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Panasonic Electric Works Switch Series Covers All Markets

High Environmental Resistance Turquoise Colored Seal Switches

P.12

- New silent switch with both-sided sliding contact.
- Boosted employability with ultra-long stroke.
- IP67 type (Immersion protected)



Automotive



Cultivator



Multistory car park



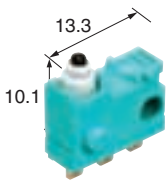
Electric cart



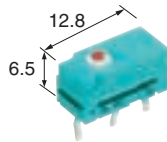
Refrigerator

Turquoise Stroke Switches

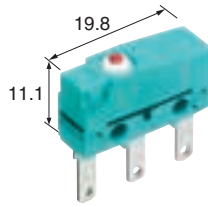
ASQ



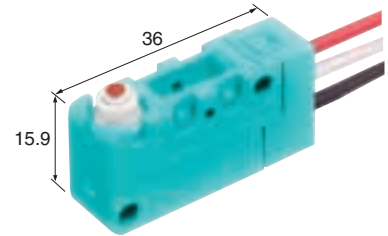
ABJ (J type)



ABS (S type)



ABV (V type)



Turquoise Switches

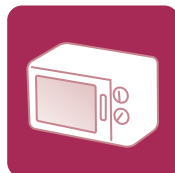
Snap-action Switch Series with Plenty of Variation

P.50

- Various sizes.



Air conditioner



Microwave oven



Vending machine

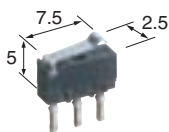


Vacuum cleaner

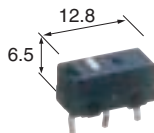


Heater

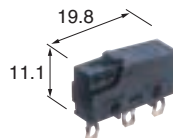
AV4 (FU) Switches



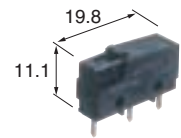
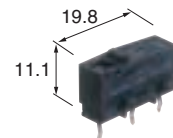
AH1 (FJ) Switches



AVM3 (PS) Switches

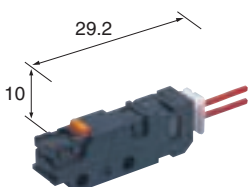


AV3/AVM3/AVT3/AVL3 (FS/FS-T) Switches

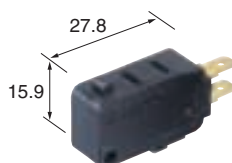


AV6 (CS) Switches

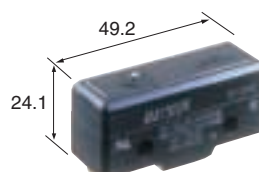
Pin plunger



AM5 (QV) Switches



AM1 (NZ) Basic Switches



Environmental
resistance

Compact

Low level
current type

(Unit: mm)

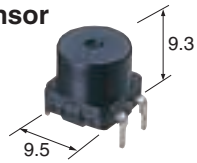
Detection Switches

P.128

- **Contributes to safety countermeasures by detecting machine tilt.**

TIP Switches

Containing a photo sensor



Dehumidifier



Humidifier



Heater

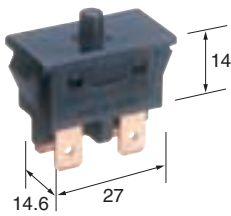
Door Interlock Switch for Office Automation Equipment

P.119

- **Complies with safety standards.**

GX Switches

For 1-circuit line



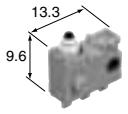
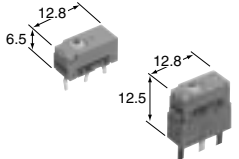
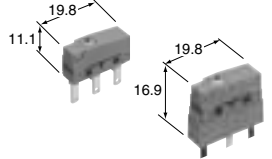
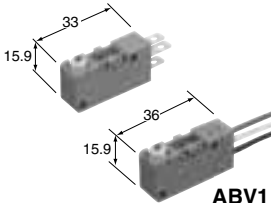
GW Switches

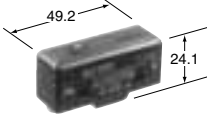

For 1-circuit line



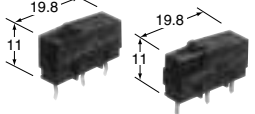
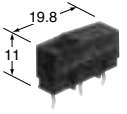
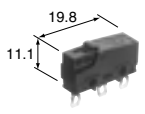

PPC

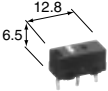
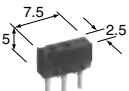
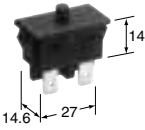
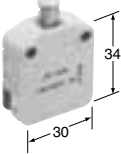

Switch Selector Chart

		Turquoise									
		J type (Stroke switches)		ABJ (J type)		ABS (S type)		ABV (V type)			
• Type of switch											
		ASQ		ABJ		ABS		ABV1			
• Features		<ul style="list-style-type: none"> • Compact size and ultra-long stroke • IP67 • Silent operation 		<ul style="list-style-type: none"> • Ultra-miniature size (12.8 × 6 × 6.5 mm) • Adoption of elastomer double molding technology and Ultrasonic swaging technology to uniform sealing in high production quantities • High environmental resistance (IP67) 		<ul style="list-style-type: none"> • Subminiature size (19.8 × 6.4 × 11.1 mm) • Adoption of Elastomer double molding technology and Ultrasonic swaging technology to uniform sealing in high production quantities • High environmental resistance (IP67) 		<ul style="list-style-type: none"> • Miniature size (33 × 10.3 × 15.9 mm) • Adoption of Ultrasonic swaging technology and epoxy sealing to uniform sealing in high production quantities • High environmental resistance (IP67) 			
• O.F. by pin plunger (gf, Max.)		1.5N (Pin plunger) 1.7N (Leaf lever) 1.5N (Simulated leaf lever)		1.23N 1.96N 2.45N (Long stroke type)		0.98N 1.47N		0.98N 1.96N			
• Max. contact rating (resistive)		Gold plating on both sides of sliding contact		Silver alloy contact		Silver alloy contact		Silver alloy contact			
		100 mA 30 V DC		1.96N type 2 A 125 V AC 2 A 30 V DC O.F. 1.23N 1 A 125 V AC 1 A 30 V DC O.F. 2.45N (Long stroke type) 1 A 125 V AC 1 A 30 V DC		2 A 125 V AC 2 A 250 V AC 2 A 30 V DC 0.4 A 125 V DC		5 A 250 V AC (O.F. min. 1.96N) 3 A 250 V AC (O.F. 0.98N)			
				Gold-clad contact		Gold-clad contact (triple layer) (double layer)		Gold-clad contact			
				0.1 A 125 V AC 0.1 A 30 V DC		0.1 A 125 V AC 0.1 A 250 V AC 0.1 A 30 V DC		3 A 250 V AC (O.F. min. 1.96N) 1 A 250 V AC (O.F. 0.98N)			
• Rating of low-level circuit type (resistive)		1 mA 5 V DC		5 mA 6 V DC 2 mA 12 V DC 1 mA 24 V DC		5 mA 6 V DC 2 mA 12 V DC 1 mA 24 V DC		5 mA 6 V DC 2 mA 12 V DC 1 mA 24 V DC			
• Expected life (min. ope.)		Electrical		2 × 10 ⁵ (Nominal rating)	2 × 10 ⁵ (Low-level rating)	3 × 10 ⁴ (Silver alloy contact type)	10 ⁵ (Gold-clad contact type)	5 × 10 ⁴ (Silver alloy contact type)	2 × 10 ⁵ (Gold-clad contact type)	10 ⁵ (Nominal rating)	10 ⁶ (Low-level rating)
		Mechanical		—		10 ⁶		5 × 10 ⁶		5 × 10 ⁶	
• Terminal style		Quick-connect						● .110		● .187	
		Solder		●		●		●		●	
		Screw									
		PC board		●		●		●			
		Lead wire		●		●		●		● (IP67)	
		Connector									
• Contact material		Gold-clad		(Standard) Silver alloy (Low-level) Gold-clad		(Standard) Silver alloy (Low-level) Gold-clad		(Standard) Silver alloy (Low-level) Gold-clad			
• UL, CSA, VDE, SEMKO		—		UL/CSA		UL/CSA/VDE/SEMKO		UL/CSA/VDE/SEMKO			
• Page		15		25		36		47			

