for other colors.
< > indicates momentary position.

2. Push-button series

Poles	Handle shape		Kind of operation	Terminal shape	Color of handle
1-pole 2-pole	5.1 dia.  (Option)	7.5 dia.  (Option)	ON-<ON>	PC board terminal  Bracket type  PC-H terminal  PC-V terminal 	(Color of cap) Black Red White Light grey Blue Green Yellow

Remarks: The standard handle color is black. Red or white is available for lots of 1,000 or more.
Suffix your order number with "W" for white or "R" for red. Please consult us for other colors.
< > indicates momentary position.

ORDERING INFORMATION

1. Toggle series

AJN

Turquoise snap

Number of poles

1: 1-pole 2: 2-pole

Handle shape

1: Standard toggle

2: Short toggle

3: Flat lever

4: Short flat lever

Kind of operation

1: ON-ON

2: ON-OFF-ON

3: ON-<ON>

4: <ON>-OFF-<ON>

5: ON-OFF-<ON>

Terminal shape

1: PC board terminal

2: Bracket type

3: PC-H terminal 0.2 inch pitch type

4: PC-V terminal (1-pole: A Series; 2-pole: A and B Series)

5: PC-H terminal 0.3 inch pitch type

6: PC-V terminal (1-pole: B Series)

2. Push-button series

AJN

B

Turquoise snap

Number of poles

1: 1-pole 2: 2-pole

Handle shape

B: Push-button

Kind of operation

3: Momentary (ON-<ON>)

Terminal shape

1: PC board terminal

2: Bracket type

3: PC-H terminal 0.2 inch pitch type

4: PC-V terminal (1-pole: A Series; 2-pole: A and B Series)

5: PC-H terminal 0.3 inch pitch type

6: PC-V terminal (1-pole: B Series)

PRODUCT TYPES





1. Toggle series

Standard toggle

Short toggle

Flat lever

Short flat lever



Change the asterisk to a "1" when ordering.

Change the asterisk to a "2" when ordering.

Change the asterisk to a "3" when ordering.

Change the asterisk to a "4" when ordering.

1) PC board terminal and Bracket type

Number of poles	*3 Kind of operation < >: Momentary position	PC board terminal	Bracket type
		Part No.	Part No.
1-pole	ON-ON	AJN1*11	AJN1*12
	ON-OFF-ON	AJN1*21	AJN1*22
	ON-<ON>	AJN1*31	AJN1*32
	<ON>-OFF-<ON>	AJN1*41	AJN1*42
	ON-OFF-<ON>	AJN1*51	AJN1*52
2-pole	ON-ON	AJN2*11	AJN2*12
	ON-OFF-ON	AJN2*21	AJN2*22
	ON-<ON>	AJN2*31	AJN2*32
	<ON>-OFF-<ON>	AJN2*41	AJN2*42
	ON-OFF-<ON>	AJN2*51	AJN2*52

2) PC-H terminal and PC-V terminal

Number of poles	*3 Kind of operation < >: Momentary position	PC-H terminal		PC-V terminal	
		0.2 inch pitch type	0.3 inch pitch type	A Series	B Series
		Part No.	Part No.	Part No.	Part No.
1-pole	ON-ON	AJN1*13	AJN1*15	AJN1*14	AJN1*16
	ON-OFF-ON	AJN1*23	AJN1*25	AJN1*24	AJN1*26
	ON-<ON>	AJN1*33	AJN1*35	AJN1*34	AJN1*36
	<ON>-OFF-<ON>	AJN1*43	AJN1*45	AJN1*44	AJN1*46
	ON-OFF-<ON>	AJN1*53	AJN1*55	AJN1*54	AJN1*56
2-pole	ON-ON	AJN2*13	AJN2*15	AJN2*14	
	ON-OFF-ON	AJN2*23	AJN2*25	AJN2*24	
	ON-<ON>	AJN2*33	AJN2*35	AJN2*34	
	<ON>-OFF-<ON>	AJN2*43	AJN2*45	AJN2*44	
	ON-OFF-<ON>	AJN2*53	AJN2*55	AJN2*54	

Remarks: 1. Products that have UL and CSA markings are standard.
2. The standard handle color is black. Red or white is available for lots of 1,000 or more. Suffix your order number with "W" for white or "R" for red. Please consult us for other colors.
3. Single-side momentary operation models momentary position on the slotted side.

Combination with color caps of toggle series
Combine and use with the flat lever type.

Flat lever type

+

Round color cap

⇒

Switch with color cap

+

Rounded flat color cap

⇒

2. Push-button series

1) PC board terminal and Bracket type

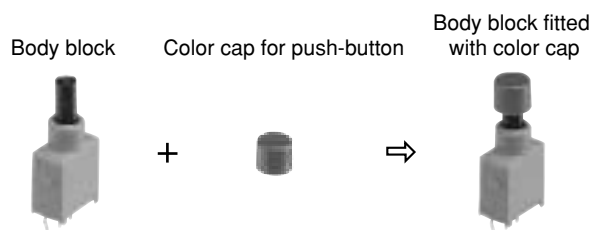
Number of poles	Kind of operation < >: Momentary position	PC board terminal	Bracket type
		Part No.	Part No.
1-pole	ON-<ON>	AJN1B31	AJN1B32
2-pole	ON-<ON>	AJN2B31	AJN2B32

2) PC-H terminal and PC-V terminal

Number of poles	Kind of operation < >: Momentary position	PC-H terminal		PC-V terminal	
		0.2 inch pitch type	0.3 inch pitch type	A Series	B Series
		Part No.	Part No.	Part No.	Part No.
1-pole	ON-<ON>	AJN1B33	AJN1B35	AJN1B34	AJN1B36
2-pole	ON-<ON>	AJN2B33	AJN2B35	AJN2B34	

Remark: Products that have UL and CSA markings are standard.

Please use optional color cap for push-button to be fitted on body block.



3. Color cap (option)

	Product name	Part No.
For toggle switch	Round color cap	AJN81*
	Rounded flat color cap	AJN82*
For push-button switch	5.1 dia.	AJN83*
	7.5 dia.	AJN84*

Remarks: 1. When ordering replace the asterisk with the letter that represents the color you want. B: black; R: red; W: white; H: light grey; L: blue; G: green; Y: yellow
2. For shape, please refer to the color cap dimension.

SPECIFICATIONS

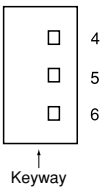
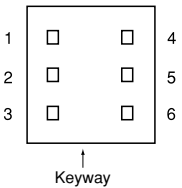
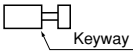
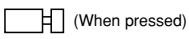


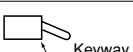


1. Contact rating

Resistive load (Max.)	0.1A 30V AC/DC 50mA 48V AC/DC 0.4VA Max. AC/DC common (Applicable voltage range: 1 mV to 48 V; Applicable current range: 0.1 μA to 0.1 A)
Low-level load (Min.)	0.1μA 1mV DC

2. Characteristics

Expected life	Mechanical	Min. 2×10^5 (at 20 cpm.)
	Electrical (resistive load)	Min. 3×10^4 , 0.1 VA 30 V AC/DC, 50m A 48V AC/DC (at 20 cpm.) Min. 10^5 , 0.4 VA AC/DC (14mA 30 V, 0.1 A 4 V), 0.1 μA 1mV DC (at 20 cpm.)
Insulation resistance		Initial, Min. 500 MΩ (at 500 V DC measured by insulation resistive meter)
Breakdown voltage		Initial, 500 Vrms (at detection current: 10mA)
Contact resistance		Initial, Max. 50 mΩ (By voltage drop at 0.1 A, 2 to 4 V DC)
Vibration resistance		10 to 55 Hz at double amplitude of 1.5 mm (contact opening Max. 10μs)
Shock resistance		490 m/s ² (contact opening Max. 10μs)
Actuator strength		Min. 14.7 N for 1 min. operating direction
Ambient temperature		-20°C to +80 °C (Not freezing below 0 °C)
Solderability		At least 90 % covered by 260 °C, 5 s soldering
Soldering temperature resistance		350 °C for 3 s
Contact material		Gold (Au) plating

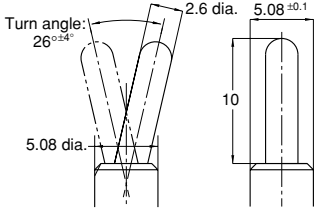
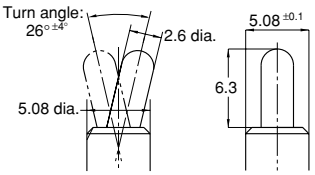
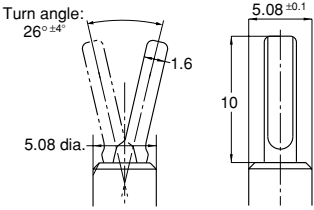
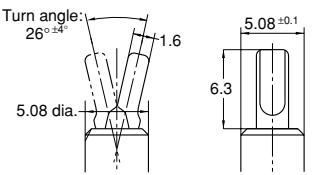
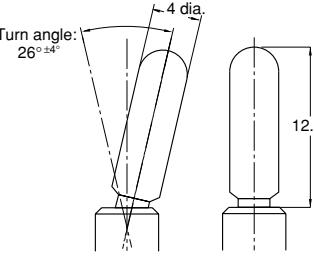
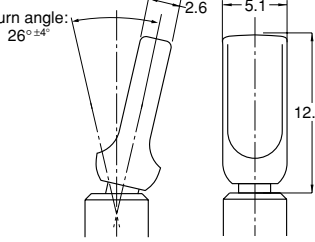
ELECTRICAL CIRCUIT DIAGRAM

Kind of operation			1-pole	2-pole
				
Push-button switch	Momentary ON-<ON>		5-6	2-3, 5-6
			4-5	1-2, 4-5
Toggle switch	ON-ON ON-<ON>		4-5	1-2, 4-5
		—	—	—
			5-6	2-3, 5-6
	ON-OFF-ON <ON>-OFF-<ON> ON-OFF-<ON>		4-5	1-2, 4-5
			—	—
			5-6	2-3, 5-6

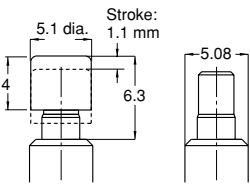
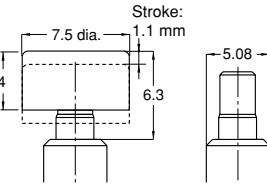
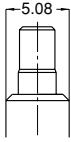
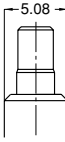
Remarks: 1. Terminal number isn't stamped on switches.
2. For ON - <ON>, ON - OFF - <ON> type toggle switches, the lever springs back (momentary position) when pushed toward the keyway side.

HANDLE SHAPE

1. Toggle series

Standard toggle	Short toggle	Flat lever	Short flat lever
			
With round color cap	With rounded flat color cap		
			

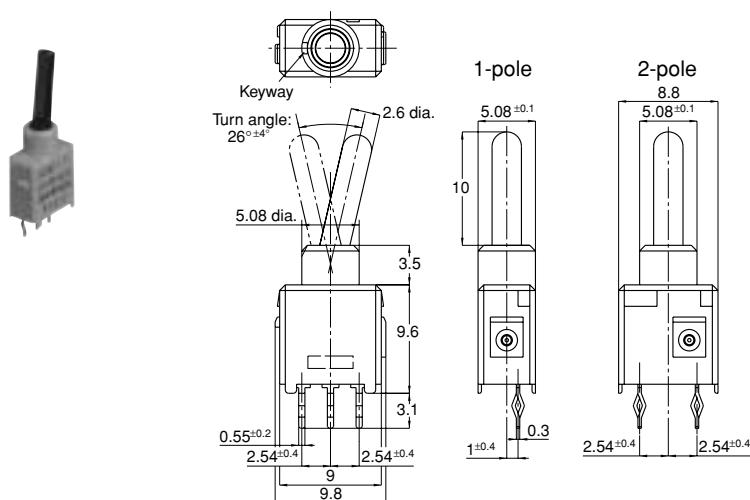
2. Push-button series

For 5.1 dia. push-button	For 7.5 dia. push-button
	
With color cap	With color cap
	
Without color cap	Without color cap

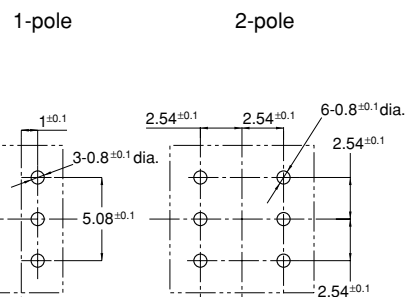
DIMENSIONS (mm) (General tolerance: ± 0.5)

1. Toggle switch (For standard toggle)

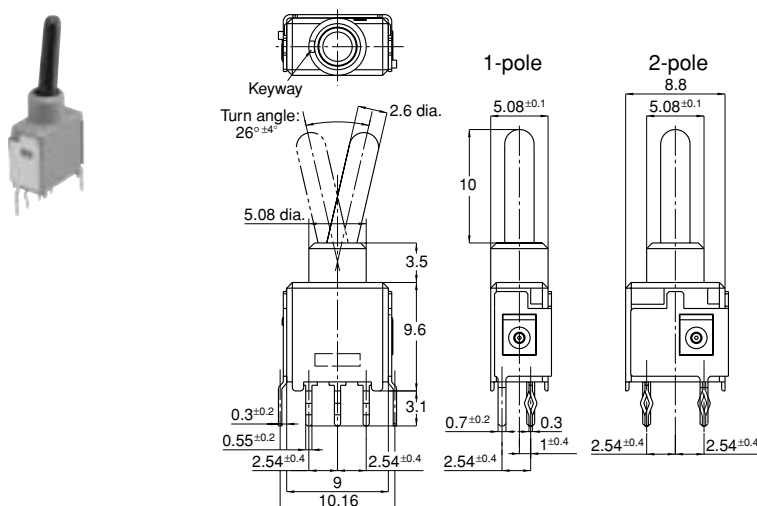
1) PC board terminal



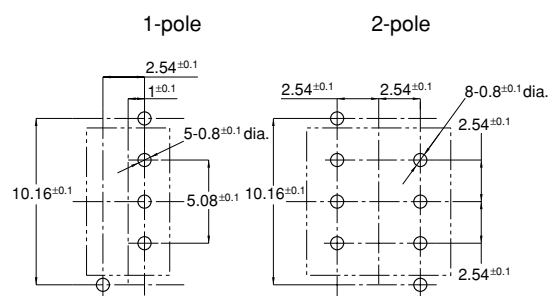
PC board pattern (Top view)



2) Bracket type

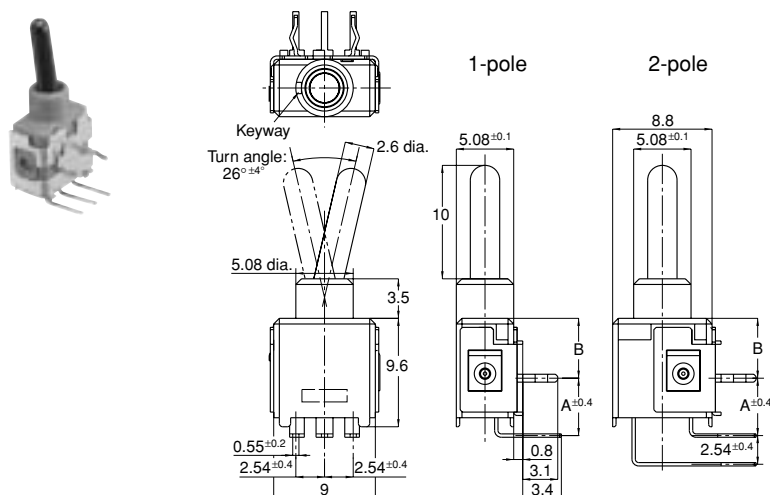


PC board pattern (Top view)

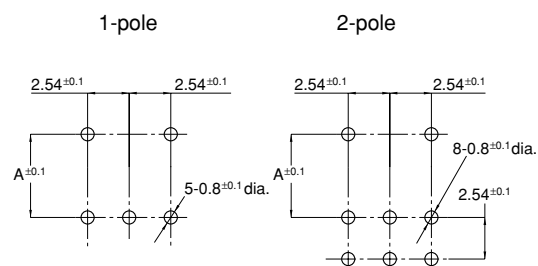


Remark: The upper side of the PC board pattern drawing is the keyway side.

3) PC-H terminal



PC board pattern (Top view)



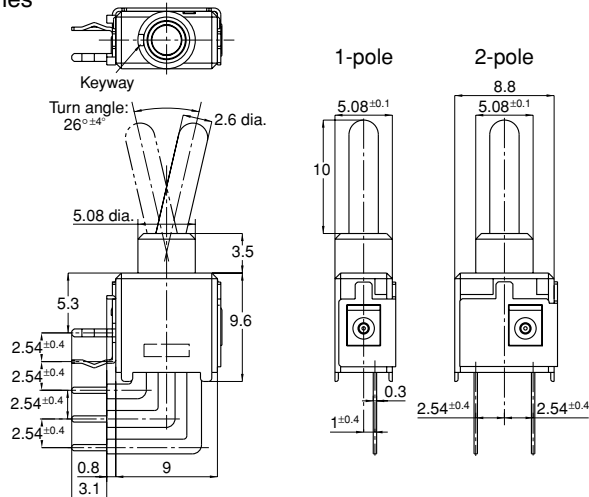
	A	B
0.2 inch pitch type	5.08	5.3
0.3 inch pitch type	7.62	2.76

AJN1, 2

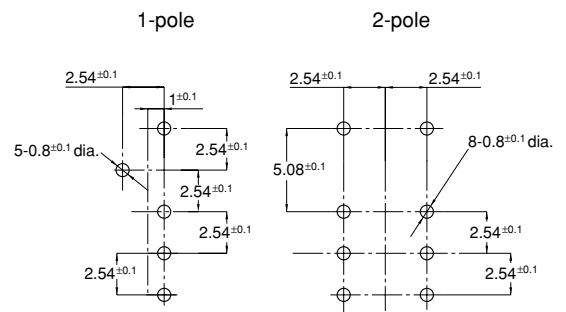
4) PC-V terminal

1-pole: A Series

2-pole: A and B Series

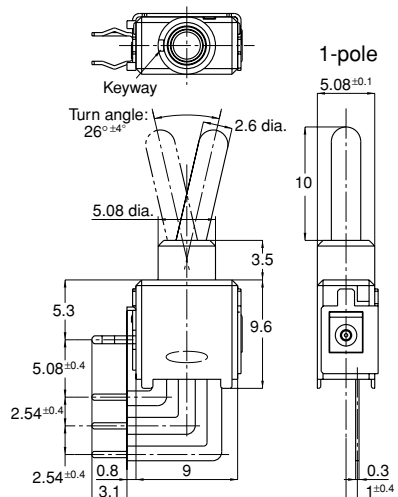


PC board pattern (Top view)

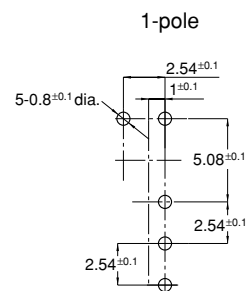


5) PC-V terminal

1-pole: B Series

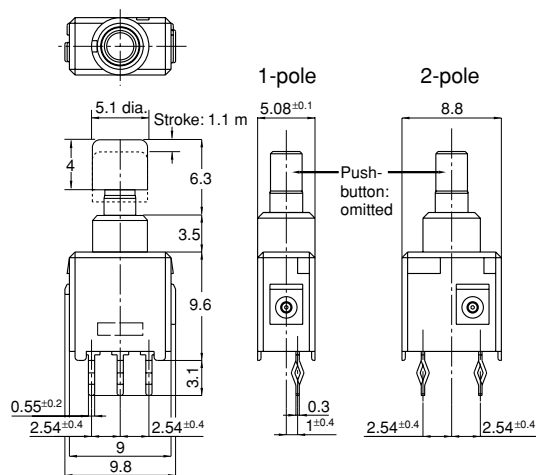


PC board pattern (Top view)

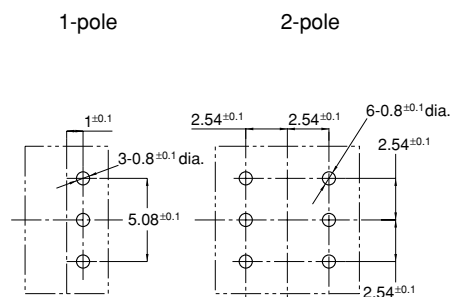


2. Push-button switch (for 5.1 dia.)

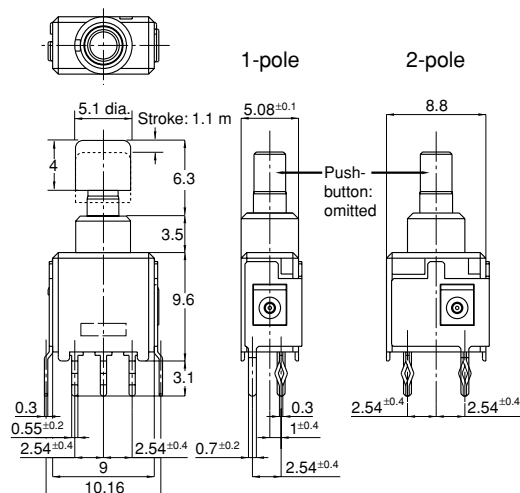
1) PC board terminal



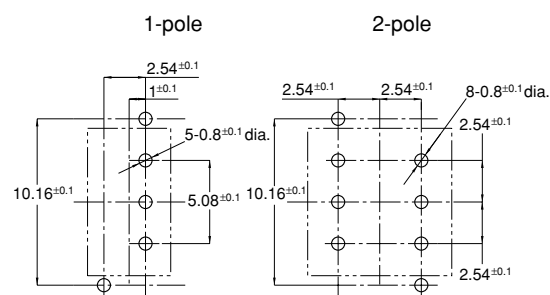
PC board pattern (Top view)



2) Bracket type

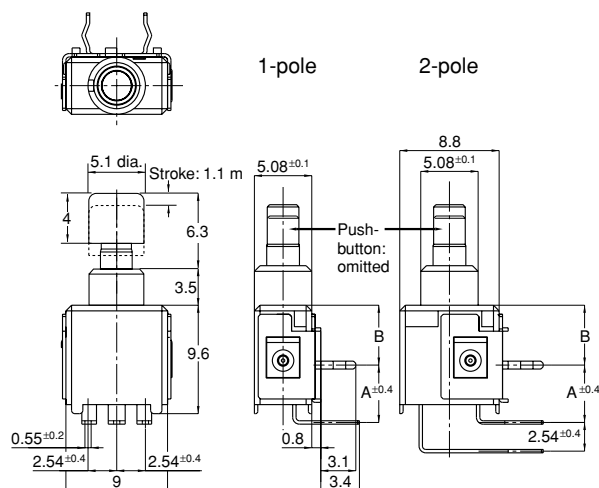


PC board pattern (Top view)

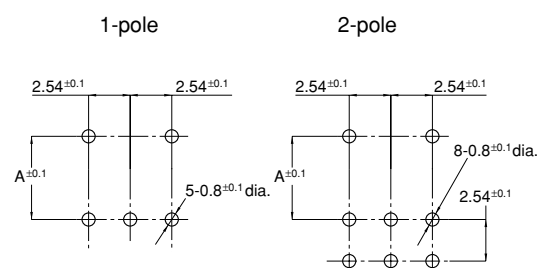


Remark: The upper side of the PC board pattern drawing is the keyway side.

3) PC-H terminal



PC board pattern (Top view)

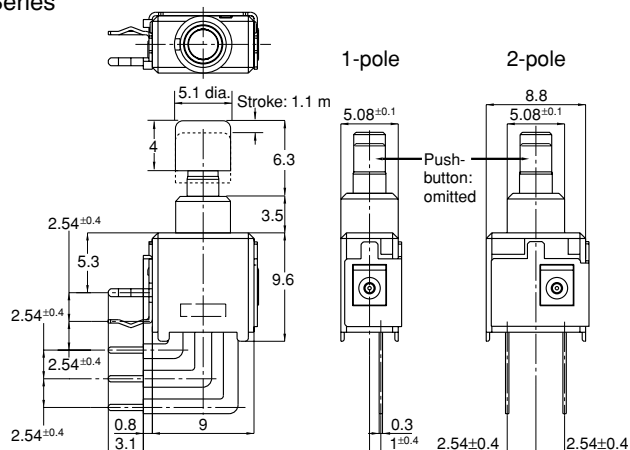


	A	B
0.2 inch pitch type	5.08	5.3
0.3 inch pitch type	7.62	2.76

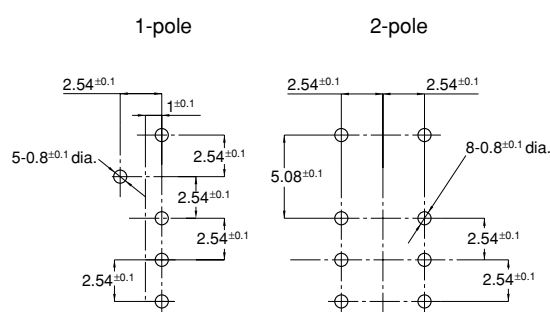
4) PC-V terminal

1-pole: A Series

2-pole: A and B Series



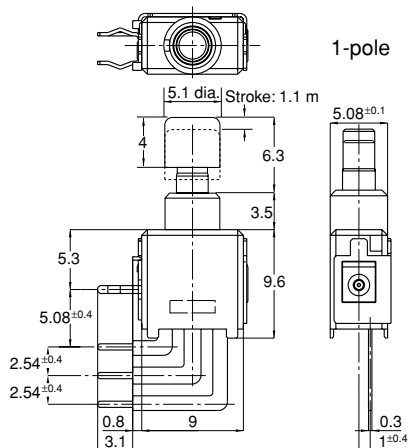
PC board pattern (Top view)



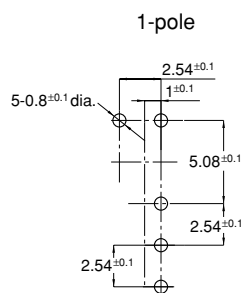
AJN1, 2

5) PC-V terminal

1-pole: B Series



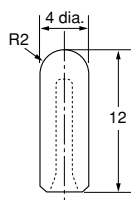
PC board pattern (Top view)



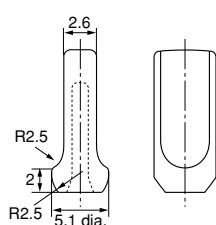
3. Color cap

1) For toggle switch

Round color cap

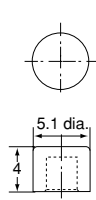


Rounded flat color cap

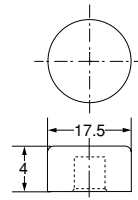


2) For push-button switch

5.1mm dia.



7.5mm dia.



NOTES

1. Soldering operations

1) For hand soldering, a soldering iron should be used with the soldering completed within 3 seconds at a temperature of 350°C.

Force should not be applied to the terminal section. Also, care should be taken not to touch the body of the switch with the soldering iron.

2) When soldering is done with an automatic soldering bath, the soldering should be completed within 5 seconds at a bath temperature of 260°C

3) Care should be taken not to move the terminal section within 1 min after the soldering has been completed.

2. Automatic cleaning

1) Although the switch can be washed as is because it is sealed with epoxy resin and an O-ring, please verify by washing under actual conditions.

2) Do not use ultrasound for cleaning as this will adversely affect switching properties.

3) Do not operate the handle or apply a force during washing.

3. As there is a possibility of damage if the product is dropped, sufficient care should be taken to avoid dropping.

4. Once removed, the color cap will not stick back on the switch with the same tenacity as they previously exhibited.

Replace them with new one.

HIGHLY RELIABLE TOGGLE AND ROCKER SWITCHES

AJ1 (J1)/AJ2 (J2) TOGGLE AND ROCKER SWITCHES

6 dia.



RoHS Directive compatibility information
<http://www.nais-e.com/>

FEATURES

1. Superior anti-inrush properties make it ideal for power supply switching. (AJ1 type)

With a wedge mechanism that increases the contact pressure by $\sqrt{2}$ times and through use of an Ag alloy for superior anti-weld properties, high-capacity switching is possible in a compact switch that also excels in resisting inrush properties.

The switch can withstand 5,000 switching times at an anti-inrush performance of 20 A (steady 3 A, 125 V AC).

2. Ideal for low-level signal load switching and applications with a low frequency of switching. (AJ2 type)

Au cladding is used on contacts for superior corrosion resistance. Stable contact reliability is maintained due to improved contact pressure thanks to the crossbar contact and the wiping effect during contact insertion thanks to the wedge mechanism.

3. Structure prevents flux from flowing in.

A sealing material used around the terminals completely prevents flux from flowing in.

4. Inch grid terminal dimensions

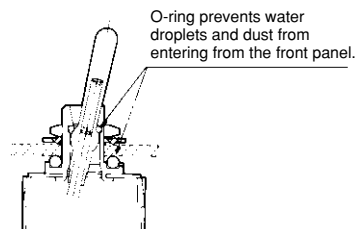
Terminal pitch is 2/10 of an inch (5.08 mm) for international terminal arrangements.

5. Fire retardant molding material (UL94V-0) used in body.

6. Lever-lock type available which is ideal for preventing errors during operation due to inadvertent force on the lever.

7. Waterproof panel type available for preventing entry of water droplets and dust.

8. Lead-free.

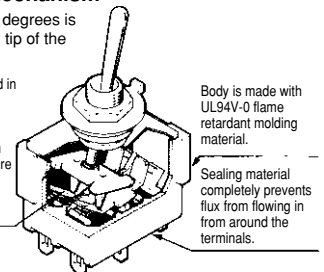


CONSTRUCTION

• Wedge mechanism

An angle of 45 degrees is provided at the tip of the contact.

An Ag alloy is used in the contacts for superior anti-weld properties. The wedge mechanism controls temperature rising and enables high capacity switching.



PRECAUTIONS WHEN USING CADMIUM-FREE CONTACT TYPE

Models with cadmium-free contacts have been introduced in order to reduce environmentally harmful substances. ("F" is affixed to the end of the part number.) (Only AJ1 type; AJ2 type is originally cadmium free.)

We ask customers who are currently using products with cadmium-containing contacts (no "F" at the end of the part number) to please make the switch to models with cadmium-free contacts.

When switching, operating life may differ depending on the load. Please be sure to verify this by conducting an evaluation using actual equipment.

AJ1, AJ2

ASSORTMENT

Contact material	Pole	Handle shape			Kind of operation	Terminal shape	Color cap	Accessories
Ag alloy contact J1 type	1-pole	Standard toggle	Plastic flat lever	Paddle	ON-OFF ON-ON ON-OFF-ON ON-<ON> <ON>-OFF-<ON> ON-OFF-<ON>	Solder	Red Yellow Green Blue Black White Light grey Dark grey	Snap-in plate
		Short toggle				PC board		
	2-pole	Long toggle	Metal flat lever	Rocker		Bracket type		Snap-in plate for LED
						PC-H terminal		
Au clad contact J2 type			Metal short flat lever	Lever lock type				
	4-pole	Plastic long lever	Metal long flat lever	Panel water-protected type		PC-V terminal		

AJ1 ORDERING INFORMATION

AJ

1

F

AJ1 type switches

Number of poles
1: 1-pole 2: 2-pole 4: 4-pole

Shape of handle
11: Standard toggle
12: Short toggle
13: Long toggle
23: Plastic long lever and plastic flat lever
 (common body block)
34: Metal flat lever
35: Metal short flat lever
36: Metal long flat lever
41: Rocker and Paddle
 (common body block)
51: Rocker kit
1R: Lever lock type
1W: Panel water-protected type

Operation
0: ON-OFF 3: ON-<ON>
1: ON-ON 4: <ON>-OFF-<ON>
2: ON-OFF-ON 5: ON-OFF-<ON>

Terminal shape
1: Solder 4: PC-H
2: PC board 5: PC-V
3: Bracket type

Overseas standards
No display: Standard product
9: UL and CSA approved product

F: Cadmium-free product

AJ1 (AgZnO alloy contact type) PRODUCT TYPES

1. Standard toggle and short toggle

Standard toggle

Change the asterisk
to a "1" when ordering.

Short toggle

Change the asterisk
to a "2" when ordering.

1) Solder terminal, PC board terminal and Bracket type

Number of poles	Operation < >: Momentary position	Solder terminal	PC board terminal	Bracket type
		Part No.	Part No.	Part No.
1-pole	ON-OFF	AJ111*01F	AJ111*02F	AJ111*03F
	ON-ON	AJ111*11F	AJ111*12F	AJ111*13F
	ON-OFF-ON	AJ111*21F	AJ111*22F	AJ111*23F
	ON-<ON>	AJ111*31F	AJ111*32F	AJ111*33F
	<ON>-OFF-<ON>	AJ111*41F	AJ111*42F	AJ111*43F
	ON-OFF-<ON>	AJ111*51F	AJ111*52F	AJ111*53F
2-pole	ON-OFF	AJ121*01F	AJ121*02F	AJ121*03F
	ON-ON	AJ121*11F	AJ121*12F	AJ121*13F
	ON-OFF-ON	AJ121*21F	AJ121*22F	AJ121*23F
	ON-<ON>	AJ121*31F	AJ121*32F	AJ121*33F
	<ON>-OFF-<ON>	AJ121*41F	AJ121*42F	AJ121*43F
	ON-OFF-<ON>	AJ121*51F	AJ121*52F	AJ121*53F
4-pole	ON-ON	AJ141*11F	AJ141*12F	—
	ON-OFF-ON	AJ141*21F	AJ141*22F	—
	ON-<ON>	AJ141*31F	AJ141*32F	—
	<ON>-OFF-<ON>	AJ141*41F	AJ141*42F	—
	ON-OFF-<ON>	AJ141*51F	AJ141*52F	—

2) PC-H terminal and PC-V terminal

Number of poles	Operation < >: Momentary position	PC-H terminal	PC-V terminal
		Part No.	Part No.
1-pole	ON-OFF	—	—
	ON-ON	AJ111*14F	AJ111*15F
	ON-OFF-ON	AJ111*24F	AJ111*25F
	ON-<ON>	AJ111*34F	AJ111*35F
	<ON>-OFF-<ON>	AJ111*44F	AJ111*45F
	ON-OFF-<ON>	AJ111*54F	AJ111*55F
2-pole	ON-OFF	—	—
	ON-ON	AJ121*14F	AJ121*15F
	ON-OFF-ON	AJ121*24F	AJ121*25F
	ON-<ON>	AJ121*34F	AJ121*35F
	<ON>-OFF-<ON>	AJ121*44F	AJ121*45F
	ON-OFF-<ON>	AJ121*54F	AJ121*55F

Remarks: Regarding standard toggles:

- When ordering please change the asterisk to a "1".
- Standard installation accessories are included with the product.
- When distinguishing by color, please use with the separately sold color caps (AJ281*) if there is a possibility that static electricity might cause damage to the electronic components.

Standard toggle



Color cap



Switch with color cap

- For UL and CSA certified products, please add a "9" before the "F" at the end of the part number when ordering.

Regarding short toggles:

- When ordering please change the asterisk to a "2".
- Bracket type, PC-H terminals and PC-V terminals can be special ordered only if the order lot quantity is 50 pieces or higher.
 - For orders of 50 to 100 pieces we can deliver in 3 weeks after receiving your order.
 - Please inquire about delivery times for orders that exceed 100 pieces.
- Standard installation accessories are included with the product.

Regarding long toggles (made-to-order product):

When ordering, the asterisk in the table above should be changed to a "3". Please inquire about deliver times.

AJ1, AJ2

3) Standard installation accessories (repair parts)

Product name	Front hex nut (Nickel plated)	Back hex nut (Uni-chrome plated)	Keying washer	Lockwasher
Dimensions (Unit mm)				
Part number	AJ2081	AJ2082	AJ2083	AJ2084

Remark: A selling unit of each accessory is 10 pieces.

4) Accessories (Option)

Product name	Dimensions (mm)	Part No.
Color cap for standard toggle		AJ281*

Remark: Please specify the color cap color by replacing the asterisk in the part number with appropriate letter
(W: white; B: black; R: red; Z: dark grey; H: light grey; L: blue; G: green; Y: yellow).

2. Plastic long lever and plastic flat lever

Plastic long lever



Plastic flat lever



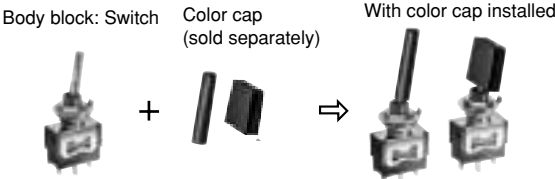
1) Body block

Number of poles	Kind of operation < >: Momentary position	Solder terminal	PC board terminal
		Part No.	Part No.
1-pole	ON-OFF	AJ112301F	AJ112302F
	ON-ON	AJ112311F	AJ112312F
	ON-OFF-ON	AJ112321F	AJ112322F
	ON-<ON>	AJ112331F	AJ112332F
	<ON>-OFF-<ON>	AJ112341F	AJ112342F
	ON-OFF-<ON>	AJ112351F	AJ112352F
2-pole	ON-OFF	AJ122301F	AJ122302F
	ON-ON	AJ122311F	AJ122312F
	ON-OFF-ON	AJ122321F	AJ122322F
	ON-<ON>	AJ122331F	AJ122332F
	<ON>-OFF-<ON>	AJ122341F	AJ122342F
	ON-OFF-<ON>	AJ122351F	AJ122352F
4-pole	ON-ON	AJ142311F	AJ142312F
	ON-OFF-ON	AJ142321F	AJ142322F
	ON-<ON>	AJ142331F	AJ142332F
	<ON>-OFF-<ON>	AJ142341F	AJ142342F
	ON-OFF-<ON>	AJ142351F	AJ142352F

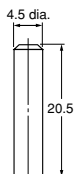
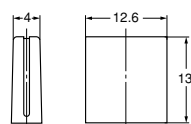
Remarks: 1. Bracket type, PC-H terminals and PC-V terminals can be special ordered only if the order lot quantity is 50 pieces or higher.
a. For orders of 50 to 100 pieces we can deliver in 3 weeks after receiving your order.
b. Please inquire about delivery times for orders that exceed 100 pieces.
c. When ordering please change the number "1" before the "F" in the part number for the soldered terminal type in the table above to one of the numbers below.
Bracket type: 3; PC-H terminal: 4; PC-V terminal: 5
d. Only single pole and 2-pole types are available. Also, the ON-OFF type is only available in the bracket type.
2. Standard installation accessories are included with the product.
3. For UL and CSA certified products, please add a "9" before the "F" at the end of the part number when ordering.