Basic		Miniature	
AM1 (NZ)		AM5 (QV)	
			
AM1		AM5	
<ul style="list-style-type: none"> Versatile range for all applications 		<ul style="list-style-type: none"> Reliable design with shock resistance High inrush current resistance 0.1 A to 16 A type available 	
0.69N to 5.30N		0.49N to 3.92N	
10 A 125, 250 V AC or 1 A 480 V AC 1/8HP 125 V AC 1/4HP 250 V AC 1/2A 125 V DC 1/4A 250 V DC	Silver alloy contact		
	16 A 250 V AC 11 A 250 V AC 6 A 250 V AC		
	Gold-clad contact		
	0.1 A 250 V AC		
—	5 mA 6 V DC 2 mA 12 V DC 1 mA 24 V DC		
5 × 10 ⁵	10 ⁵ (Nominal rating)	2 × 10 ⁶ (Low-level rating)	
2 × 10 ⁷	10 ⁷		
	● .187 .250		
●	●		
●			
Silver alloy	(Standard) Silver alloy (Low-level) Gold-clad silver alloy		
UL/C-UL	UL/C-UL, ENEC/VDE		
52	61		

Switch Selector Chart

		Subminiature			
		AV3/AM3/AVT3/AVL3 (FS/FS-T)	AV3 (FS): Greater than 1mm of contact gap	AVM3 (PS)	AV6 (CS)
• Type of switch		 AV3/AVT3/AVM3/AVL3	 AV3	 AVM3	 AV6
• Features		<ul style="list-style-type: none"> Consistent quality and high precision through sophisticated automatic fabrication system Low-level circuit types available Long life version available 	<ul style="list-style-type: none"> Contact gap of greater than 1mm Door inter-lock switch for OA equipment 	<ul style="list-style-type: none"> High capacity micro switch In-line terminals make soldering works easy 	<ul style="list-style-type: none"> Using a connector for connections significantly improves operation effectiveness Contact reliability is achieved by simple dust prevention guard and gold-clad double layer contacts
• O.F. by pin plunger (gf, Max.)		<Standard> 0.25N (Gold-clad) 0.49N 0.98N <Long life version> 1.47N	1.47N	1.47N	0.50N 1.50N
• Max. contact rating (resistive)		<Standard> 3 A 250 V AC 3 A 30 V DC 0.4 A 125 V DC <Long life version> 5 A 250 V AC 5 A 30 V DC 0.4 A 125 V DC <Au clad contact> 0.1 A 250 V AC (Triple layer) 0.1 A 30 V DC	3 A 30 V AC	10.1 A 250 V AC	0.1 A 30 V DC
• Rating of low-level circuit type (resistive)		1 to 100 mA, 5 to 30 V DC (Double layer) 1 to 100 mA, 5 to 250 V AC (Triple layer)	—	—	—
• Expected life (min. ope.)	Electrical	5 × 10 ⁴	10 ⁴	5 × 10 ⁴	2 × 10 ⁵
	Mechanical	5 × 10 ⁵ 3 × 10 ⁷ (Long life version)	5 × 10 ⁵	3 × 10 ⁷	5 × 10 ⁵
• Terminal style	Quick-connect	● .110	● .110		
	Solder	●	●	●	
	Screw				
	PC board	●	●	●	
	Lead wire				
	Connector				●
• Contact material		(Standard) Silver alloy (Low-level) Gold-clad triple layer, double layer	Silver alloy	Silver alloy	Gold-clad silver alloy
• UL, CSA, VDE, SEMKO		UL/CSA/VDE/SEMKO	UL/CSA/TÜV/SEMKO	UL/CSA	UL/CSA/TÜV
• Page		74	87	89	94

Ultra-miniature		Inter Lock Switch		Detection Switch
(AH1) FJ	AV4 (FU)	AGX (GX)	AV1 (GW)	AHF2 (Tip SW)
				
AH1	AV4	AGX	AV1	AHF2
<ul style="list-style-type: none"> Ultra-miniature size (12.8 × 6 × 6.5 mm/12.7 × 6 × 6 mm) Flux-resistant construction Flat terminal 	<ul style="list-style-type: none"> Super miniature size (7.5 × 2.5 × 5 mm) Solder terminal type with mounting holes available Mechanical life 3 × 10⁵ 	<ul style="list-style-type: none"> Snap-in mounting type Satisfying the downsizing needs 14 mm in depth Contact gap of greater than 4 mm 	<ul style="list-style-type: none"> Dual restoration spring mechanism Insulation distance 8 mm (snap-in mounting 2 form A and 3 form A type) 	<ul style="list-style-type: none"> Photo sensor inside The contact type is equivalent to normally closed contacts, which satisfies the PL Act.
0.74N 1.47N	0.98N	<Standard> 1a: 3.92N 2a: 3.92N 3a: 5.88N <High capacity> 1a: 4.90N 2a-3a: 5.88N	1a: 4.90N 1b: 2.94N 1a1b: 5.88N 2a: 7.85N 3a: 9.81N	Operation angle: 25 to 60 degrees
O.F. 1.47N type 3 A 125 V AC 2 A 30 V DC O.F. 0.74N type 1 A 125 V AC 1 A 30 V DC	<Ag contact> 0.5 A 30 V DC <Au contact> 0.1 A 30 V DC	<Standard> 10.1 A 250 V AC	10.1 A 250 V AC	Photo transistor Please refer to the inside of catalog
Au clad contact 5 mA 6 V DC 2 mA 12 V DC 1 mA 24 V DC		—	—	—
3 × 10 ⁴	2 × 10 ⁴ (Au type: 2 × 10 ⁵)	1 × 10 ⁵	5 × 10 ⁴	10 ⁵
10 ⁶ (O.F. 0.74 N) 5 × 10 ⁵ (O.F. 1.47 N)	3 × 10 ⁵	1 × 10 ⁶	10 ⁶	10 ⁵
●	●	● .250	● .250	
●	●			
●	●			●
(Standard) Silver alloy (Low-level) Gold-clad silver alloy	(Standard) Silver alloy (Low-level) Gold plating	Silver alloy	Silver alloy	Silver alloy
UL/CSA	—	UL/C-UL, ENEC/VDE	UL/C-UL, ENEC/VDE	—
99	104	109	113	118

TECHNICAL TERMINOLOGY & CAUTIONS FOR USE

TECHNICAL TERMINOLOGY

1. Rated values

Values indicating the characteristics and performance guarantee standards of the snap-action switches. The rated current and rated voltage, for instance, assume specific conditions (type of load, current, voltage, frequency, etc.).

2. Mechanical life



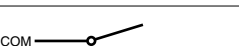
The service life when operated at a preset operating frequency without passing electricity through the contacts. (The life test is performed at a switching frequency of 60 times/minute and operating speed of 100 mm/second at the regular cam.)

3. Electrical life

The service life when the rated load is connected to the contact and switching operations are performed. (The life test is performed at a switching frequency of 20 times/minute and operating speed of 100 mm/second at the regular cam.)

4. Contact form

This refers to the components determining the type of application which make up the electrical input/output circuits in the contact.

Switching type	
Normally closed type	
Normally open type	

Terminal symbols

COM: Common terminal

NC: Normally closed terminal

NO: Normally open terminal

5. Insulation resistance

Resistance between noncontinuous terminals, terminals and metal parts not carrying current, and between terminals

and the ground.

6. 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.

7. Contact resistance

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

8. Vibration resistance

Malfunction vibration ... 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.

9. Shock resistance

Shock durability ... Shock range where the mechanical shocks received during snap-action switches transport and installation do not damage the parts or harm the operating characteristics.

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

10. Operating Force (O.F.)

The force required to cause contact snap-action. It is expressed terms of force applied to the plunger or the actuator.

11. Release Force (R.F.)

The force to be applied to the plunger or the actuator at the moment contact snaps back from operated position to unoperated position.

12. Pretravel (P.T.)

Distance of the plunger or the actuator movement from free position to operating position.

13. Overtravel (O.T.)

The distance which the plunger or the actuator is permitted to travel after actuation without any damage to the switching mechanism.

14. Movement Differential (M.D.)

The distance from operating to release position of the plunger or the actuator.

15. Operating Position (O.P.)

The position of the plunger or the actuator when the traveling contacts snaps with the fixed contact.

16. Free Position (F.P.)

Position of the switch plunger or the actuator when no force is applied to.

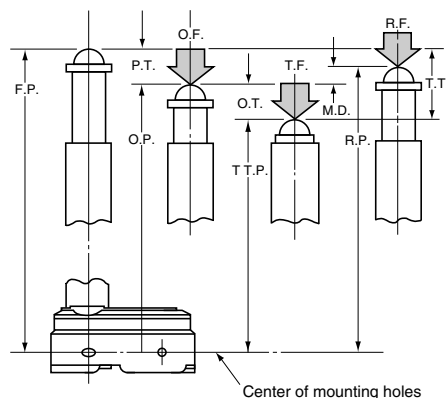
17. Overtravel Position (O.T.P.)

The stopping position of the plunger or the actuator after total travel.

18. Release Position (R.P.)

The position of the plunger or the actuator when the traveling contact snaps back from operating position to its original position.

The following terminologies are applied to all our switches.



CAUTIONS FOR USE

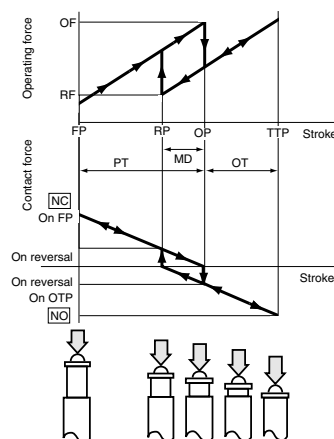
■ Technical Notes on Mechanical Characteristics

1. Actuation Force and Stroke

Adequate stroke setting is the key to high reliability. It is also important that adequate contact force be maintained to ensure high reliability. For a normally closed circuit, the driving mechanism should be set so that the actuator is normally in the free position. For a normally open circuit, the actuator should be pressed to 70% to 100% of the specified stroke to absorb possible errors.

If the stroke is set too close to the operating point (O.P.), this may cause unstable contact, and in the worst case

may cause actuator damage due to inertia of the drive mechanism. It is advisable that the stroke be adjusted with the mounting plate or driving mechanism. The figure at right shows a typical example of activation and contact forces varying with stroke. In the vicinity of the O.P. and R.P., the contact force is diminished, causing chatter and contact bounce immediately before or after reversal. For this reason, use the switch while giving due consideration to this. This also causes the snap action switch to be sensitive to vibration or physical impact.



TECHNICAL TERMINOLOGY & CAUTIONS FOR USE

2. Changes in Operation

Characteristics

Exercise design care so that malfunctions will not occur if the snap action switch characteristics vary by as much as 20% from, rated values.

3. Mechanical Conditions for Type Selection

Actuator type should be selected according to activation method, activation

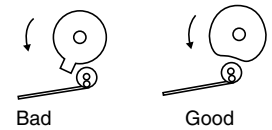
speed, activation rate, and activation frequency.

- 1) An extremely slow activation speed may cause unstable contact transfer, possibly resulting in contact failures or contact fusion.
- 2) An extremely high activation speed may cause damage to contacts or contact response failure.

4. Driving Mechanism

Use of a driving mechanism which will cause physical impact to the actuator should be avoided.

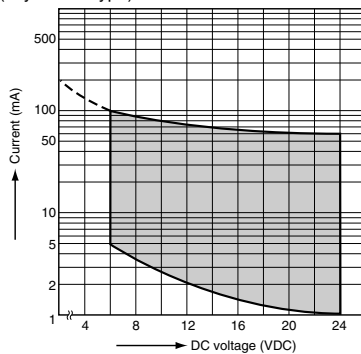
<Example>



■ Technical Notes on Electrical Characteristics

1. The snap-action switch is designed for AC operations. While it has small contact gaps and no arc absorber, it may be used for low-capacity DC operations. (However, a DC magnetic blow-out switch is available in the NZ Basic Switches.)
2. For applications with very small switching voltage or current, choose the dry circuit type.

Small current and voltage Application Range (Dry Circuit type)



3. Application to Electronic Circuits

- 1) The snap-action switch contacts can sustain bounce or chatter when closed. Bounce or chatter can cause noise or pulse count errors when the snap action switch is used in electronic circuits.
- 2) If contact bounce or chatter poses problems in the vicinity of the O.P. and R.P., use a suitable absorption network, such as a C/R network.
4. Check the surge current, normal current and surge duration.
5. Contact resistance given in performance specifications is measured with a voltage drop method using 6 to 8 V DC, 1 A (except for low-level load type). Contact resistance across COM and NC terminals is measured in the open position, while contact resistance across COM and NO terminals is measured in the closed position.

6. Ratings are measured under the following conditions:

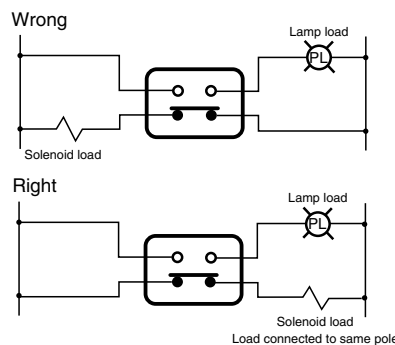
- Inductive load:
 - Power factor = 0.6 to 0.7
 - Time constant = 7 ms or less (DC)
7. To prevent contact fusion failure, be sure to use a serial resistance for each capacitive load.
 8. If snap action switch operation is synchronized with the AC supply phase, this may cause: shortened electrical life, contact fusion failure, contact transfer, or other reliability problems.

■ Cautions in a circuit

1. Contact protection is recommended when snap-action switches are used in an inductive load circuit. (except for NZ Basic Switches magnetic blow-out types for DC)

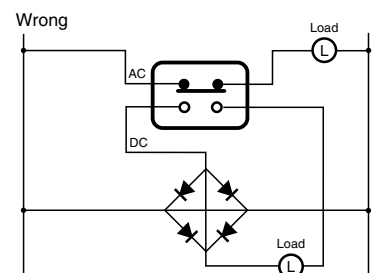
2. Do not connect the contacts on individual switches to different type or different poles of the power supply.

Examples of power supply connections (connection to different poles)

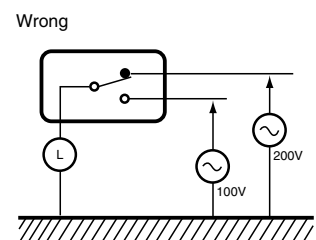


Example of wrong power supply connection (connection to different poles of power supply)

This may lead to mixed DC and AC.



3. Avoid circuits which apply voltage between contacts. (This may lead to mixed deposition.)



Circuit diagram	Notes
	1. r = more than 10 ohms 2. In an AC circuit. Impedance of L 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 L. C: 0.1 μF
	For DC circuits only.
	Can be used for both AC and DC circuits.

TECHNICAL TERMINOLOGY & CAUTIONS FOR USE

■ Mounting state and environment

1. Checking the insulation distance

After mounting and wiring, check the insulation distance between terminals and the ground. If the insulation distance is inadequate, mount insulating material between as required.

2. Fastening the microswitch body

See the Section "NOTES" for the individual switch.

3. Position adjustment with effector

The effector should be positioned so that direct force is not applied to the pushbutton or actuator in its free position. The operating force to the pushbutton should only be applied in a perpendicular direction.

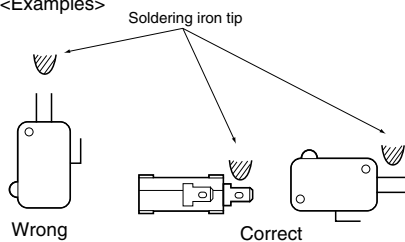
4. Soldering precautions

1) For manual soldering, lay the terminals flat (horizontal with the ground) and quickly perform the soldering operation using a soldering iron with the appropriate heat capacity and the proper amount of solder. Take care that the flux does not flow into the switch interior by using a ventilation fan to discharge flux gas and to prevent contact of the switch body with the soldering iron tip. Be careful not to apply force to the lead wires or the terminal portions immediately after soldering.

The temperature setting and time conditions vary depending on the product. See the Section "NOTES" for each product.

2) For automatic soldering also, see the Section "NOTES" for each product.

<Examples>



5. Avoid using in a silicon atmosphere

Avoid using organic silicon rubber, adhesives, sealing compounds, oil, grease, and wires in a silicon atmosphere.