Product configuration

Please use body block "switch" with a color cap (sold separately).



2) Accessories (Option)

Product name	Dimensions (mm)	Part No.
Color cap for plastic long lever		AJ182*
Color cap for plastic flat lever		AJ183*

Remark: Please specify the color cap color by replacing the asterisk in the part number with appropriate letter (W: white; B: black; R: red; Z: dark grey; H: light grey; L: blue; G: green; Y: yellow).

3. Metal flat lever and metal short flat lever

Metal flat lever Metal short flat lever



Change the asterisk to a "4" when ordering. Change the asterisk to a "5" when ordering.

Number of poles	Kind of operation < >: Momentary position	Solder terminal	PC board terminal
		Part No.	Part No.
1-pole	ON-OFF	AJ113*01F	AJ113*02F
	ON-ON	AJ113*11F	AJ113*12F
	ON-OFF-ON	AJ113*21F	AJ113*22F
	ON-<ON>	AJ113*31F	AJ113*32F
	<ON>-OFF-<ON>	AJ113*41F	AJ113*42F
2-pole	ON-OFF-<ON>	AJ113*51F	AJ113*52F
	ON-OFF	AJ123*01F	AJ123*02F
	ON-ON	AJ123*11F	AJ123*12F
	ON-OFF-ON	AJ123*21F	AJ123*22F
	ON-<ON>	AJ123*31F	AJ123*32F
4-pole	<ON>-OFF-<ON>	AJ123*41F	AJ123*42F
	ON-OFF-<ON>	AJ123*51F	AJ123*52F
	ON-ON	AJ143*11F	AJ143*12F
	ON-OFF-ON	AJ143*21F	AJ143*22F
	ON-<ON>	AJ143*31F	AJ143*32F
	<ON>-OFF-<ON>	AJ143*41F	AJ143*42F
	ON-OFF-<ON>	AJ143*51F	AJ143*52F

Remarks: **Regarding metal flat lever**

- Bracket type, PC-H terminals and PC-V terminals can be special ordered only if the order lot quantity is 50 pieces or higher.
 - For orders of 50 to 100 pieces we can deliver in 3 weeks after receiving your order.
 - Please inquire about delivery times for orders that exceed 100 pieces.
 - When ordering please change the number "1" before the "F" in the part number for the soldered terminal type in the table above to one of the numbers below.
Bracket type: 3; PC-H terminal: 4; PC-V terminal: 5
 *Only single pole and 2-pole types are available. Also, the ON-OFF type is only available in the bracket type.
- Standard installation accessories are included with the product.
- For UL and CSA certified products, please add a "9" before the "F" at the end of the part number when ordering.

4. Metal long flat lever



Number of poles	Kind of operation < >: Momentary position	Solder terminal	PC board terminal
		Part No.	Part No.
1-pole	ON-OFF	AJ113601F	AJ113602F
	ON-ON	AJ113611F	AJ113612F
	ON-OFF-ON	AJ113621F	AJ113622F
	ON-<ON>	AJ113631F	AJ113632F
	<ON>-OFF-<ON>	AJ113641F	AJ113642F
	ON-OFF-<ON>	AJ113651F	AJ113652F
2-pole	ON-OFF	AJ123601F	AJ123602F
	ON-ON	AJ123611F	AJ123612F
	ON-OFF-ON	AJ123621F	AJ123622F
	ON-<ON>	AJ123631F	AJ123632F
	<ON>-OFF-<ON>	AJ123641F	AJ123642F
	ON-OFF-<ON>	AJ123651F	AJ123652F
4-pole	ON-ON	AJ143611F	AJ143612F
	ON-OFF-ON	AJ143621F	AJ143622F
	ON-<ON>	AJ143631F	AJ143632F
	<ON>-OFF-<ON>	AJ143641F	AJ143642F
	ON-OFF-<ON>	AJ143651F	AJ143652F

Remarks: Regarding metal long flat lever

- Bracket type, PC-H terminals and PC-V terminals can be special ordered only if the order lot quantity is 50 pieces or higher.
 - For orders of 50 to 100 pieces we can deliver in 3 weeks after receiving your order.
 - Please inquire about delivery times for orders that exceed 100 pieces.
 - When ordering please change the number "1" before the "F" in the part number for the soldered terminal type in the table above to one of the numbers below.
Bracket type: 3; PC-H terminal: 4; PC-V terminal: 5
- *Only single pole and 2-pole types are available. Also, the ON-OFF type is only available in the bracket type.
- Standard installation accessories are included with the product.
- For UL and CSA certified products, please add a "9" before the "F" at the end of the part number when ordering.

5. Paddle and rocker

Paddle Rocker



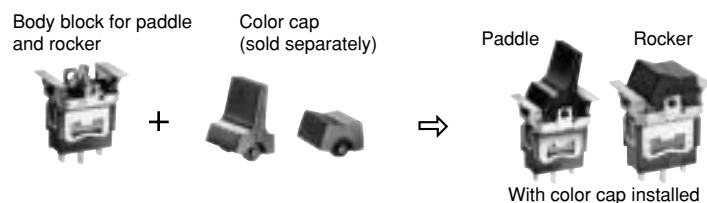
1) Body block

Number of poles	Kind of operation < >: Momentary position	Solder terminal	PC board terminal	Bracket type
		Part No.	Part No.	Part No.
1-pole	ON-OFF	AJ114101F	AJ114102F	AJ114103F
	ON-ON	AJ114111F	AJ114112F	AJ114113F
	ON-OFF-ON	AJ114121F	AJ114122F	AJ114123F
	ON-<ON>	AJ114131F	AJ114132F	AJ114133F
	<ON>-OFF-<ON>	AJ114141F	AJ114142F	AJ114143F
	ON-OFF-<ON>	AJ114151F	AJ114152F	AJ114153F
2-pole	ON-OFF	AJ124101F	AJ124102F	AJ124103F
	ON-ON	AJ124111F	AJ124112F	AJ124113F
	ON-OFF-ON	AJ124121F	AJ124122F	AJ124123F
	ON-<ON>	AJ124131F	AJ124132F	AJ124133F
	<ON>-OFF-<ON>	AJ124141F	AJ124142F	AJ124143F
	ON-OFF-<ON>	AJ124151F	AJ124152F	AJ124153F

Remark: For UL and CSA certified products, please add a "9" before the "F" at the end of the part number when ordering.

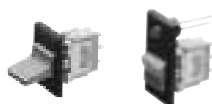
Product configuration

Please use body block "switch" with a color cap (sold separately).



If a snap-in plate is needed, please use one of the separately sold snap-in plates shown below. We do not sell LED. Bracket type switches cannot be used with snap-in plates.

With snap-in plate installed

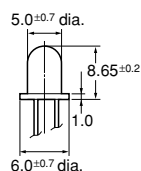
**2) Accessories (Option)**

Product name	Color cap for paddle	Color cap for rocker	Snap-in plate	Snap-in plate for LED
Dimensions (mm)				
Part No.	AJ284*	AJ285*	AJ271*	AJ272*

Remark: Please specify the color cap color by replacing the asterisk in the part number with appropriate letter (W: white; B: black; R: red; Z: dark grey; H: light grey; L: blue; G: green; Y: yellow).

Regarding the LED

We do not sell LED for the snap-in plate for LED. Please use LED with the dimensions shown below.



AJ1, AJ2

6. Lever lock type



Number of poles	Kind of operation < >: Momentary position	Solder terminal	PC board terminal
		Part No.	Part No.
1-pole	ON-OFF	AJ111R01F	AJ111R02F
	ON-ON	AJ111R11F	AJ111R12F
	ON-OFF-ON	AJ111R21F	AJ111R22F
	ON-<ON>	AJ111R31F	AJ111R32F
	<ON>-OFF-<ON>	AJ111R41F	AJ111R42F
	ON-OFF-<ON>	AJ111R51F	AJ111R52F
2-pole	ON-OFF	AJ121R01F	AJ121R02F
	ON-ON	AJ121R11F	AJ121R12F
	ON-OFF-ON	AJ121R21F	AJ121R22F
	ON-<ON>	AJ121R31F	AJ121R32F
	<ON>-OFF-<ON>	AJ121R41F	AJ121R42F
	ON-OFF-<ON>	AJ121R51F	AJ121R52F
4-pole	ON-ON	AJ141R11F	AJ141R12F
	ON-OFF-ON	AJ141R21F	AJ141R22F
	ON-<ON>	AJ141R31F	AJ141R32F
	<ON>-OFF-<ON>	AJ141R41F	AJ141R42F
	ON-OFF-<ON>	AJ141R51F	AJ141R52F

Remarks: 1. Bracket type, PC-H terminals and PC-V terminals can be special ordered only if the order lot quantity is 50 pieces or higher.

a. For orders of 50 to 100 pieces we can deliver in 3 weeks after receiving your order.

b. Please inquire about delivery times for orders that exceed 100 pieces.

c. When ordering please change the number "1" before the "F" in the part number for the soldered terminal type in the table above to one of the numbers below.

Bracket type: 3; PC-H terminal: 4; PC-V terminal: 5

*Only single pole and 2-pole types are available. Also, the ON-OFF type is only available in the bracket type.

2. Standard installation accessories are included with the product.

3. Not certified for UL and CSA.

7. Panel water-protected type



Number of poles	Kind of operation < >: Momentary position	Solder terminal	PC board terminal
		Part No.	Part No.
1-pole	ON-OFF	AJ111W01F	AJ111W02F
	ON-ON	AJ111W11F	AJ111W12F
	ON-OFF-ON	AJ111W21F	AJ111W22F
	ON-<ON>	AJ111W31F	AJ111W32F
	<ON>-OFF-<ON>	AJ111W41F	AJ111W42F
	ON-OFF-<ON>	AJ111W51F	AJ111W52F
2-pole	ON-OFF	AJ121W01F	AJ121W02F
	ON-ON	AJ121W11F	AJ121W12F
	ON-OFF-ON	AJ121W21F	AJ121W22F
	ON-<ON>	AJ121W31F	AJ121W32F
	<ON>-OFF-<ON>	AJ121W41F	AJ121W42F
	ON-OFF-<ON>	AJ121W51F	AJ121W52F
4-pole	ON-ON	AJ141W11F	AJ141W12F
	ON-OFF-ON	AJ141W21F	AJ141W22F
	ON-<ON>	AJ141W31F	AJ141W32F
	<ON>-OFF-<ON>	AJ141W41F	AJ141W42F
	ON-OFF-<ON>	AJ141W51F	AJ141W52F

Remarks: 1. Of the standard installation accessories that come with the product, the front hex nut and lock washer are included.

2. Not certified for UL and CSA.

AJ2 ORDERING INFORMATION

AJ	2					
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AJ2 type switches

Number of pole
1: 1-pole 2: 2-pole 4: 4-pole

Shape of handle
1: Standard toggle
2: Plastic long lever
3: Plastic flat lever
4: Rocker and Paddle (common body block)
5: Rocker kit
6: Metal flat lever
1R: Lever lock type
1W: Panel water-protected type

Kind of operation
0: ON-OFF 3: ON-<ON>
1: ON-ON 4: <ON>-OFF-<ON>
2: ON-OFF-ON 5: ON-OFF-<ON>

Terminal shape
1: Solder 4: PC-H
2: PC board 5: PC-V
3: Bracket type

Overseas standards
No display: Standard product
9: UL and CSA approved product

AJ2 (AgNi alloy contact and Au clad contact type) PRODUCT TYPES

1. Standard toggle



1) Solder terminal, PC board terminal and Bracket type

Number of poles	Kind of operation < >: Momentary position	Solder terminal	PC board terminal	Bracket type
		Part No.	Part No.	Part No.
1-pole	ON-OFF	AJ21101	AJ21102	AJ21103
	ON-ON	AJ21111	AJ21112	AJ21113
	ON-OFF-ON	AJ21121	AJ21122	AJ21123
	ON-<ON>	AJ21131	AJ21132	AJ21133
	<ON>-OFF-<ON>	AJ21141	AJ21142	AJ21143
	ON-OFF-<ON>	AJ21151	AJ21152	AJ21153
2-pole	ON-OFF	AJ22101	AJ22102	AJ22103
	ON-ON	AJ22111	AJ22112	AJ22113
	ON-OFF-ON	AJ22121	AJ22122	AJ22123
	ON-<ON>	AJ22131	AJ22132	AJ22133
	<ON>-OFF-<ON>	AJ22141	AJ22142	AJ22143
	ON-OFF-<ON>	AJ22151	AJ22152	AJ22153
4-pole	ON-ON	AJ24111	AJ24112	—
	ON-OFF-ON	AJ24121	AJ24122	—
	ON-<ON>	AJ24131	AJ24132	—
	<ON>-OFF-<ON>	AJ24141	AJ24142	—
	ON-OFF-<ON>	AJ24151	AJ24152	—

AJ1, AJ2

2) PC-H terminal and PC-V terminal

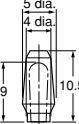
Number of poles	Kind of operation < >: Momentary position	PC-H terminal	PC-V terminal
		Part No.	Part No.
1-pole	ON-OFF	—	—
	ON-ON	AJ21114	AJ21115
	ON-OFF-ON	AJ21124	AJ21125
	ON-<ON>	AJ21134	AJ21135
	<ON>-OFF-<ON>	AJ21144	AJ21145
	ON-OFF-<ON>	AJ21154	AJ21155
2-pole	ON-OFF	—	—
	ON-ON	AJ22114	AJ22115
	ON-OFF-ON	AJ22124	AJ22125
	ON-<ON>	AJ22134	AJ22135
	<ON>-OFF-<ON>	AJ22144	AJ22145
	ON-OFF-<ON>	AJ22154	AJ22155

Remarks: 1. Standard installation accessories are included with the product.

2. When distinguishing by color, please use with the separately sold color caps (AJ281*) for standard toggle if there is a possibility that static electricity might cause damage to the electronic components.

3. For UL and CSA certified products, please add a "9" before the "F" at the end of the part number when ordering.

3) Accessories (Option)

Product name	Dimensions (mm)	Part No.
Color cap for standard toggle		AJ281*

Remark: Please specify the color cap color by replacing the asterisk in the part number with appropriate letter (W: white; B: black; R: red; Z: dark grey; H: light grey; L: blue; G: green; Y: yellow).

2. Plastic long lever



1) Body block

Number of poles	Kind of operation < >: Momentary position	Solder terminal	PC board terminal
		Part No.	Part No.
1-pole	ON-OFF	AJ21201	AJ21202
	ON-ON	AJ21211	AJ21212
	ON-OFF-ON	AJ21221	AJ21222
	ON-<ON>	AJ21231	AJ21232
	<ON>-OFF-<ON>	AJ21241	AJ21242
	ON-OFF-<ON>	AJ21251	AJ21252
2-pole	ON-OFF	AJ22201	AJ22202
	ON-ON	AJ22211	AJ22212
	ON-OFF-ON	AJ22221	AJ22222
	ON-<ON>	AJ22231	AJ22232
	<ON>-OFF-<ON>	AJ22241	AJ22242
	ON-OFF-<ON>	AJ22251	AJ22252
4-pole	ON-ON	AJ24211	AJ24212
	ON-OFF-ON	AJ24221	AJ24222
	ON-<ON>	AJ24231	AJ24232
	<ON>-OFF-<ON>	AJ24241	AJ24242
	ON-OFF-<ON>	AJ24251	AJ24252

Remarks: 1. Bracket type, PC-H terminals and PC-V terminals can be special ordered only if the order lot quantity is 50 pieces or higher.

a. For orders of 50 to 100 pieces we can deliver in 3 weeks after receiving your order.

b. Please inquire about delivery times for orders that exceed 100 pieces.

c. When ordering please change the "1" at the end of the part number for the solder terminal type to one of the following numbers.

Bracket type: 3; PC-H terminal: 4; PC-V terminal: 5

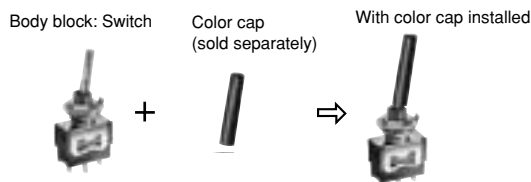
d. Only single pole and 2-pole types are available. Also, the ON-OFF type is only available in the bracket type.

2. Standard installation accessories are included with the product.

3. For UL and CSA certified products, please add a "9" at the end of the part number when ordering.

Product configuration

Please use body block "switch" with a color cap (sold separately).

**2) Accessories (Option) (AJ2 only)**

Product name	Dimensions (mm)	Part No.
Color cap for plastic long lever		AJ282*

Remark: Please specify the color cap color by replacing the asterisk in the part number with appropriate letter (W: white; B: black; R: red; Z: dark grey; H: light grey; L: blue; G: green; Y: yellow).

3. Plastic flat lever**1) Body block**

Number of poles	Kind of operation < >: Momentary position	Solder terminal	PC board terminal
		Part No.	Part No.
1-pole	ON-OFF	AJ21301	AJ21302
	ON-ON	AJ21311	AJ21312
	ON-OFF-ON	AJ21321	AJ21322
	ON-<ON>	AJ21331	AJ21332
	<ON>-OFF-<ON>	AJ21341	AJ21342
2-pole	ON-OFF-<ON>	AJ21351	AJ21352
	ON-OFF	AJ22301	AJ22302
	ON-ON	AJ22311	AJ22312
	ON-OFF-ON	AJ22321	AJ22322
	ON-<ON>	AJ22331	AJ22332
4-pole	<ON>-OFF-<ON>	AJ22341	AJ22342
	ON-OFF-<ON>	AJ22351	AJ22352
	ON-ON	AJ24311	AJ24312
	ON-OFF-ON	AJ24321	AJ24322
	ON-<ON>	AJ24331	AJ24332
	<ON>-OFF-<ON>	AJ24341	AJ24342
	ON-OFF-<ON>	AJ24351	AJ24352

Remarks: 1. Bracket type, PC-H terminals and PC-V terminals can be special ordered only if the order lot quantity is 50 pieces or higher.

a. For orders of 50 to 100 pieces we can deliver in 3 weeks after receiving your order.

b. Please inquire about delivery times for orders that exceed 100 pieces.

c. When ordering please change the "1" at the end of the part number for the solder terminal type to one of the following numbers.

Bracket type: 3; PC-H terminal: 4; PC-V terminal: 5

d. Only single pole and 2-pole types are available. Also, the ON-OFF type is only available in the bracket type.

2. Standard installation accessories are included with the product.

3. For UL and CSA certified products, please add a "9" at the end of the part number when ordering.

2) Accessories (Option) (AJ2 only)

Product name	Dimensions (mm)	Part No.
Color cap for plastic flat lever		AJ283*

Remark: Please specify the color cap color by replacing the asterisk in the part number with appropriate letter (W: white; B: black; R: red; Z: dark grey; H: light grey; L: blue; G: green; Y: yellow).

AJ1, AJ2

4. Metal flat lever



1) Solder terminal, PC board terminal and Bracket type

Number of poles	Kind of operation < >: Momentary position	Solder terminal	PC board terminal	Bracket type
		Part No.	Part No.	Part No.
1-pole	ON-OFF	AJ21601	AJ21602	AJ21603
	ON-ON	AJ21611	AJ21612	AJ21613
	ON-OFF-ON	AJ21621	AJ21622	AJ21623
	ON-<ON>	AJ21631	AJ21632	AJ21633
	<ON>-OFF-<ON>	AJ21641	AJ21642	AJ21643
	ON-OFF-<ON>	AJ21651	AJ21652	AJ21653
2-pole	ON-OFF	AJ22601	AJ22602	AJ22603
	ON-ON	AJ22611	AJ22612	AJ22613
	ON-OFF-ON	AJ22621	AJ22622	AJ22623
	ON-<ON>	AJ22631	AJ22632	AJ22633
	<ON>-OFF-<ON>	AJ22641	AJ22642	AJ22643
	ON-OFF-<ON>	AJ22651	AJ22652	AJ22653
4-pole	ON-ON	AJ24611	AJ24612	—
	ON-OFF-ON	AJ24621	AJ24622	—
	ON-<ON>	AJ24631	AJ24632	—
	<ON>-OFF-<ON>	AJ24641	AJ24642	—
	ON-OFF-<ON>	AJ24651	AJ24652	—

2) PC-H terminal and PC-V terminal

Number of poles	Kind of operation < >: Momentary position	PC-H terminal	PC-V terminal
		Part No.	Part No.
1-pole	ON-OFF	—	—
	ON-ON	AJ21614	AJ21615
	ON-OFF-ON	AJ21624	AJ21625
	ON-<ON>	AJ21634	AJ21635
	<ON>-OFF-<ON>	AJ21644	AJ21645
	ON-OFF-<ON>	AJ21654	AJ21655
2-pole	ON-OFF	—	—
	ON-ON	AJ22614	AJ22615
	ON-OFF-ON	AJ22624	AJ22625
	ON-<ON>	AJ22634	AJ22635
	<ON>-OFF-<ON>	AJ22644	AJ22645
	ON-OFF-<ON>	AJ22654	AJ22655

Remarks: 1. Standard installation accessories are included with the product.

2. For UL and CSA certified products, please add a "9" at the end of the part number when ordering.

5. Paddle and rocker

Paddle

Rocker



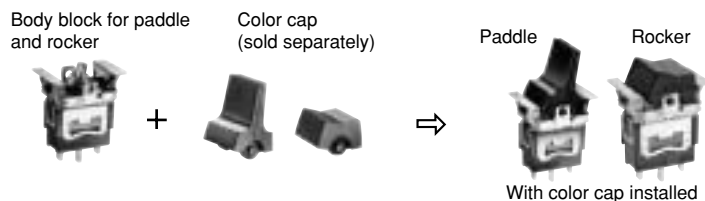
1) Body block

Number of poles	Kind of operation < >: Momentary position	Solder terminal	PC board terminal	Bracket type
		Part No.	Part No.	Part No.
1-pole	ON-OFF	AJ21401	AJ21402	AJ21403
	ON-ON	AJ21411	AJ21412	AJ21413
	ON-OFF-ON	AJ21421	AJ21422	AJ21423
	ON-<ON>	AJ21431	AJ21432	AJ21433
	<ON>-OFF-<ON>	AJ21441	AJ21442	AJ21443
	ON-OFF-<ON>	AJ21451	AJ21452	AJ21453
2-pole	ON-OFF	AJ22401	AJ22402	AJ22403
	ON-ON	AJ22411	AJ22412	AJ22413
	ON-OFF-ON	AJ22421	AJ22422	AJ22423
	ON-<ON>	AJ22431	AJ22432	AJ22433
	<ON>-OFF-<ON>	AJ22441	AJ22442	AJ22443
	ON-OFF-<ON>	AJ22451	AJ22452	AJ22453

Remark: For UL and CSA certified products, please add a "9" at the end of the part number when ordering.

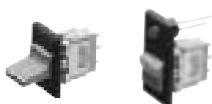
Product configuration

Please use body block "switch" with a color cap (sold separately).



If a snap-in plate is needed, please use one of the separately sold snap-in plates shown below. We do not sell LED. Bracket type switches cannot be used with snap-in plates.

With snap-in plate installed



2) Accessories (Option)

Product name	Color cap for paddle	Color cap for rocker	Snap-in plate	Snap-in plate for LED
Dimensions (mm)				
Part No.	AJ284*	AJ285*	AJ271*	AJ272*

Remark: Please specify the color cap color by replacing the asterisk in the part number with appropriate letter (W: white; B: black; R: red; Z: dark grey; H: light grey; L: blue; G: green; Y: yellow).

6. Lever lock type



Number of poles	Kind of operation < >: Momentary position	Solder terminal	PC board terminal
		Part No.	Part No.
1-pole	ON-OFF	AJ211R01	AJ211R02
	ON-ON	AJ211R11	AJ211R12
	ON-OFF-ON	AJ211R21	AJ211R22
	ON-<ON>	AJ211R31	AJ211R32
	<ON>-OFF-<ON>	AJ211R41	AJ211R42
2-pole	ON-OFF-<ON>	AJ211R51	AJ211R52
	ON-OFF	AJ221R01	AJ221R02
	ON-ON	AJ221R11	AJ221R12
	ON-OFF-ON	AJ221R21	AJ221R22
	ON-<ON>	AJ221R31	AJ221R32
4-pole	<ON>-OFF-<ON>	AJ221R41	AJ221R42
	ON-OFF-<ON>	AJ221R51	AJ221R52
	ON-ON	AJ241R11	AJ241R12
	ON-OFF-ON	AJ241R21	AJ241R22
	ON-<ON>	AJ241R31	AJ241R32
	<ON>-OFF-<ON>	AJ241R41	AJ241R42
	ON-OFF-<ON>	AJ241R51	AJ241R52

Remarks: 1. Bracket type, PC-H terminals and PC-V terminals can be special ordered only if the order lot quantity is 50 pieces or higher.

a. For orders of 50 to 100 pieces we can deliver in 3 weeks after receiving your order.

b. Please inquire about delivery times for orders that exceed 100 pieces.

c. When ordering please change the number "1" before the "F" in the part number for the soldered terminal type in the table above to one of the numbers below.

Bracket type: 3; PC-H terminal: 4; PC-V terminal: 5

d. Only single pole and 2-pole types are available. Also, the ON-OFF type is only available in the bracket type.

2. Standard installation accessories are included with the product.

3. Not certified for UL and CSA.

AJ1, AJ2

7. Panel water-protected type



Number of poles	Kind of operation < >: Momentary position	Solder terminal	PC board terminal
		Part No.	Part No.
1-pole	ON-OFF	AJ211W01	AJ211W02
	ON-ON	AJ211W11	AJ211W12
	ON-OFF-ON	AJ211W21	AJ211W22
	ON-<ON>	AJ211W31	AJ211W32
	<ON>-OFF-<ON>	AJ211W41	AJ211W42
	ON-OFF-<ON>	AJ211W51	AJ211W52
2-pole	ON-OFF	AJ221W01	AJ221W02
	ON-ON	AJ221W11	AJ221W12
	ON-OFF-ON	AJ221W21	AJ221W22
	ON-<ON>	AJ221W31	AJ221W32
	<ON>-OFF-<ON>	AJ221W41	AJ221W42
	ON-OFF-<ON>	AJ221W51	AJ221W52
4-pole	ON-ON	AJ241W11	AJ241W12
	ON-OFF-ON	AJ241W21	AJ241W22
	ON-<ON>	AJ241W31	AJ241W32
	<ON>-OFF-<ON>	AJ241W41	AJ241W42
	ON-OFF-<ON>	AJ241W51	AJ241W52

Remarks: 1. Of the standard installation accessories that come with the product, the front hex nut and lock washer are included.
2. Not certified for UL and CSA.

8. Special order lot products

(short toggle, long toggle, metal short flat lever, and metal long flat lever)

You can special order these products if the order lot quantity is 50 pieces or more. Please inquire. For 50 to 100 pieces we will deliver within 3 weeks of receiving your order. We will inform you separately about the delivery time for quantities over 100 pieces.

ORDERING INFORMATION

AJ2

Number of poles
1: 1-pole 2: 2-pole 4: 4-pole

Shape of handle
1S: Short toggle
1L: Long toggle
6S: Metal short flat lever
6L: Metal long flat lever

Kind of operation
0: ON-OFF 3: ON-OFF-<ON>
1: ON-ON 4: <ON>-OFF-<ON>
2: ON-OFF-ON 5: ON-OFF-<ON>

Terminal shape
1: Solder 4: PC-H
2: PC board 5: PC-V
3: Bracket type

- ON-OFF type is only available with solder terminals, PC board terminals and bracket types for 1-pole and 2-pole.
- Bracket type, PC-H and PC-V terminals are only for 1-pole and 2-pole.
- For UL and CSA certified products, please add a "9" at the end of the part number when ordering.
- Standard installation accessories are included with the product

9. Standard installation accessories (repair parts)

Product name	Front hex nut (Nickel plated)	Back hex nut (Uni-chrome plated)	Keying washer	Lockwasher
Dimensions (Unit mm)				
Part number	AJ2081	AJ2082	AJ2083	AJ2084

Remark: A selling unit of each accessory is 10 pieces.

SPECIFICATIONS

1. Contact rating

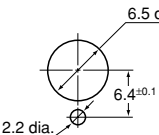
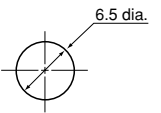
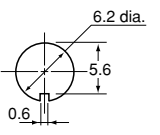
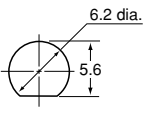
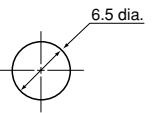
Kind of load	Type/Life						
	AJ1 (Ag alloy contact type)				AJ2 (Au clad contact type)		
	ON-OFF ON-ON	Electrical life	ON-OFF-ON ON-<ON> <ON>-OFF-<ON> ON-OFF-<ON>	Electrical life	1-pole and 2-pole	4-pole	Electrical life
Resistive load	7A 125V AC 4A 250V AC 6A 30V DC	3×10 ⁴	7A 125V AC 4A 250V AC 6A 30V DC	10 ⁴	6A 125V AC 3A 250V AC 6A 30V DC	4A 125V AC 2A 250V AC 4A 30V DC	3×10 ⁴
Inductive load (cosφ = 0.6)	6A 125V AC 3A 250V AC	3×10 ⁴	6A 125V AC 3A 250V AC	10 ⁴	6A 125V AC 3A 250V AC	4A 125V AC 2A 250V AC	3×10 ⁴
Incandescent lamp	100W 100V AC	10 ⁴	—	—	—	—	—
Inrush load	20A 10ms Steady: 3A 125V AC	5×10 ³	—	—	—	—	—
Low-level load	(Please use J2 type.)				1mA 5V DC		

2. Characteristics

Expected life (min. operations)	Mechanical (20 cpm)	10 ⁵
	Electrical (20 cpm resistive)	See above
Insulation resistance (at 500V DC)	More than 100MΩ	
Breakdown voltage	Between contacts: 1,000 Vrms, Between terminals and ground: 1,500 Vrms, (Detection current: 10mA)	
Contact resistance (Initial)	For AJ1 type: Max. 10 mΩ (by voltage drop at 1 A, 2 to 4 V DC)	For AJ2 type: Max. 10 mΩ (by voltage drop at 0.1 A, 2 to 4 V DC)
Vibration resistance (Contact opening less than 10μs)	10 to 55 Hz at 1.5mm double amplitude	
Shock resistance (Contact opening less than 10μs)	Min. 490m/s ²	
Temperature rise (at terminals)	Max. 45 deg.	
Ambient temperature	-25°C to +85°C (Not freezing below 0°C)	
Contact material	AJ1 type: AgZnO alloy, AJ2 type: AgNi alloy and Au clad	

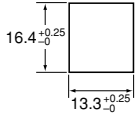
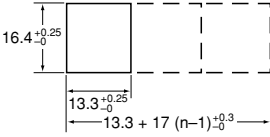
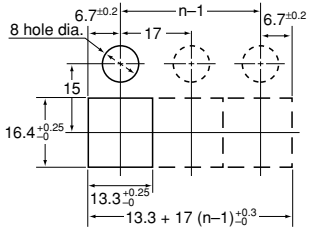
MOUNTING DIMENSIONS (for AJ1 type and AJ2 type)

1. Toggle and Lever type

Type	Toggle and Lever type (except panel water-protected type)			Panel water-protected type	
Panel cutout (mm)					
Panel thickness	Max. 2.4 mm	Max. 3.2 mm (without keying washer)	Max. 3.2 mm (without keying washer)	Max. 4.9 mm	Max. 4.9 mm
	Max. 4.5 mm (without back hex nut)	Max. 5.3 mm (without back hex nut and keying washer)	Max. 5.3 mm (without back hex nut and keying washer)		

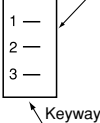
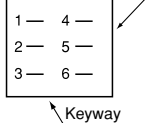
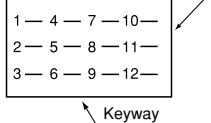







Remark: A keying washer is not included with the panel water-protected type.

2. Paddle and Rocker type

	Installed alone	Adjacent installation with snap-in plate	Adjacent installation with snap-in plate for LED
Panel cutout (mm)			
Panel thickness	1 to 3.2mm	1 to 2.7mm	1 to 2.7mm

Remark: Adjacent installation is not possible unless a snap-in plate is used.

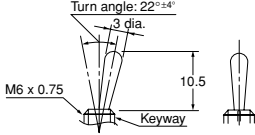
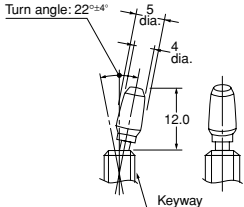
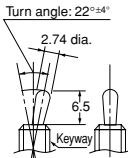
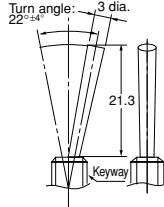
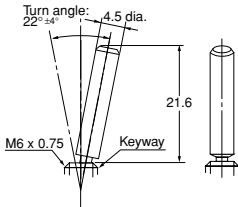
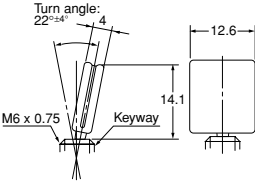
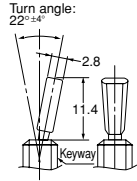
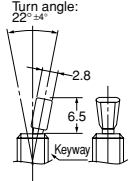
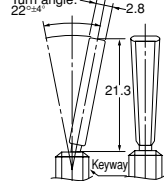
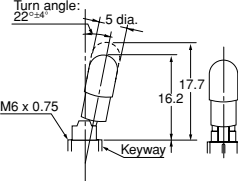
ELECTRICAL CIRCUIT DIAGRAM (for AJ1 type and AJ2 type)

Terminal arrangement (As seen from terminal side)			1-pole	2-pole	4-pole
			Side with "MATSUSHITA" 	Side with "MATSUSHITA" 	Side with "MATSUSHITA" 
Handle position and contact terminal number	ON-OFF		2-3	2-3, 5-6	—
			—	—	—
	ON-ON ON-<ON>		2-3	2-3, 5-6	2-3, 5-6, 8-9, 11-12
			1-2	1-2, 4-5	1-2, 4-5, 7-8, 10-11
	ON-OFF-ON <ON>-OFF-<ON> ON-OFF-<ON>		2-3	2-3, 5-6	2-3, 5-6, 8-9, 11-12
			—	—	—
			1-2	1-2, 4-5	1-2, 4-5, 7-8, 10-11
Remark			ON-OFF type does not have a terminal No. 1.	ON-OFF type does not have terminal No. 1 and No. 4.	There is no ON-OFF type for the 4-pole type.

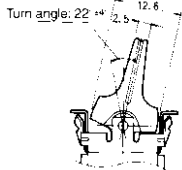
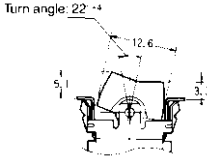
Remark: For ON-<ON>, ON-OFF-<ON> type, the lever springs back (momentary position) when pushed toward the keyway side.