6. Please consult us when using under the following conditions:

- 1) Environments where hydrogen sulfide or other corrosive gases are present.
- 2) Environments where gasoline, thinner or other flammable, explosive gases are present.
- 3) Dusty environments (for non-seal type snap action switches).

4) The perpendicular operating speed exceeds the allowable operating speed.

5) Switching between different poles.

6) Use in environments not in the prescribed temperature or humidity range.

7. Storage precautions

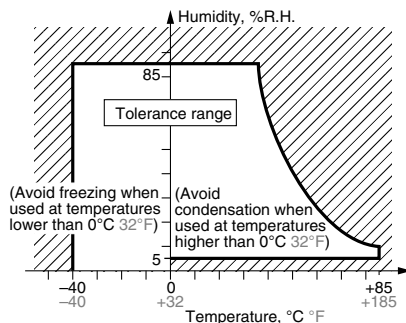
To prevent discoloration due to sulfurization of the terminals (silver-plated), store the switches in a polyethylene bag or other suitable airtight container.

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

- Temperature: The allowable temperature range differs for each switch, so refer to the switch's individual specifications. In addition, when transporting or storing switches while they are tube packaged, there are cases when the temperature may differ from the allowable range. In this situation, be sure to consult the individual specifications.

- Humidity: 5 to 85% R.H.



- Pressure: 86 to 106 kPa

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

2) Condensation

Condensation forms when there is a sudden change in temperature under high temperature, high humidity conditions. Condensation will cause deterioration of the switch insulation.

3) Freezing

Condensation or other moisture may freeze on the switch when the temperature is lower than 0°C 32°F. This causes problems such as sticking of movable parts or operational time lags.

4) Low temperature, low humidity environments

The plastic becomes brittle if the switch is exposed to a low temperature, low humidity environment for long periods of time.

5) 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.

6) 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.

9. We reserve the right to modify without notice the materials, internal components, and other parts to improve product quality.

10. Handling precautions

When handling the switches, be careful not to drop them on the floor since this may damage them.

For items 5. and 6., select contact sulfurization (clipping) prevention products (FS and Au clad 2-layer contacts) for use with extremely small loads or an environment-resistant Turquoise switch.

















11.

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.

TECHNICAL TERMINOLOGY & CAUTIONS FOR USE

■ Types of actuators

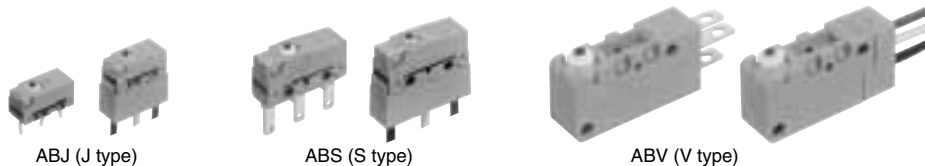
Shape	Class.	Pretravel (P.T.)	Overtravel (O. T.)	Operating Force (O. F.)	Vibration Shock	Features	
	Pin plunger	Small	Small	Large	Out-standing	Appropriate for linear short-stroke action. Pin plunger acts directly on snap action mechanism, enabling high-precision positioning. Amount of movement after operation is smallest among all of the actuators, however, so reliable stopper is required.	
	Spring small plunger	Small	Medium	Large	Excellent	Used in much the same way as the pin plunger, but is easier to use because the amount of movement after operation is larger.	
	Spring short plunger	Small	Medium	Large	Good	Pin plunger is short, with large plunger diameter that makes centering easier. Like small spring plunger, amount of movement after operation is large.	
	Panel attachment plunger	Small	Large	Large	Good	Secured to panel with hex or lock nut; used as manual or mechanical plunger. Amount of movement after operation is extremely large and operation point can be adjusted by changing attachment position. Can be used in combination with low-speed cam.	
	Panel attachment roller plunger	Small	Large	Large	Possible	This is the panel attachment type with a roller, and can be used with fast-moving cams and dogs..	
	Hinge lever	Large	Medium	Small	Possible	Little force required for operation. Appropriate for use with low-speed cams and dogs; has large stroke. Lever available in various shapes to fit operating unit.	
	Simulated roller lever	Large	Medium	Small	Possible	Tip of hinge lever is bent into a semi-circle, enabling use as a simple roller type.	
	Leaf lever	Large	Large	Small	Excellent	Play in lever is used to assure maximum stroke. Construction provides for space where lever is attached, for outstanding resistance to freezing.	
	Hinge roller lever	Large	Medium	Small	Possible	This is a hinge lever with a roller, and can be used with high-speed cams and dogs. The force required for pin plunger action is lighter than that of the lever, and the stroke is longer.	
	One way action hinge roller lever	Medium	Medium	Medium	Possible	This is hinge roller lever type, and can operate in relation to an operating unit from a one way direction, but the roller is bent from the opposite direction and cannot move. This can be used to prevent reverse-direction action.	
	Leaf spring	Medium	Medium	Medium	Good	This has a leaf spring with offset yield force and has a large stroke. Ideal for driving low-speed cams and cylinders. Fulcrum is fixed for high precision. To prevent leaf damage, movement after operation must be within specified value.	
	Roller leaf spring	Medium	Medium	Medium	Good	This is a leaf spring with a roller, and can be used with high-speed cams.	
	(O.C. reversed action groove type) Reverse-action hinge lever	Large	Small	Medium	Excellent	This is used for low-speed, low-torque cams. The lever comes in various shapes to fit the operating body.	The plunger is constantly pressed down by a coiled spring, and operating the lever induces reverse action. Because the plunger is depressed when not engaged, vibration and shock resistance are excellent. Pressing the plunger too far does not cause abnormal force to be applied to the switch mechanism, so a stable service life is assured.
	(O.C. reversed action groove type) Reverse-action hinge roller lever	Medium	Medium	Medium	Excellent	This is a reverse-action hinge lever with a roller and is appropriate for cam operation. Excellent resistance to vibration and impact when not engaged.	
	(O.C. reversed action groove type) Reverse-action hinge roller short lever	Small	Medium	Large	Excellent	This is a shorter version of the reverse-action hinge lever with a roller and has a larger action force, but is appropriate for cam operation with a short stroke. Excellent resistance to vibration and impact when not engaged.	
	Rotating-action type	Large	Large	Small	Possible	This is a rotating, light-action type that is ideal for detecting paper, coins, and similar objects.	

TURQUOISE SWITCHES

High Environmental Resistance Turquoise Colored Seal Switches

Against dust, gas and water

Elastomer double molding technology, an industry first, and ultrasonic swaging technology contribute to uniform sealing in high production quantities IP67 type (immersion protected) Broad lineup: J, S and V models make up over 1,000 types.



Lineup

● Available

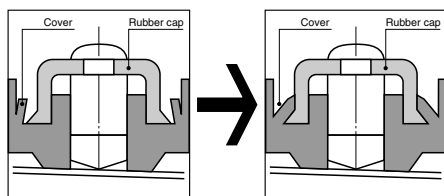
Size	Type	Terminal						Contact	Actuator							Mounting hole	
		Solder	PC board	Angle	.110 quick-connect	.187 quick-connect	Wire leads		Pin plunger	Hinge lever	Short hinge lever	Long hinge lever	Simulated roller lever	Roller lever	Short roller lever		Leaf lever
J type	Terminals	●	●					Au, Ag	●	●			●	●			M1.2, M2.3, M3
	Wire leads						●	Au, Ag	●	●			●	●	●		
S type	Terminals	●	●	●	●			Au, Ag	●	●	●	●	●	●			M2.3
	Wire leads						●	Au, Ag	●	●	●	●	●	●	●		
V type	Terminals					●		Au, Ag	●	●			●	●	●		M3
	Wire leads						●	Au, Ag	●	●			●	●	●		

Ultrasonic swaging process

The rubber cap is securely sealed to the switch cover during an ultrasonic swaging process.

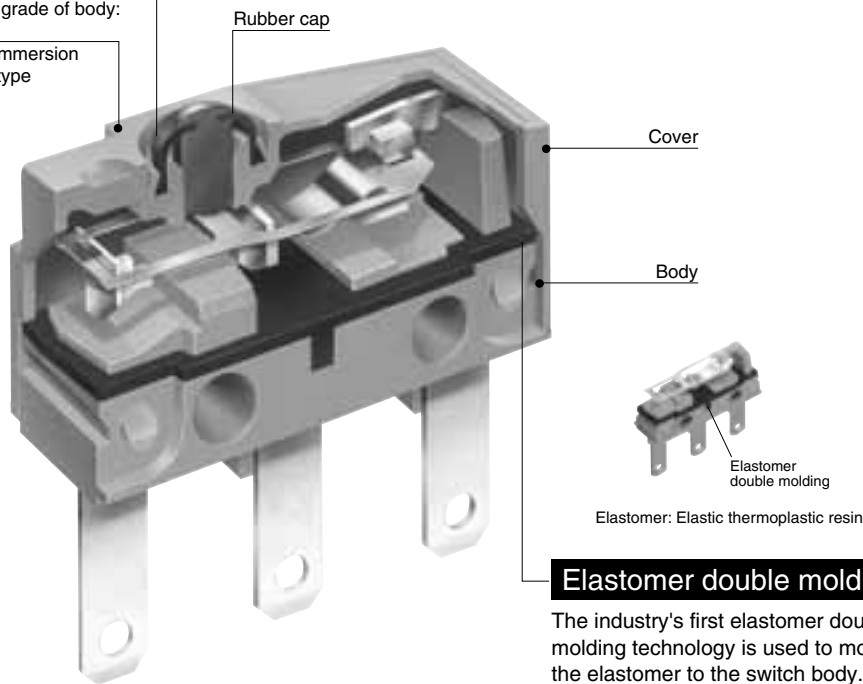
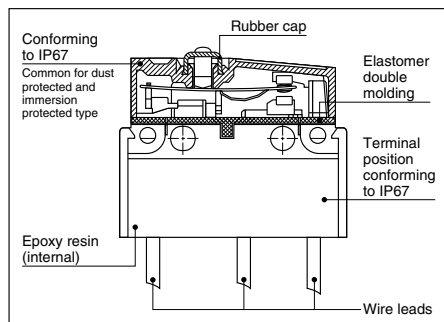
Protective grade of body: IP67
Dust and immersion protected type

Cross section of the rubber cap



Ultrasonic swaging process: A process which bends the material through ultrasonic vibration.

Cross section of wire leads type



Elastomer double molding

The industry's first elastomer double molding technology is used to mold the elastomer to the switch body. A reliable seal of the body and cover is achieved.

Construction

The dust protected type (IP50) and the immersion protected type (IP67) pass the following tests, respectively. The immersion protected type is especially tested to check for the entry of water after soaking for a certain period of time. Avoid operation where they are immersed in water.

[Test conditions]

• Dust protected type (IP50)
The powder circulation pump may be replaced by other means suitable to maintain the talcum powder in suspension in a closed test chamber. The talcum powder used shall be able to pass through a square-meshed sieve the nominal wire diameter of which is 50 μm and the nominal width between wires 75

μm. The amount of talcum powder to be used is 2 kg per cubic metre of the test chamber volume. The duration of the test is 8 hours.

• Immersion protected type (IP67)
The lowest point of enclosures should be least 1,000 mm below the surface of the water. The duration of the test is 30 minutes.

TURQUOISE SWITCHES IMPORTANT NOTES REGARDING USE

1. Fastening of the switch body

Fasten the switch body onto a smooth surface using the correct screw as shown in the chart below and tighten it with the prescribed torque. Be careful not to exceed the prescribed torque when tightening as this may adversely affect the sealing properties and switch functioning, and also cause damage. If using a torque driver, verify that it is set to the prescribed torque. Also, we recommend that you use a spring washer and adhesive to prevent loosening and to lessen the tightening load on the switch.

	Screws	Tightening torque
ABJ	M1.2	Not more than 0.098N-m
	M2.3	Not more than 0.29N-m
	M3.0	Not more than 0.29N-m
ABS	M2.3	Not more than 0.29N-m
ABV	M3.0	Not more than 0.49N-m

2) Fixed pin type

To secure the switch unit, thermally crimp or press-fit the mounting pins. If the pins are to be press-fitted, install a guide on the opposite surface to the mounting pins to prevent them from slipping out of position and developing play.

3) Be sure to maintain adequate insulating clearance between each terminal and ground.

4) The positioning of the switch should be such that direct force is not applied to the pushbutton or actuator in its free position. The operating force to the pushbutton should only be applied in a perpendicular direction.

5) The standard value of overtravel used should be within the range of 70% to 100% of the rated O.T. value.

6) When soldering the V-type turquoise switch or the immersion protected type of the J and S type switches, the sealing material sometimes forms a lump or bulge at the base of the terminal or lead. Be sure to allow enough space for this when attaching the switch.

2. Soldering operations

1) Manual soldering: use soldering irons (max. 350°C 662°F) capable of temperature adjustment. This is to prevent deterioration due to soldering heat. Care should be taken not to apply force to the terminals during soldering.

Specifications

	Wattage	Soldering time
ABJ	18 W	Within 3 seconds
ABS	60 W	Within 3 seconds
ABV	60 W	Within 5 seconds

2) Terminal portions should not be moved within 1 minute after soldering.

3. Variance of operating characteristics

Allow for up to ±20% variation of the

specified characteristics values to compensate for long term operational wear of the switch in your design.

4. Cautions regarding use

1) When switching inductive loads (relays, solenoids, buzzers, etc.), an arc absorbing circuit is recommended to protect the contacts.

2) If switching of the contact is synchronized with the phase of the AC power, reduced electrical life or welded contact may occur. Therefore, test the switch while it is operating under actual loads for this condition. If found, you may wish to take corrective action in your design.

3) In the following operating condition, the electrical life might be greatly reduced depending upon the switching load. Please consult us before use.

- Switching operation at a high or low speed (near limits specified).

4) If the build up of dust or dirt becomes so severe that it requires the use of the attached lever, there is the concern that the flexible part may be impeded and return movement may not be possible. In this situation take the following precautions:

- Select a product number for a switch with a higher operation load or use a leaf type lever.

- Attach a protective cover to the lever.

5) If the leaf lever type switch is excessively pushed (pushed further than the operational limit position) or switching is done at high speed or is accompanied by the impact, the lever will break. Please be careful. Also, be careful with the BV short roller lever type switch as improper return may result from pressing too much.

5. Protection from dust, water and corrosive gas

1) The pin button and the space around the body cap Turquoise switches are sealed with elastic material, the terminal portion is integrally molded. This prevents dust entry and protects the switch against corrosive gases. Wireleaded types are recommended for applications subject to water or oil splash. However, avoid soaking these immersion protected types in oil or water, because they types are not of completely oil tight construction.

2) Take care that breathing actions don't allow water vapor to get inside during opening and closing or cause rapid temperature changes.

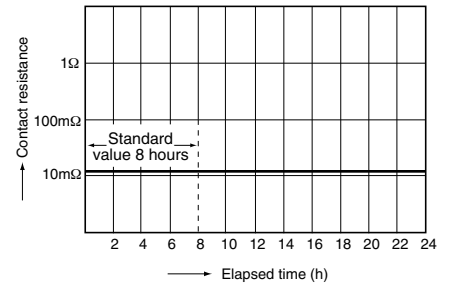
3) Keep away from environments where silicon based adhesives, oil or grease are present as faulty contacts may result from silicon oxide. Do not use in areas where flammable or explosive gases from gasoline and thinner, etc., may be

present.

- Dust protection test

Test conditions:

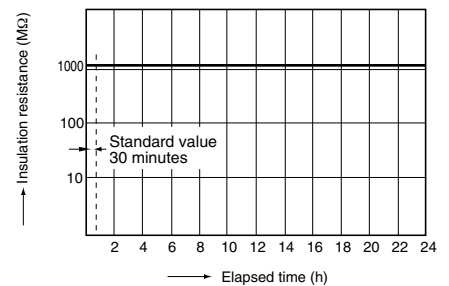
Dust-protected switches ... Repeatedly pass pure talc powder through a standard wire sieve with a 75mm nominal diameter so that the talc is suspended in the air around the switch area. Two kilograms of talc powder should be suspended for each cubic meter of laboratory space. The talc suspension should then be left for eight hours.