HANDLE SHAPE (mm) (Tolerance: ±0.5)

1. Toggle and Lever type

Standard toggle	Standard toggle with color cap	Short toggle	Long toggle	Plastic long lever
				
Plastic flat lever	Metal flat lever	Metal short flat lever	Metal long flat lever	Lever lock type
				

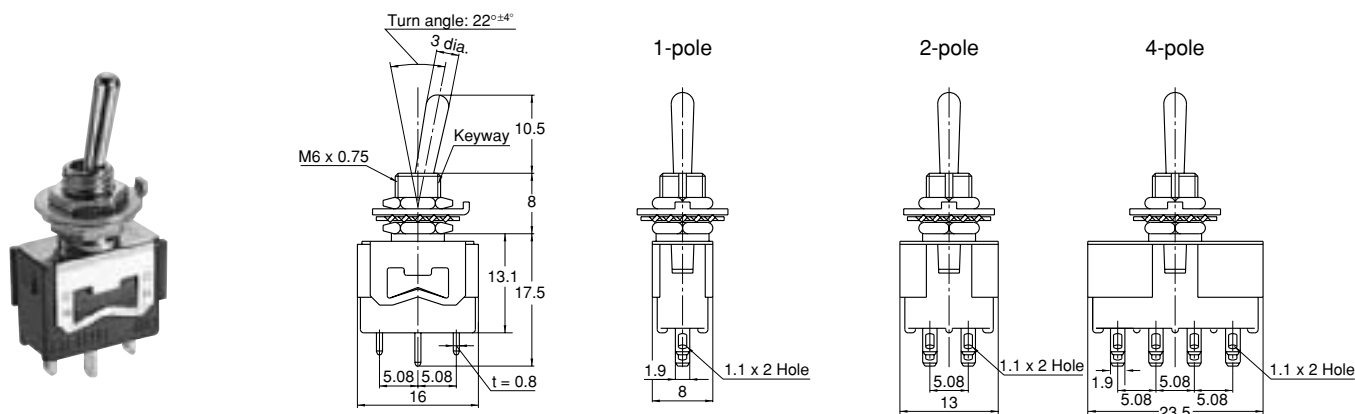
2. Paddle and Rocker type

Paddle	Rocker
	

DIMENSIONS (mm) (for AJ1 type and AJ2 type) (General tolerance: ± 0.5)

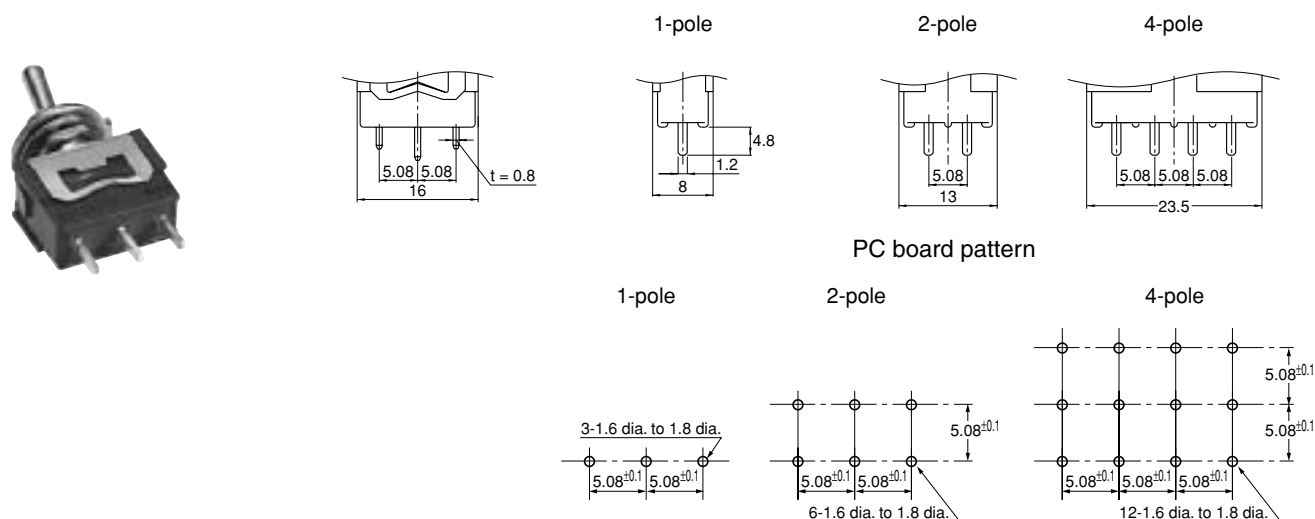
1. Toggle and Lever type, Body and terminal shape (For standard toggle)

1) Solder terminal



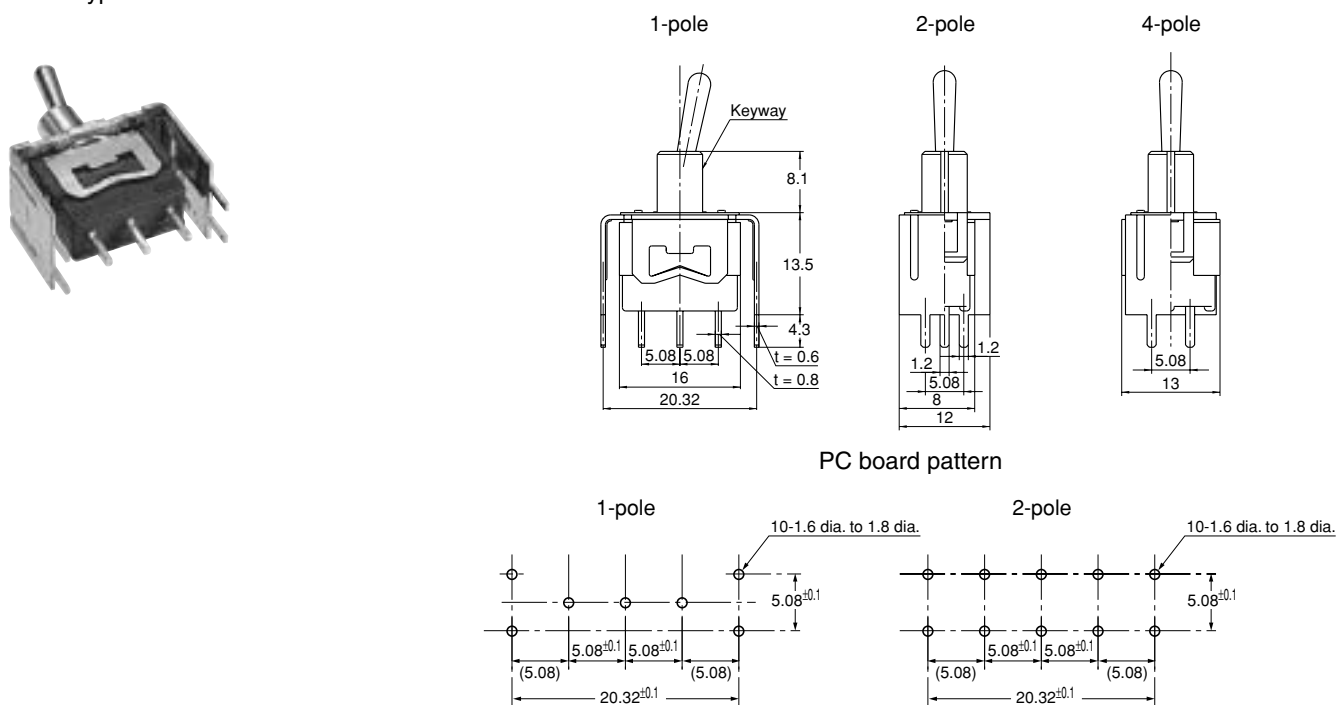
Remark: The waterproof panel type has an O-ring; therefore it does not have back hex nut ***3". (*1=7.6, *2=13.5)

2) PC board terminal



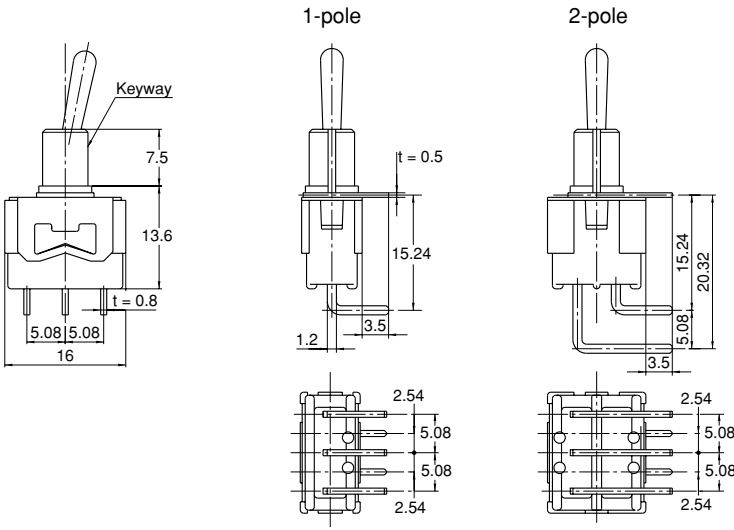
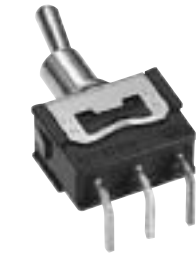
Remark: The main body dimensions are the same as the solder terminal type above.

3) Bracket type

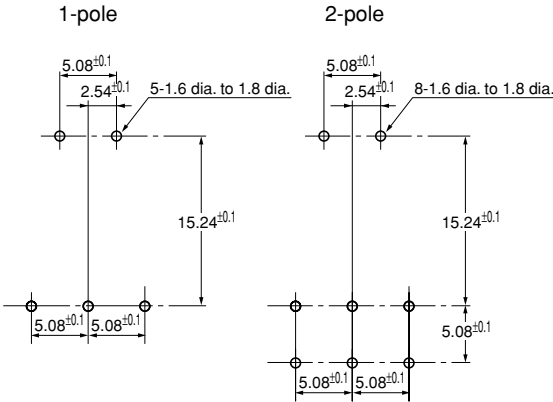


AJ1, AJ2

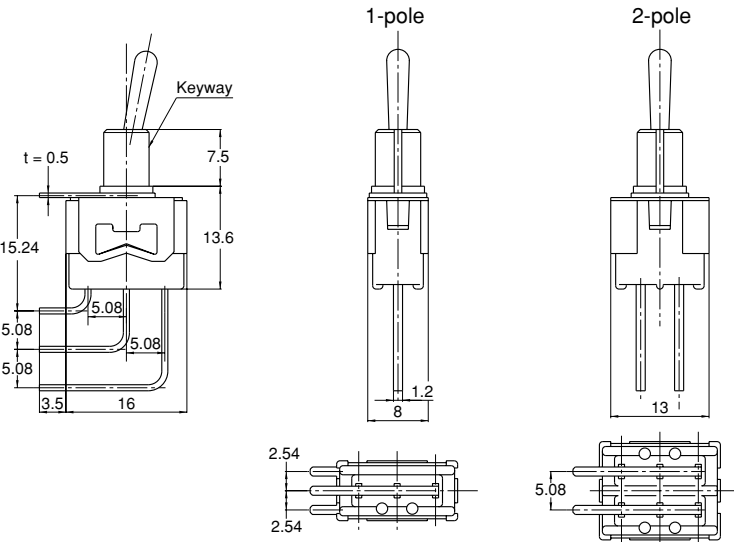
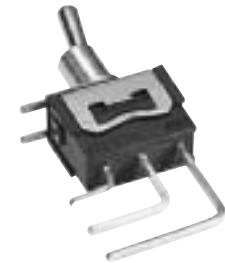
4) PC-H terminal



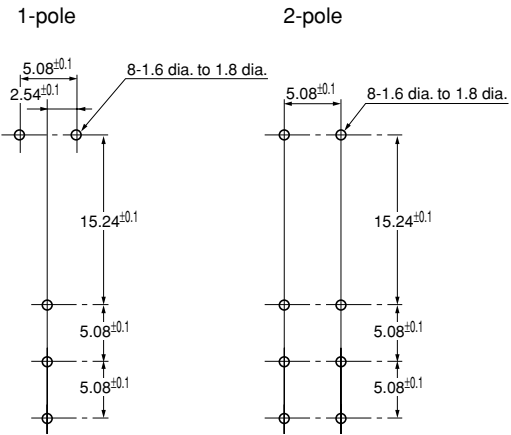
PC board pattern



5) PC-V terminal

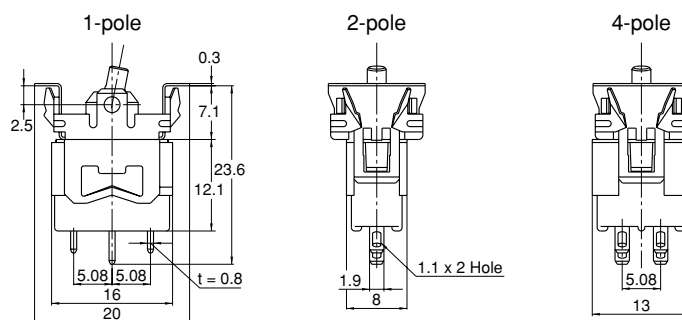


PC board pattern



2. Paddle and Rocker type, Body and terminal shape

Solder terminal



Remark: The body and terminal shape of the PC board terminal and bracket types are the same as the toggle type.

3. Panel water-protected type, Body and terminal shape

The water-protected type is only available in the standard toggle type.

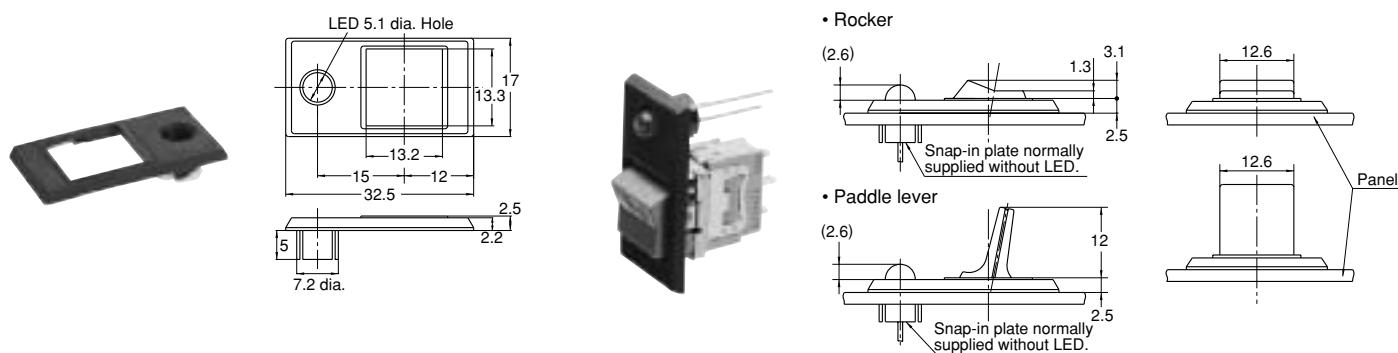
Please refer to the remarks for solder terminals.

DIMENSIONS OF SNAP-IN PLATE (mm) (General tolerance: -0.5)

1. Snap-in plate



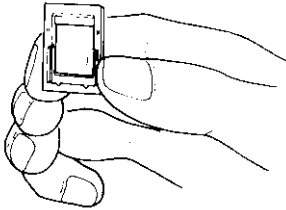
2. Snap-in plate for LED



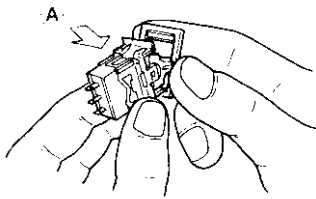
HOW TO HANDLE SNAP-IN PLATE

1. Snap-in plate Mounting Method

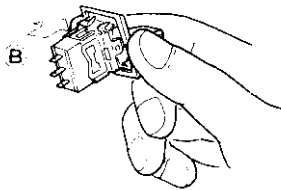
1) Hold a plate with spring groove down.



2) Put one side of mounting bracket of the switch into spring groove and push switch as indicated by arrow (A).

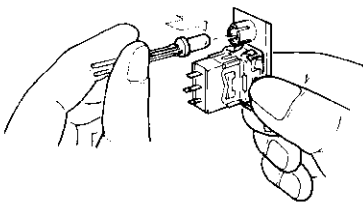


3) Push the switch in the direction (A) and snap it in as indicated by arrow (B).
(Completed installation)

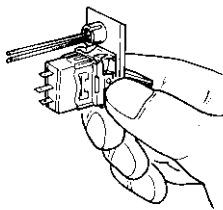


2. LED Mounting Method

1) Secure the switch and push the LED directly in the direction of the arrow.



2) Completed installation.



NOTES

1. Panel installation

- 1) Do not tighten the nut, holding the switch.
- 2) Keep the panel tightening torque to less than 98.0 N·cm. However, for the waterproof panel type, use a torque of between 29.4 to 98.0 N·cm.

2. Soldering operations

- 1) For hand soldering 350°C soldering iron should be used with the soldering completed within 5 s. Force should not be applied to the terminal section. Also, care should be taken not to touch the body of the switch with the soldering iron.
- 2) When soldering is done with an automatic soldering bath, the soldering should be completed within 6 seconds at a bath temperature of 250°C and within 3 s at a bath temperature of 350°C.
- 3) Care should be taken not to move the terminal section within 1 min after the soldering has been completed. Also, sufficient care should be taken not to apply tensile load to the terminal section through the lead wires.

3. Static electricity

When switches are operated, if there is fear of damage to electronic components connected in the switch circuit due to static electricity generated by the human body, switches with colored caps should be used.

4. Color cap

In the color caps of the plastic long lever and flat lever types, when interchanging or removing the caps, strength is weakened. When an interchange is required, new color caps should be used.

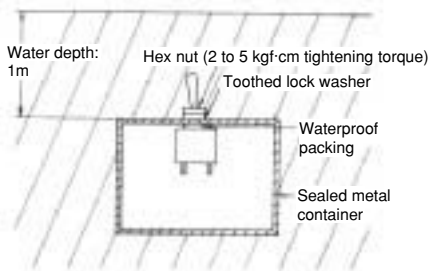
5.

For use in applications where the load is extremely small, or where the frequency of use is very low, type J2 which is provided with gold clad contacts should be used.

6. Waterproof panel type

- 1) Install the lock washer to the front side of the panel.
- 2) The waterproof panel type is only designed to seal the panel from water. It is not meant to be submerged in water.

Test of panel waterproofing



Conditions:
Water depth: 1m
Test time: 30 min.
Test condition: As shown in above figure.

Criteria:

- 1) No entry of water into sealed container or inside of product.
- 2) Insulation resistance: at least 100 M# (at 500 V DC)

Measurement locations

- (1) Between each terminal in circuit
- (2) Between nozzle and all terminals
- 3) Breakdown voltage
- (1) 1,000 V AC, 1 minute
- (2) 1,500 V AC, 1 minute

Measurement locations are same as for insulation resistance.

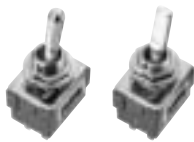
7. Handle strength

Type	Handle strength (static load for 1 min.)
Standard toggle	68.6N
Short toggle	
Long toggle	
Plastic long lever	24.5N
Plastic flat lever	
Metal flat lever	39.2N
Metal short flat lever	
Metal long flat lever	
Paddle	19.6N
Rocker	
Lever lock type	49N
Panel water-protected type	68.6N

8. Environment

Avoid using and storing these switches in a location where they will be exposed to corrosive gases, silicon, or high dust levels, all of which can have an adverse effect on the contacts.

12 dia.



RoHS Directive compatibility information
<http://www.nais-e.com/>

FEATURES

1. Excellent anti-inrush properties allow it to handle large inrush currents.

With a wedge mechanism that increases contact efficiency by $\sqrt{2}$ times and through use of an oxide Ag alloy for superior anti-weld properties, this compact switch is capable of high-capacity switching.

This makes it ideal for circuits with high inrush currents such as those in motor load and lamp load.

2. High level of safety with at least 3 mm between contacts.

Compliant with overseas safety standards.

(ON-OFF and ON-ON type)

Insulation distance between recharge part and ground is at least 6 mm and between poles it is at least 3 mm.

Compliant with the Electrical Appliance and Material Control Law and EN (Class 1) standard.

3. Structure prevents flux from flowing in.

A sealant used around the terminals completely prevents flux from flowing in.

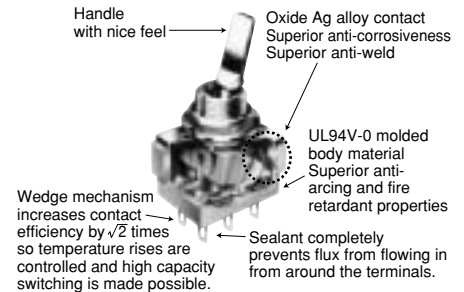
4. Fire retardant molding material used in body.

Excels in anti-arcing (180 s) and anti-tracking (600 V) through use of UL94V-0 fire retardant electric-use molding material.

CONSTRUCTION

• Wedge mechanism

<Flat lever type>



PRECAUTIONS WHEN USING CADMIUM-FREE CONTACT TYPE

Models with cadmium-free contacts have been introduced in order to reduce environmentally harmful substances. ("F" is affixed to the end of the part number.)

We ask customers who are currently using products with cadmium-containing contacts (no "F" at the end of the part number) to please make the switch to models with cadmium-free contacts.

When switching, operating life may differ depending on the load. Please be sure to verify this by conducting an evaluation using actual equipment.

ORDERING INFORMATION

AJ 4 [] [] [] [] F

4: AJ4 type toggle switch

Number of poles and shape of terminal:

- 1: 1-pole, Solder terminal
- 2: 2-pole, Solder terminal
- 4: 4-pole, Solder terminal
- 5: 1-pole, .110 Quick-connect terminal
- 6: 2-pole, .110 Quick-connect terminal
- 8: 4-pole, .110 Quick-connect terminal

Shape of handle:

- 1: Standard toggle
- 3: Flat lever

Kind of operation:

- 0: ON-OFF
- 1: ON-ON
- 2: ON-OFF-ON
- 3: ON-OFF-<ON>
- 4: <ON>-OFF-<ON>
- 5: ON-OFF-<ON>

Shape of nut:

- 0: Hexagonal nut

F: Cadmium-free product

PRODUCT TYPES

1. Standard toggle



Number of poles	Kind of operation < >: Momentary position	Solder terminal	.110 Quick-connect terminal
		Part No.	Part No.
1-pole	ON-OFF	AJ41100F	AJ45100F
	ON-ON	AJ41110F	AJ45110F
	ON-OFF-ON	AJ41120F	AJ45120F
	ON-<ON>	AJ41130F	AJ45130F
	<ON>-OFF-<ON>	AJ41140F	AJ45140F
	ON-OFF-<ON>	AJ41150F	AJ45150F
2-pole	ON-OFF	AJ42100F	AJ46100F
	ON-ON	AJ42110F	AJ46110F
	ON-OFF-ON	AJ42120F	AJ46120F
	ON-<ON>	AJ42130F	AJ46130F
	<ON>-OFF-<ON>	AJ42140F	AJ46140F
	ON-OFF-<ON>	AJ42150F	AJ46150F
4-pole	ON-OFF	AJ44100F	AJ48100F
	ON-ON	AJ44110F	AJ48110F
	ON-OFF-ON	AJ44120F	AJ48120F
	ON-<ON>	AJ44130F	AJ48130F
	<ON>-OFF-<ON>	AJ44140F	AJ48140F
	ON-OFF-<ON>	AJ44150F	AJ48150F

Remark: Standard installation accessories are included with the product.

2. Flat lever

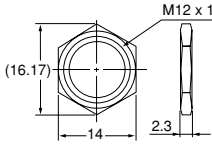
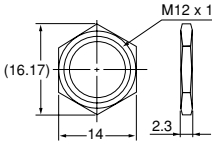
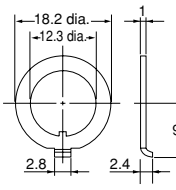
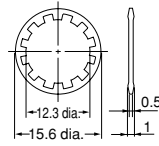
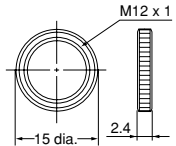


Number of poles	Kind of operation < >: Momentary position	Solder terminal	.110 Quick-connect terminal
		Part No.	Part No.
1-pole	ON-OFF	AJ41300F	AJ45300F
	ON-ON	AJ41310F	AJ45310F
	ON-OFF-ON	AJ41320F	AJ45320F
	ON-<ON>	AJ41330F	AJ45330F
	<ON>-OFF-<ON>	AJ41340F	AJ45340F
	ON-OFF-<ON>	AJ41350F	AJ45350F
2-pole	ON-OFF	AJ42300F	AJ46300F
	ON-ON	AJ42310F	AJ46310F
	ON-OFF-ON	AJ42320F	AJ46320F
	ON-<ON>	AJ42330F	AJ46330F
	<ON>-OFF-<ON>	AJ42340F	AJ46340F
	ON-OFF-<ON>	AJ42350F	AJ46350F
4-pole	ON-OFF	AJ44300F	AJ48300F
	ON-ON	AJ44310F	AJ48310F
	ON-OFF-ON	AJ44320F	AJ48320F
	ON-<ON>	AJ44330F	AJ48330F
	<ON>-OFF-<ON>	AJ44340F	AJ48340F
	ON-OFF-<ON>	AJ44350F	AJ48350F

Remark: Standard installation accessories are included with the product.

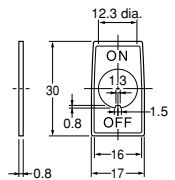
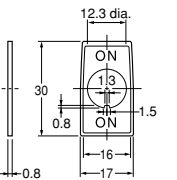
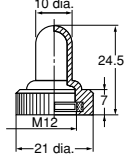
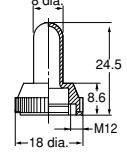
3. Accessories

1) Installation accessories (Repair parts)

Product name	Standard installation accessories				Optional installation accessories
	Front hex nut (Nickel plated)	Back hex nut (Uni-chrome plated)	Keying washer	Lock washer	Front Knurl nut (Nickel plated)
Dimensions (mm)					
Part No.	AJ3081	AJ3082	AJ3083	AJ3084	AJ3080

Remark: A selling unit of each accessory is 10 pieces.

2) Accessories (Option)

Product name	Indication plate (aluminum)* ³		Rubber cap* ^{1, 2, 4}	
	ON-OFF	ON-ON	EP rubber type	Silicone rubber type
Dimensions (mm)				
Part No.	WD1901	WD1902	WD1911	WD1811*

Remarks: 1. The asterisk in the part number WD1811* for the silicon rubber type rubber cap is where the letter representing the color should be inserted.
(Standard models: B: black; R: red; Z: grey. Made to order: Y: yellow; G: green.)

2. Rubber and EP rubber caps are only available in black.

3. Letters on the display panel are aluminum colored and the area surrounding the letters is black.

4. Rubber caps are compatible with the J4 switch, T-15 series switch, T-10 series switch, and T-03/T-06 series switches (when plate thickness is 2.7 mm or less).

SPECIFICATIONS

1. Contact rating

Kind of load	AJ4 type					
	ON-OFF ON-ON		Electrical life	ON-OFF-ON ON-<ON> <ON>-OFF-<OFF> ON-OFF-<ON>		Electrical life
	1-pole and 2-pole	4-pole		1-pole and 2-pole	4-pole	
Resistive load	10A 125V AC 10A 250V AC 10A 30V DC	6A 250V AC 6A 30V DC	Min. 3×10 ⁴	10A 125V AC 10A 250V AC 10A 30V DC	6A 250V AC 6A 30V DC	Min. 3×10 ⁴
Inductive load (pf = 0.6)	10A 250V AC	6A 250V AC	Min. 3×10 ⁴	10A 250V AC	6A 250V AC	Min. 3×10 ⁴
Lamp load (incandescent)	300W 100V AC	200W 100V AC	Min. 3×10 ⁴	300W 100V AC 200W 100V AC	200W 100V AC 100W 100V AC	Min. 10 ⁴ Min. 3×10 ⁴
Motor load (single phase)	200W 125V AC 400W 250V AC	50W 125V AC 100W 250V AC	Min. 3×10 ⁴	200W 125V AC 400W 250V AC	—	Min. 10 ⁴
				100W 125V AC 200W 250V AC	50W 125V AC 100W 250V AC	Min. 3×10 ⁴

Remark: The rating displayed on the product is 10 A, 250 V AC only.

2. Characteristics

Mechanical life	Min. 10 ⁵ (20 cpm)
Electrical life	See above. (10 cpm)
Insulation distance	Between grounds: Min. 6 mm, Between poles: Min. 3 mm, Between contacts: Min. 3 mm (ON-OFF and ON-ON type only)
Insulation resistance	Min. 100 MΩ (at 500 V DC measured by insulation resistive meter)
Breakdown voltage	ON-OFF and ON-ON type: 2000 Vrms, Other types: 1500 Vrms (at detection current: 10mA)
Contact resistance	Initial, Max. 10 mΩ (By voltage drop at 1 A, 2 to 4 V DC)
Vibration resistance	10 to 55 Hz at double amplitude of 1.5 mm (contact opening Max. 10μs)
Shock resistance	Min. 490 m/s ² (contact opening Max. 10μs)
Actuator strength (static load)	112.7N for 1 min.
Terminal strength (static load)	24.5N for 1 min.
Ambient temperature	-25°C to +85°C (Not freezing below 0°C)
Contact material	AgZnO alloy

CIRCUIT DIAGRAM

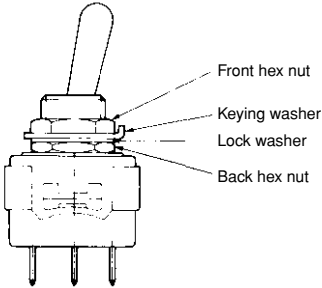
Terminal arrangement (As seen from terminal side)			1-pole	2-pole	4-pole
			<div><div>1 — 2 — 3 —</div><div>↙ Keyway</div></div>	<div><div>1 — 4 — 2 — 5 — 3 — 6 —</div><div>↙ Keyway</div></div>	<div><div>1 — 4 — 7 — 10 — 2 — 5 — 8 — 11 — 3 — 6 — 9 — 12 —</div><div>↙ Keyway</div></div>
Handle position and contact terminal number	ON-OFF	<div><div>↙ Keyway</div></div>	2-3	2-3, 5-6	1-3, 4-6, 7-9, 10-12
		<div><div>↙ Keyway</div></div>	—	—	—
	ON-ON ON-<ON>	<div><div>↙ Keyway</div></div>	2-3	2-3, 5-6	2-3, 5-6, 8-9, 11-12
		<div><div>↙ Keyway</div></div>	1-2	1-2, 4-5	1-2, 4-5, 7-8, 10-11
	ON-OFF-<ON> <ON>-OFF-<ON> ON-OFF-<ON>	<div><div>↙ Keyway</div></div>	2-3	2-3, 5-6	2-3, 5-6, 8-9, 11-12
		<div><div>↙ Keyway</div></div>	—	—	—
		<div><div>↙ Keyway</div></div>	1-2	1-2, 4-5	1-2, 4-5, 7-8, 10-11
Remark			ON-OFF type does not have a terminal No. 1.	ON-OFF type does not have terminal No. 1 and No. 4.	ON-OFF type does not have terminal No. 2, 5, 8 and 11.

Remark: For ON-<ON>, ON-OFF-<ON> type, the lever springs back (momentary position) when pushed toward the keyway side.

MOUNTING DIMENSIONS

Panel cutout (mm)			
Panel thickness	Max. 3.5 mm	Max. 4.0 mm (without keying washer)	Max. 4.0 mm (without keying washer)

Remark: For panel installations, be sure to use the back hex nut.



HANDLE SHAPE (mm)

Standard toggle	Flat lever

NOTES

1. Installation

Keep the panel tightening torque to less than 1.96 N-cm. Also, do not tighten the nut, holding the switch.

2. For induction load switching

(relays, solenoids and buzzers, etc.) we recommend inserting a suitable spark quenching circuit in order to prevent damage to the contacts due to the possibility of arcing caused by back voltage.

3. For hand soldering, a 350°C soldering iron should be used with the soldering completed within 5 seconds. Also, care should be taken not to touch the body of the switch with the soldering iron.

4. We cannot guarantee performance if the product is dropped onto a hard, concrete floor from a height of 80 cm or more. Please be careful.

5. When using the switch, be careful not to apply unreasonable perpendicular force (static loading of 112.7 N or more) in the operation direction.

6. Verification of insulation distance

Please verify that insulation distances have been maintained between terminals and with ground after installation and wiring of the switch.

When wiring the .110 Quick connect terminal we recommend using a receptacle with an insulating sleeve. Also, after wiring make sure that the terminals are free from any steady forces.

7. This product is not hermetically sealed, so its performance could deteriorate under certain ambient conditions. Avoid using and storing these switches in a location where they will be exposed to corrosive gases, silicon, or high dust levels, all of which can have an adverse effect on the contacts.

8. Do not use the switches where they will come into contact with water through splashing, etc. This could cause abnormal heating and smoke generation, which could damage the circuit and lead to an accident.

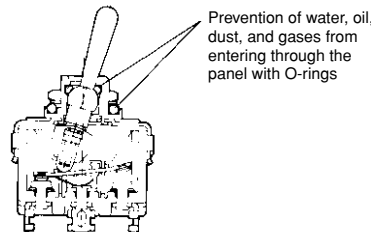
9. Do not use in atmospheres that contain combustible gas. Such use could cause fires and explosions.



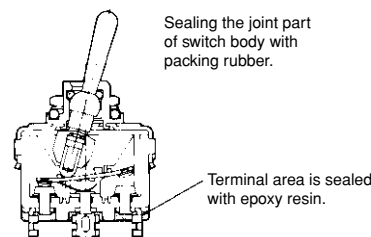
12 dia.
Angled
hole
Toggle
Push-
button
Rocker

RoHS Directive compatibility information
<http://www.nais-e.com/>

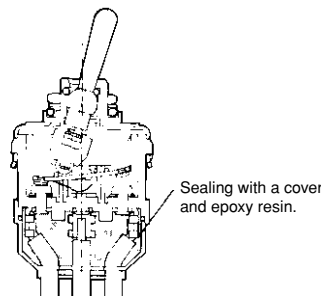
- **Panel-sealed type**
Entry of water, oil, dust and gas from the front of the panel is prevented.
(Panel front: IP67*; Inside of panel: IP40)



- **Terminal-sealed type**
Both switch body and terminals have been sealed to protect from dust and gas that enters from the panel.
(Panel front: IP67*; Inside of panel: IP60)



- **Wire lead type**
Furthermore, a cover is provided for the terminals to keep out water and oil that enters from the panel.
(Panel front: IP67*; Inside of panel: IP67)



Remark: The asterisk in "Panel front: IP67*" means this only applies to toggle and push-button types.
The panel surface for the rocker type is IP64.
Please see NOTES 1 and 2 regarding use of the sealed type.

- 3. **Rubber cap also available in silicon type for excellent weather resistance.**

- 5 colors available so you can distinguish switches by purpose.

<Example>

Black: For main power supply

Grey: For setting and switching

Red: For resetting

- With a usable ambient temperature range of -25°C to $+85^{\circ}\text{C}$, use is possible in environments that require resistance against heat and cold.

PRECAUTIONS WHEN USING CADMIUM-FREE CONTACT TYPE

Models with cadmium-free contacts have been introduced in order to reduce environmentally harmful substances. ("F" is affixed to the end of the part number.)

We ask customers who are currently using products with cadmium-containing contacts (no "F" at the end of the part number) to please make the switch to models with cadmium-free contacts.

When switching, operating life may differ depending on the load. Please be sure to verify this by conducting an evaluation using actual equipment.

FEATURES

1. Series now includes rocker and push-button switches.

Based on the well-established T-15 Series switch, the mechanism is kept as is and a rocker type and push-button type have been added to the series. (Note that the push-button type is rated at 10 A.)

2. Sealed type added for use in different environments.

Packing is used where parts join and an O-ring is used to seal moving parts. New to the series, this type can be used in harsh environments such as those with water, oil, dust, and gas.

ASSORTMENT

Kind of actuator	Standard type	Sealed type			Number of pole				Shape of terminal			
		Panel-sealed type	Terminal-sealed type	Wire leads type	1P	2P	3P	4P	Solder terminal	Screw terminal	.250 Quick-connect terminal	Wire lead
Toggle type	Available	Available	Available	Available	Available	Available	Available*1	Available*1	Available	Available	Available*1	Available*2
Rocker type	Available	Available	Available	Available	Available	Available	—	—	Available	Available	—	Available*2
Push-button type	Available	Available	—	—	Available	Available	—	—	Available	Available	—	—

Remarks: *1: Only standard type

*2: Only wire leads type

T15

TOGGLE PRODUCT TYPES



1. Standard type

1) Solder terminal and .250 Quick-connect terminal

Number of poles	Kind of operation < >: Momentary position	Solder terminal	250 Quick-connect terminal
		Product No.	Product No.
1-pole	ON-OFF	T115AF	T115A-AF
	ON-ON	T115DF	T115D-AF
	ON-OFF-ON	T115EF	T115E-AF
	ON-<ON>	T115FF	T115F-AF
	<ON>-OFF-<ON>	T115GF	T115G-AF
	ON-OFF-<ON>	T115HF	T115H-AF
2-pole	ON-OFF	T215KF	T215K-AF
	ON-ON	T215NF	T215N-AF
	ON-OFF-ON	T215PF	T215P-AF
	ON-<ON>	T215RF	T215R-AF
	<ON>-OFF-<ON>	T215SF	T215S-AF
	ON-OFF-<ON>	T215TF	T215T-AF
3-pole	ON-OFF	T315KF	T315K-AF
	ON-ON	T315NF	T315N-AF
	ON-OFF-ON	T315PF	T315P-AF
4-pole	ON-OFF	T415KF	T415K-AF
	ON-ON	T415NF	T415N-AF
	ON-OFF-ON	T415PF	T415P-AF

2) Screw terminal

Number of poles	Kind of operation < >: Momentary position	Screw terminal
		Product No.
1-pole	ON-OFF	T115A-SF
	ON-ON	T115D-SF
	ON-OFF-ON	T115E-SF
	ON-<ON>	T115F-SF
	<ON>-OFF-<ON>	T115G-SF
	ON-OFF-<ON>	T115H-SF
2-pole	ON-OFF	T215K-SF
	ON-ON	T215N-SF
	ON-OFF-ON	T215P-SF
	ON-<ON>	T215R-SF
	<ON>-OFF-<ON>	T215S-SF
	ON-OFF-<ON>	T215T-SF
3-pole	ON-OFF	T315K-SF
	ON-ON	T315N-SF
	ON-OFF-ON	T315P-SF
4-pole	ON-OFF	T415K-SF
	ON-ON	T415N-SF
	ON-OFF-ON	T415P-SF

Remarks: 1. Standard installation accessories are included with the product.
2. For UL/C-UL certified products, please add "UL" before "F" at the end of part number when ordering.

2. Panel-sealed type**1) Solder terminal**

Number of poles	Kind of operation < >: Momentary position	Solder terminal
		Product No.
1-pole	ON-OFF	TP115A-F
	ON-ON	TP115D-F
	ON-OFF-ON	TP115E-F
	ON-<ON>	TP115F-F
	<ON>-OFF-<ON>	TP115G-F
	ON-OFF-<ON>	TP115H-F
2-pole	ON-OFF	TP215K-F
	ON-ON	TP215N-F
	ON-OFF-ON	TP215P-F
	ON-<ON>	TP215R-F
	<ON>-OFF-<ON>	TP215S-F
	ON-OFF-<ON>	TP215T-F

2) Screw terminal

Number of poles	Kind of operation < >: Momentary position	Screw terminal
		Product No.
1-pole	ON-OFF	TP115A-SF
	ON-ON	TP115D-SF
	ON-OFF-ON	TP115E-SF
	ON-<ON>	TP115F-SF
	<ON>-OFF-<ON>	TP115G-SF
	ON-OFF-<ON>	TP115H-SF
2-pole	ON-OFF	TP215K-SF
	ON-ON	TP215N-SF
	ON-OFF-ON	TP215P-SF
	ON-<ON>	TP215R-SF
	<ON>-OFF-<ON>	TP215S-SF
	ON-OFF-<ON>	TP215T-SF

Remarks: 1. Of the standard installation accessories that come with the product, the front hex nut and lock washer are included.
 2. For UL/C-UL certified products, please add "UL" before "F" at the end of part number when ordering.

3. Terminal-sealed type**1) Solder terminal**

Number of poles	Kind of operation < >: Momentary position	Solder terminal
		Product No.
1-pole	ON-OFF	TD115A-F
	ON-ON	TD115D-F
	ON-OFF-ON	TD115E-F
	ON-<ON>	TD115F-F
	<ON>-OFF-<ON>	TD115G-F
	ON-OFF-<ON>	TD115H-F
2-pole	ON-OFF	TD215K-F
	ON-ON	TD215N-F
	ON-OFF-ON	TD215P-F
	ON-<ON>	TD215R-F
	<ON>-OFF-<ON>	TD215S-F
	ON-OFF-<ON>	TD215T-F

Remarks: 1. Of the standard installation accessories that come with the product, the front hex nut and lock washer are included.
 2. For UL/C-UL certified products, please add "UL" before "F" at the end of part number when ordering.