- Waterproof test

Test conditions:

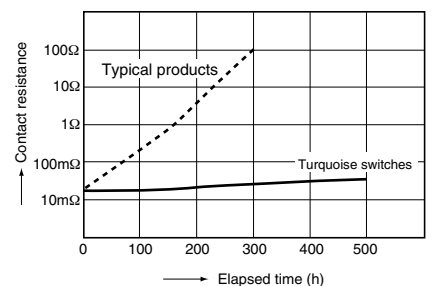
Immersion protected IP67 switches ... Submerge at 1 m below the water surface for 30 minutes.



- Hydrogen sulfide exposure test

Test conditions:

Concentration: 3 ppm
Temperature: 40°C 104°F
Humidity: 75% RH



6. Oil-proof and chemical-proof characteristics

The rubber elastomer swells when exposed to oil and chemicals. The extent of swelling will vary widely depending on the type and amount of oil and chemicals. Check with the actual oil or chemicals used.

In particular, be aware that solvents such as freon, chlorine, and toluene cannot be used.

NOTES FOR TURQUOISE SWITCHES

7. Washability (ABJ and ABS)

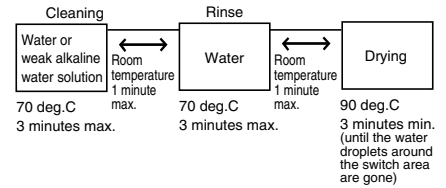
The Turquoise switch terminal with lead wires type and without lead wires type share the same main body. As a result, if the print board terminal type satisfies the set conditions, then it can undergo a complete cleaning after automatic soldering. After soldering is completed, perform cleaning within the prescribed temperature and time range, and pay careful attention to the following points.

1) Perform proper temperature, time, drying control in the cleaning process in order to prevent absorption of the liquid due to respiratory action. Be particularly careful that all the water droplets in the switch area are cleaned off in the final drying process.

2) Some cleaning liquids (solvents) may harm the rubber parts. Use water or a weak alkaline water solution.

3) Ultrasonic cleaning methods may damage the internal components or contacts. Use immersion or shower cleaning methods. In addition to the above points, the use of automatic cleaning equipment is particularly recommended for easy control of the process temperature and time. The recommended cleaning conditions for the Turquoise switches are shown below. However, please evaluate the actual cleaning process to verify its suitability for the switch.

Recommended Cleaning Method



REFERENCE

1. Dust-protected type

This type of construction prevents dust that is large enough to have an effect on operation from getting inside the unit. This construction is stipulated by protective classes against solid matter in the IEC standards (IEC529).

Test conditions: The switch is left for eight hours in a test chamber with a constant level of floating pure talc that has passed through a standard 75mm sieve, in a concentration of 2kg of talc per cubic meter of volume in the test chamber.

2. Immersion-protected type

This type of construction prevents any harmful effects even after the device is left underwater at a depth of one meter for thirty minutes. This construction is stipulated by protective classes against water in the IEC standards (IEC529).

3. IEC's IP Codes

The IEC (International Electrotechnical Commission) has defined the IP characteristic code that represents the levels of protection described in IEC standard 529. The two numbers that follow the IP code (the characteristics numbers) indicate the suitability of this protection for all environmental conditions.

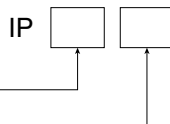
• Level of Protection Indicated by the 1st Characteristics Number

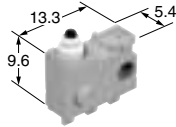
1st Characteristics Number	Protection level (IEC529/Solid matter)
0	No protection
1	Protected against solid matter larger than 50mm
2	Protected against solid matter larger than 12mm
3	Protected against solid matter larger than 2.5mm
4	Protected against solid matter larger than 1.0mm
5	Dust-protected type Prevents dust that is large enough to have an effect on operation from getting inside the unit
6	Dust-resistant type Prevents dust from getting inside the unit

• Level of Protection Indicated by the 2nd Characteristics Number

JIS C0920	2nd Characteristics Number	Protection level (IEC529/Liquid matter)
	0	No protection
Droplet-protected type I	1	Protected against water droplets that fall perpendicular to the unit
Droplet-protected type II	2	Protected against water droplets that fall from within 15° of perpendicular to the unit
Rain-protected type	3	Protected against water droplets that fall from within 60° of perpendicular to the unit
Splash-protected type	4	Protected against water that splashes on the unit from any direction
Spray-protected type	5	Free from adverse effects even if sprayed directly with water from any direction
Water-resistant type	6	Protected against water sprayed directly on the unit from any direction
Immersion-protected type	7	Water does not get inside of the unit when submerged in water according to the specified conditions
Underwater type	8	Unit can be used underwater

Note: Details of test conditions are the same as JIS C 0920. Please refer to them.





(mm)

<http://panasonic-denko.co.jp/ac/e/service/environment>

FEATURES

1. Same size as J type with ultra-long stroke. For pin plunger type, it maintains an ultra-long stroke O.T. (Over Travel) with over 2.2 mm on the NO side and over 2.5 mm on the NC side. Variations in operation can be absorbed.

2. Since contact pressure does not depend on the operation stroke, the range of possible use over the entire stroke is greatly increased. (Please refer to operation concept diagram.)

3. High contact reliability to support low level switching loads

High contact reliability is maintained with gold plating on both sides of sliding contact.

4. Highly effective sealing for resistance against adverse environments

Immersion protection type

- JIS C0920 (water-resistance experiments for electrical machines and protection rating against incursion of solid substances)

D2

- JIS D0203 (method for testing moisture resistance and water resistance in automotive components)

IP67

- IEC529 (rating for outer shell protection)

5. Silent operation

With sliding contact construction there is no operation noise.

6. Direct operation possible from lateral direction with pin plunger (lever-less operation allows space savings)

7. Contains no harmful substances (mercury, lead, hexivalent chromium, cadmium)

TYPICAL APPLICATIONS

1. Automobiles (detection of door opening and closing and shift lever position, etc.)

2. Household appliances (propane stoves, vacuum cleaners, air conditioners, washing machines, etc.)

ORDERING INFORMATION

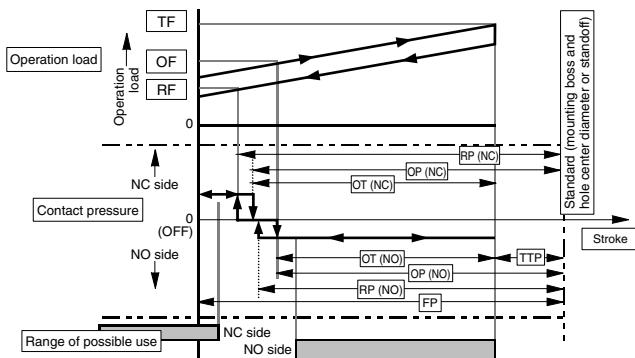
Ex. ASQ1 [] [] [] []

Type of switch	Size of mounting hole	Terminal	Contact form	Actuator
ASQ1: Turquoise stroke switch	0: 3 mm standard type 1: 3 mm without boss type 4: Right side pin type 5: Left side pin type 6: Right 2 boss type 7: Left 2 boss type	2: Wire leads right side type (NC and NO type only) 3: Wire leads left side type (NC and NO type only) 4: Solder terminal 5: PC board terminal 6: Wire leads (bottom type) 7: PC right angle terminal 8: PC left angle terminal	1: SPDT 2: SPST-NC (wire lead type only) 3: SPST-NO (wire lead type only)	0: Pin plunger 7: Leaf lever 8: Simulated leaf lever

Remark: Not every combination is available. Please refer to the following table, "PRODUCT TYPES".

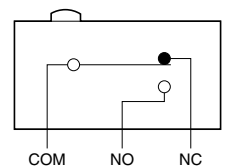
OPERATION CONCEPT DIAGRAM (reference)

Contact form: terminal type

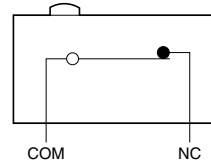


CONTACT ARRANGEMENT

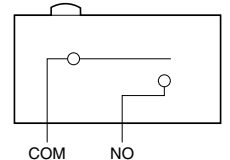
1. SPDT



2. SPST-NC (Wire leads type only)

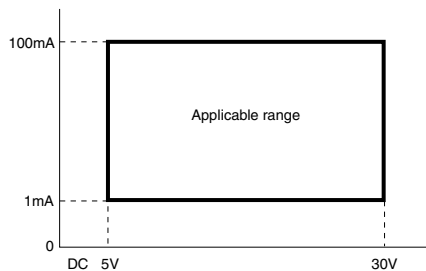


3. SPST-NO (Wire leads type only)



ASQ1

APPLICABLE CURRENT RANGE (reference)



PRODUCT TYPES

1. Terminal type (Mounting hole: 3mm standard type/3mm without boss type/2 boss type/Side pin type)

Actuator	Operating force Max.	Mounting hole: 3mm standard type			Mounting hole: 3mm without boss type	Right 2 boss type	Left 2 boss type	Right side pin type	Left side pin type
		Solder terminal	PC right angle terminal	PC left angle terminal	PC board terminal	Solder terminal	Solder terminal	Solder terminal	Solder terminal
Pin plunger	1.5N	ASQ10410	ASQ10710	ASQ10810	ASQ11510	ASQ16410	ASQ17410	ASQ14410	ASQ15410
Leaf lever	1.7N	ASQ10417	ASQ10717	ASQ10817	ASQ11517	ASQ16417	ASQ17417	ASQ14417	ASQ15417
Simulated leaf lever	1.5N	ASQ10418	ASQ10718	ASQ10818	ASQ11518	ASQ16418	ASQ17418	ASQ14418	ASQ15418

2. Wire leads bottom type (Mounting hole: 3mm standard type)

Actuator	Operating force Max.	Wire leads bottom type (Mounting hole: 3mm standard type)		
		Switching type	NC type	NO type
Pin plunger	1.5N	ASQ10610	ASQ10620	ASQ10630
Leaf lever	1.7N	ASQ10617	ASQ10627	ASQ10637
Simulated leaf lever	1.5N	ASQ10618	ASQ10628	ASQ10638

3. Wire leads side type (Mounting hole: 3mm standard type)

Actuator	Operating force Max.	Wire leads right side type (Mounting hole: 3mm standard type)		Wire leads left side type (Mounting hole: 3mm standard type)	
		NC type	NO type	NC type	NO type
Pin plunger	1.5N	ASQ10220	ASQ10230	ASQ10320	ASQ10330
Leaf lever	1.7N	ASQ10227	ASQ10237	ASQ10327	ASQ10337
Simulated leaf lever	1.5N	ASQ10228	ASQ10238	ASQ10328	ASQ10338

RATING

1. Rating

1 mA, 5 V DC to 100 mA, 30 V DC

Note: Please consult us regarding 42 V DC rating.

2. Operation environment and conditions

Item	Specifications
Ambient and storage temperature	-40°C to +85°C (no freezing and condensing)
Allowable operating speed	30 to 500 mm/sec.
Max. operating cycle rate	120 cpm

Note: When switching at low and high speeds or under vibration, or in high-temperature, high-humidity environments, life and performance may be reduced significantly depending on the load capacity. Please consult us.

3. Electrical characteristics

Withstand voltage (Initial)	Between non-continuous terminals: 600 Vrms, Between each terminal and other exposed metal parts: 1,500 Vrms, Between each terminal and ground: 1,500 Vrms (at detection current of 1 mA)
Insulation resistance (Initial)	Min. 100 MΩ (at 100 V DC insulation resistance meter) (Locations measured same as withstand voltage.)
Contact resistance (Initial)	Max. 1 Ω (at contact resistance meter)

4. Characteristics

Item		Specifications	
Electrical switching life	5 V DC 1 mA (resistive load)	Min. 5×10^5	Switching frequency: 20 times/min. Conduction ratio: 1:1 Pushbutton operation speed: 100 mm/s Pushbutton switching position: free position (FP) to operation limit position (TTP)
	16 V DC 50 mA (resistive load)	Min. 5×10^5	
	30 V DC 100 mA (resistive load)	Min. 2×10^5	
Vibration resistance (malfunction vibration resistance)		Single amplitude: 0.75 mm Amplitude of vibration: 10 to 55 Hz (4 minutes cycle) Direction and time: 30 minutes each in X, Y and Z directions	
		Amplitude of vibration: 5 to 200 Hz (10 minutes cycle) Acceleration: 43.1 m/s^2 Direction and time: 30 minutes each in X, Y and Z directions	
Shock resistance (malfunction shock resistance)		Shock value: 980 m/s^2 Direction and time: 5 times each in X, Y and Z directions	
Vibration resistance endurance		Frequency of vibration: 33.3 Hz, Acceleration: 43.1 m/s^2 Direction and time: 8 hours each in X, Y and Z directions	
Terminal strength		6 N min. (each direction) *Terminal deformation possible.	
Heat resistance		85°C 500 heures	
Cold resistance		-40°C 500 heures	
Humidity resistance		40°C 95% RH 500 heures	
High-temperature, high-humidity resistance		85°C 85% RH 500 heures	
Thermal shock resistance		30 min. at 85°C to 30 min at -40°C for 1,000 cycles	
Water resistance		Submersed for 30 min. under 1 m of water.	

Notes: As long as there are no particular designations, the following conditions apply to the test environment.

- Ambient temperature: 5 to 35°C
- Relative humidity: 25 to 85% RH
- Air pressure: 86 to 106 kPa

5. Protective structure

1) JIS C0920: Waterproof type

A concrete testing method is to check for any adverse effect on the structure after leaving it submerged for 30 minutes under 1 m of water (with temperature difference between water and switch no larger than 5°C).

2) IEC 529: IP67 (waterproof type)

A concrete testing method is to check for any adverse effect on the structure after leaving it submerged for 30 minutes under 1 m of water (with temperature difference between water and switch no larger than 5°C).

3) JIS D0203: Equivalent of D2

A concrete testing method is to check for any adverse effect on the structure after leaving it submerged for 30 minutes under 10 cm of water (with temperature difference between water and switch no larger than 30°C).

Note: Names of the standards can be found in the section describing features.

6. Operating characteristics

Actuator		Pin plunger	Leaf lever	Simulated leaf lever
Operating Force (max. O.F.) *Note 2		1.5N	1.7N	1.5N
Total travel Force (max. T.F.) (reference value)		(2.0N)	(3.1N)	(2.8N)
Free Position (max. F.P.)	From mounting boss and hole center line	9.2mm	11.5mm	14.4mm
	From standoff	13.4mm	15.7mm	18.6mm
Operating Position on NC side O.P. (N.C.) *Note 3	From mounting boss and hole center line	$8.7 \pm 0.3 \text{ mm}$	$9.8 \pm 0.5 \text{ mm}$	$12.5 \pm 0.5 \text{ mm}$
	From standoff	$12.9 \pm 0.3 \text{ mm}$	$14.0 \pm 0.5 \text{ mm}$	$16.7 \pm 0.5 \text{ mm}$
Operating Position on NO side O.P. (N.O.) *Note 4	From mounting boss and hole center line	$8.4 \pm 0.3 \text{ mm}$	$9.3 \pm 0.5 \text{ mm}$	$12.0 \pm 0.5 \text{ mm}$
	From standoff	$12.6 \pm 0.3 \text{ mm}$	$13.5 \pm 0.5 \text{ mm}$	$16.2 \pm 0.5 \text{ mm}$
Release Position on NC side R.P. (N.C.) *Note 5	From mounting boss and hole center line	$8.8 \pm 0.3 \text{ mm}$	$10.1 \pm 0.5 \text{ mm}$	$12.9 \pm 0.5 \text{ mm}$
	From standoff	$13.0 \pm 0.3 \text{ mm}$	$14.3 \pm 0.5 \text{ mm}$	$17.1 \pm 0.5 \text{ mm}$
Release Position on NO side R.P. (N.O.) *Note 6	From mounting boss and hole center line	$8.5 \pm 0.3 \text{ mm}$	$9.6 \pm 0.5 \text{ mm}$	$12.4 \pm 0.5 \text{ mm}$
	From standoff	$12.7 \pm 0.3 \text{ mm}$	$13.8 \pm 0.5 \text{ mm}$	$16.6 \pm 0.5 \text{ mm}$
Over travel on N.C. side (min. O.T. (N.C.))		2.5mm	3.1mm	3.3mm
Over travel on N.O. side (min. O.T. (N.O.))		2.2mm	2.6mm	2.8mm
Total Travel Position (T.T.P.) (reference value)	From mounting boss and hole center line	(5.9mm)	(6.2mm)	(8.7mm)
	From standoff	(10.1mm)	(10.4mm)	(12.9mm)

Notes: 1. The above indicates the characteristics when operating the pushbutton from the vertical direction.