2) Screw terminal

Number of poles	Kind of operation < >: Momentary position	Screw terminal
		Product No.
1-pole	ON-OFF	TD115A-SF
	ON-ON	TD115D-SF
	ON-OFF-ON	TD115E-SF
	ON-<ON>	TD115F-SF
	<ON>-OFF-<ON>	TD115G-SF
	ON-OFF-<ON>	TD115H-SF
2-pole	ON-OFF	TD215K-SF
	ON-ON	TD215N-SF
	ON-OFF-ON	TD215P-SF
	ON-<ON>	TD215R-SF
	<ON>-OFF-<ON>	TD215S-SF
	ON-OFF-<ON>	TD215T-SF

Remarks: 1. Of the standard installation accessories that come with the product, the front hex nut and lock washer are included.

2. For UL/C-UL certified products, please add "UL" before "F" at the end of part number when ordering.

4. Wire lead type

Number of poles	Kind of operation < >: Momentary position	Wire lead type
		Product No.
1-pole	ON-OFF	TC115A-F
	ON-ON	TC115D-F
	ON-OFF-ON	TC115E-F
	ON-<ON>	TC115F-F
	<ON>-OFF-<ON>	TC115G-F
	ON-OFF-<ON>	TC115H-F
2-pole	ON-OFF	TC215K-F
	ON-ON	TC215N-F
	ON-OFF-ON	TC215P-F
	ON-<ON>	TC215R-F
	<ON>-OFF-<ON>	TC215S-F
	ON-OFF-<ON>	TC215T-F

Remarks: 1. Standard installation accessories are included with the product.

2. 600 V vinyl wire (VSF, thick: 2 mm², length: 200 mm) is used. Please inquire about type and different length of lead wire.

3. For UL/C-UL certified products, please add "UL" before "F" at the end of part number when ordering.

5. Accessories

1) Installation accessories (Repair parts)

Product name	Standard installation accessories				Optional installation accessories
	Front hex nut (Nickel plated)	Back hex nut (Uni-chrome plated)	Keying washer	Lock washer	Front Knurl nut (Nickel plated)
Dimensions (mm)					
Part No.	AJ3081	AJ3082	AJ3083	AJ3084	AJ3080

Remark: A selling unit of each accessory is 10 pieces.

• Using the different rubber caps

We recommend silicon rubber and EP rubber caps for the following applications.

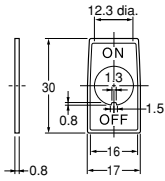
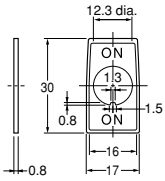
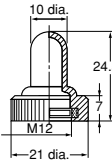
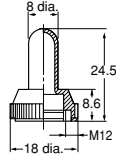
1) Silicon rubber caps

- When it is necessary to differentiate by color.
- When using in applications that require resistance to heat and cold. Ambient temperature: -25°C to +85°C (EP rubber type is 0°C to +40°C.)
- When compactness is required.

2) EP rubber type

When cost is the primary consideration.

2) Accessories (Option)

Product name	Indication plate (aluminum)*3		Rubber cap*1, 2, 4	
	ON-OFF	ON-ON	EP rubber type	Silicone rubber type
Dimensions (mm)				
Part No.	WD1901	WD1902	WD1911	WD1811*

Remarks: 1. The asterisk in the part number WD1811* for the silicon rubber type rubber cap is where the letter representing the color should be inserted.
 (Standard models: B: black; R: red; Z: grey. Made to order: Y: yellow; G: green.)
 2. EP rubber cap is available in black only.
 3. Letters on the display panel are aluminum colored and the area surrounding the letters is black.
 4. Rubber caps are compatible with the J4 switch, T-15 series switch, T-10 series switch, and T-03/T-06 series switches (when plate thickness is 2.7 mm or less).

ROCKER PRODUCT TYPES



1. Standard type

1) Solder terminal, without indication on actuator

Number of poles	Kind of operation < >: Momentary position	Solder terminal
		Product No.
1-pole	ON-OFF	TR115A-*F
	ON-ON	TR115D-*F
	ON-OFF-ON	TR115E-*F
	ON-<ON>	TR115F-*F
	<ON>-OFF-<ON>	TR115G-*F
	ON-OFF-<ON>	TR115H-*F
2-pole	ON-OFF	TR215K-*F
	ON-ON	TR215N-*F
	ON-OFF-ON	TR215P-*F
	ON-<ON>	TR215R-*F
	<ON>-OFF-<ON>	TR215S-*F
	ON-OFF-<ON>	TR215T-*F

2) Screw terminal, without indication on actuator

Number of poles	Kind of operation < >: Momentary position	Screw terminal
		Product No.
1-pole	ON-OFF	TR115A-S*F
	ON-ON	TR115D-S*F
	ON-OFF-ON	TR115E-S*F
	ON-<ON>	TR115F-S*F
	<ON>-OFF-<ON>	TR115G-S*F
	ON-OFF-<ON>	TR115H-S*F
2-pole	ON-OFF	TR215K-S*F
	ON-ON	TR215N-S*F
	ON-OFF-ON	TR215P-S*F
	ON-<ON>	TR215R-S*F
	<ON>-OFF-<ON>	TR215S-S*F
	ON-OFF-<ON>	TR215T-S*F

3) Solder terminal, with ON-OFF indication on actuator

Number of poles	Kind of operation < >: Momentary position	Solder terminal
		Product No.
1-pole	ON-OFF	TR115A-*F
2-pole	ON-OFF	TR215K-*F

Remark: For UL/C-UL certified products, please add "UL" before "F" at the end of part number when ordering.

4) Screw terminal, with ON-OFF indication on actuator

Number of poles	Kind of operation < >: Momentary position	Screw terminal
		Product No.
1-pole	ON-OFF	TR115A-S*F
2-pole	ON-OFF	TR215K-S*F

Remarks: 1. Please specify the actuator color by replacing the asterisk in the product number and part number with appropriate letter.

B: black; W: white; R: red (custom ordered); Z: dark grey (custom ordered)

2. For UL/C-UL certified products, please add "UL" before "F" at the end of part number when ordering.

2. Panel-sealed type

1) Solder terminal, without indication on actuator

Number of poles	Kind of operation < >: Momentary position	Solder terminal
		Product No.
1-pole	ON-OFF	TRP115A-*F
	ON-ON	TRP115D-*F
	ON-OFF-ON	TRP115E-*F
	ON-<ON>	TRP115F-*F
	<ON>-OFF-<ON>	TRP115G-*F
	ON-OFF-<ON>	TRP115H-*F
2-pole	ON-OFF	TRP215K-*F
	ON-ON	TRP215N-*F
	ON-OFF-ON	TRP215P-*F
	ON-<ON>	TRP215R-*F
	<ON>-OFF-<ON>	TRP215S-*F
	ON-OFF-<ON>	TRP215T-*F

2) Screw terminal, without indication on actuator

Number of poles	Kind of operation < >: Momentary position	Screw terminal
		Product No.
1-pole	ON-OFF	TRP115A-S*F
	ON-ON	TRP115D-S*F
	ON-OFF-ON	TRP115E-S*F
	ON-<ON>	TRP115F-S*F
	<ON>-OFF-<ON>	TRP115G-S*F
	ON-OFF-<ON>	TRP115H-S*F
2-pole	ON-OFF	TRP215K-S*F
	ON-ON	TRP215N-S*F
	ON-OFF-ON	TRP215P-S*F
	ON-<ON>	TRP215R-S*F
	<ON>-OFF-<ON>	TRP215S-S*F
	ON-OFF-<ON>	TRP215T-S*F

3) Solder terminal, with ON-OFF indication on actuator

Number of poles	Kind of operation < >: Momentary position	Solder terminal
		Product No.
1-pole	ON-OFF	TRP115A-*F
2-pole	ON-OFF	TRP215K-*F

4) Screw terminal, with ON-OFF indication on actuator

Number of poles	Kind of operation < >: Momentary position	Screw terminal
		Product No.
1-pole	ON-OFF	TRP115A-S*F
2-pole	ON-OFF	TRP215K-S*F

Remarks: 1. Please specify the actuator color by replacing the asterisk in the product number and part number with appropriate letter.

B: black; W: white; R: red (custom ordered); Z: dark grey (custom ordered)

2. For UL/C-UL certified products, please add "UL" before "F" at the end of part number when ordering.

3. Terminal-sealed type

1) Solder terminal, without indication on actuator

Number of poles	Kind of operation < >: Momentary position	Solder terminal
		Product No.
1-pole	ON-OFF	TRD115A-*F
	ON-ON	TRD115D-*F
	ON-OFF-ON	TRD115E-*F
	ON-<ON>	TRD115F-*F
	<ON>-OFF-<ON>	TRD115G-*F
	ON-OFF-<ON>	TRD115H-*F
2-pole	ON-OFF	TRD215K-*F
	ON-ON	TRD215N-*F
	ON-OFF-ON	TRD215P-*F
	ON-<ON>	TRD215R-*F
	<ON>-OFF-<ON>	TRD215S-*F
	ON-OFF-<ON>	TRD215T-*F

2) Screw terminal, without indication on actuator

Number of poles	Kind of operation < >: Momentary position	Screw terminal
		Product No.
1-pole	ON-OFF	TRD115A-S*F
	ON-ON	TRD115D-S*F
	ON-OFF-ON	TRD115E-S*F
	ON-<ON>	TRD115F-S*F
	<ON>-OFF-<ON>	TRD115G-S*F
	ON-OFF-<ON>	TRD115H-S*F
2-pole	ON-OFF	TRD215K-S*F
	ON-ON	TRD215N-S*F
	ON-OFF-ON	TRD215P-S*F
	ON-<ON>	TRD215R-S*F
	<ON>-OFF-<ON>	TRD215S-S*F
	ON-OFF-<ON>	TRD215T-S*F

3) Solder terminal, with ON-OFF indication on actuator

Number of poles	Kind of operation < >: Momentary position	Solder terminal
		Product No.
1-pole	ON-OFF	TRD115A-*F
2-pole	ON-OFF	TRD215K-*F

4) Screw terminal, with ON-OFF indication on actuator

Number of poles	Kind of operation < >: Momentary position	Screw terminal
		Product No.
1-pole	ON-OFF	TRD115A-S*F
2-pole	ON-OFF	TRD215K-S*F

Remarks: 1. Please specify the actuator color by replacing the asterisk in the product number and part number with appropriate letter.

B: black; W: white; R: red (custom ordered); Z: dark grey (custom ordered)

2. For UL/C-UL certified products, please add "UL" before "F" at the end of part number when ordering.

4. Wire lead type

1) Without indication on actuator

Number of poles	Kind of operation < >: Momentary position	Wire lead type
		Product No.
1-pole	ON-OFF	TRC115A-*F
	ON-ON	TRC115D-*F
	ON-OFF-ON	TRC115E-*F
	ON-<ON>	TRC115F-*F
	<ON>-OFF-<ON>	TRC115G-*F
	ON-OFF-<ON>	TRC115H-*F
2-pole	ON-OFF	TRC215K-*F
	ON-ON	TRC215N-*F
	ON-OFF-ON	TRC215P-*F
	ON-<ON>	TRC215R-*F
	<ON>-OFF-<ON>	TRC215S-*F
	ON-OFF-<ON>	TRC215T-*F

2) With ON-OFF indication on actuator

Number of poles	Kind of operation < >: Momentary position	Wire lead type
		Product No.
1-pole	ON-OFF	TRC115A-*F
2-pole	ON-OFF	TRC215K-*F

Remarks: 1. Please specify the actuator color by replacing the asterisk in the product number and part number with appropriate letter.
B: black; W: white; R: red (custom ordered); Z: dark grey (custom ordered)
2. 600 V vinyl wire (VSF, thick: 2 mm², length: 200 mm) is used. Please inquire about type and different length of lead wire.
3. For UL/C-UL certified products, please add “UL” before “F” at the end of part number when ordering.

PUSH-BUTTON PRODUCT TYPES



1. Standard type

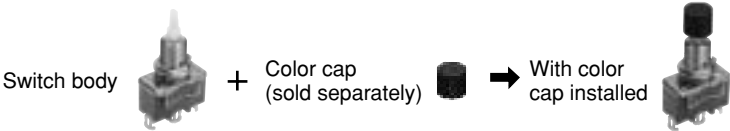
1) Solder terminal

Number of poles	Kind of operation	Solder terminal
		Product No.
1-pole	Momentary	TB110F-F
	Alternate	TB115D-F
2-pole	Momentary	TB210R-F
	Alternate	TB215N-F

2) Screw terminal

Number of poles	Kind of operation	Screw terminal
		Product No.
1-pole	Momentary	TB110F-SF
	Alternate	TB115D-SF
2-pole	Momentary	TB210R-SF
	Alternate	TB215N-SF

Remarks: 1. Please use switch body with a color cap (sold separately).
2. Standard installation accessories are included with the product.
3. For UL/C-UL certified products, please add “UL” before “F” at the end of part number when ordering.



2. Panel-sealed type

1) Solder terminal

Number of poles	Kind of operation	Solder terminal
		Product No.
1-pole	Momentary	TBP110F-F
	Alternate	TBP115D-F
2-pole	Momentary	TBP210R-F
	Alternate	TBP215N-F

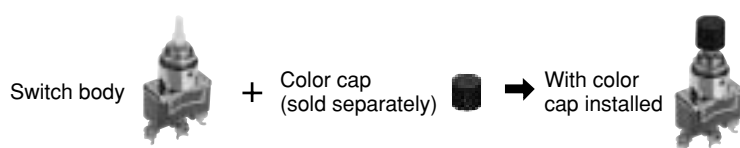
2) Screw terminal

Number of poles	Kind of operation	Screw terminal
		Product No.
1-pole	Momentary	TBP110F-SF
	Alternate	TBP115D-SF
2-pole	Momentary	TBP210R-SF
	Alternate	TBP215N-SF

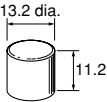
Remarks: 1. Please use switch body with a color cap (sold separately).

2. Standard installation accessories are included with the product.

3. For UL/C-UL certified products, please add "UL" before "F" at the end of part number when ordering.

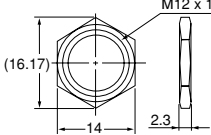
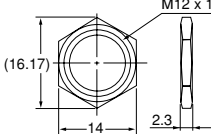
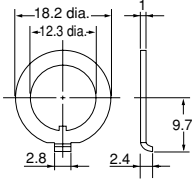
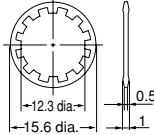
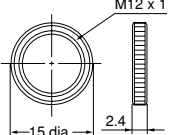


3. Color cap for push-button (Option)

Product name	Color cap (sold separately)
Dimensions (mm)	
Part No.	WDB1821*

Remark: Please specify the color cap color by replacing the asterisk in the part number with appropriate letter
(B: black; W: white; R: red; Z: dark grey; H: light grey; Y: yellow; G: green; L: blue).

4. Installation accessories (Repair parts)

Product name	Standard installation accessories				Standard installation accessories
	Front hex nut (Nickel plated)	Back hex nut (Uni-chrome plated)	Keying washer	Lock washer	Front Knurl nut (Nickel plated)
Dimensions (mm)					
Part No.	AJ3081	AJ3082	AJ3083	AJ3084	AJ3080

Remark: A selling unit of each accessory is 10 pieces.

SPECIFICATIONS

1. Contact rating

1) Toggle type and Rocker type

Kind of load	AC	DC
Resistive load	15A 250V	0.5A 250V, 0.9A 125V, 15A 30V
Inductive load	15A 250V (Power factor: 0.6)	0.3A 250V (Time constant: 8 ms), 0.5A 125V (Time constant: 8 ms) 15A 30A (Time constant: 8 ms)
Lamp load (incandescent)	400W 100V, 800W 200V, Inrush current: Max. 40 A	7A 30V
Motor load (single phase)	400 W 125 V (single phase), 550 W 250 V (single phase), 750 W 250 V (three-phase)	—

2) Push-button type (momentary)

Kind of load	AC	DC
Resistive load	10A 250V	0.4A 250V, 0.8A 125V, 8A 30V

3) Push-button type (alternate)

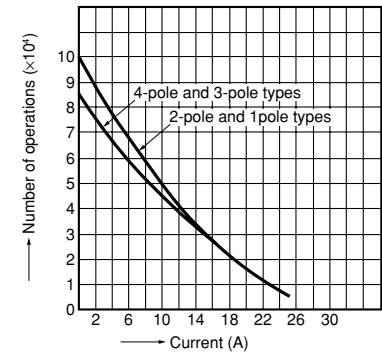
Kind of load	AC	DC
Resistive load	15A 250V	0.5A 250V, 0.9A 125V, 15A 30V

2. Characteristics

Shape of handle	Toggle type		Rocker type	Push-button type
Protection type	Standard type	Panel-sealed type Terminal-sealed type Wire leads type	Standard type Panel-sealed type Terminal-sealed type Wire leads type	Standard type Panel-sealed type
Mechanical expected life	1-pole and 2-pole: Min. 10 ⁵ 3-pole and 4-pole: Min. 8.5×10 ⁴	Min. 5×10 ⁴ (20 cpm) ON-OFF, ON-ON, ON-OFF-ON, Min. 3×10 ⁴ (20 cpm) ON-(ON), (ON)-OFF-(ON), ON-OFF-(ON)	Min. 3×10 ⁴ (20 cpm)	
Electrical expected life (10 cpm)	Standard and panel-sealed types: Min. 3×10 ⁴ Terminal-sealed and wire leads types: Min. 1.5×10 ⁴		Standard type: Min. 3×10 ⁴ Panel-sealed, terminal- sealed and wire leads types: Min. 10 ⁴	Min. 10 ⁴
Breakdown voltage	1500 Vrms (at detection current: 10mA)			
Insulation resistance	Min. 100 MΩ (at 500 V DC measured by insulation resistive meter)			
Contact resistance	Wire leads type: Initial, Max. 30 mΩ (By voltage drop at 1 A, 2 to 4 V DC) Other types: Initial, Max. 10 mΩ (By voltage drop at 1 A, 2 to 4 V DC)			
Actuator strength	112.7N for 1 min.			
Vibration resistance	10 to 55 Hz at double amplitude of 1.5 mm (contact opening: Max. 10 ms)			
Terminal strength (static load)	24.5N for 1 min.			
Ambient temperature	−25°C to +70°C (Not freezing below 0°C)			
Contact material	AgZnO alloy			

DATA (Electrical life, For toggle standard type)

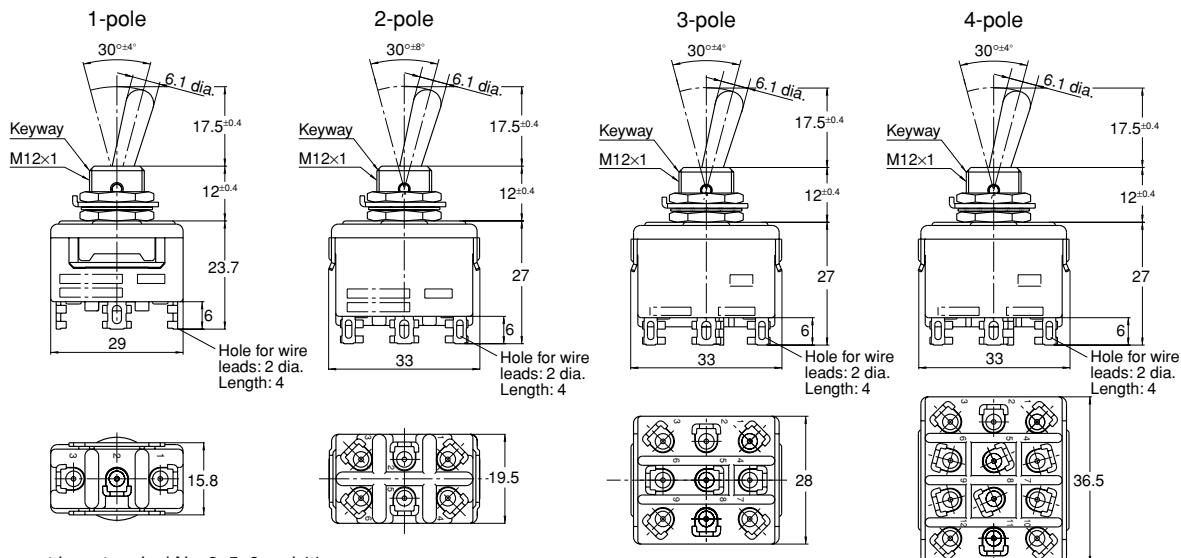
Tested condition: 250 V AC, Power factor: 0.6 and 10 cpm



TOGGLE TYPE DIMENSIONS (mm) (General tolerance: ± 0.5)

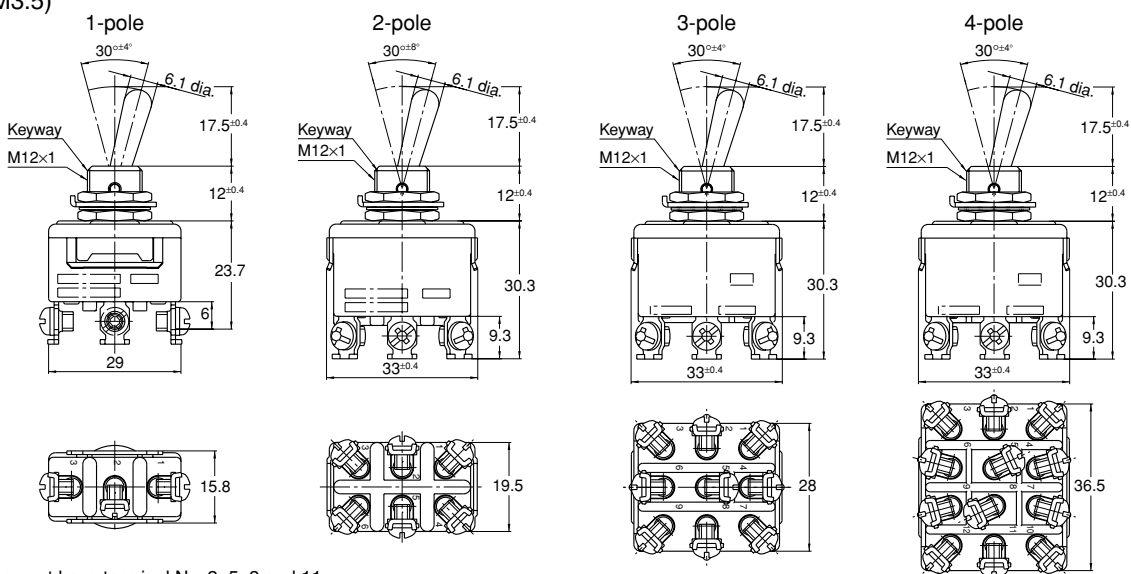
1. Standard type

1) Solder terminal



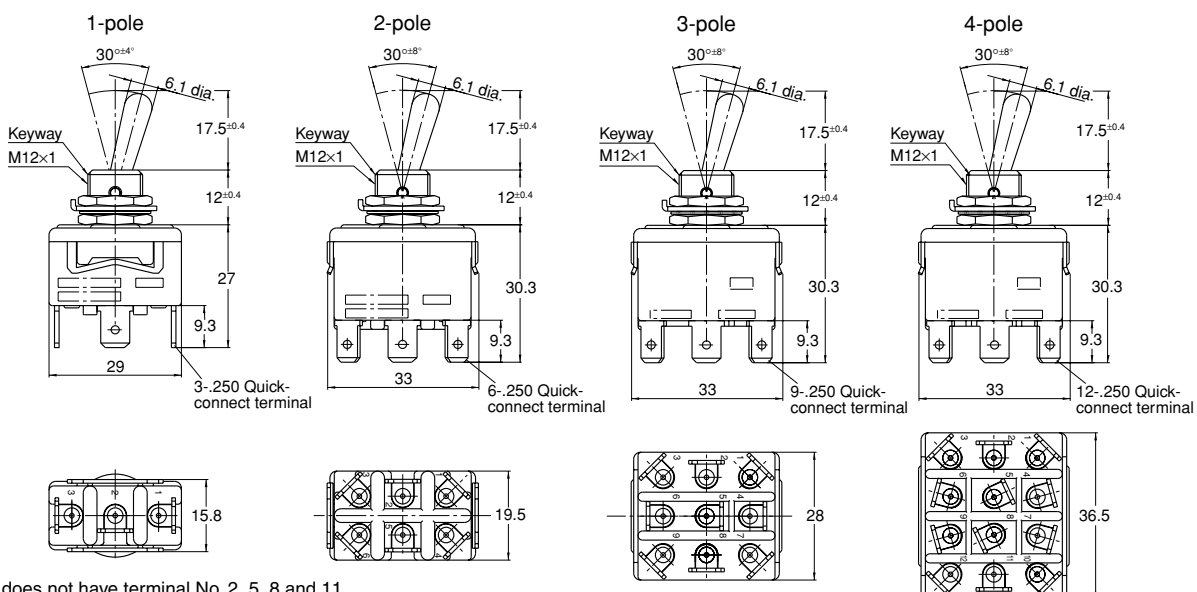
Remark: ON-OFF type does not have terminal No. 2, 5, 8 and 11.

2) Screw terminal (M3.5)



Remark: ON-OFF type does not have terminal No. 2, 5, 8 and 11.

3) .250 Quick-connect terminal

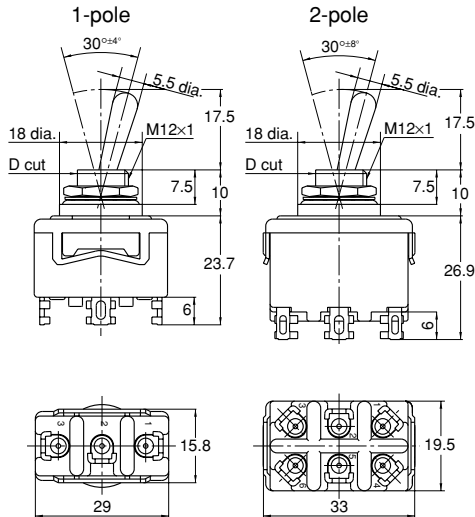


Remark: 1. ON-OFF type does not have terminal No. 2, 5, 8 and 11.
2. There is no through-hole on .250 Quick-connect terminals.

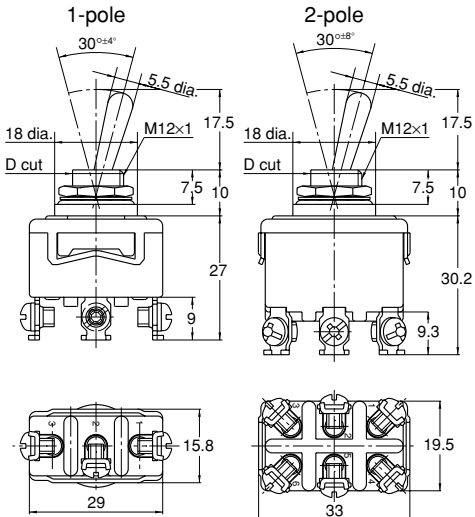
T15

2. Panel-sealed type

1) Solder terminal



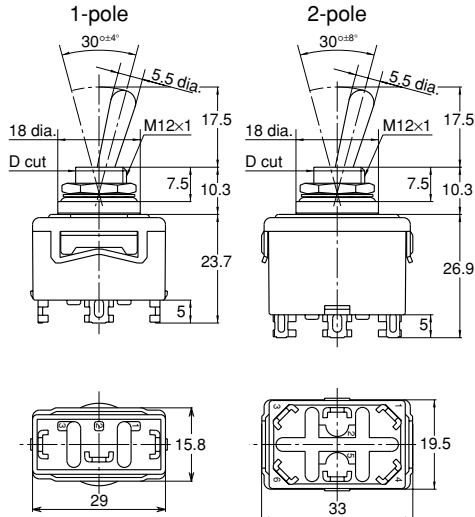
2) Screw terminal (M3.5)



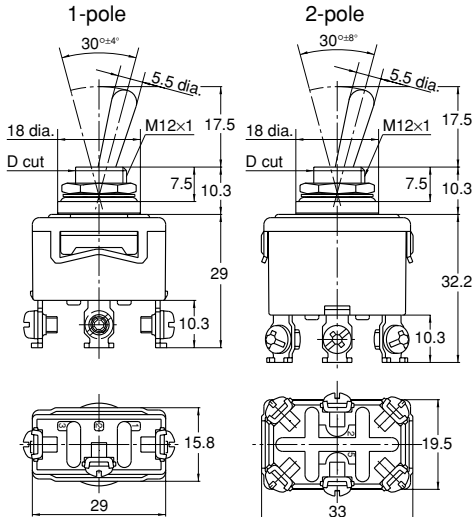
Remark: ON-OFF type does not have terminal No. 2 and 5.

3. Terminal-sealed type

1) Solder terminal

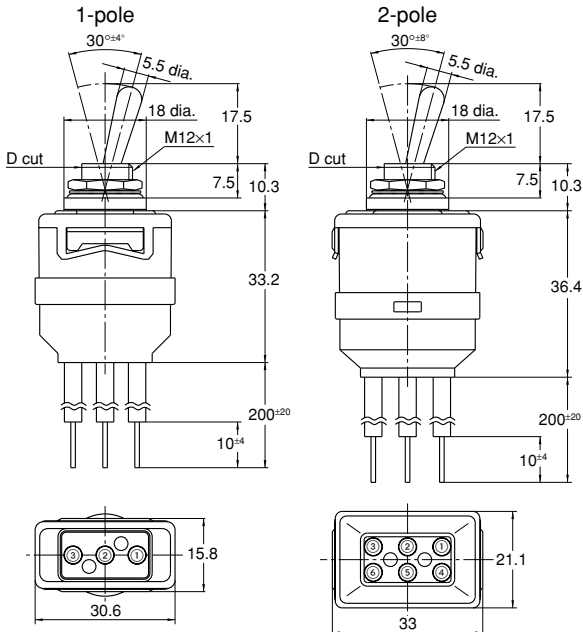
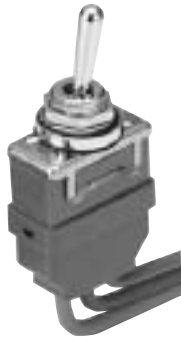


2) Screw terminal (M3.5)



Remark: ON-OFF type does not have terminal No. 2 and 5.

4. Wire leads type



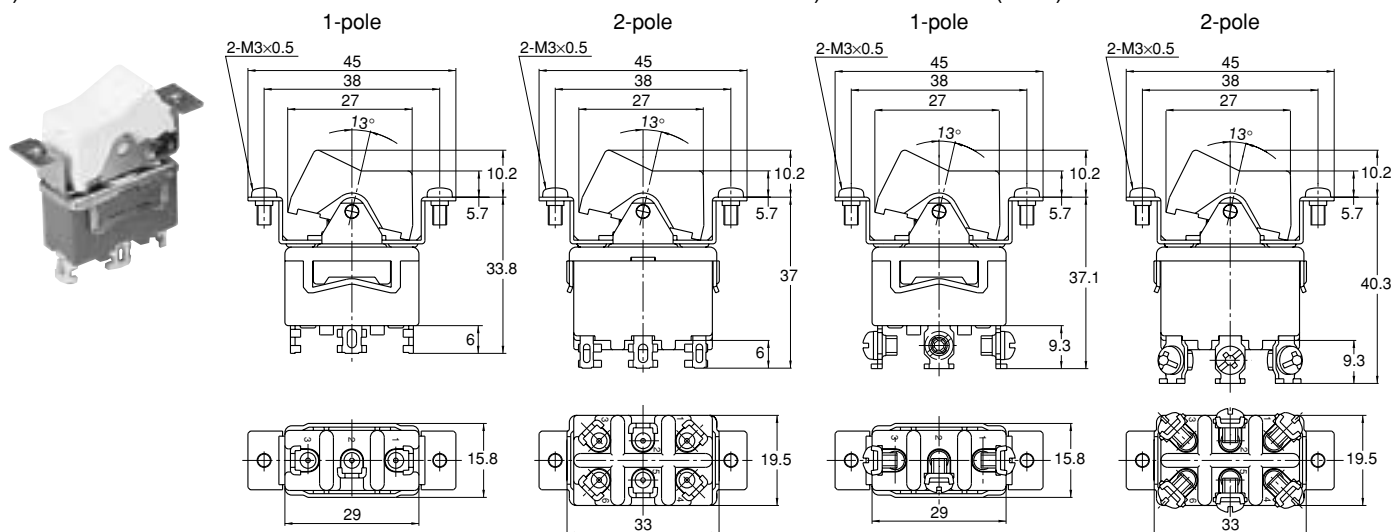
Remarks: 1. ON-OFF type does not have wire lead No. 2 and 5.
2. 600 V vinyl wire (VSF, thick: 2 mm², length: 200 mm) is used. Please inquire about type and different length of lead wire.

Color of wire leads	
No.	Color
①	Brown
②	Red
③	Orange
④	Yellow
⑤	Green
⑥	Blue

ROCKER TYPE DIMENSIONS (mm) (General tolerance: ± 0.5)

1. Standard type

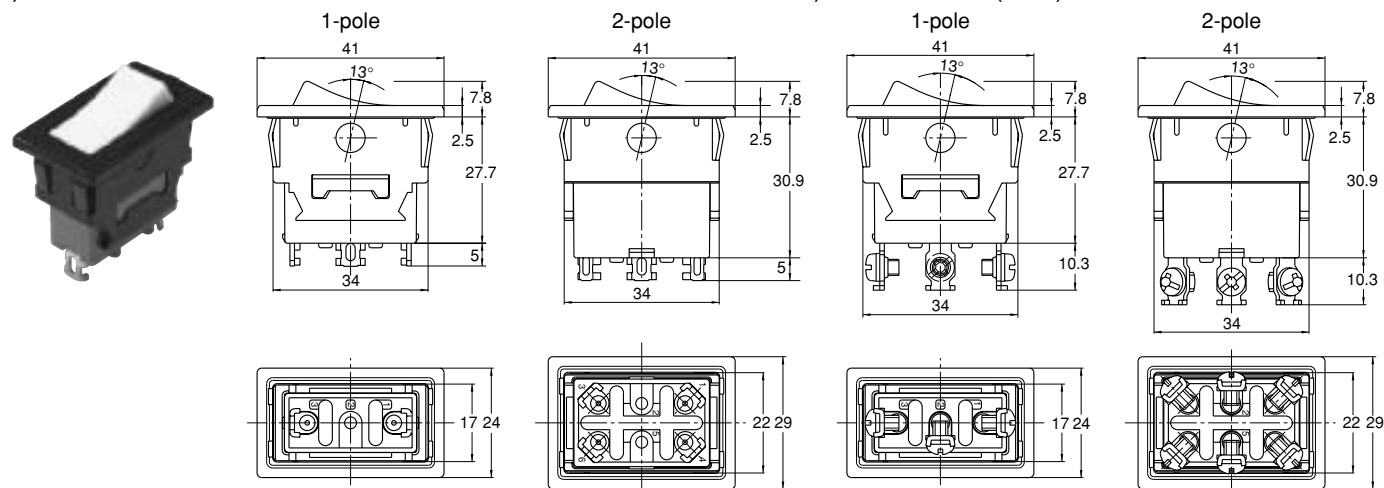
1) Solder terminal



Remarks: 1. ON-OFF type does not have terminal No. 2 and 5.
2. Dimensions of handle: 13.4 × 27

2. Panel-sealed type

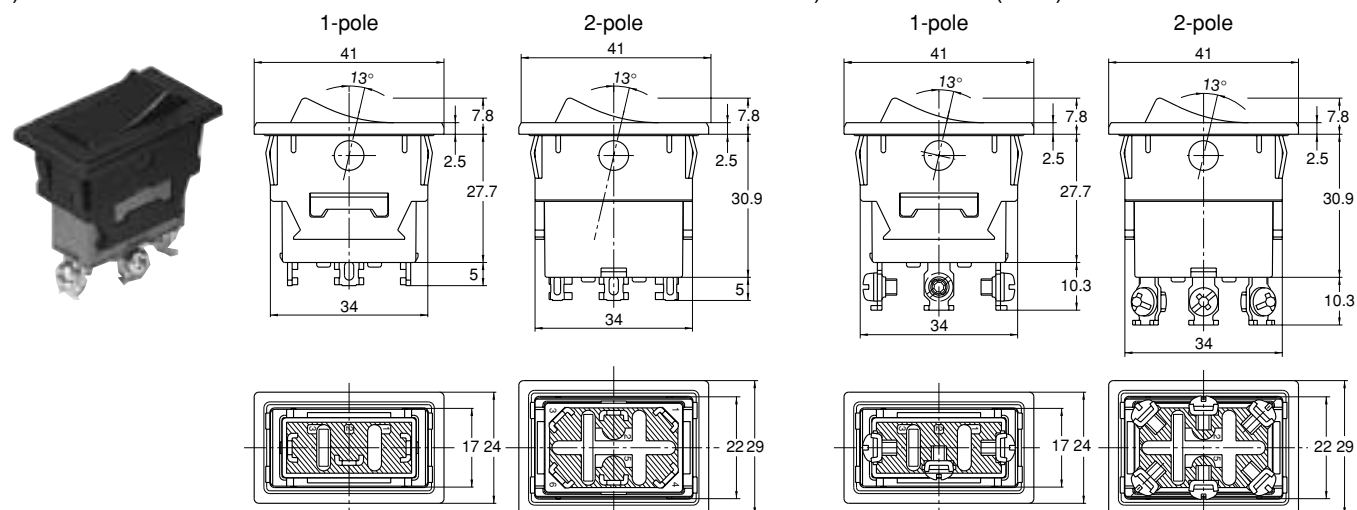
1) Solder terminal



Remarks: 1. ON-OFF type does not have terminal No. 2 and 5.
2. Dimensions of handle: 1-pole: 12.6 × 29, 2-pole: 17.4 × 29

3. Terminal-sealed type

1) Solder terminal

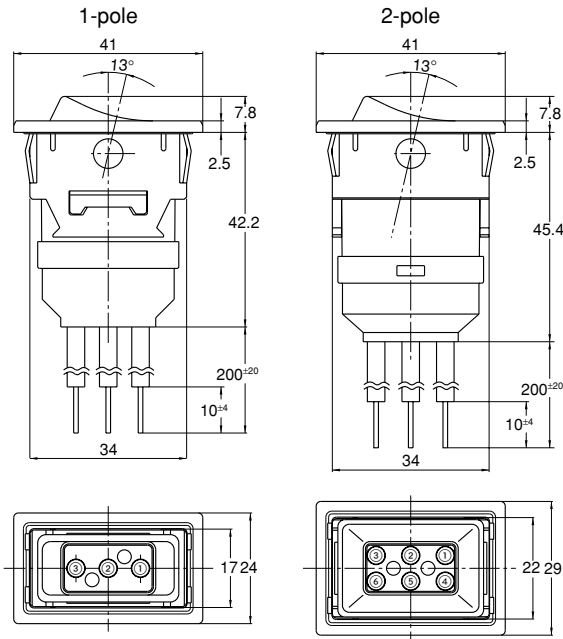


Remarks: 1. ON-OFF type does not have terminal No. 2 and 5.
2. Dimensions of handle: 1-pole: 12.6 × 29, 2-pole: 17.4 × 29

4. Wire leads type



Remarks: 1. ON-OFF type does not have terminal No. 2 and 5.
2. Dimensions of handle: 1-pole: 12.6 × 29, 2-pole: 17.4 × 29
3. 600 V vinyl wire (VSF, thick: 2 mm², length: 200 mm) is used. Please inquire about type and different length of lead wire.



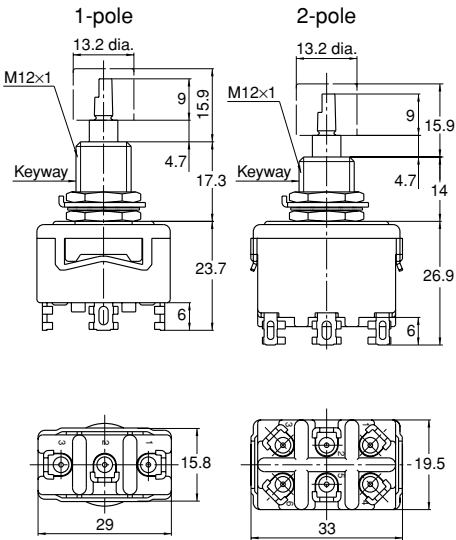
Color of wire leads

No.	Color
①	Brown
②	Red
③	Orange
④	Yellow
⑤	Green
⑥	Blue

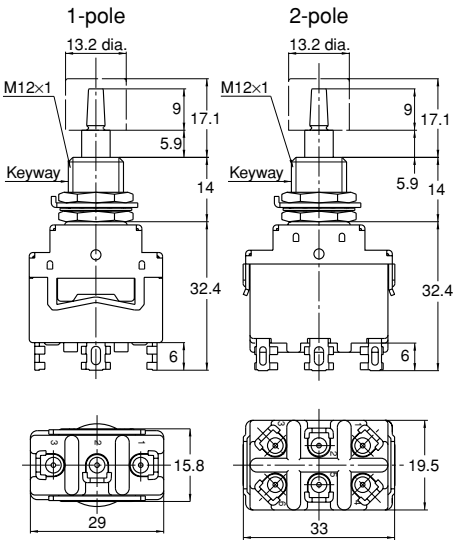
PUSH-BUTTON TYPE DIMENSIONS (mm) (General tolerance: ±0.5)

1. Standard type

• Solder terminal, Momentary

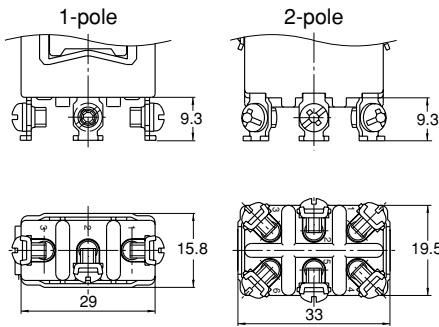


• Solder terminal, Alternate



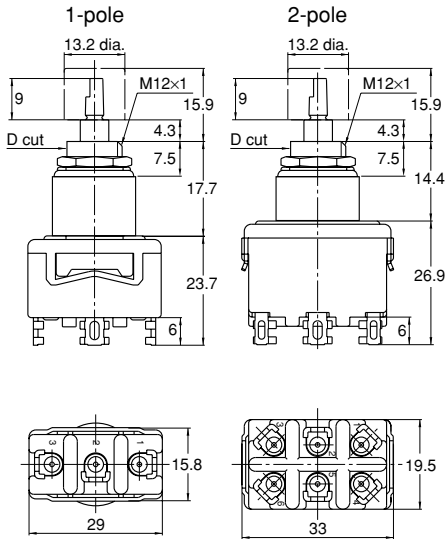
• Screw terminal (M3.5)

Dimensions other than listed below are same as those of solder terminal type.

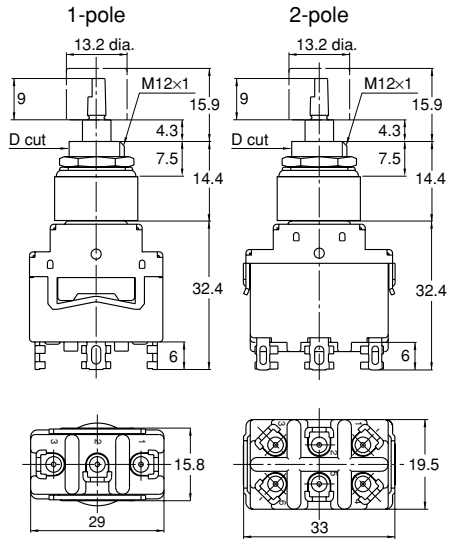


2. Panel-sealed type

• Solder terminal, Momentary

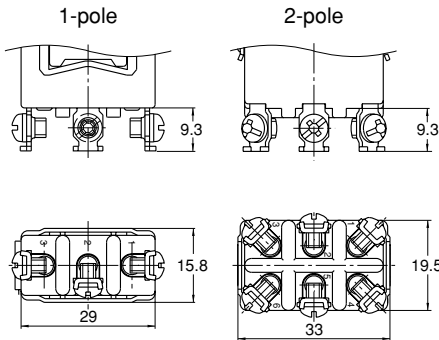


• Solder terminal, Alternate



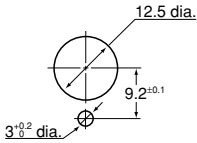
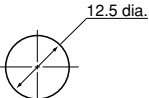
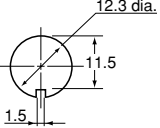
• Screw terminal (M3.5)

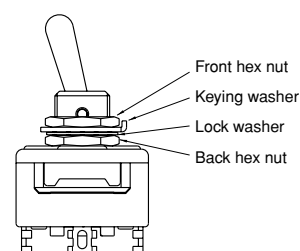
Dimensions other than listed below are same as those of solder terminal type.

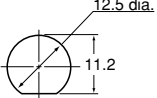
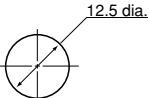


MOUNTING DIMENSIONS

1. Toggle type

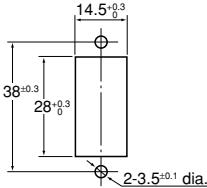
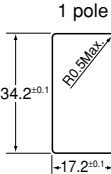
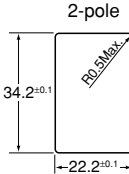
Type	Standard type		
Panel cutout (mm)			
Panel thickness	Max. 4.6 mm	Max. 5.6 mm (without keying washer)	Max. 5.6 mm (without keying washer)



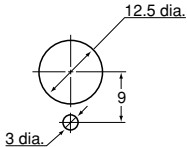
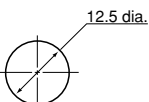
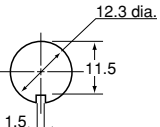
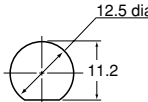
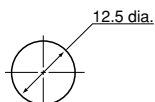
Type	Panel-sealed, Terminal-sealed and Wire leads types	
Panel cutout (mm)		
Panel thickness	Max. 4 mm	Max. 4 mm (without keying washer)

Remark: For panel installations of standard type, be use to use the back hex nut.

2. Rocker type

Type	Standard type	Panel-sealed, Terminal-sealed and Wire leads types	
Panel cutout (mm)		1 pole 	2-pole 
Panel thickness	Max. 4.5 mm	1.2 to 3.2 mm	

3. Push-button type

Type	Standard type		Panel-sealed type		
Panel cutout (mm)					
Panel thickness	Momentary, 1-pole: Max. 10 mm Momentary, 2-pole: Max. 6.5 mm Alternate: Max. 6.5 mm	Momentary, 1-pole: Max. 10 mm Momentary, 2-pole: Max. 7.5 mm Alternate: Max. 7.5 mm (without keying washer)	Momentary, 1-pole: Max. 11 mm Momentary, 2-pole: Max. 7.5 mm Alternate: Max. 7.5 mm (without keying washer)	Max. 4 mm	Max. 4 mm (without keying washer)

Remark: For panel installations of standard type, be use to use the back hex nut.

ELECTRICAL CIRCUIT DIAGRAM

1. Toggle type and Rocker type

Number of pole				1-pole	2-pole	3-pole	4-pole
Toggle type				Available	Available	Available *3	Available *3
Rocker type				Available	Available	—	—
Terminal arrangement (As seen from terminal side)				<div>1 — 2 — 3 —</div> <div>Keyway</div>	<div>1 — 4 — 2 — 5 — 3 — 6 —</div> <div>Keyway</div>	<div>1 — 4 — 7 — 2 — 5 — 8 — 3 — 6 — 9 —</div> <div>Keyway</div>	<div>1 — 4 — 7 — 10 — 2 — 5 — 8 — 11 — 3 — 6 — 9 — 12 —</div> <div>Keyway</div>
Handle position and contact terminal number	Handle shape	Toggle type	Rocker type				
	ON-OFF	<div>Keyway</div>	Right Part No. <div></div>	1-3	1-3, 4-6	1-3, 4-6, 7-9	1-3, 4-6, 7-9, 10-12
		—	—	—	—	—	—
		<div>Keyway</div>	Left <div></div>	—	—	—	—
	ON-ON ON-<ON> *1	<div>Keyway</div>	Right Part No. <div></div>	2-3	2-3, 5-6	2-3, 5-6, 8-9	2-3, 5-6, 8-9, 11-12
		—	—	—	—	—	—
		<div>Keyway</div>	Left <div>*2</div>	1-2	1-2, 4-5	1-2, 4-5, 7-8	1-2, 4-5, 7-8, 10-11
	ON-OFF-ON <ON>-OFF-<ON> ON-OFF-<ON> *1	<div>Keyway</div>	Right Part No. <div></div>	2-3	2-3, 5-6	2-3, 5-6, 8-9	2-3, 5-6, 8-9, 11-12
		<div>Keyway</div>	Center <div></div>	—	—	—	—
		<div>Keyway</div>	Left <div></div>	1-2	1-2, 4-5	1-2, 4-5, 7-8	1-2, 4-5, 7-8, 10-11
	Remarks			ON-OFF type does not have a terminal No. 2.	ON-OFF type does not have terminal No. 2 and 5.	ON-OFF type does not have terminal No. 2, 5 and 8.	ON-OFF type does not have terminal No. 2, 5, 8 and 11.

Remarks: *1. For ON-<ON>, ON-OFF-<ON> type of toggle, if the lever turns to the keyway side, it takes momentary position.
*2. For the rocker type, if the actuator turns to the left side in view of the side where a part number is marked, it takes momentary position.
*3. Only standard type

2. Push-button type

		1-pole	2-pole
Terminal arrangement (As seen from terminal side)		<div>1 — 2 — 3 —</div> <div>Keyway</div>	<div>1 — 4 — 2 — 5 — 3 — 6 —</div> <div>Keyway</div>
Push-button position and contact terminal number	<div></div>	2-3	2-3, 5-6
	Operated <div></div>	1-2	1-2, 4-5

NOTES

1. Dustproof, waterproof, anticorrosive gas, and oil-proof designs

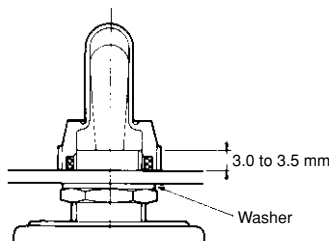
The panel-sealed type/terminal-sealed type/wire lead type switch has a protection level of IP67 on the outer side of the mounting panel and a level of IP40, IP60, or IP67 on the inner side of the panel.

For actual application, note the following points:

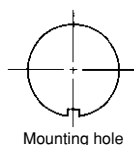
- 1) Avoid immersion in water or oil during installation.
- 2) Avoid immersion in water or oil during operation.
- 3) Oils or gases impose varying degrees of impact on the switch's sealing performance depending on type or quantity.
- 4) While the switch has a immersion and dust-protected design, its sealing performance or operability may be adversely affected in an environment where in the switch's movable parts can be contaminated with dust, oil, or other foreign objects. For the toggle type, use of a rubber cap is recommended.
- 5) The standard toggle switch, when used with a rubber cap, provides a protection level of IP54.
It should be used in an environment where it will not be subject to frequent water splashes.
- 6) As the sealing performance of the rocker type switch is affected by the panel processing accuracy or mounted panel thickness, check the switch under actual loading conditions. (While water or dust will not enter the switch's internal structure, it may enter the panel.)
- 7) Do not operate the rocker type switch when water accumulates in the switch handle.

2. Installation

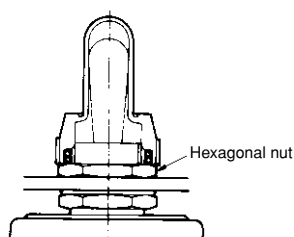
- 1) For the toggle and push-button type
 - a. When installing the standard type switch, be sure to use a hex nut.
 - b. For the panel-sealed, terminal-sealed and wire lead types, use a lock washer on the front side of the panel, and an O-ring on the back side of it.
 - c. Do not install the switch by rotating it.
- 2) Rubber cap installation
 - a. The washer should be used on the back side of the panel.



- b. Enough screw pitch should be obtained being adjusted within 3 to 3.5mm (See Fig.2)
- c. Install a rubber cap on the switch knob before securing the switch with the hex nut.
- d. The mounting hole in the panel should preferably be provided with an anti-rotation projection.



- e. If the rubber cap is installed over the hex nut, the waterproof performance will be impaired although the dustproof performance will not be affected.



3. Soldering

- 1) By using 350°C soldering iron, soldering should be completed within 5 seconds.

- 2) Exercise care so as not to touch the switch body with a soldering iron.

4. Load type and ratings

- 1) When the switch is loaded with a lamp, motor or capacitive load, a surge current higher than the stationary current passes through the switch contacts.

Measure the surge with the actual load and, if needed, take necessary action so that the surge will not exceed the switch's rated current.

- 2) When the switch is loaded with an inductive load (relay, solenoid, buzzer, etc.), a contact failure may result from arc discharge caused by a counterelectromotive force. It is advisable that you use an adequate anti-spark circuit across the switch contacts.

5. Others

- 1) Do not apply an excessive static load exceeding 112.7N {11.5kgf} perpendicular to the direction of operation.
- 2) Operate the switch knob by hand.
- 3) Take care not to drop the product as it may impair performance.

TOGGLE SWITCH

T-10 SERIES
SWITCHES

12 dia.



FEATURES

- 1. Capable of high capacity switching (10 A 250 V AC and 15 A 125 V AC)**
Ag alloy contacts are used to prevent temperature rises and allow high capacity switching.
- 2. Terminals constructed for easy implementation**
A unique terminal construction facilitates soldering.

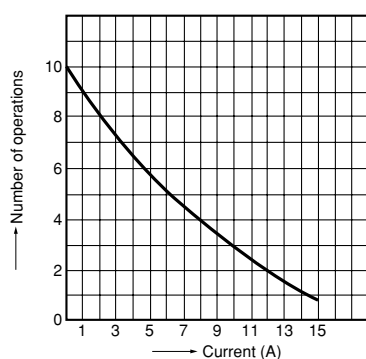
PRECAUTIONS WHEN USING CADMIUM-FREE CONTACT TYPE

Models with cadmium-free contacts have been introduced in order to reduce environmentally harmful substances. ("F" is affixed to the end of the part number.) We ask customers who are currently using products with cadmium-containing contacts (no "F" at the end of the part number) to please make the switch to models with cadmium-free contacts. When switching, operating life may differ depending on the load. Please be sure to verify this by conducting an evaluation using actual equipment.

RoHS Directive compatibility information
<http://www.nais-e.com/>

DATA (Life curve)

Tested condition: 250 V AC, Power factor: 0.6 and 10 cpm



PRODUCT TYPES

Number of poles	Kind of operation		Solder terminal
	Left	Right	Product No.
1-pole	ON	OFF	T110A-F
	ON	ON	T110D-F
2-pole	ON	OFF	T210K-F
	ON	ON	T210N-F

Remarks: 1. The product comes with standard installation accessories. However, keying washer is sold separately.
2. For UL/C-UL certified products, please add "UL" before the "F" at the end of the part number when ordering.

SPECIFICATIONS

1. Contact rating

Kind of load	AC	DC
Resistive load	10A 250V AC 15A 125V AC	8A 30V DC 0.8A 125V DC 0.4A 250V DC
Inductive load	10A 250V AC (Power factor: 0.6) 15A 125V AC (Power factor: 0.6)	5A 30V DC (Time constant: 7 msec.) 0.4A 125V DC (Time constant: 7 msec.) 0.2A 250V DC (Time constant: 7 msec.)
Lamp load (incandescent)	300W 100V AC 500W 200V AC Inrush current: Max. 30 A	—
Motor load (single phase)	200W 125V AC 300W 250V AC	—

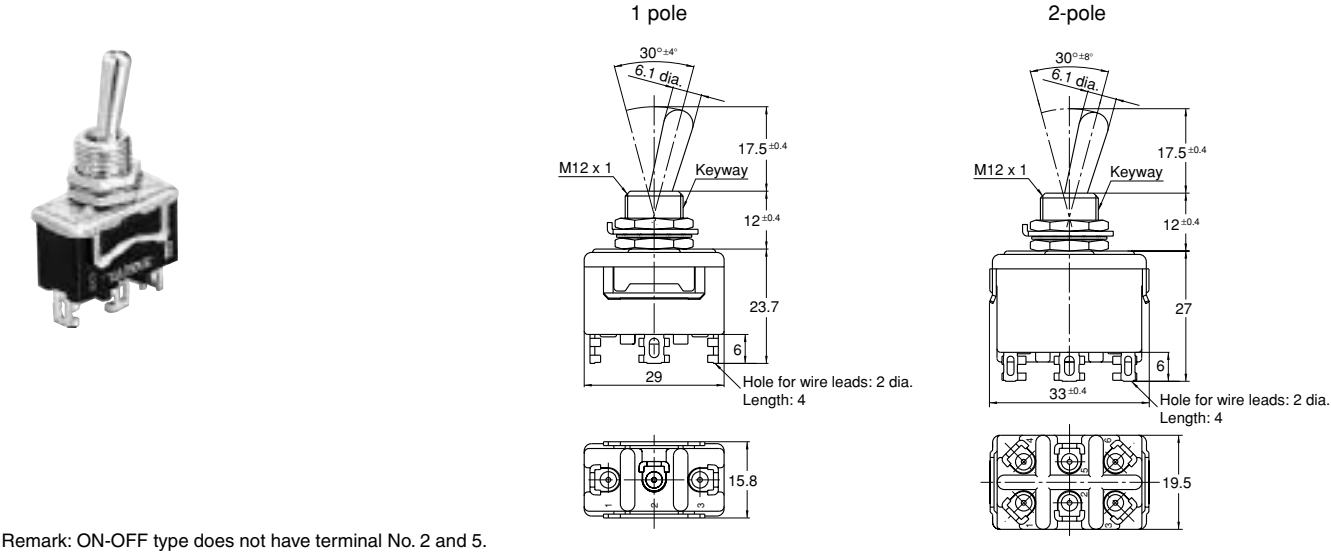
2. Characteristics

Mechanical expected life	Min. 10 ⁵
Electrical expected life	Min. 3×10 ⁴ (10 cpm) at rated load
Overload life	Min. 50 (5 cpm) (Rated load×1.5)
Insulation resistance	Min. 100 MΩ (at 500 V DC measured by insulation resistive meter)
Breakdown voltage	1500 Vrms (at detection current: 10mA)
Vibration resistance	10 to 55 Hz at double amplitude of 1.5 mm (contact opening: Max. 1 ms)
Contact resistance	Initial, Max. 20 mΩ (By voltage drop at 1 A, 2 to 4 V DC)
Actuator strength (static load)	112.7N for 1 min.
Terminal strength (static load)	24.5N for 1 min.
Ambient temperature	−25°C to +70°C (Not freezing below 0°C)
Contact material	AgZnO alloy

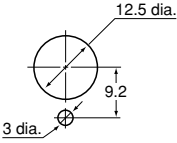
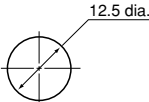
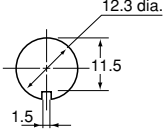
ELECTRICAL CIRCUIT DIAGRAM

Number of poles			1-pole	2 pole
Terminal arrangement (As seen from terminal side)			<div><div>1 — 2 — 3 —</div><div>↙ Keyway</div></div>	<div><div>1 — 4 — 2 — 5 — 3 — 6 —</div><div>↙ Keyway</div></div>
Handle position and contact terminal number	ON-OFF	<div><div></div><div>↙ Keyway</div></div>	1-3	1-3, 4-6
		—	—	—
		<div><div></div><div>↙ Keyway</div></div>	—	—
	ON-ON	<div><div></div><div>↙ Keyway</div></div>	2-3	2-3, 5-6
		—	—	—
		<div><div></div><div>↙ Keyway</div></div>	1-2	1-2, 4-5
Remark			ON-OFF type does not have a terminal No. 1.	ON-OFF type does not have terminal No. 1 and 4.

DIMENSIONS (mm) (General tolerance: ±0.5)



MOUNTING DIMENSIONS

Panel cutout (mm)			
Panel thickness	Max. 4.6 mm* (Using separately sold keying washer.)	Max. 5.6 mm	Max. 5.6 mm

Remarks: 1. For panel installations, use the back hex nut.
2. * Keying washer (separately sold) Part No.: AJ3083

12 dia.



FEATURES

Depth of 18.6 mm saves space.

This space-saving switch has body dimensions of 25 (W) x 14.8 (D) x 18.6 (H). (63% that of our previous T-15 series switch.)

PRECAUTIONS WHEN USING CADMIUM-FREE CONTACT TYPE

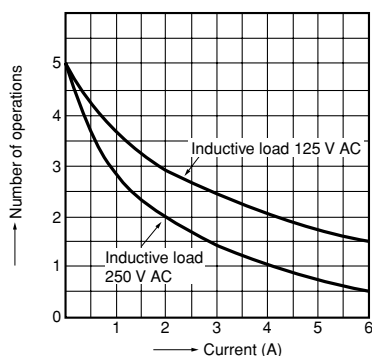
Models with cadmium-free contacts have been introduced in order to reduce environmentally harmful substances. ("F" is affixed to the end of the part number.) We ask customers who are currently using products with cadmium-containing contacts (no "F" at the end of the part number) to please make the switch to models with cadmium-free contacts. When switching, operating life may differ depending on the load. Please be sure to verify this by conducting an evaluation using actual equipment.

RoHS Directive compatibility information
<http://www.nais-e.com/>

DATA (Life curve)

Tested sample: T-06 series

Tested condition: 125 V AC, 250 V AC, Power factor: 0.6 and 10 cpm



PRODUCT TYPES

1) T-06 series

Number of poles	Kind of operation	Solder terminal
		Product No.
1-pole	ON-OFF	T106A-F
	ON-ON	T106D-F
2-pole	ON-OFF	T206K-F
	ON-ON	T206N-F

Remark: The product comes with standard installation accessories. However, keying washer is sold separately.

2) T-03 series

Number of poles	Kind of operation	Solder terminal
		Product No.
1-pole	ON-OFF	T103A-F
	ON-ON	T103D-F
2-pole	ON-OFF	T203K-F
	ON-ON	T203N-F

Remark: The product comes with standard installation accessories. However, keying washer is sold separately.

SPECIFICATIONS

1. Contact rating

Kind of load	T-06 series	T-03 series
Resistive load	6A 125V AC,6A 30V DC, 3A 250V AC	3A 125V AC, 2A 250V AC
Inductive load	6 A 125 V AC (Power factor: 0.6), 3 A 250 V AC (Power factor: 0.6)	3 A 125 V AC (Power factor: 0.6), 2 A 250 V AC (Power factor: 0.6)
Motor load (single phase)	100W 125V AC, 100W 250V AC	—

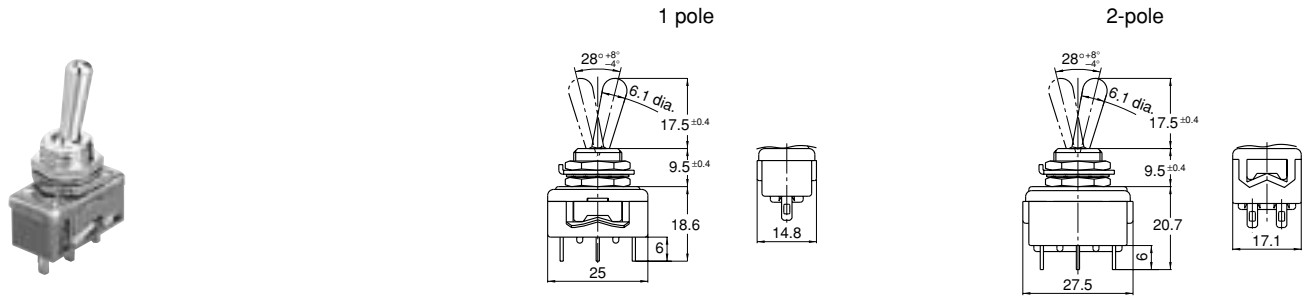
2. Characteristics

Mechanical expected life	Min. 5×10 ⁴
Electrical expected life	T-06 series: Min. 3×10 ⁴ (10 cpm) at rated load, T-03 series: Min. 10 ⁴ (10 cpm) at rated load
Overload life	Min. 50 (5 cpm) (Rated load×1.5)
Insulation resistance	Min. 100 MΩ (at 500 V DC measured by insulation resistive meter)
Breakdown voltage	1500 Vrms (at detection current: 10mA)
Vibration resistance	10 to 55 Hz at double amplitude of 1.5 mm (contact opening: Max. 1 ms)
Contact resistance	Initial, Max. 20 mΩ (By voltage drop at 1 A, 2 to 4 V DC)
Actuator strength (static load)	112.7N for 1 min.
Terminal strength (static load)	24.5N for 1 min.
Ambient temperature	−25°C to +70°C
Contact material	AgZnO alloy

ELECTRICAL CIRCUIT DIAGRAM (for T-06 and T-03 series)

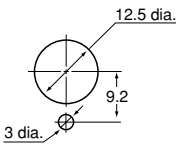
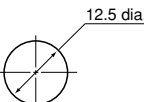
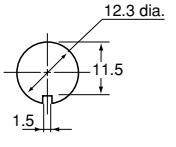
			1-pole	2-pole
Terminal arrangement (As seen from terminal side)			<div><div>1 — 2 — 3 —</div><div>↙ Keyway</div></div>	<div><div>1 — 4 — 2 — 5 — 3 — 6 —</div><div>↙ Keyway</div></div>
Handle position and contact terminal number	ON-OFF	<div><div></div><div>↙ Keyway</div></div>	2-3	2-3, 5-6
		—	—	—
		<div><div></div><div>↙ Keyway</div></div>	—	—
	ON-ON	<div><div></div><div>↙ Keyway</div></div>	2-3	2-3, 5-6
		—	—	—
		<div><div></div><div>↙ Keyway</div></div>	1-2	1-2, 4-5
Remark			ON-OFF type does not have a terminal No. 1.	ON-OFF type does not have terminal No. 1 and 4.

DIMENSIONS (for T-06 and T-03 series) (mm) (General tolerance: ±0.5)



Remark: ON-OFF type does not have terminal No. 1 and 4.

MOUNTING DIMENSIONS (for T-06 and T-03 series)

Panel cutout (mm)			
Panel thickness	Max. 2.5 mm* (Using separately sold keying washer.)	Max. 3.5 mm	Max. 3.5 mm

Remarks: 1. For panel installations, use the back hex nut.
2. * Keying washer (separately sold) Part No.: AJ3083

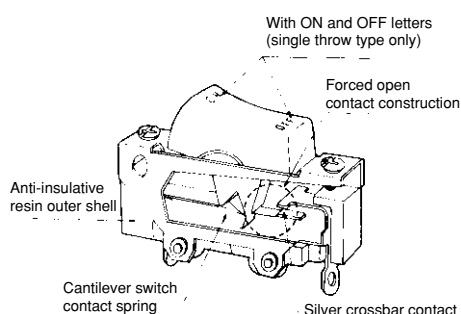
**TUMBLER/ROCKER
SWITCHES**

**TUMBLER/ROCKER
SWITCHES (WD2/WD3)**

FEATURES

1. Superior anti-weld properties achieved through forced open contact construction.
2. Stable contact achieved through use of AgZnO alloy crossbar contact.
3. Letter display on handle of ON-OFF type
4. Different handles available for different applications.

CONSTRUCTION



**PRECAUTIONS WHEN
USING CADMIUM-FREE
CONTACT TYPE**

Models with cadmium-free contacts have been introduced in order to reduce environmentally harmful substances. ("F" is affixed to the end of the part number.) We ask customers who are currently using products with cadmium-containing contacts (no "F" at the end of the part number) to please make the switch to models with cadmium-free contacts. When switching, operating life may differ depending on the load. Please be sure to verify this by conducting an evaluation using actual equipment.

RoHS Directive compatibility information
<http://www.nais-e.com/>

PRODUCT TYPES

1. Tumbler switch

1) Solder terminal

Type	Kind of operation	Solder terminal
		Part No.
1-pole, single throw	ON-OFF	WD2001F
1-pole (coupled)	ON-OFF	WD2003F
1-pole, double throw	ON-ON	WD2101F
1-pole (coupled)	ON-ON	WD2103F
2-pole, single throw	ON-OFF	WD2201F
2-pole, double throw	ON-ON	WD2301F

2) Wire lead type

Type	Kind of operation	Wire leads
		Part No.
1-pole, single throw	ON-OFF	WD2002F
1-pole (coupled)	ON-OFF	WD2004F
1-pole, double throw	ON-ON	WD2102F
1-pole (coupled)	ON-ON	WD2104F
2-pole, single throw	ON-OFF	WD2202F
2-pole, double throw	ON-ON	WD2302F

Remarks: 1. For UL/C-UL certified products, please add a "9" before the "F" at the end of the part number when ordering.

2. Handle display is as shown in the figure below.

3. Please inquire regarding cadmium free models.

2. Rocker switch

1) Solder terminal, 2-color handle and solder terminal

Type	Kind of operation	Solder terminal	2-color handle and solder terminal
		Part No.	Part No.
1-pole, single throw	ON-OFF	WD3001F	WD3021F
1-pole (coupled)	ON-OFF	WD3003F	WD3023F
1-pole, double throw	ON-ON	WD3101F	WD3121F
1-pole (coupled)	ON-ON	WD3103F	WD3123F
2-pole, single throw	ON-OFF	WD3201F	WD3221F
2-pole, double throw	ON-ON	WD3301F	WD3321F

2) Wire lead type

Type	Kind of operation	Wire leads
		Part No.
1-pole, single throw	ON-OFF	WD3002F
1-pole (coupled)	ON-OFF	WD3004F
1-pole, double throw	ON-ON	WD3102F
1-pole (coupled)	ON-ON	WD3104F
2-pole, single throw	ON-OFF	WD3202F
2-pole, double throw	ON-ON	WD3302F

Remarks: 1. For UL/C-UL certified products, please add a "9" before the "F" at the end of the part number when ordering.
 2. Handle display is as shown in the figure on the right.
 3. Please inquire regarding cadmium free models.

SPECIFICATIONS

1. Contact rating

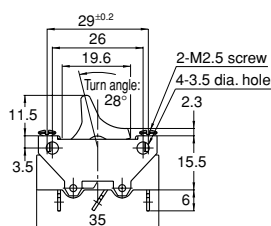
Kind of load	AC	DC
Resistive load	10A 250V	6A 30V, 0.8A 125V, 0.4A 250V
Inductive load	10A 250V (Power factor: 0.6)	4A 30V, 0.4A 125V, 0.2A 250V (Time constant: 7 ms)
Lamp load (incandescent)	300W 100V, 500W 200V, Inrush current: Max. 30 A	—
Motor load	200W 125V, 300W 250V	—

2. Characteristics

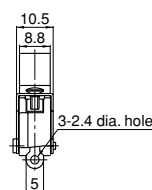
Mechanical expected life		Min. 5×10^4
Electrical expected life	AC load	Min. 3×10^4 (20 cpm) at rated load
	AC motor load	Min. 10^4 (20 cpm) at rated load
	AC lamp load	Min. 10^4 (10 cpm) at rated load
	DC load	Min. 10^4 (12 cpm) at rated load
	Overload	Min. 50 (5 cpm) (Rated load \times 1.5)
Insulation resistance		Min. 100 M Ω (at 500 V DC measured by insulation resistive meter)
Breakdown voltage		1500 Vrms (at detection current: 10mA)
Vibration resistance		10 to 55 Hz at double amplitude of 1.5 mm (contact opening: Max. 1 ms)
Contact resistance		Initial, Max. 10 m Ω (By voltage drop at 1 A, 2 to 4 V DC)
Ambient temperature		-25°C to +50°C (Not freezing below 0°C)
Contact material		AgZnO alloy

DIMENSIONS (mm) (General tolerance: ± 0.5)

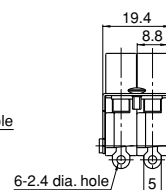
1. Tumbler switch



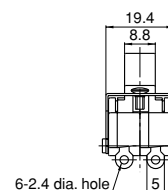
1-pole



1-pole (coupled)

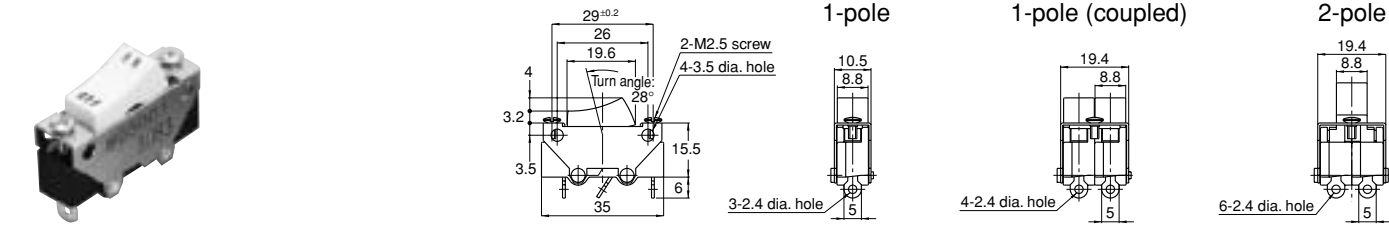


2-pole



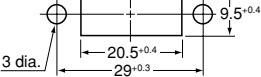
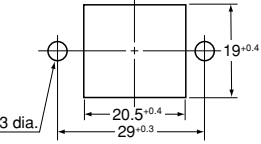
Remarks: 1. ON-OFF type does not have a terminal No.2 in the middle.
 2. ON-OFF type has an ON-OFF display on the handle.
 3. M2.5 screws for Philips screwdriver used for installation.

2. Rocker switch


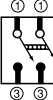

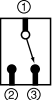




Remarks: 1. ON-OFF type does not have a terminal No.2 in the middle.
2. ON-OFF type has an ON-OFF display on the handle.
3. M2.5 screws for Philips screwdriver used for installation.

MOUNTING DIMENSIONS

Type	1-pole and 2-pole	1-pole (coupled)
Panel cutout (mm)		
Panel thickness	Tumbler switch: Max. 2.5 mm, Rocker switch: Max. 3.2 mm	

ELECTRICAL CIRCUIT DIAGRAM

	1 pole	Coupled	1 pole (coupled)
ON-OFF			
ON-ON			

Remarks: 1. The numbers on the electrical circuit diagrams indicate terminal numbers.
2. The filled bars indicate mechanical coupling by the handle action and that each pole is operating simultaneously.

NOTES

Soldering

When using solder to wire this switch, be careful not to allow solder or flux to enter the inside of the switch from the small openings around the terminals as this can lead to faulty contacting. Bear this in mind, in particular, for the terminal No.2 on the double throw type.

6 dia.



RoHS Directive compatibility information
<http://www.nais-e.com/>

FEATURES

1. Identical to our AJ1 and AJ2 type switches, these push-button switches fit 6 mm installation holes.

2. Light load for a soft operation feel.

A soft operation feel is achieved by building in our AH1 snap action switch. With a light load of approx. 1.96 N, there is no difference between 1-pole and 2-pole models, so both types can be mixed without it feeling unnatural. Also, if dirt and water resistant properties are required of the internal switch, a J type turquoise switch (sealed type snap action switch) can be built in. Please inquire.

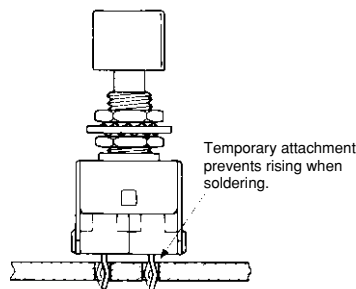
3. Operating life of over 500,000 times.

A mechanical life of 500,000 times is achieved by building in a snap action switch. Electrical life is 300,000 times or higher.

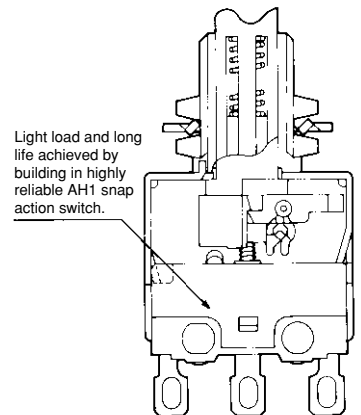
4. Au clad contact type also available for minute loads.

An Au clad contact type has been added to the series for high reliability when loads are minute, even when switching frequency is low.

5. Self-securing terminals for temporary attachment to PC boards.



CONSTRUCTION



ORDERING INFORMATION

1. Switch body

AB 2

2: AB2 type Push-button switches

Number of poles and Operation

- 1: 1-pole, momentary
- 2: 2-pole, momentary
- 3: 1-pole, alternate
- 4: 2-pole, alternate

Contact material

- 1: AgNi alloy contact type
- 2: AgNi alloy and Au clad contact type

Terminal shape

- 1: Solder terminal
- 2: PC board terminal

2. Color cap

AB28 1

Shape
 1: 10 dia.

Color

- W: white
- B: black
- R: red
- Z: dark grey
- H: light grey
- L: blue
- G: green
- Y: yellow

PRODUCT TYPES

1. Body block

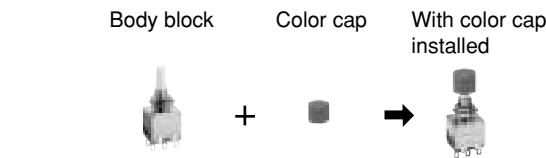
1) Solder terminal

Number of poles	Kind of operation	Contact material	Part No.
1-pole	Momentary	AgNi alloy	AB2111
		AgNi alloy and Au clad	AB2121
	Alternate	AgNi alloy	AB2311
		AgNi alloy and Au clad	AB2321
2-pole	Momentary	AgNi alloy	AB2211
		AgNi alloy and Au clad	AB2221
	Alternate	AgNi alloy	AB2411
		AgNi alloy and Au clad	AB2421

2) PC board terminal

Number of poles	Kind of operation	Contact material	Part No.
1-pole	Momentary	AgNi alloy	AB2112
		AgNi alloy and Au clad	AB2122
	Alternate	AgNi alloy	AB2312
		AgNi alloy and Au clad	AB2322
2-pole	Momentary	AgNi alloy	AB2212
		AgNi alloy and Au clad	AB2222
	Alternate	AgNi alloy	AB2412
		AgNi alloy and Au clad	AB2422

Remarks: 1. Please use body block with a color cap (sold separately).
2. Standard installation accessories are included with the product.



2. Accessories

Product name	Standard installation accessories			Optional installation accessories	Accessories (Option)
	Front hex nut (Nickel plated)	Back hex nut (Uni-chrome plated)	Lock washer	Keying washer	Color cap
Dimensions (mm)					
Part No.	AJ2081	AJ2082	AJ2084	AJ2083	AB281*

Remarks: 1. Please specify the color cap color by replacing the asterisk in the part number with appropriate letter
(W: white; B: black; R: red; Z: dark gray; H: light gray; L: blue; G: green; Y: yellow).
2. A selling unit of each accessory except color cap is 10 pieces.

SPECIFICATIONS

1. Contact rating

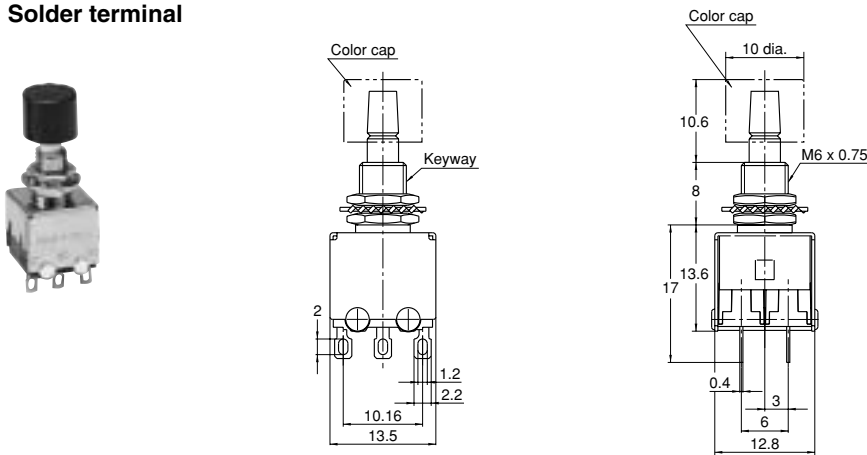
Contact material	AgNi alloy contact type		AgNi alloy and Au clad contact type	
Kind of load	Rating	Electrical life	Rating	Electrical life
Resistive load	3A 125V AC	Min. 3×10 ⁴	0.1A 125V AC	Min. 3×10 ⁴
Low-level load	—	—	1mA 24V DC 2mA 12V DC 5mA 6V DC	Min. 3×10 ⁴

2. Characteristics

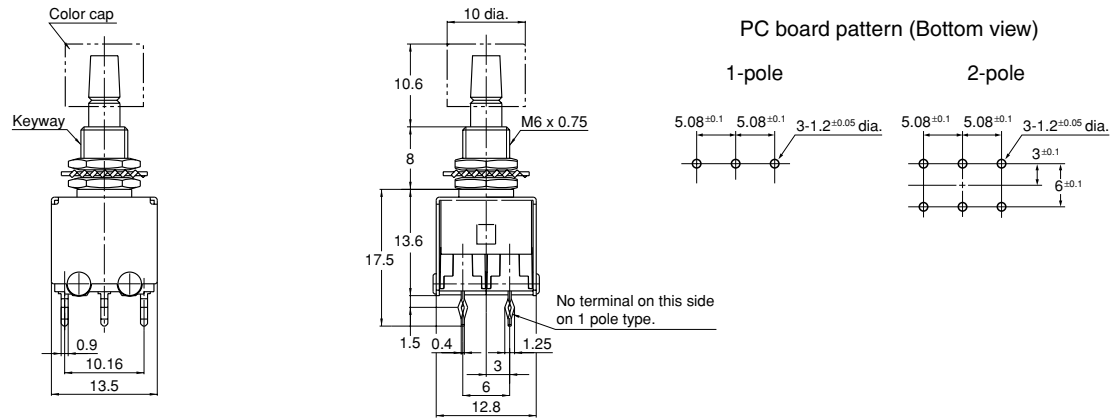
Expected life	Mechanical	Momentary: Min. 50×10^4 , Alternate: Min. 10×10^4 (60 cpm)
	Electrical	Min. 3×10^4 (20 cpm)
Insulation resistance		Min. 100 M Ω (at 500 V DC measured by insulation resistive meter)
Breakdown voltage	Between terminals	600 Vrms (at detection current: 10mA)
	Between terminal and ground	1500 Vrms (at detection current: 10mA)
Contact resistance		Max. 100 m Ω (AgNi alloy contact type: by voltage drop at 1 A, 2 to 4 V DC, AgNi alloy and Au clad contact type: by voltage drop at 0.1 A, 2 to 4 V DC)
Vibration resistance		10 to 55 Hz at double amplitude of 1.5 mm (contact opening: Max. 10 μ s)
Shock resistance		Min. 196 m/s ² (contact opening: Max. 10 μ s)
Ambient temperature		-25°C to +85 °C (Not freezing below 0 °C)
Operating force (reference value)		Momentary: Approx. 1.96N, Alternate: Approx. 2.45N
Operating stroke (reference value)		Approx. 2.5 mm

DIMENSIONS (mm) (General tolerance: ± 0.5)

1. Solder terminal



2. PC board terminal



MOUNTING DIMENSIONS

Panel cutout (mm)	Panel thickness
	Max. 3.2 mm
	Max. 4.7 mm (without back hex nut)
	Max. 3.2 mm
	Max. 4.7 mm (without back hex nut)
	Max. 2.4 mm (using keying washer)
	Max. 3.9 mm (without back hex nut and using keying washer)

NOTES

1. Panel installation

For panel installation, please use the included nut and tighten with a torque of no more than 0.98 N·m. Do not hold the switch body when tightening the nut.

2. Soldering

For hand soldering, a 320°C soldering iron tip should be used with the soldering completed within three seconds. Do not apply force to the terminals when working. Also, after soldering, sufficient care should be taken not to apply tensile load to the terminal section through the lead wires.

3. Miscellaneous

For alternative types, verify that there is a free position when removing the cap.

12 dia.



Push type



Lock type

RoHS Directive compatibility information
<http://www.nais-e.com/>

FEATURES

1. High performance and excellent characteristics.

An AH7 snap action switch is used in the switch body and since the installation frame is made of molded plastic, dimensional accuracy is now on a new level.

2. Two series: push type and lock type

Lock type also available that locks when rotated.

3. Six push-button colors

You can use colors in accordance with sequence functions.

4. The switch body uses an AH7 snap action switch (O.F. 3.92 N max. type).

Also, if dirt and water resistant properties are required of the internal switch, a V type turquoise switch (sealed type snap action switch) can be built in. Please inquire.

PRECAUTIONS WHEN USING CADMIUM-FREE CONTACT TYPE

Models with cadmium-free contacts have been introduced in order to reduce environmentally harmful substances. ("F" is affixed to the end of the part number.) We ask customers who are currently using products with cadmium-containing contacts (no "F" at the end of the part number) to please make the switch to models with cadmium-free contacts. When switching, operating life may differ depending on the load. Please be sure to verify this by conducting an evaluation using actual equipment.

PRODUCT TYPES

Type	Part No.	Push-button color (Number replaces asterisk in part number.)					
		Black	Red	Green	Yellow	White	Blue
Push type	AB5*2177F	1	2	3	4	5	6
Lock type	AB5*2277F	1	2	3	4	5	6

SPECIFICATIONS

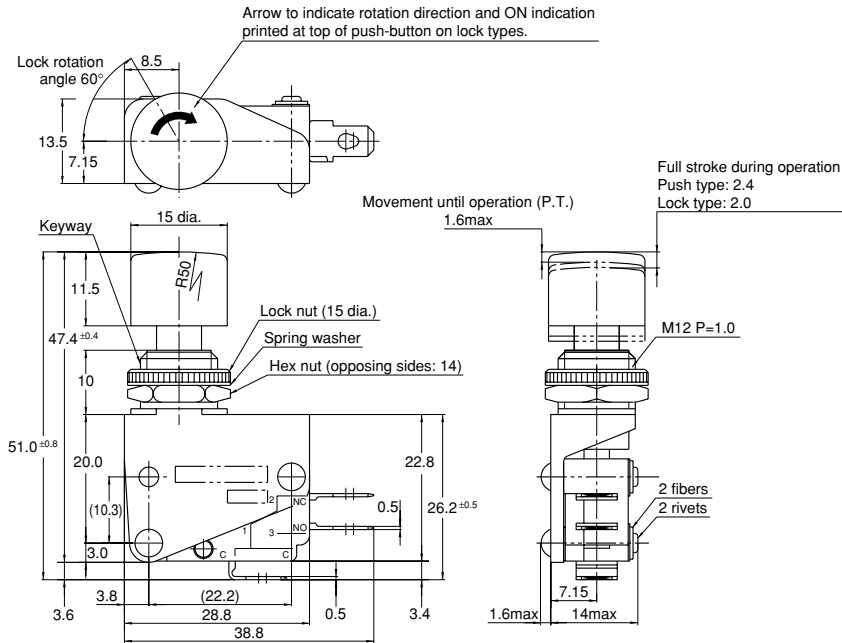
1. Contact rating

Kind of load	AC rating	DC rating
Resistive load (cos nearly equal 1.0)	15A 125V AC, 15A 250V AC	0.6A 125V DC
Inductive load (cos nearly equal 0.4)	10A 125V AC, 10A 250V AC	0.6A 125V DC

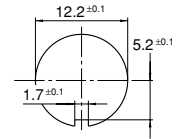
2. Characteristics

Expected life	Mechanical	Min. 10 ⁷ (60 cpm)
	Electrical	Min. 10 ⁵ (20 cpm) at rated load
Insulation resistance		Min. 100 MΩ (at 500 V DC measured by insulation resistive meter)
Breakdown voltage	Between non-continuous terminals	1000 Vrms for 1 min. (at detection current: 10mA)
	Between each terminal and other exposed metal parts	1500 Vrms for 1 min. (at detection current: 10mA)
	Between each terminal and ground	1500 Vrms for 1 min. (at detection current: 10mA)
Contact resistance		Max. 50 mΩ (By voltage drop at 1 A, 6 to 8 V DC)
Allowable operation speed (No load)		0.1 to 1,000 mm/s
Max. switching frequency (No load)		600 cpm
Ambient temperature		-25°C to +85 °C (Not freezing below 0 °C)
Contact material		Movable: AgSnO ₂ alloy; Fixed: AgZnO alloy

DIMENSIONS (mm) (General tolerance: ± 0.4)



Mounting dimensions
(Panel thickness: Max. 3 mm)



NOTES

1. For panel installation, please tighten with a torque of no more than 1.47 NÆm.
2. For push-button installation, please tighten with a torque of no more than 0.49 NÆm.
3. Notch is provided on the operation shaft and pushbutton to prevent the push-button from falling off. After using the notch, screw in a further 120 to 160° (3 or 4 threads).
4. Please note that the number changes when the push-button is replaced.

POWER ROCKER SWITCH

AJ8 SWITCHES WITH TRIP FUNCTION UPGRADED TYPE



RoHS Directive compatibility information
<http://www.nais-e.com/>

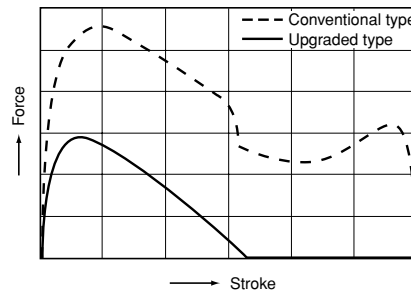
FEATURES

1. Power switches with an electromagnetic reset function which meet the need for energy savings in equipment and for safety.

Applications for these switches include promoting energy savings in equipment (by reducing power consumption when OA equipment is in standby mode, for example), preventing fires caused by overheating of a heater inside equipment, preventing electrical leaks, and automatically turning off the power if the unit tips over or is shaken. These switches feature a built-in electromagnetic reset function that shuts off the main power supply in response to a signal that is received from an external sensor.

2. Improved feel of switch operation. These switches provide the same comfortable operation of our conventional AJ8 switches.

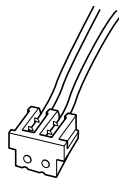
Comparison of force through operating stroke



3. CT terminals adopted for coil terminals

These switches can be used with AMP's CT connectors, which are widely used for wiring connections in OA equipment, making it possible to achieve greater efficiency in wiring work.

Receptacle socket for AMP's CT connector



4. Prolonged electrical service life.

Coil operation provides an electrical life of at least 50,000 switching operations.

5. Assures excellent ability to withstand inrush current when used to turn a power supply on/off.

The switch uses our own proprietary mechanism that provides an excellent ability to withstand inrush current.

Inrush current rating (IEC61058-1): 160A (normally 16A at 125V AC), 10,000 times

6. Approved under major international safety standards.

UL, cUL, TÜV and SEMKO approved.

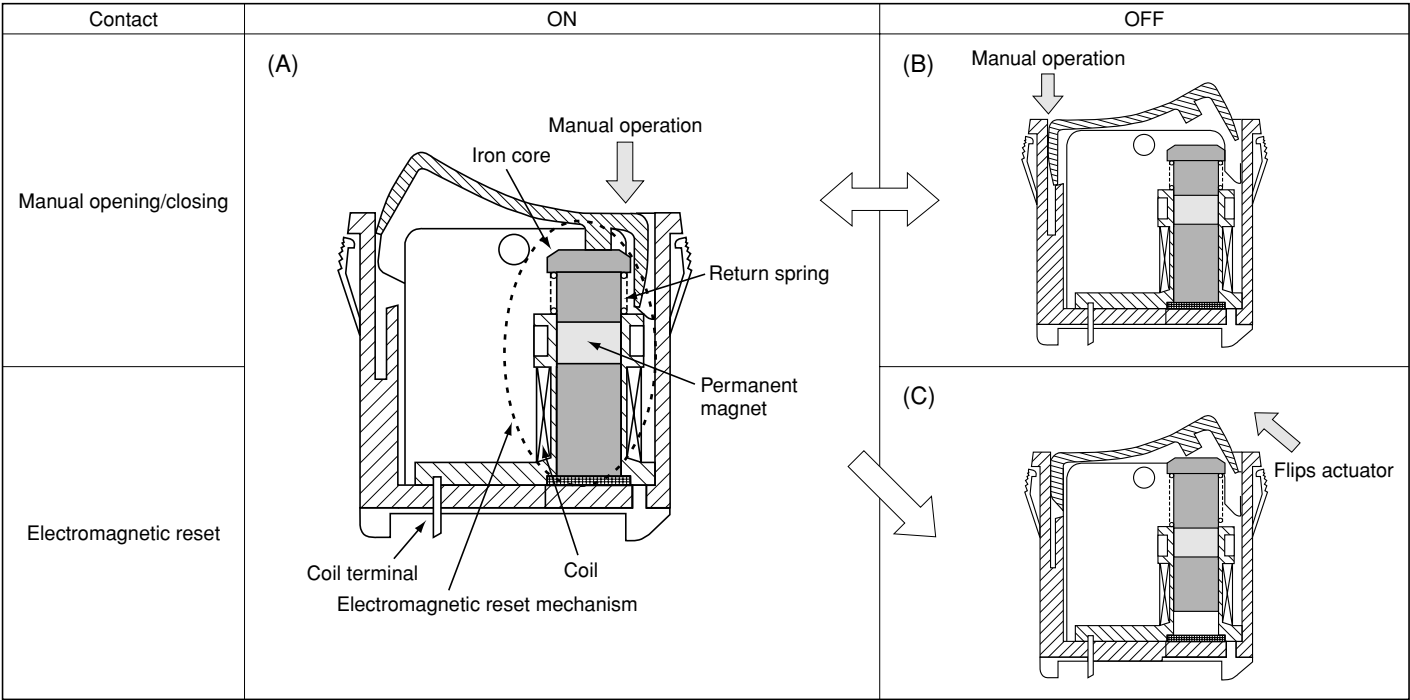
PRECAUTIONS WHEN USING CADMIUM-FREE CONTACT TYPE

Models with cadmium-free contacts have been introduced in order to reduce environmentally harmful substances. ("F" is affixed to the end of the part number.)

We ask customers who are currently using products with cadmium-containing contacts (no "F" at the end of the part number) to please make the switch to models with cadmium-free contacts. When switching, operating life may differ depending on the load. Please be sure to verify this by conducting an evaluation using actual equipment.

OPERATING PRINCIPLE

- Manual operation is a repetition of (A) and (B). This operation is independent of the electromagnetic reset function.
- The reset mechanism operates only when an electromagnetic reset has occurred. (C)



ORDERING INFORMATION



AJ	8	R								C	F
----	---	---	--	--	--	--	--	--	--	---	---

AJ8: AJ8 switches

Functions
R: Reset function

Number of pole and Operation
1: 1-pole, single throw (ON-OFF)
2: 2-pole, single throw (ON-OFF)
5: 1-pole, double throw (ON-ON)

Terminal shape
0: .250 Quick-connect terminal

Actuator indication
0: No indication
1:  indication
2:  indication

Coil voltage
1: 5 V DC 3: 12 V DC 4: 24 V DC

Actuator color
Z: Dark gray B: Black

Flange color
Nil: Dark gray B: Black

C: Upgraded type

F: Cadmium-free product

Remarks: 1. They come with a stamp indicating international standards without your request.
2. The color of indication on the actuator is white.

AJ8R

PRODUCT TYPES

Remarks: Standard actuator color is dark gray and black.
To order switches with a black actuator, replace the letter “Z” with “B” in the product numbers shown below when ordering.
(Ex.) AJ8R1001ZC (Actuator color: Dark gray Flange color: Dark gray)
→ AJ8R1001BC (Actuator color: Black Flange color: Dark gray)

1. Without indication on actuators (Actuator color: Dark gray)

Poles	Operation type	Coil voltage	Part No.	
			Flange color: Dark gray	Flange color: Black
1-pole	Single throw (ON-OFF)	5V DC	AJ8R1001ZCF	AJ8R1001ZBCF
		12V DC	AJ8R1003ZCF	AJ8R1003ZBCF
		24V DC	AJ8R1004ZCF	AJ8R1004ZBCF
	Double throw (ON-ON)	5V DC	AJ8R5001ZCF	AJ8R5001ZBCF
		12V DC	AJ8R5003ZCF	AJ8R5003ZBCF
		24V DC	AJ8R5004ZCF	AJ8R5004ZBCF
2-pole	Single throw (ON-OFF)	5V DC	AJ8R2001ZCF	AJ8R2001ZBCF
		12V DC	AJ8R2003ZCF	AJ8R2003ZBCF
		24V DC	AJ8R2004ZCF	AJ8R2004ZBCF

2. With indication on actuator

1) With I O indication (Actuator color: Dark gray)

Poles	Operation type	Coil voltage	Part No.	
			Flange color: Dark gray	Flange color: Black
1-pole	Single throw (ON-OFF)	5V DC	AJ8R1011ZCF	AJ8R1011ZBCF
		12V DC	AJ8R1013ZCF	AJ8R1013ZBCF
		24V DC	AJ8R1014ZCF	AJ8R1014ZBCF
	Double throw (ON-ON)	5V DC	AJ8R5011ZCF	AJ8R5011ZBCF
		12V DC	AJ8R5013ZCF	AJ8R5013ZBCF
		24V DC	AJ8R5014ZCF	AJ8R5014ZBCF
2-pole	Single throw (ON-OFF)	5V DC	AJ8R2011ZCF	AJ8R2011ZBCF
		12V DC	AJ8R2013ZCF	AJ8R2013ZBCF
		24V DC	AJ8R2014ZCF	AJ8R2014ZBCF

2) With — O indication (Actuator color: Dark gray)

Poles	Operation type	Coil voltage	Part No.	
			Flange color: Dark gray	Flange color: Black
1-pole	Single throw (ON-OFF)	5V DC	AJ8R1021ZCF	AJ8R1021ZBCF
		12V DC	AJ8R1023ZCF	AJ8R1023ZBCF
		24V DC	AJ8R1024ZCF	AJ8R1024ZBCF
	Double throw (ON-ON)	5V DC	AJ8R5021ZCF	AJ8R5021ZBCF
		12V DC	AJ8R5023ZCF	AJ8R5023ZBCF
		24V DC	AJ8R5024ZCF	AJ8R5024ZBCF
2-pole	Single throw (ON-OFF)	5V DC	AJ8R2021ZCF	AJ8R2021ZBCF
		12V DC	AJ8R2023ZCF	AJ8R2023ZBCF
		24V DC	AJ8R2024ZCF	AJ8R2024ZBCF

SPECIFICATIONS

1. Contact rating

Voltage	Resistive load (pf = 1)	Motor load (EN61058-1) (pf = 0.6)	Inrush load
125V AC	16A	—	160A (8.3ms)
250V AC	10A	4A	—

Remark: The motor load is in accordance with EN61058-1. Inrush current can be switched up to the value of 6 times the indicated rating.

2. Coil rating

Nominal Voltage *(Max. 10 sec)	Drop-out voltage (at 20°C)	Nominal operating current [±10%] (at 20°C)	Coil resistance [±10%] (at 20°C)	Maximum voltage (Max. 1 s)
5V DC	Max.4.5V Min.0.5V	725mA	6.9Ω	5.5V
12V DC	Max.10.8V Min.1.2V	300mA	40Ω	13.2V
24V DC	Max.21.6V Min.2.4V	150mA	160Ω	26.4V

Remark: If the rated voltage is applied to the coil for more than ten seconds or the maximum voltage is applied for more than one second, coil performance will deteriorate.

3. Characteristics

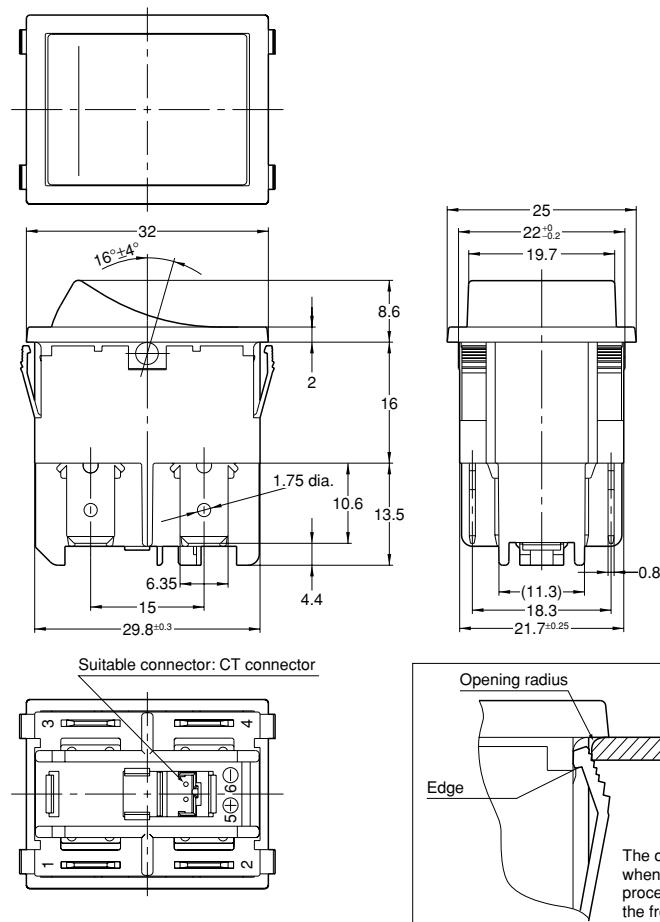
Electrical life	Manual operation	Min.10 ⁴ (at 7 cpm.,at rated load)
	Coil operation	Min.10 ³ (at 7 cpm.,at rated load), Min.5×10 ⁴ (at 7 cpm. 5A 125V AC)
Mechanical life		Min.5×10 ⁴ (at 20 cpm.)
Initial contact resistance (By voltage drop at 1A, 2 to 4V DC)		Max. 100mΩ
Initial insulation resistance		Min. 100MΩ (at 500V DC measured by insulation resistive meter)
Initial breakdown voltage	Between contacts	2,000 Vrms
	Between coil and contact	4,000 Vrms
Ambient temperature		0°C to +60°C (Not freezing below 0°C)
Vibration resistance		10 to 55 Hz at single amplitude of 0.75mm
Shock resistance	Functional	Min.294m/s ² {30G} (Contact opening Max. 1ms)
	Destructive	Min.980m/s ² {100G}
Terminal strength		.250 Quick-connect terminal Min. 98N{10kgf}/min. (Pull & push direction)
Actuator strength		39.2N{4kgf} for 1min. operating direction
Contact release time		Max. 100ms (at rated voltage)
Initial operating force * Reference value		4.9N or less (Max. 500gf or less) Setting force after reset has been released: Max. 6.86N or less (Max. 700gf or less)
Flame retardancy		UL94V-0
Tracking resistance		Min. 175
Unit weight		1-pole, single throw: Approx. 17g; 1-pole, double throw: Approx. 19g; 2-pole, single throw: Approx. 20g
Contact material		AgSnO ₂ alloy

Remark: Test conditions are in accordance with EN61058-1, UL1054 and JIS C 6571.

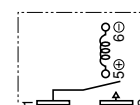
DIMENSIONS

mm General tolerance: ±0.5

2-pole, single throw (ON-OFF)

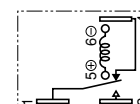


Wiring diagram(Bottom view)
1-pole, single throw (ON-OFF)



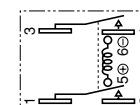
ON (set): 1-2

1-pole, double throw (ON-ON)



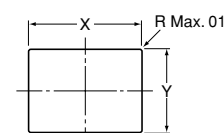
Reset: 1-4 closed
Set: 1-2 closed

2-pole, single throw (ON-OFF)



ON (set): 1-2 closed
3-4 closed

Diagram of recommended locations
for panel mounting holes



Panel thickness	X	Y
1 to less than 1.8	30.4 ^{+0.1} _{-0.1}	22.0 ^{+0.1} _{-0.1}
1.8 to 2.3	31.1 ^{+0.1} _{-0.1}	22.0 ^{+0.1} _{-0.1}

Remark: Contact us if you are considering using a panel of other than the recommended size and shape.

- Remarks: 1. The external dimensions and mounting dimensions for the 1-pole, single throw type and the 1-pole, double throw type are the same as those for the 2-pole, single throw type indicated above.
2. The figures show the 2-pole, single throw (ON-OFF) type as an example.
The contact terminals are 1, 2, 3, and 4.
In the case of the 1-pole, single throw (ON-OFF) type, the contact terminals are 1 and 2.
In the case of the 1-pole, double throw (ON-ON) type, the contact terminals are 1, 2, and 4.
There are no other terminals. Refer to the internal wiring diagram.
3. The coil is a polarized coil; coil terminal 5 is positive and coil terminal 6 is negative.

NOTES

- 1. Operating voltage application time**
If the rated voltage is applied to the coil for more than 10 seconds or the maximum voltage is applied for more than 1 second, coil performance may deteriorate.
- 2. The shape of the mounting panel should be as recommended in the dimensions diagram.**
Contact us if you are considering using a panel of other than the recommended size and shape.
- 3. The mounting panel should be made of SPCC. If a different material is used, its adhesion to the switch unit may not be as strong. Check this on site if necessary.**
- 4. Note that the actuator could pop out of the switch housing if 19.6N (2kgf) or more of force is applied to the side of the actuator.**
- 5. Regarding fastening lead wires to terminals**
(1) When connecting the .250 Quick-connect terminals, use a .250 receptacle and insert the terminals straight in. If you insert them at an angle, the terminals could catch on the opening and will require greater insertion force.
(2) The coil terminals have specific polarities. Make sure you connect them correctly.

- (3) Use a receptacle that is compliant with JIS C 2809.
In addition, there is some deviation regarding the insertion force depending on the model used from different manufacturers, so the insertion force should be checked under realistic conditions.
- (4) Use AMP's CT connector for the coil terminals.
- 6. Because special receptacle terminals are used for the contact terminals and the common terminals, do not attempt to solder them. Doing so could melt plastic components and otherwise harm the performance of the switch**
- 7. The terminals should be connected in such a way that they are not under constant stress from the connecting wires.**
- 8. Take care not to drop the product as it may impair performance.**
- 9. Resistance to chemicals**
To clean the switch unit, use a neutral detergent diluted with water.
Do not use acidic or alkaline solvents as they may damage the switch.
Furthermore, be careful not to get any of the detergent solution inside of the switch while cleaning it.

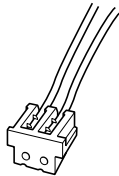
- 10. This product is not hermetically sealed, so its performance could deteriorate under certain ambient conditions. Avoid using and storing these switches in a location where they will be exposed to corrosive gases, silicon, or high dust levels, all of which can have an adverse effect on the contacts. In addition, because these switches contain permanent magnets, avoid using and storing these switches in a location where metallic dust, etc., is present.**
- 11. When these switches are used with weak currents of 500mA or less, a layer of material on the surface of the contacts may cause contact instability. Check and evaluate this possibility before using these switches under such conditions.**
- 12. When using an ON-OFF type switch with no (I O) indication on the actuator, the OFF position should be indicated on the set in which the switch is installed.**
- 13. To assure reliability, check the switch under actual loading conditions. Avoid any situation that may adversely affect switching performance.**

COIL TERMINAL CONNECTOR

Because CT terminals are used for the coil terminals, AMP's CT connector can be used.

Remark: We do not sell this type of connector.
Questions concerning this connector should be directed to the manufacturer.

AMP s CT connector



receptacle socket

- Pressure welding type:**
173977-2: for AWG26, 28
2-179694-2: for AWG24
- Crimping type:**
179228-2

Small size

AJ7 switch 10A type
Standard actuator



AJ7 switch 10A type
Wide actuator



AJ7 switch 6A type



RoHS Directive compatibility information
<http://www.nais-e.com/>

FEATURES

1. Power rocker switches for safety requirements.

- All versions comply with ClassII EN61058-1 insulation grade.

Insulation distance: 8mm Min.

Contact gap: 3mm Min.

• International Standard-approved status

		Already approved
AJ7 switch 10A type	Standard actuator type	UL, CSA, VDE, TÜV, ÖVE, KEMA, SEMKO, NEMKO, DEMKO, FIMKO, SEV
	Wide actuator type	UL, CSA, VDE, TÜV, SEMKO, NEMKO, DEMKO, FIMKO, SEV, KEMA, ÖVE
AJ7 switch 6A type		UL, CSA, TÜV

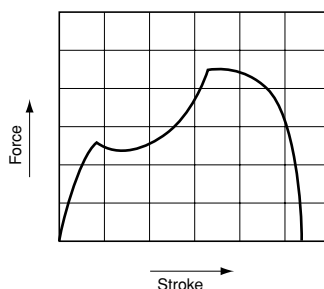
2. High inrush current resistance is ideal for office automation equipment.

Type	Inrush	Contact rating	Expected life
10A type	100A	10A 250V AC	Min. 10 ⁴
6A type	60A	6A 250V AC	

3. Operation that only requires a light touch

The best operation characteristics were sought by analyzing touch data gathered by monitoring 1,500 people.

- Power Rocker Switch touch curve



4. A broad product line

The AJ7 switches are available with five different types of terminals: quick-connect terminals, soldering terminals, PC board terminals, right angle terminals and left angle terminals.

5. Eight standard actuator colors

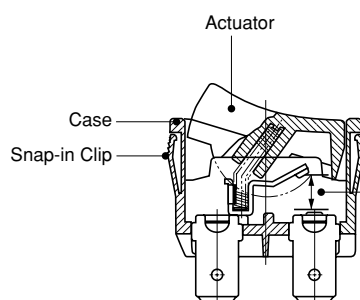
White, black, red, dark gray, light gray, blue, green, yellow

6. Cadmium-free contact compatibility.

PRECAUTIONS WHEN USING CADMIUM-FREE CONTACT TYPE

Models with cadmium-free contacts have been introduced in order to reduce environmentally harmful substances. ("F" is affixed to the end of the part number.) We ask customers who are currently using products with cadmium-containing contacts (no "F" at the end of the part number) to please make the switch to models with cadmium-free contacts. When switching, operating life may differ depending on the load. Please be sure to verify this by conducting an evaluation using actual equipment.

CONSTRUCTION



Contact gap (more than 3mm)

The EN60950 (intended for office automation equipment) conforms with a 3mm gap.

When directly opening or closing the primary power supply side, a contact gap of at least 3mm is required in order to ensure safety.

AJ7 (J7)

ORDERING INFORMATION

AJ

7

F

7: AJ7 switch

Rating & size of actuator

Nil: 10A standard size

W: 10A wide size

6: 6A standard size

Number of poles and Operation

1: 1-pole, single throw (ON-OFF)

2: 2-pole, single throw (ON-OFF)

Terminal shape

0: .187 Quick-connect terminal

1: Soldering terminal


2: PC board terminal


3: PC board right angle terminal (for standard actuator only)


4: PC board left angle terminal (for standard actuator only)


Actuator indication


0: No indication

1:  indication (Indication on top)

2:  indication (Indication on top)

3:  indication (Side indication)

4:  indication (Indication on top)

5:  indication (Side indication)

Actuator color Remark 1)

W: White B: Black R: Red Z: Dark gray H: Light gray L: Blue G: Green Y: Yellow

Flange color

Nil: Black (standard color)

(Custom ordered color: W: White, R: Red, Z: Dark gray, H: Light gray, L: Blue, G: Green, Y: Yellow) Remark 1, 5)

Insulation guard

Nil: Short guard type

T: Long guard type (.187 Quick-connect terminal and soldering terminal only)

F: Cadmium-free product

Remarks: 1. The 10A type has indication on the actuator.

2. The correspondence between actuator colors and flange colors marked with an asterisk differs according to the type; refer to the remark for the PRODUCT TYPES.

3. "I ○" is engraved on all flanges.

4. The color of indication on the actuator:

• White actuator: black

• Others: white

5. The flange color of 6A type is black only.

ACTUATOR INDICATIONS ON PRODUCTS MADE TO ORDER


With indication on top






With side indication


(When the "I" indication is visible on the side of the actuator, it indicates that the switch is in the "ON" state.)



With  indications:

The  and  symbols are located on each side, respectively.

With  indications:

The  symbols is located on the side.

PRODUCT TYPES

1. 10 A type

1) Standard actuator type

(1) Without indication on actuators

Terminal shape	Poles	Operating types	Part No.
			Without indication
.187 Quick-connect terminal	1-pole	ON-OFF	AJ7100*F
	2-pole		AJ7200*F
Soldering terminal	1-pole		AJ7110*F
	2-pole		AJ7210*F
PC board terminal	1-pole		AJ7120*F
	2-pole		AJ7220*F
PC board right angle terminal	1-pole		AJ7130*F
	2-pole		AJ7230*F
PC board left angle terminal	1-pole		AJ7140*F
	2-pole		AJ7240*F

- Remarks: 1. A letter indicating the actuator color is entered in place of asterisk. (W: White, B: Black, R: Red, Z: Dark gray, H: Light gray, L: Blue, G: Green, and Y: Yellow).
Standard flange color is black. For other colors type, they are custom ordered. For requests of other flange color, please enter the following letter before the "F" in the part number. (W: White, R: Red, Z: Dark gray, H: Light gray, L: Blue, G: Green and Y: Yellow)
2. Long guard type is available for .187 Quick-connect terminal and soldering terminal type. When ordering, please add a "T" before the "F" at the end of the part number.
3. The color of indication on the actuator:
- For white actuator: black
 - For others: white
4. They come with a stamp indicating international standards without your request.
5. Note that the position of the I mark on the flange is used as a reference for left angle and right angle terminals as shown in the diagram below. This also applies to the 6A type.



Right angle terminal



Left angle terminal

(2) With indication on actuators

Terminal shape	Poles	Operating types	Part No.	
			With I ○ indication	With — ○ indication
.187 Quick-connect terminal	1-pole	ON-OFF	AJ7101*F	AJ7102*F
	2-pole		AJ7201*F	AJ7202*F
Soldering terminal	1-pole		AJ7111*F	AJ7112*F
	2-pole		AJ7211*F	AJ7212*F
PC board terminal	1-pole		AJ7121*F	AJ7122*F
	2-pole		AJ7221*F	AJ7222*F
PC board right angle terminal	1-pole		AJ7131*F	AJ7132*F
	2-pole		AJ7231*F	AJ7232*F
PC board left angle terminal	1-pole		AJ7141*F	AJ7142*F
	2-pole		AJ7241*F	AJ7242*F

- Remarks: 1. A letter indicating the actuator color is entered in place of asterisk. (W: White, B: Black, R: Red, Z: Dark gray, H: Light gray, L: Blue, G: Green, and Y: Yellow).
Standard flange color is black. For other colors type, they are custom ordered. For requests of other flange color, please enter the following letter before the "F" in the part number. (W: White, R: Red, Z: Dark gray, H: Light gray, L: Blue, G: Green and Y: Yellow)
2. Long guard type is available for .187 Quick-connect terminal and soldering terminal type. When ordering, please add a "T" before the "F" at the end of the part number.
3. The color of indication on the actuator:
- For white actuator: black
 - For others: white
4. They come with a stamp indicating international standards without your request.
5. Note that the position of the I mark on the flange is used as a reference for left angle and right angle terminals as shown in the diagram below. This also applies to the 6A type.



Right angle terminal



Left angle terminal

AJ7 (J7)

2) Wide actuator type

(1) Without indication on actuators

Terminal shape	Poles	Operating types	Part No.	
			Without indication	
.187 Quick-connect terminal	1-pole	ON-OFF	AJ7W100*F	
	2-pole		AJ7W200*F	
Soldering terminal	1-pole		AJ7W110*F	
	2-pole		AJ7W210*F	
PC board terminal	1-pole		AJ7W120*F	
	2-pole		AJ7W220*F	

(2) With indication on actuators

Terminal shape	Poles	Operating types	Part No.	
			With ○ indication	With — ○ indication
.187 Quick-connect terminal	1-pole	ON-OFF	AJ7W101*F	AJ7W102*F
	2-pole		AJ7W201*F	AJ7W202*F
Soldering terminal	1-pole		AJ7W111*F	AJ7W112*F
	2-pole		AJ7W211*F	AJ7W212*F
PC board terminal	1-pole		AJ7W121*F	AJ7W122*F
	2-pole		AJ7W221*F	AJ7W222*F

Remarks: 1. A letter indicating the actuator color is entered in place of asterisk. (W: White, B: Black, R: Red, Z: Dark gray, H: Light gray, L: Blue, G: Green, and Y: Yellow). Standard flange color is black. For other colors type, they are custom ordered. For requests of other flange color, please enter the following letter before the “F” in the part number. (W: White, R: Red, Z: Dark gray, H: Light gray, L: Blue, G: Green and Y: Yellow)
2. The color of indication on the actuator:
• For white actuator: black
• For others: white
3. They come with a stamp indicating international standards without your request.

2. 6 A type

1) Standard actuator type

(1) Without indication on actuators

Terminal shape	Poles	Operating types	Part No.	
			Without indication	
.187 Quick-connect terminal	1-pole	ON-OFF	AJ76100*F	
	2-pole		AJ76200*F	
Soldering terminal	1-pole		AJ76110*F	
	2-pole		AJ76210*F	
PC board terminal	1-pole		AJ76120*F	
	2-pole		AJ76220*F	
PC board right angle terminal	1-pole		AJ76130*F	
	2-pole		AJ76230*F	
PC board left angle terminal	1-pole		AJ76140*F	
	2-pole		AJ76240*F	

(2) With indication on actuators

Terminal shape	Poles	Operating types	Part No.	
			With ○ indication	With — ○ indication
.187 Quick-connect terminal	1-pole	ON-OFF	AJ76101*F	AJ76102*F
	2-pole		AJ76201*F	AJ76202*F
Soldering terminal	1-pole		AJ76111*F	AJ76112*F
	2-pole		AJ76211*F	AJ76212*F
PC board terminal	1-pole		AJ76121*F	AJ76122*F
	2-pole		AJ76221*F	AJ76222*F
PC board right angle terminal	1-pole		AJ76131*F	AJ76132*F
	2-pole		AJ76231*F	AJ76232*F
PC board left angle terminal	1-pole		AJ76141*F	AJ76142*F
	2-pole		AJ76241*F	AJ76242*F

(Standard color is black. For other color type, they are custom ordered.)
Remarks: 1. Replace the asterisk with a code that indicates the actuator color.
B: Black (standard), W: White (custom ordered), R: Red (custom ordered), Z: Dark gray (custom ordered), H: Light gray (custom ordered)
2. The color of | ○ indication on the actuator: White actuator: black Others: white
3. They come with a stamp indicating international standards without your request.

SPECIFICATIONS

1. Contact rating

Type	Voltage	Resistive load ($\cos \phi \approx 1.0$)	Motor load (EN61058-1) ($\cos \phi \approx 0.6$)
10A type	250V AC	10A	4A
6A type		6A	3A

Remark: The motor load is in accordance with EN61058-1. Inrush current can be switched up to the value of 6 times the indicated rating.

2. Characteristics

Expected life (Min. operations)	Mechanical	Min. 5×10^4 (at 20 cpm.)
	Electrical	Min. 10^4 (at 7 cpm., at rated load)
Initial insulation resistance (Between terminals)		Min. 100 M Ω (at 500V DC measured by insulation resistive meter)
Initial breakdown voltage (Between terminals)		2,000 Vrms detection current: 10 mA
Initial contact resistance (By voltage drop at 1A, 2 to 4V DC)		Max. 100m Ω
Temperature rise	at 6×10^3 ope. or less	Max. 30°C (UL1054)
	from 6×10^3 ope. to 10^4	Max. 55°C (EN61058-1)
Vibration resistance		10 to 55 Hz at double amplitude of 1.5mm
Shock resistance		Min. 490m/s ² {50 G}
Actuator strength		40 N {4.08kgf} for 1 minute (operating direction)
Tensile terminal strength		100 N {10.2kgf} for 1 minute or more (Pull & push direction)
Ambient temperature		-25°C to +85°C (Not freezing below 0°C)
Flame retardancy		UL94V-0
Tracking resistance		Min. 175
Operating force (reference characteristics)	1-pole	2.2 ± 1.2 N {0.22 \pm 0.12kgf}
	2-pole	4 ± 2.5 N {0.41 \pm 0.25kgf}
Contact material		AgSnO ₂ alloy

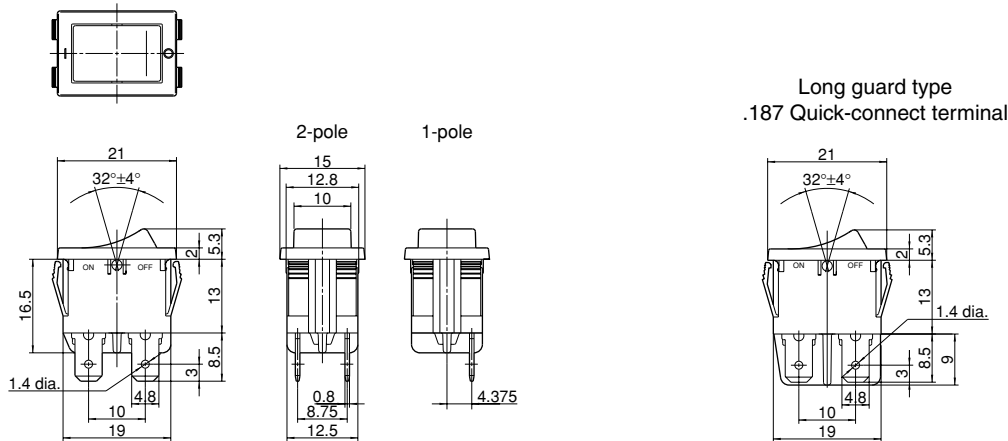
Remark: Test conditions are in accordance with EN61058-1, UL1054 and JIS C 6571.

DIMENSIONS

mm General tolerance: ± 0.5

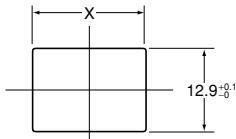
The dimension diagram for the standard actuator types is common to both the 10A type and the 6A type.

1. .187 Quick-connect terminal/Long guard type



Remark: As for soldering type, only terminal is different.

Diagram of recommended locations
for panel mounting holes

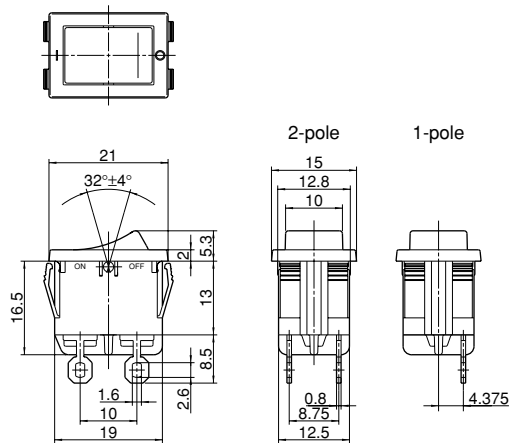


Panel thickness	X
0.75 to 1.25	19.2 ⁺⁰ _{-0.1}
1.25 to 2	19.4 ⁺⁰ _{-0.1}
2 to 3	19.8 ⁺⁰ _{-0.1}

AJ7 (J7)

2. Soldering terminal

mm General tolerance: ±0.5



Long guard type
Soldering terminal

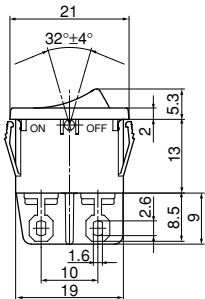
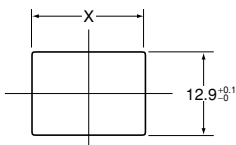


Diagram of recommended locations
for panel mounting holes



Panel thickness	X
0.75 to 1.25	19.2 ⁺⁰ _{-0.1}
1.25 to 2	19.4 ⁺⁰ _{-0.1}
2 to 3	19.8 ⁺⁰ _{-0.1}

3. PC board terminal

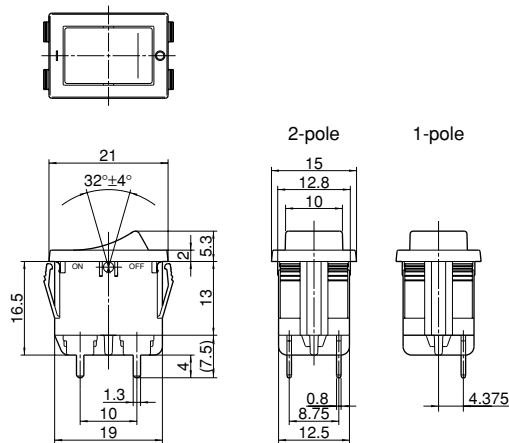
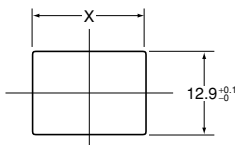
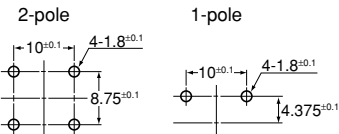


Diagram of recommended locations
for panel mounting holes



PC board pattern



Panel thickness	X
0.75 to 1.25	19.2 ⁺⁰ _{-0.1}
1.25 to 2	19.4 ⁺⁰ _{-0.1}
2 to 3	19.8 ⁺⁰ _{-0.1}

4. PC board right angle terminal

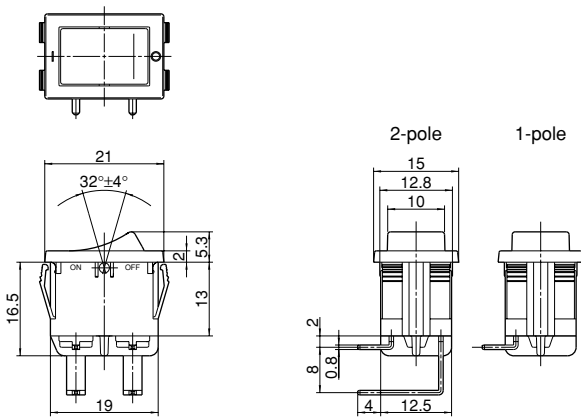
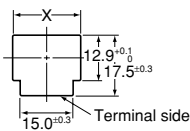
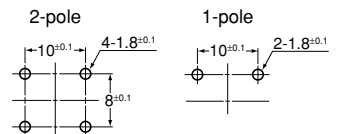


Diagram of recommended locations
for panel mounting holes



PC board pattern



Panel thickness	X
0.75 to 1.25	19.2 ⁺⁰ _{-0.1}
1.25 to 2	19.4 ⁺⁰ _{-0.1}
2 to 3	19.8 ⁺⁰ _{-0.1}

Remark: A type left angle terminals is also available.

5. Wide actuator type

mm General tolerance: ± 0.5

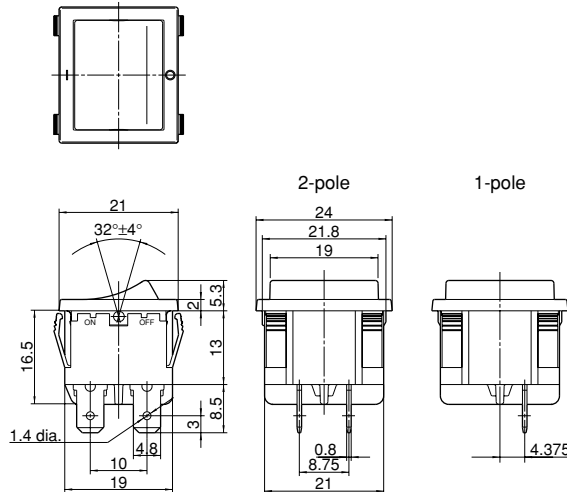
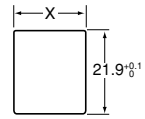


Diagram of recommended locations for panel mounting holes



Panel thickness	X
1 to less than 1.8	19.2 ⁺⁰ _{-0.1}
1.8 to 2.3	19.9 ⁺⁰ _{-0.1}

Remark: Dimensions for the terminals of soldering terminal type and PC board terminal type are the same as those of standard size type.

NOTES

1. Switch mounting

Mount the switch with the hole cutting dimensions shown in the dimensions. Contact us if you are considering using a panel of other than the recommended size and shape.

2. Regarding fastening lead wires to terminals

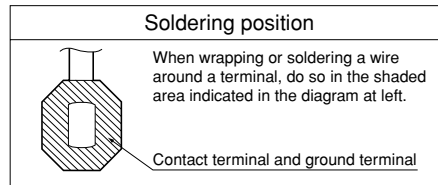
1) When connecting the tab terminals, use a .187 Quick-connect and insert the terminals straight in.

If they are skewed, the terminals will require excessive insertion force. In addition, there is some variation in the insertion force required for different receptacles from different manufacturers, so confirm how much force is needed under actual conditions.

Do not solder wires onto tab terminals.

2) With manual soldering: Complete the soldering connection work within 3 seconds with the tip of the soldering iron (60W soldering iron) at a temperature of 420°C or lower, and take care not to apply any force to the terminal area.

Avoid touching the switch with soldering iron.



Refer to the diagram above, "soldering position," for details on the position where a wire should be soldered to a terminal. When soldering PC board terminals, keep soldering time to within 5 s at 270°C soldering bath or within 3 s at 350°C soldering bath.

3) The terminals should be connected in such a way that they are not under constant stress from the connecting wires.

4) Terminal material is copper alloy which may discolor due to finger's oil or after a long time. But that discoloration does not effect actual performance.

3. Resistance to chemicals

To clean the switch unit, use a neutral detergent diluted with water.

Do not use acidic or alkaline solvents as they may damage the switch.

Furthermore, be careful not to get any of the detergent solution inside of the switch while cleaning it.

4. Environment

Avoid using and storing these switches in a location where they will be exposed to corrosive gases, silicon, or high dust levels, all of which can have an adverse effect on the contacts.

5. Take care not to drop the product as it may impair performance.

REFERENCE

1. Outline of UL1054 test

Overload test AJ7: 12.5A 250V AC (Power factor 0.75 to 0.8)

50 operation

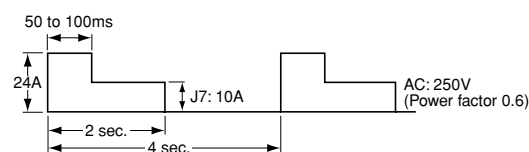
Endurance test AJ7: 10A 250V AC (Power factor 0.75 to 0.8)

6×10³ operation

After testing, temperature rise of terminals should be less than 30°C and no abnormality should be observed in characteristics.

2. Outline of EN61058-1 test

After switching 5×10^3 times on the below load condition at both 85⁺⁵°C and 25±10°C, temperature rise of terminals should be less than 55°C and no abnormality should be observed in characteristics.



AJ7 (J7)

INTRODUCTION TO 4P CONNECTORS FOR THE AJ7 SWITCH (produced by Nippon Tanshi co., Ltd)



Suitable switches: AJ7 switch, .187 Quick-connect terminal

(Note: Terminal guard long type switches are not suitable for this connector.)

Housing

Product number: 4120-4204

Receptacle

Product number: 171901-M2

Notes) This AJ7 switch connector is not available from Matsushita Electric Works. Contact us for further details on this connector.

AJ8 switch standard actuator



AJ8 switch Wide actuator



RoHS Directive compatibility information
<http://www.nais-e.com/>

FEATURES

1. Power rocker switches for safety requirements.

- All versions comply with ClassII EN61058-1 insulation grade. Insulation distance: 8mm Min. Contact gap: 3mm Min.
- International Standard-approved status

		Already approved
AJ8 switch	Standard actuator type	UL, CSA, VDE, TÜV, ÖVE, KEMA, SEMKO, NEMKO, DEMKO, FIMKO, SEV
	Wide actuator type	UL, CSA, VDE, TÜV, SEMKO, NEMKO, DEMKO, FIMKO, SEV, KEMA, ÖVE

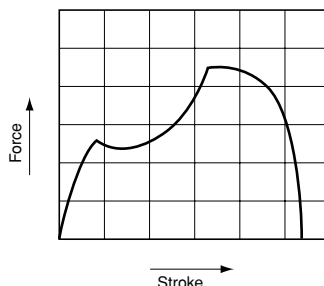
2. High inrush current resistance is ideal for office automation equipment.

Type	Inrush	Contact rating	Expected life
AJ8	160A	16A 250V AC	Min.10 ⁴

3. Operation that only requires a light touch

The best operation characteristics were sought by analyzing touch data gathered by monitoring 1,500 people.

- Power Rocker Switch touch curve



4. A broad product line

The AJ8 switches are available with five different types of terminals: quick-connect terminals, soldering terminals, PC board terminals, right angle terminals and left angle terminals.

5. Eight standard actuator colors

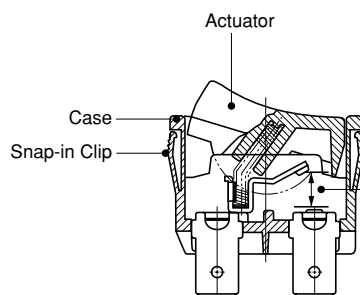
White, black, red, dark gray, light gray, blue, green, yellow

6. Cadmium-free contact compatibility.

PRECAUTIONS WHEN USING CADMIUM-FREE CONTACT TYPE

Models with cadmium-free contacts have been introduced in order to reduce environmentally harmful substances. ("F" is affixed to the end of the part number.) We ask customers who are currently using products with cadmium-containing contacts (no "F" at the end of the part number) to please make the switch to models with cadmium-free contacts. When switching, operating life may differ depending on the load. Please be sure to verify this by conducting an evaluation using actual equipment.

CONSTRUCTION



Contact gap (more than 3mm)

The EN60950 (intended for office automation equipment) conforms with a 3mm gap. When directly opening or closing the primary power supply side, a contact gap of at least 3mm is required in order to ensure safety.

AJ8 (J8)

ORDERING INFORMATION

AJ

8

F

8: AJ8 switch

Nil: Standard actuator
W: Wide actuator

Number of poles and Operation
1: 1-pole, single throw (ON-OFF)
2: 2-pole, single throw (ON-OFF)

Terminal shape
0: .250 Quick-connect terminal
1: Soldering terminal
2: PC board terminal
3: PC board right angle terminal (for standard actuator only)
4: PC board left angle terminal (for standard actuator only)

Actuator indication
0: No indication
1: indication
2: indication

Actuator color
W: White B: Black R: Red Z: Dark gray H: Light gray L: Blue G: Green Y: Yellow

Flange color
Nil: Black (standard color)
(Custom ordered color: W: White, R: Red, Z: Dark gray, H: Light gray, L: Blue, G: Green, Y: Yellow) Remark 1)

Insulation guard
Nil: Short guard type
T: Long guard type (.250 Quick-connect terminal and soldering terminal of standard actuator only)

F: Cadmium-free product

Remarks: 1. Please consult us for details concerning different flange colors.
2. "I O" is engraved on all flanges.
3. The color of indication on the actuator:
• White actuator: black
• Others: white

PRODUCT TYPES

1. Standard actuator type

(1) Without indication on actuators

Terminal shape	Poles	Operating types	Part No.
			Without indication
.250 Quick-connect terminal	1-pole	ON-OFF	AJ8100*F
	2-pole		AJ8200*F
Soldering terminal	1-pole		AJ8110*F
	2-pole		AJ8210*F
PC board terminal	1-pole		AJ8120*F
	2-pole		AJ8220*F
PC board right angle terminal	1-pole		AJ8130*F
	2-pole		AJ8230*F
PC board left angle terminal	1-pole		AJ8140*F
	2-pole		AJ8240*F

Remarks: 1. A letter indicating the actuator color is entered in place of asterisk. (W: White, B: Black, R: Red, Z: Dark gray, H: Light gray, L: Blue, G: Green, and Y: Yellow). Standard flange color is black. For other colors type, they are custom ordered. For requests of other flange color, please enter the following letter before the "F" in the part number. (W: White, R: Red, Z: Dark gray, H: Light gray, L: Blue, G: Green and Y: Yellow)

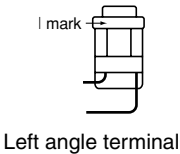
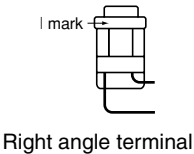
2. Long guard type is available for .250 Quick-connect terminal and soldering terminal type. When ordering, please add a "T" before the "F" at the end of the part number.

3. The color of indication on the actuator:

- For white actuator: black
- For others: white

4. They come with a stamp indicating international standards without your request.

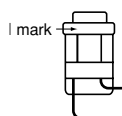
5. Note that the position of the I mark on the flange is used as a reference for left angle and right angle terminals as shown in the diagram below.



(2) With indication on actuators

Terminal shape	Poles	Operating types	Part No.	
			With I ○ indication	With — ○ indication
.250 Quick-connect terminal	1-pole	ON-OFF	AJ8101*F	AJ8102*F
	2-pole		AJ8201*F	AJ8202*F
Soldering terminal	1-pole		AJ8111*F	AJ8112*F
	2-pole		AJ8211*F	AJ8212*F
PC board terminal	1-pole		AJ8121*F	AJ8122*F
	2-pole		AJ8221*F	AJ8222*F
PC board right angle terminal	1-pole		AJ8131*F	AJ8132*F
	2-pole		AJ8231*F	AJ8232*F
PC board left angle terminal	1-pole		AJ8141*F	AJ8142*F
	2-pole		AJ8241*F	AJ8242*F

- Remarks: 1. A letter indicating the actuator color is entered in place of asterisk. (W: White, B: Black, R: Red, Z: Dark gray, H: Light gray, L: Blue, G: Green, and Y: Yellow). Standard flange color is black. For other colors type, they are custom ordered. For requests of other flange color, please enter the following letter before the "F" in the part number. (W: White, R: Red, Z: Dark gray, H: Light gray, L: Blue, G: Green and Y: Yellow)
2. Long guard type is available for .250 Quick-connect terminal and soldering terminal type. When ordering, please add a "T" before the "F" at the end of the part number.
3. The color of indication on the actuator:
- For white actuator: black
 - For others: white
4. They come with a stamp indicating international standards without your request.
5. Note that the position of the I mark on the flange is used as a reference for left angle and right angle terminals as shown in the diagram below.



Right angle terminal



Left angle terminal

2. Wide actuator type

(1) Without indication on actuators

Terminal shape	Poles	Operating types	Part No.	
			Without indication	
.250 Quick-connect terminal	1-pole	ON-OFF	AJ8W100*F	
	2-pole		AJ8W200*F	
Soldering terminal	1-pole		AJ8W110*F	
	2-pole		AJ8W210*F	
PC board terminal	1-pole		AJ8W120*F	
	2-pole		AJ8W220*F	

(2) With indication on actuators

Terminal shape	Poles	Operating types	Part No.	
			With I ○ indication	With — ○ indication
.250 Quick-connect terminal	1-pole	ON-OFF	AJ8W101*F	AJ8W102*F
	2-pole		AJ8W201*F	AJ8W202*F
Soldering terminal	1-pole		AJ8W111*F	AJ8W112*F
	2-pole		AJ8W211*F	AJ8W212*F
PC board terminal	1-pole		AJ8W121*F	AJ8W122*F
	2-pole		AJ8W221*F	AJ8W222*F

- Remarks: 1. A letter indicating the actuator color is entered in place of asterisk. (W: White, B: Black, R: Red, Z: Dark gray, H: Light gray, L: Blue, G: Green, and Y: Yellow). Standard flange color is black. For other colors type, they are custom ordered. For requests of other flange color, please enter the following letter before the "F" in the part number. (W: White, R: Red, Z: Dark gray, H: Light gray, L: Blue, G: Green and Y: Yellow)
2. The color of indication on the actuator:
- For white actuator: black
 - For others: white
3. They come with a stamp indicating international standards without your request.

SPECIFICATIONS

1. Contact rating

Type	Voltage	Resistive load ($\cos \phi \approx 1.0$)	Motor load (EN61058-1) ($\cos \phi \approx 0.6$)
AJ8 switch	250V AC	16A	4A

Remark: The motor load is in accordance with EN61058-1. Inrush current can be switched up to the value of 6 times the indicated rating.

AJ8 (J8)

2. Characteristics

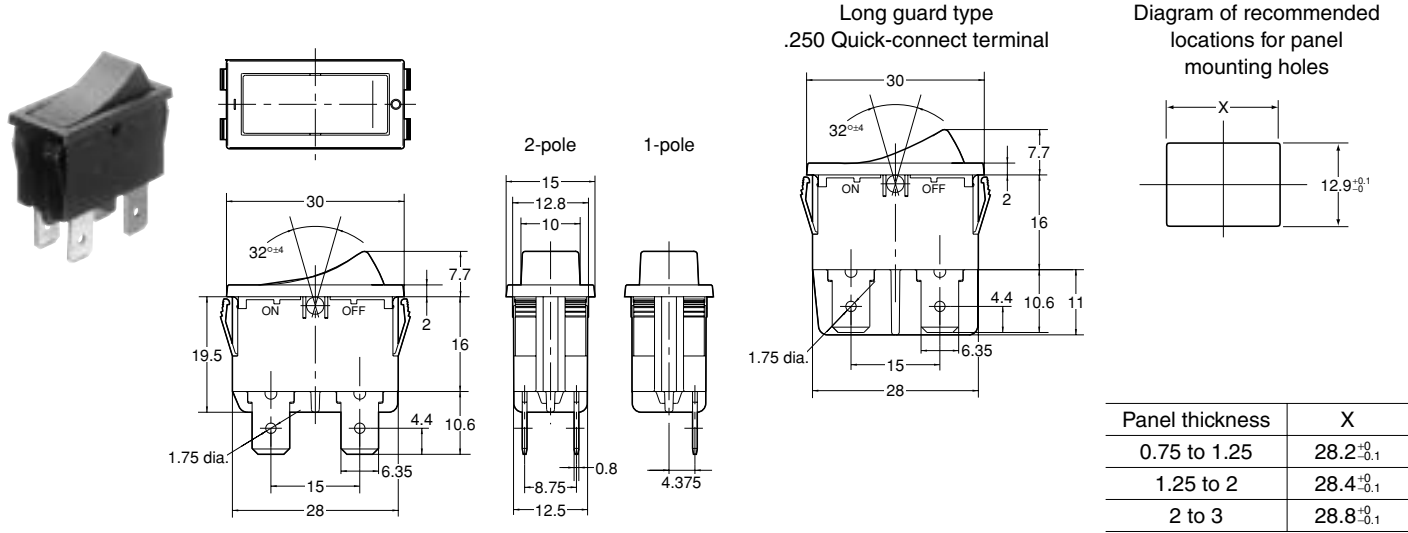
Expected life (Min. operations)	Mechanical	Min. 5×10^4 (at 20 cpm.)
	Electrical	Min. 10^4 (at 7 cpm., at rated load)
Initial insulation resistance (Between terminals)		Min. 100 MΩ (at 500V DC measured by insulation resistive meter)
Initial breakdown voltage (Between terminals)		2,000 Vrms detection current: 10 mA
Initial contact resistance (By voltage drop at 1A, 2 to 4V DC)		Max. 100mΩ
Temperature rise	at 6×10^3 ope. or less	Max. 30°C (UL1054)
	from 6×10^3 ope. to 10^4	Max. 55°C (EN61058-1)
Vibration resistance		10 to 55 Hz at double amplitude of 1.5mm
Shock resistance		Min. 490m/s ² {50 G}
Actuator strength		40 N {4.08kgf} for 1 minute (operating direction)
Terminal strength (.250 Quick-connect terminal)		100 N {10.2kgf} for 1 minute or more (Pull & push direction)
Ambient temperature		-25°C to +85°C (Not freezing below 0°C)
Flame retardancy		UL94V-0
Tracking resistance		Min. 175
Operating force (reference characteristics)	1-pole	2.45 ± 1.47 N {0.25 ±0.15kgf}
	2-pole	4.5 ± 2.5 N {0.46 ±0.25kgf}
Contact material		AgSnO ₂ alloy

Remark: Test conditions are in accordance with EN61058-1, UL1054 and JIS C 6571.

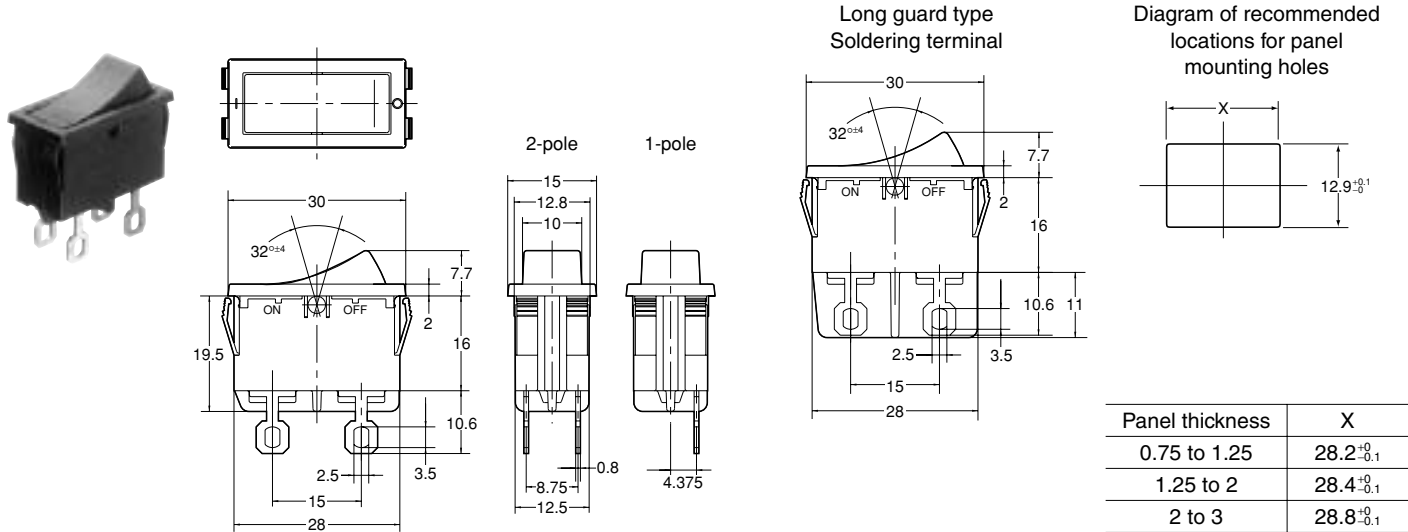
DIMENSIONS

mm General tolerance: ±0.5

1. .250 Quick-connect terminal/Short guard type

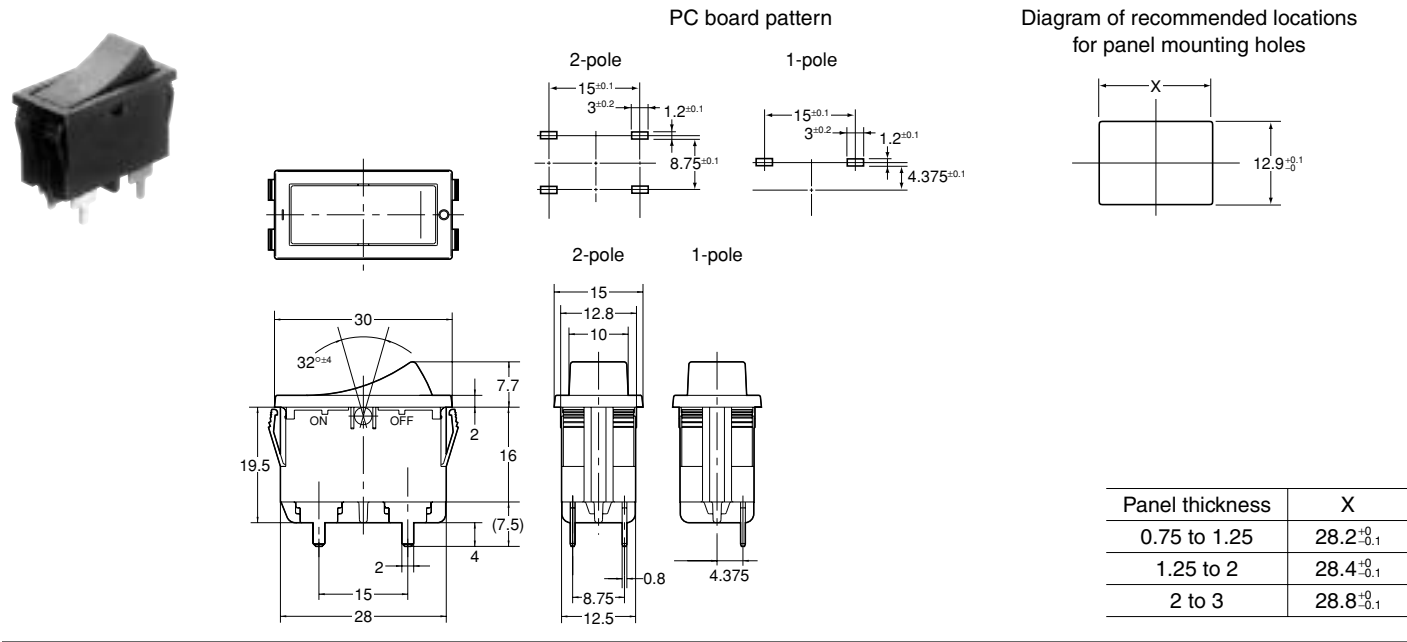


2. Soldering terminal

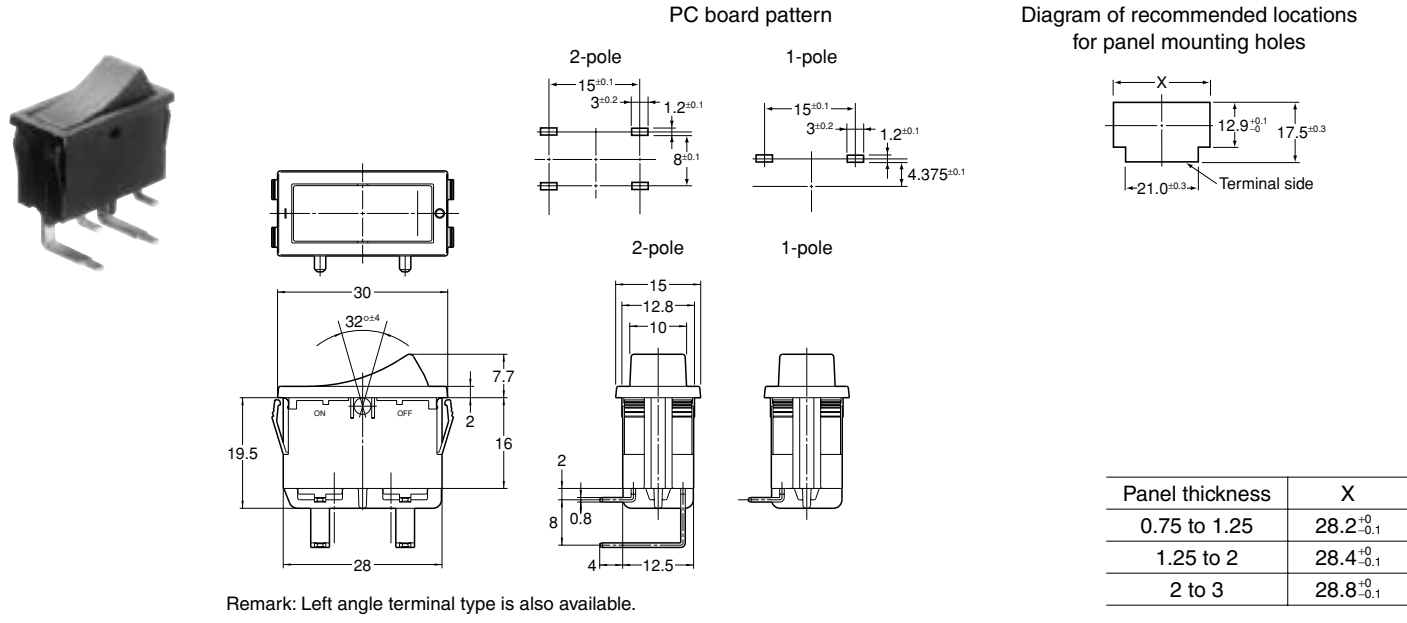


3. PC board terminal

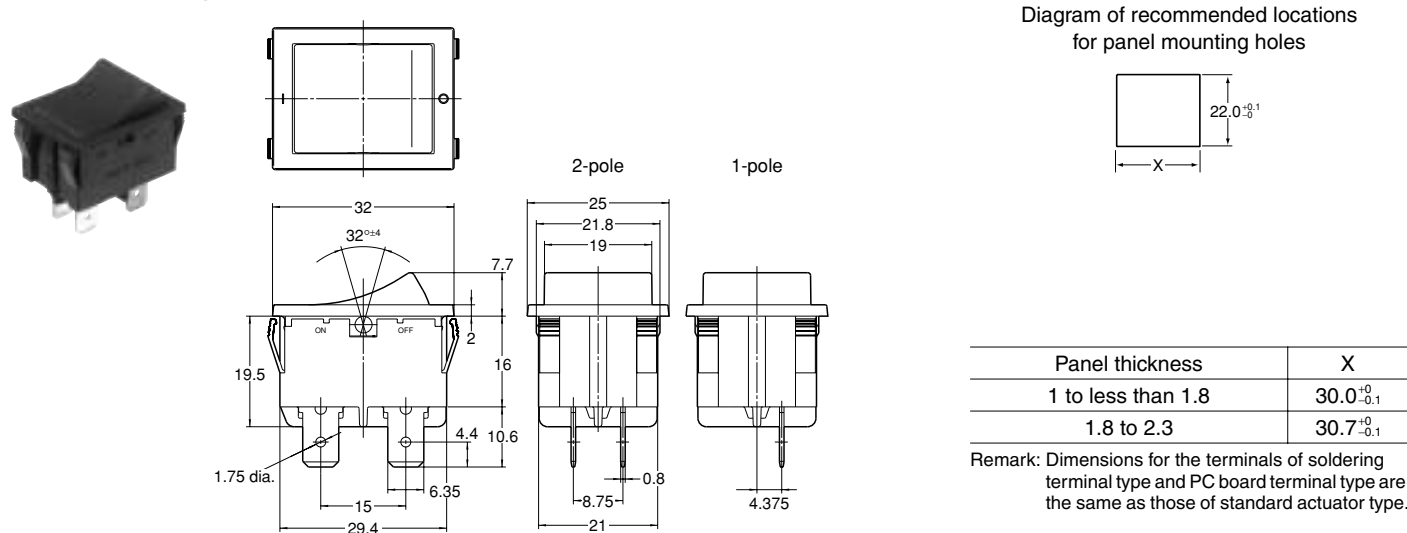
mm General tolerance: ± 0.5



4. PC board right angle terminal



5. Wide actuator type



AJ8 (J8)

NOTES

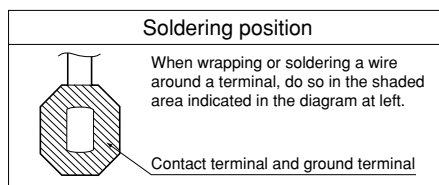
1. Switch mounting

Mount the switch with the hole cutting dimensions shown in the dimensions. Contact us if you are considering using a panel of other than the recommended size and shape.

2. Regarding fastening lead wires to terminals

1) When connecting the tab terminals, use a .250 Quick-connect and insert the terminals straight in. If they are skewed, the terminals will require excessive insertion force. In addition, there is some variation in the insertion force required for different receptacles from different manufacturers, so confirm how much force is needed under actual conditions. Do not solder wires onto tab terminals.
2) With manual soldering: Complete the soldering connection work within 3 seconds with the tip of the soldering iron (60W soldering iron) at a temperature of 420°C or lower, and take care not to apply any force to the terminal area.

Avoid touching the switch with soldering iron.



Refer to the diagram above, "soldering position," for details on the position where a wire should be soldered to a terminal. When soldering PC board terminals, keep soldering time to within 5 s at 270°C soldering bath or within 3 s at 350°C soldering bath.

3) The terminals should be connected in such a way that they are not under constant stress from the connecting wires.

4) Terminal material is copper alloy which may discolor due to finger's oil or after a long time. But that discoloration does not effect actual performance.

3. Resistance to chemicals

To clean the switch unit, use a neutral detergent diluted with water. Do not use acidic or alkaline solvents as they may damage the switch. Furthermore, be careful not to get any of the detergent solution inside of the switch while cleaning it.

4. Environment

Avoid using and storing these switches in a location where they will be exposed to corrosive gases, silicon, or high dust levels, all of which can have an adverse effect on the contacts.

5. Take care not to drop the product as it may impair performance.

REFERENCE

1. Outline of UL1054 test

Overload test AJ8: 20A 250V AC

(Power factor 0.75 to 0.8)

50 operation

Endurance test AJ8: 16A 250V AC

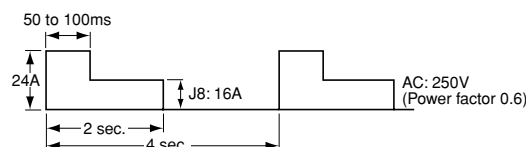
(Power factor 0.75 to 0.8)

6×10³ operation

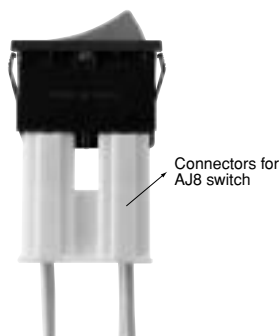
After testing, temperature rise of terminals should be less than 30°C and no abnormality should be observed in characteristics.

2. Outline of EN61058-1 test

After switching 5×10^3 times on the above load condition at both 85⁺⁵/₀°C and 25±10°C, temperature rise of terminals should be less than 55°C and no abnormality should be observed in characteristics.



INTRODUCTION TO 4P CONNECTORS FOR THE AJ8 SWITCH (produced by Nippon Tanshi co.,Ltd)



Notes) This AJ8 switch connector is not available from Matsushita Electric Works. Contact us for further details on this connector.

Suitable switches: AJ8 switch, .250 Quick-connect terminal

(Note: Terminal guard long type switches are not suitable for this connector.)

Housing

Product number: N1620-4204

Receptacle

Product number: 17168-2 (post-plated product for fine wires)

17168-M2 (material plated product for fine wires)

172131-M2 (for thick wires)

AJ9 switch snap-in mounting type



AJ9 switch screw mounting type



FEATURES

1. Power rocker switches for safety requirements.

- All versions comply with ClassII EN61058-1 insulation grade.

Insulation distance: 8mm Min.

Contact gap: 3mm Min.

• International Standard-approved status

	Already approved
AJ9 switch	UL, CSA, VDE, SEMKO

2. High inrush current resistance is ideal for office automation equipment.

Type	Inrush	Contact rating	Expected life
AJ9	100A	16A 250V AC	Min. 10 ⁴

3. Eight standard actuator colors

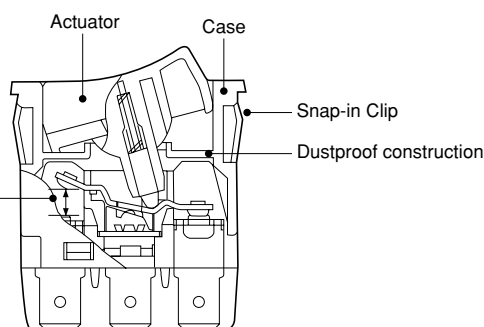
White, black, red, dark gray, light gray, blue, green, yellow

PRECAUTIONS WHEN USING CADMIUM-FREE CONTACT TYPE

Models with cadmium-free contacts have been introduced in order to reduce environmentally harmful substances. ("F" is affixed to the end of the part number.) We ask customers who are currently using products with cadmium-containing contacts (no "F" at the end of the part number) to please make the switch to models with cadmium-free contacts. When switching, operating life may differ depending on the load. Please be sure to verify this by conducting an evaluation using actual equipment.

RoHS Directive compatibility information
<http://www.nais-e.com/>

CONSTRUCTION



Contact gap (more than 3mm)

The EN60950 (intended for office automation equipment) conforms with a 3mm gap. When directly opening or closing the primary power supply side, a contact gap of at least 3mm is required in order to ensure safety.

ORDERING INFORMATION

AJ

9

F

9: AJ9 switch

Poles

1: 1-pole 2: 2-pole

Mounting type

1: Snap-in mounting (16A)

2: Screw mounting (16A)

Operating type

0: ON-OFF 1: ON-ON

Terminal shape

0: .250 Quick-connect terminal

1: Soldering compatible with .250 Quick-connect terminal

2: PC board terminal

Actuator indication

0: No indication

1:

I

O

 indication

2:

—

O

 indication

Actuator color Remark 2)

W: White B: Black R: Red Z: Dark gray H: Light gray L: Blue G: Green Y: Yellow

Flang color

Nil: Black (standard color)

(Custom ordered color: W: White, R: Red, Z: Dark gray, H: Light gray, L: Blue, G: Green, Y: Yellow) Remark 1)

Approved standard

3: UL, CSA, VDE, SEMKO

9: UL, CSA Remark 3)

F: Cadmium-free product

Remarks: 1. Please consult us for details concerning different flange colors.
2. The color of "I O" indication on the actuator:
• White actuator: black
• Others: white
3. The ON-OFF type with no indications on the actuator have received UL and CSA certifications.

PRODUCT TYPES

1. Snap-in mounting type

(1) Without indication on actuators

Terminal shape	Poles	Operating types	Part number (Without indication)
.250 Quick-connect terminal	1-pole	ON-OFF	AJ911000*9F
		ON-ON	AJ911100*3F
	2-pole	ON-OFF	AJ921000*9F
		ON-ON	AJ921100*3F
Soldering compatible with .250 Quick-connect terminal	1-pole	ON-OFF	AJ911010*9F
		ON-ON	AJ911110*3F
	2-pole	ON-OFF	AJ921010*9F
		ON-ON	AJ921110*3F
PC board terminal	1-pole	ON-OFF	AJ911020*9F
		ON-ON	AJ911120*3F
	2-pole	ON-OFF	AJ921020*9F
		ON-ON	AJ921120*3F

(Standard flange color is black. For other colors type, they are custom ordered.)
Remarks: 1. A letter indicating the actuator color is entered in place of * symbol. (W: White B: Black R: Red Z: Dark gray H: Light gray L: Blue G: Green Y: Yellow)
For requests of other flange color, please suffix following letter. (W: White R: Red Z: Dark gray H: Light gray L: Blue G: Green Y: Yellow)
2. The color of "I O" indication on the actuator:
White actuator: black, Others: white
3. The ON-OFF type with no indications on the actuator have received UL and CSA certifications.
All other types come with a stamp indicating international standards without your request.

(2) With indication on actuators

Terminal shape	Poles	Operating types	Part No. (With I ○ indication)	Part No. (With — ○ indication)
.250 Quick-connect terminal	1-pole	ON-OFF	AJ911001*3F	AJ911002*3F
		ON-ON	AJ911101*3F	AJ911102*3F
	2-pole	ON-OFF	AJ921001*3F	AJ921002*3F
		ON-ON	AJ921101*3F	AJ921102*3F
Soldering compatible with .250 Quick-connect terminal	1-pole	ON-OFF	AJ911011*3F	AJ911012*3F
		ON-ON	AJ911111*3F	AJ911112*3F
	2-pole	ON-OFF	AJ921011*3F	AJ921012*3F
		ON-ON	AJ921111*3F	AJ921112*3F
PC board terminal	1-pole	ON-OFF	AJ911021*3F	AJ911022*3F
		ON-ON	AJ911121*3F	AJ911122*3F
	2-pole	ON-OFF	AJ921021*3F	AJ921022*3F
		ON-ON	AJ921121*3F	AJ921122*3F

(Standard flange color is black. For other colors type, they are custom ordered.)

Remarks: 1. A letter indicating the actuator color is entered in place of * symbol. (W: White B: Black R: Red Z: Dark gray H: Light gray L: Blue G: Green Y: Yellow)

For requests of other flange color, please suffix following letter. (W: White R: Red Z: Dark gray H: Light gray L: Blue G: Green Y: Yellow)

2. The color of I ○ indication on the actuator:

White actuator: black, Others: white

3. The ON-OFF type with no indications on the actuator have received UL and CSA certifications.

All other types come with a stamp indicating international standards without your request.

2. Screw mounting type

(1) Without indication on actuators

Terminal shape	Poles	Operating types	Part number (Without indication)
.250 Quick-connect terminal	1-pole	ON-OFF	AJ912000*9F
		ON-ON	AJ912100*3F
	2-pole	ON-OFF	AJ922000*9F
		ON-ON	AJ922100*3F
Soldering compatible with .250 Quick-connect terminal	1-pole	ON-OFF	AJ912010*9F
		ON-ON	AJ912110*3F
	2-pole	ON-OFF	AJ922010*9F
		ON-ON	AJ922110*3F
PC board terminal	1-pole	ON-OFF	AJ912020*9F
		ON-ON	AJ912120*3F
	2-pole	ON-OFF	AJ922020*9F
		ON-ON	AJ922120*3F

(2) With indication on actuators

Terminal shape	Poles	Operating types	Part No. (With I ○ indication)	Part No. (With — ○ indication)
.250 Quick-connect terminal	1-pole	ON-OFF	AJ912001*3F	AJ912002*3F
		ON-ON	AJ912101*3F	AJ912102*3F
	2-pole	ON-OFF	AJ922001*3F	AJ922002*3F
		ON-ON	AJ922101*3F	AJ922102*3F
Soldering compatible with .250 Quick-connect terminal	1-pole	ON-OFF	AJ912011*3F	AJ912012*3F
		ON-ON	AJ912111*3F	AJ912112*3F
	2-pole	ON-OFF	AJ922011*3F	AJ922012*3F
		ON-ON	AJ922111*3F	AJ922112*3F
PC board terminal	1-pole	ON-OFF	AJ912021*3F	AJ912022*3F
		ON-ON	AJ912121*3F	AJ912122*3F
	2-pole	ON-OFF	AJ922021*3F	AJ922022*3F
		ON-ON	AJ922121*3F	AJ922122*3F

Remarks: 1. A letter indicating the actuator color is entered in place of * symbol. (W: White B: Black R: Red Z: Dark gray H: Light gray L: Blue G: Green Y: Yellow)

2. The color of I ○ indication on the actuator:

White actuator: black, Others: white

3. The ON-OFF type with no indications on the actuator have received UL and CSA certifications.

All other types come with a stamp indicating international standards without your request.

AJ9 (J9)

SPECIFICATIONS

1. Contact rating

Type	Voltage	Resistive load (cos ϕ ≒ 1.0)	Motor load (EN61058-1) (cos ϕ ≒ 0.6)
AJ9 switch	250V AC	16A	4A

Remark: The motor load is in accordance with EN61058-1. Inrush current can be switched up to the value of 6 times the indicated rating.

2. Characteristics

Expected life (Min. operations)	Mechanical	Min. 5 × 10 ⁴ (at 20 cpm.)
	Electrical	Min. 10 ⁴ (at 10 cpm., at rated load)
Initial insulation resistance (Between terminals)		Min. 100 MΩ (at 500V DC measured by insulation resistive meter)
Initial breakdown voltage (Between terminals)		2,000 Vrms detection current: 10 mA
Initial contact resistance (By voltage drop at 1A, 2 to 4V DC)		Max. 20mΩ
Temperature rise	at 6 × 10 ³ ope. or less	Max. 30°C (UL1054)
	from 6 × 10 ³ ope. to 10 ⁴	Max. 55°C (EN61058-1)
Vibration resistance		10 to 55 Hz at double amplitude of 1.5mm
Shock resistance		Min. 294m/s ² {30 G}
Actuator strength		40 N {4.08kgf} for 1 minute (operating direction)
Tensile terminal strength		100 N {10.2kgf} for 1 minute or more (Pull & push direction)
Ambient temperature		−25°C to +85°C (Not freezing below 0°C)
Flame retardancy		UL94V-0
Tracking resistance		Min. 175
Operating force (reference characteristics)	1-pole	3.92 ± 1.96N {400 ±200gf}
	2-pole	5.88 ± 24.5N {600 ±250gf}
Contact material		AgZnO alloy

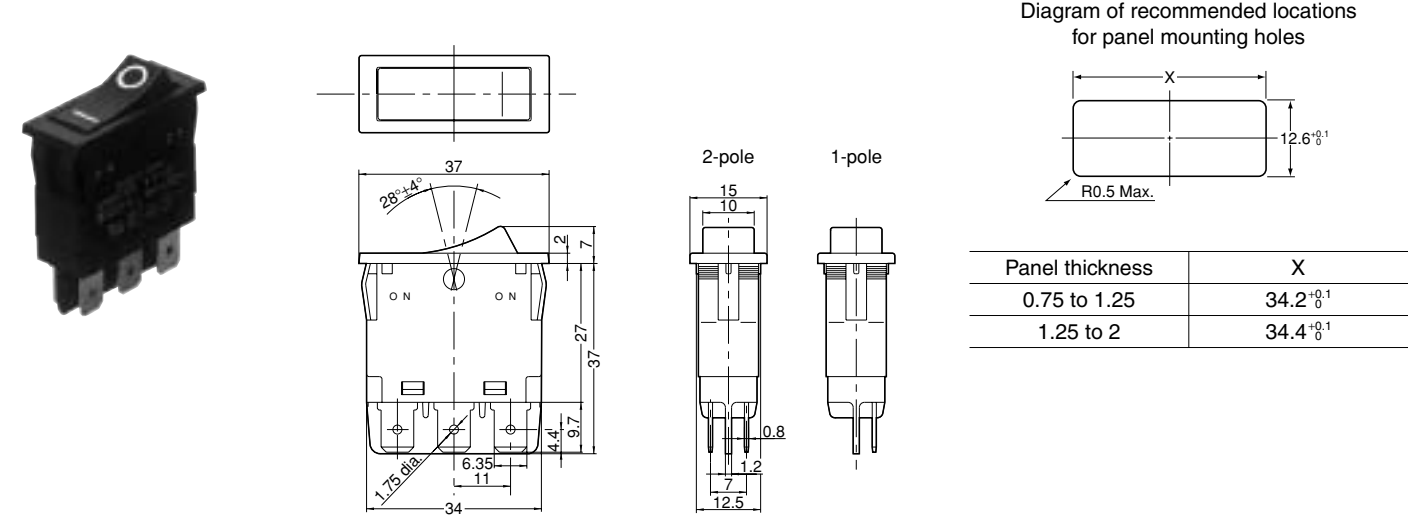
Remark: Test conditions are in accordance with EN61058-1, UL1054 and JIS C 6571.

DIMENSIONS

mm General tolerance: ±0.5

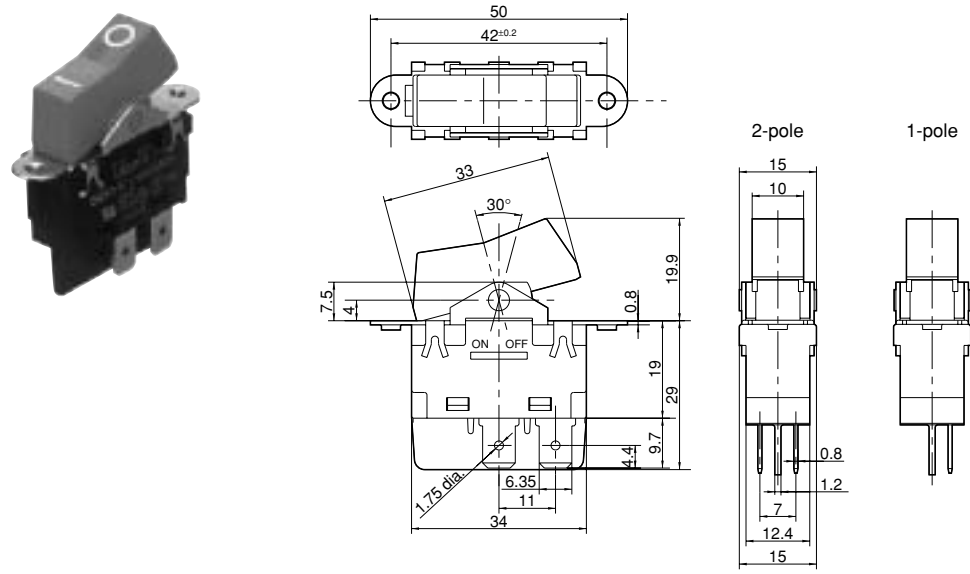
1) .250 Quick-connect terminal

1. Snap-in mounting type



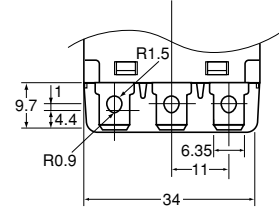
Remark: For soldering compatible with .250 Quick-connect terminal and PC board terminal, only terminal shape is changed.

2. Screw mounting type



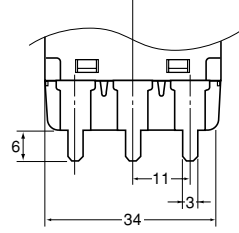
Remark: For soldering compatible with .250 Quick-connect terminal and PC board terminal, only terminal shape is changed.

2) Soldering compatible with .250 Quick-connect terminal

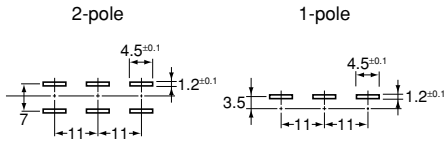


Remark: Dimensions other than listed above are same as those of .250 Quick-connect terminal.

3) PC board terminal



PC board pattern (ON-ON)



Remark: Dimensions other than listed above are same as those of .250 Quick-connect terminal.

NOTES

1. Switch mounting

Mount the switch with the recommended panel mounting hole dimensions shown in the dimensions.

Contact us if you are considering using a panel of other than the recommended size and shape.

2. Regarding fastening lead wires to terminals

1) When connecting the tab terminals, use a .250 Quick-connect and insert the terminals straight in. If they are skewed, the terminals will require excessive insertion force. In addition, there is some variation in the insertion force required for different receptacles from different manufacturers, so confirm how much force is needed

under actual conditions.
Do not solder wires onto tab terminals.
2) With manual soldering: Complete the soldering connection work within 3 seconds with the tip of the soldering iron (60W soldering iron) at a temperature of 420°C or lower, and take care not to apply any force to the terminal area. Avoid touching the switch with soldering iron.
3) The terminals should be connected in such a way that they are not under constant stress from the connecting wires.
4) Terminal material is copper alloy which may discolor due to finger's oil or after a long time. But that discoloration does not effect actual performance.

3. Resistance to chemicals

To clean the switch unit, use a neutral detergent diluted with water. Do not use acidic or alkaline solvents as they may damage the switch. Furthermore, be careful not to get any of the detergent solution inside of the switch while cleaning it.

4. Environment

Avoid using and storing these switches in a location where they will be exposed to corrosive gases, silicon, or high dust levels, all of which can have an adverse effect on the contacts.

5. Take care not to drop the product as it may impair performance.

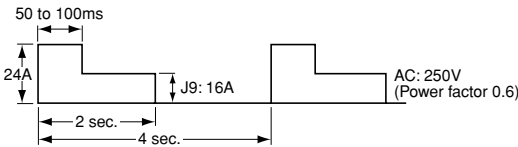
REFERENCE

1. Outline of UL1054 test

Overload test AJ9: 20A 250V AC
(Power factor 0.75 to 0.8)
50 operation
Endurance test AJ9: 16A 250V AC
(Power factor 0.75 to 0.8)
6×10³ operation
After testing, temperature rise of terminals should be less than 30°C and no abnormality should be observed in characteristics.

2. Outline of EN61058-1 test

After switching 5×10^3 times on the above load condition at both $85^{+5}_{-0}^{\circ}\text{C}$ and $25 \pm 10^{\circ}\text{C}$, temperature rise of terminals should be less than 55°C and no abnormality should be observed in characteristics.



FOREIGN SPECIFICATIONS OVERVIEW

1. International Standards

IEC standard

International Electrotechnical Commission

By promoting international cooperation toward all problems and related issues regarding standardization in the electrical and electronic technology fields, the IEC, a non-governmental organization, was started in October, 1908, for the purpose of realizing mutual understanding on an international level. To this end, the IEC standard was enacted for the purpose of promoting international standardization.

2. North America

UL (Underwriters Laboratories Inc.)

This is a non-profit testing organization formed in 1894 by a coalition of U.S. fire insurance firms, which tests and approves industrial products (finished products). When electrical products are marketed in the U.S., UL approval is mandated in many states, by state law and city ordinances. In order to obtain UL approval, the principal parts contained in industrial products must also be UL-approved parts.

UL approval is divided into two general types. One is called "listing" (Fig. 1), and applies to industrial products (finished products). Under this type of approval, products must be approved unconditionally. The other type is called "recognition" (Fig. 2), and is a conditional approval which applies to parts and materials.

LISTING MARK



Fig. 1

RECOGNITION MARK



Fig. 2

Certification



Fig. 3

Component Acceptance



Fig. 4



Fig. 5



Fig. 6

CSA (Canadian Standards Association)

This was established in 1919 as a non-profit, non-governmental organization aimed at promoting standards. It sets standards for industrial products, parts, and materials, and has the authority to judge electrical products to determine whether they conform to those standards. The CSA is the ultimate authority in the eyes of both the government and the people in terms of credibility and respect. Almost all states and provinces in Canada require CSA approval by law, in order to sell electrical products. As a result, electrical products exported from Japan to Canada are not approved under Canadian laws unless they have received CSA approval and display the CSA mark. Approval is called "certification", and products and parts which have been approved are called "certified equipment", and display the mark shown in Fig. 3. The mark shown in Fig. 4 is called the "Component Acceptance" mark, and indicates conditional approval which is applicable to parts. The C-UL mark shown in Fig. 5 (finished products) and Fig. 6 (parts) indicates that the product has been tested and approved in UL laboratories, based on UL and CSA standards, through mutual approval activities.

3. Europe

EN standard

European Standards/Norme Europeennee (France)/Europaishe Norm (Germany)

Abbreviation for European Standards. A unified standard enacted by CEN/CENELEC (European Standards Committee/European Electrical Standards Committee). EU and EFTA member nations employ the content of the EN standards into their own national standards and are obligated to abolish those national standards that do not agree with the EN standards.

(1) Germany



VDE (Verband Deutscher Elektrotechniker)

The VDE laboratory was established mainly by the German Electric Technology Alliance, which was formed in 1893. It carries out safety experiments and passes approval for electrical devices and parts. Although VDE certification is not enforced under German law, punishment is severe should electrical shock or fire occur; therefore, it is, in fact, like an enforcement.



TÜV (Technischer Überwachungs-Verein)

TÜV is a civilian, non-profit, independent organization that has its roots in the German Boiler Surveillance Association, which was started in 1875 for the purpose of preventing boiler accidents. A major characteristic of TÜV is that it exists as a combination of 14 independent organizations (TÜV Rheinland, TÜV Bayern, etc.) throughout Germany. TÜV carries out inspection on a wide variety of industrial devices and equipment, and has been entrusted to handle electrical products, as well, by the government. TÜV inspection and certification is based mainly on the VDE standard. TÜV certification can be obtained from any of the 14 TÜVs throughout Germany and has the same effectiveness as obtaining VDE certification.

(2) England



BSI (British Standards Institution)

BSI was inaugurated in 1931 as an institution for issuing standards of measure, inspection and certifying industrial products. In England the inspection of electrical goods is arbitrary and certified goods can carry the BSI designated certification label.



BEAB (British Electrotechnical Approvals Board for Household Equipment)

BEAB is a non-profit organization established in 1960. Intended for electrical household goods that use regular power supplies and for some control components, BEAB is an acknowledged standard that is based on testing using the BS standard.

(3) Denmark



DEMCO (Danmarks elektriske materielkontrol)

DEMCO was established for the safety of certain electrical goods and is based on the 1962 "Heavy Current Regulations" (Part B Appendix 601) that stipulates enforced testing and approval.

STANDARDS CHART

With more and more electrical devices and machines being exported overseas, most of the control devices incorporated into those devices and machines now meet international standards. We are is in the process of achieving international standards certification for all of our products. The table below indicates which products have already been certified, for quick reference.

- Notes) 1. Some items in a product group may not meet certification requirements in some cases.
2. Standard products are Lloyd certified.
3. Operation switches are certified based on their product numbers.

Product name		UL (Recognized)		CSA (Certified)		VDE (Certified)		SEMKO (Certified)		Remarks
		File No.	Rating (Recognized)	File No.	Rating (Certified)	File No.	Rating (Certified)	File No.	Rating	
Turquoise snap switches (AJN1/2)		E35901	0.1A 30V AC/DC 50mA 48V AC/DC	LR23413	0.1A 30V AC/DC 50mA 48V AC/DC	—	—	—	—	
AJ1 (J1)Toggle and Rocker switches		E35901	7A 125V AC 4A 250V AC	LR23413	7A 125V AC 4A 250V AC	—	—	—	—	
AJ2 (J2) Toggle and Rocker switches		E35901	1-pole and 2-pole: 6A 125V AC 3A 250V AC 4-pole: 4A 125V AC 2A 250V AC	LR23413	1-pole and 2-pole: 6A 125V AC 3A 250V AC 4-pole: 4A 125V AC 2A 250V AC	—	—	—	—	Lever lock and waterproof panel types are not certified.
T-15 series 15A High snap switches		E35901	15A 250V AC (For pushbutton and alternate: 10A 250 V AC)	C-UL certified	15A 250V AC (For pushbutton and alternate: 10A 250 V AC)	—	—	—	—	
T-10 series 10A High snap switches		E35901	10A 250V AC	C-UL certified	10A 250V AC 15A 125V AC	—	—	—	—	
Tumbler switches (WD2)		E35901	10A 250V AC	C-UL certified	10A 250V AC	—	—	—	—	
Rocker switches (WD3)		E35901	10A 250V AC	C-UL certified	10A 250V AC	—	—	—	—	
AJ8 switches with trip function upgraded type		E35901	16A 125V AC 8A 277V AC	LR23413	16A 125V AC 8A 277V AC (C-UL certified)	—	(TÜV certified)	408192	10(4)A 250V~(T85)	
Power rocker switches	AJ7 (J7) switches	E35901	10A 277V AC	LR23413	10A 277V AC	40003633	10(4)A 250V~(T85)	311326	10(4)A 250V~(T85)	
	AJ8 (J8) switches	E35901	16A 277V AC	LR23413	16A 277V AC	106364	16(4)A 250V~(T85)	408192	16(4)A 250V~(T85)	
	AJ9 (J9) switches	E35901	16A 250V AC	LR23413	16A 250V AC	114252	16(4)A 250V~(T85)	9431033	16(4)A 250V~(T85)	
										The end of part numbers of the ON-OFF type that are VDE and SEMKO certified only have "01".

Note) AJ7 (J7), AJ8 (J8) and AJ8 switches with trip function upgraded type power rocker switches come standard with simultaneous marking for overseas standard certification.

Product name		UL (Recognized)		CSA (Certified)		TÜV (Certified)		Remarks
		File No.	Rating (Recognized)	File No.	Rating (Certified)	File No.	Rating (Certified)	
ND series operation switches	Mounting hole 16 dia. type	E43149	For switch block: (Gold-clad) 125V AC 0.1A (Res.) 30V DC 0.1A (Gen.) (Silver contact) 125V AC 3A (Res.) 250V AC 3A (Res.) 30V DC 2A (Res.) 125V DC 0.4A (Res.) 125V AC 2A (Gen.) 250V AC 1.5A (Gen.) 30V DC 1A (Gen.) 125V DC 0.2A (Gen.) For emergency pushbutton switches: 250V AC 1.5A (Gen.) 125V DC 0.22A (Gen.) 250V AC 3A (Res.) 125V DC 0.4A (Res.)	211499	For switch block: (Gold-clad) 125V AC 0.1A (Res.) 30V DC 0.1A (Gen.) (Silver contact) 125V AC 3A (Res.) 250V AC 3A (Res.) 30V DC 2A (Res.) 125V DC 0.4A (Res.) 125V AC 2A (Gen.) 250V AC 1.5A (Gen.) 30V DC 1A (Gen.) 125V DC 0.2A (Gen.) For emergency pushbutton switches: 250V AC 1.5A (Gen.) 125V DC 0.22A (Gen.) 250V AC 3A (Res.) 125V DC 0.4A (Res.)	J2 -50005339	For switch block: (Gold-clad) AC-12 (125V AC 0.1A) DC-12 (30V DC 0.1A) (Silver contact) AC-12 (250V AC 3A) DC-12 (30V DC 2A) DC-12 (125V DC 0.4A)	For emergency pushbutton switches: DEMKO (DK-3580/A1) AC-15 (250V AC 1.5A) AC-12 (250V AC 3A) DC-13 (125V DC 0.22A) DC-12 (125V DC 0.4A)
	Mounting hole 22 dia. type	E43149	For switch block: (Gold-clad) 125V AC 0.1A (Res.) 30V DC 0.1A (Gen.) (Silver contact) 125V AC 3A (Res.) 250V AC 3A (Res.) 30V DC 2A (Res.) 125V DC 0.4A (Res.) 125V AC 2A (Gen.) 250V AC 1.5A (Gen.) 30V DC 1A (Gen.) 125V DC 0.2A (Gen.)	211499	For switch block: (Gold-clad) 125V AC 0.1A (Res.) 30V DC 0.1A (Gen.) (Silver contact) 125V AC 3A (Res.) 250V AC 3A (Res.) 30V DC 2A (Res.) 125V DC 0.4A (Res.) 125V AC 2A (Gen.) 250V AC 1.5A (Gen.) 30V DC 1A (Gen.) 125V DC 0.2A (Gen.)	J2 -50005334	For switch block: (Gold-clad) AC-12 (125V AC 0.1A) DC-12 (30V DC 0.1A) (Silver contact) AC-12 (250V AC 3A) DC-12 (30V DC 2A) DC-12 (125V DC 0.4A)	
NS series operation switches	Mounting hole 16 dia. type	E43149	For switch block: (Gold-clad) 250V AC 0.3A (Res.) 30V DC 1A (Res.)	211499	For switch block: (Gold-clad) 250V AC 0.3A (Res.) 30V DC 1A (Res.)	—	—	

CE MARKINGS OVERVIEW

ND series operation switch conforming to EN/IEC standards

The ND series operation switch shown below conform to both EN and IEC standards, and may display the CE markings.

Product name		Low-voltage directives
ND series operation switches	Mounting hole 16 dia. type	EN60947-1 EN60947-5-1
	Mounting hole 22 dia. type	EN60947-1 EN60947-5-1

What are EN standards?

An abbreviation of Norme Europeenne (in French), and called European Standards in English. Approval is by vote among the CEN/CENELEC member countries, and is a unified standards limited to EU member countries, but the contents conform to the international ISO/IEC standards.

If the relevant EN standard does not exist, it is necessary to obtain approval based on the relevant IEC standard or, if the relevant IEC standard does not exist, the relevant standard from each country, such as VDE, BS, SEMKO, and so forth.

CE markings and EC directives

The world's largest single market, the European Community (EC) was born on 1 January 1993 (changing its name to EU in November 1993. It is now always expressed as EU, apart from EC directives.) EU member country products have always had their quality and safety guaranteed according to the individual standards of each member country. However, the standards of each country being different prevented the free flow of goods within the EU. For this reason, in order to eliminate non-tariff barriers due to these standards, and to maximize the merits of EU unification, the EC directives were issued concomitant to the birth of the EU.

The EN standards were established as universal EU standards in order to facilitate EU directives. These standards were merged with the international IEC standards and henceforth reflect the standards in all countries. Also, the CE markings show that products conform to EC directives, and guarantee the free flow of products within the EC.

Appropriate EC directives for control equipment products

The main EC directives that are to do with machinery and electrical equipment are the machinery directive, the EMC directive, the low voltage directive, and the telecom directive. Although these directives have already been issued, the date of their enactment is different for each one. The machinery directive was 1 January 1995. The EMC directive was 1 January 1996, and the low voltage directive was enacted from 1 January 1997. The telecom directive was established by the separate CTR (Common Technology References.)

ISO14001

Certificate of approval

Since the establishment of the "Matsushita Electric Works Global Environmental Charter" in 1992, we are set to unite in a concerted effort toward making Matsushita Electric Works a company capable of sustainable development by striking the right balance between our commitments to the environment, the economy, and society.

Regarding environmental conservation, we are fully committed to the complete elimination of freon and trichloroethylene. In energy-related efforts, we are developing technology to create energy-saving products, and for natural resources, we are working to eliminate industrial waste and to develop recycling technology. Our goal is peaceful co-existence with our global society.

Matsushita Electric Works Global Environmental Charter

■ Responsibilities of industry

- To provide products and services useful to society
- To fulfill social responsibilities
- To pursue corporate logic

■ Harmonization with the global environment

- Conservation of the global environment
- Protection of resources

■ Harmonization with society

- Contributing to local communities
- Contributing to the global community



QS-9000

Certificate of approval

Our Electro-Mechanical Device Division has been accredited for QS-9000, covering our quality management system for an entire spectrum of automotive products ranging from mechanical to semiconductor relays.

QS-9000 is a required component of quality systems and includes independent requirements by the Big 3 of the U.S. automotive world, GM, Ford, and Chrysler. It calls for a comprehensive quality management system that includes CS, cost performance, ongoing improvement, and many other aspects of quality management.

■ Certification Status

- Electro-Mechanical Device Division approved
- Obihiro Matsushita Electric Works, Ltd. approved
- Matsushita Electric Works, (Thailand) Ltd. approved
- Panasonic Electric Works, Mexicana S.A. de C.V. approved

ISO9001

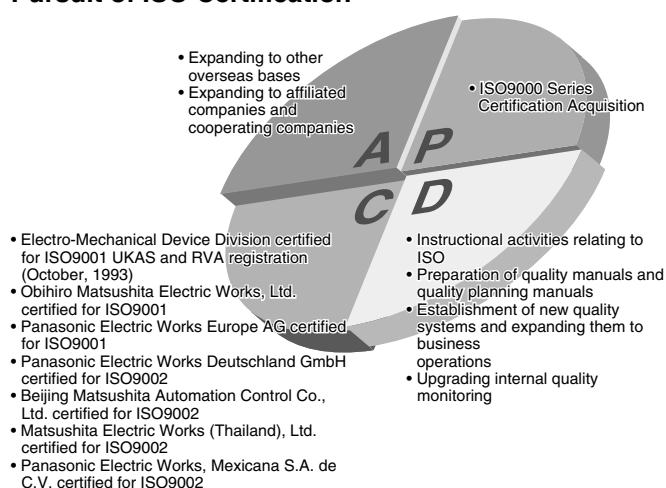
Certificate of approval

Our Electro-Mechanical Device Division, which handles from development to production and marketing, has been approved for certification of the ISO9001 quality assurance standards established by the International Standards Organization (ISO).

On October, 1993, this achievement was officially registered by the certification organizations UKAS of the United Kingdom and RVA of the Netherlands.



The Necessity and Pursuit of ISO Certification



Advantages

- Strengthening and upgrading quality assurance organizational structures applicable on an international basis
- Technology can be accumulated and disseminated through documentation and records
- Leads to improved reliability of the manufacturer's quality and improved CS (customer satisfaction)

Global Network

North America

Europe

Asia Pacific

China

Japan

Panasonic Electric Works

Please contact our Global Sales Companies in:

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