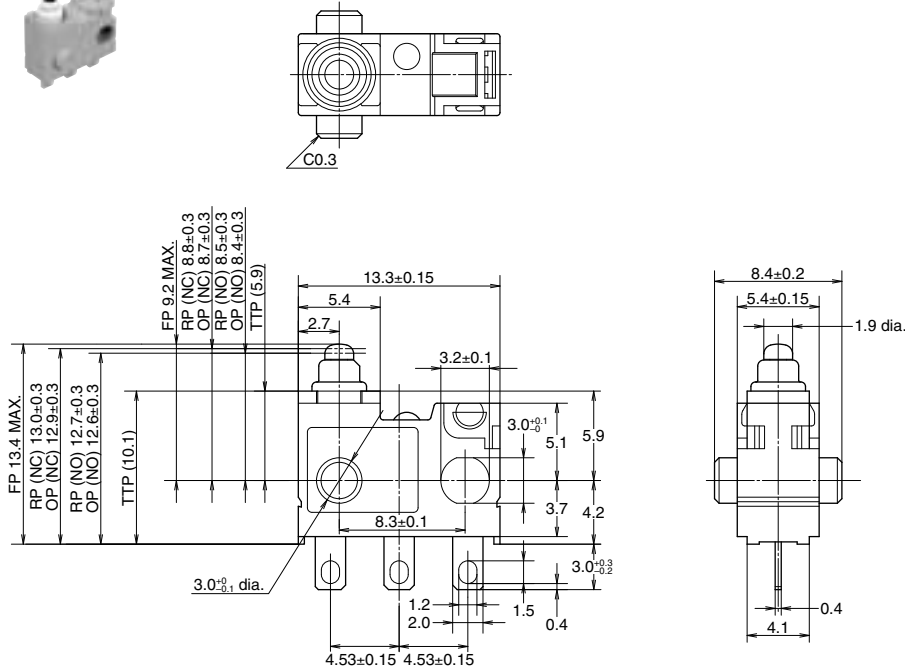
2. Indicates operation load for NO contact to achieve ON status.
3. Indicates position for NC contact to achieve OFF status.
4. Indicates position for NO contact to achieve ON status.
5. Indicates position for NC contact to achieve ON status.
6. Indicates position for NO contact to achieve OFF status.

DIMENSIONS

mm General tolerance: ±0.25

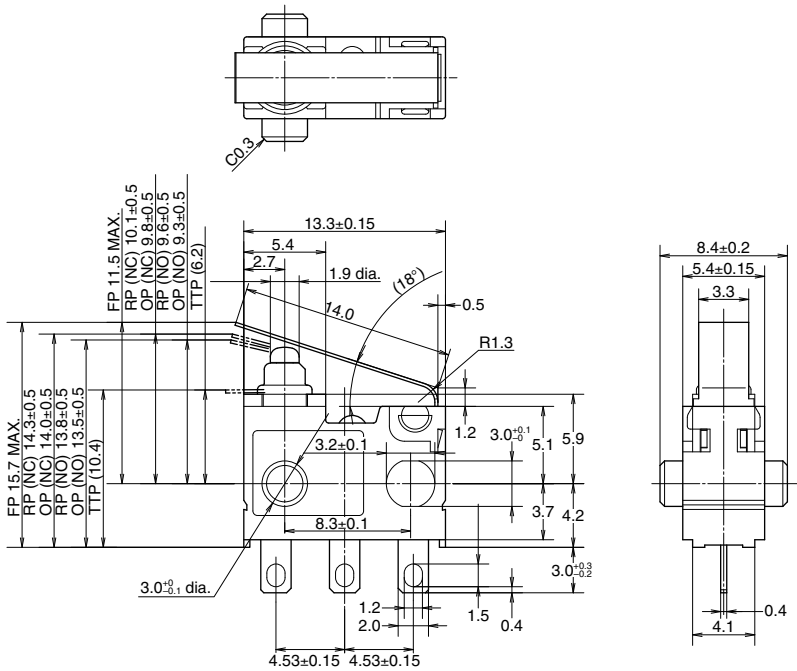
1. Terminal type: Mounting hole 3mm, standard type

Pin plunger



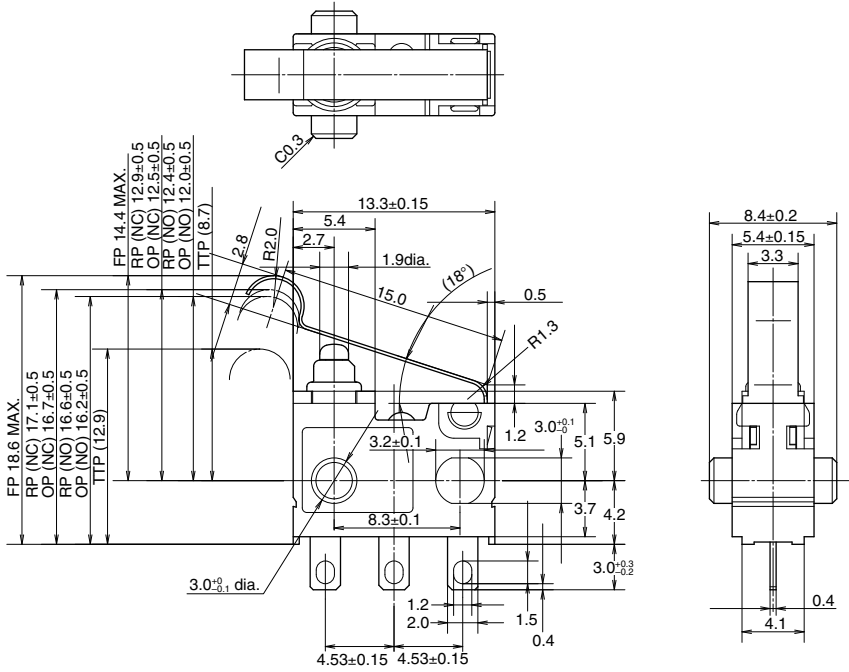
Operating Force (max. O.F.)		1.5N
Free Position (max. F.P.)	From mounting boss and hole center line	9.2mm
	From standoff	13.4mm
Operating Position on NC side O.P. (N.C.)	From mounting boss and hole center line	8.7±0.3mm
	From standoff	12.9±0.3mm
Operating Position on NO side O.P. (N.O.)	From mounting boss and hole center line	8.4±0.3mm
	From standoff	12.6±0.3mm
Release Position on NC side R.P. (N.C.)	From mounting boss and hole center line	8.8±0.3mm
	From standoff	13.0±0.3mm
Release Position on NO side R.P. (N.O.)	From mounting boss and hole center line	8.5±0.3mm
	From standoff	12.7±0.3mm
Over travel on N.C. side (min. O.T. (N.C.))		2.5mm
Over travel on N.O. side (min. O.T. (N.O.))		2.2mm

Leaf lever



Operating Force (max. O.F.)		1.7N
Free Position (max. F.P.)	From mounting boss and hole center line	11.5mm
	From standoff	15.7mm
Operating Position on NC side O.P. (N.C.)	From mounting boss and hole center line	9.8±0.5mm
	From standoff	14.0±0.5mm
Operating Position on NO side O.P. (N.O.)	From mounting boss and hole center line	9.3±0.5mm
	From standoff	13.5±0.5mm
Release Position on NC side R.P. (N.C.)	From mounting boss and hole center line	10.1±0.5mm
	From standoff	14.3±0.5mm
Release Position on NO side R.P. (N.O.)	From mounting boss and hole center line	9.6±0.5mm
	From standoff	13.8±0.5mm
Over travel on N.C. side (min. O.T. (N.C.))		3.1mm
Over travel on N.O. side (min. O.T. (N.O.))		2.6mm

Note: When switching at high speed or under shock, lever endurance may drop. Therefore, please be sure to conduct an endurance evaluation under actual switching conditions.

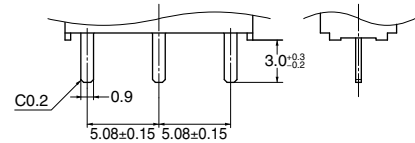
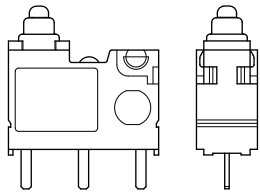


Operating Force (max. O.F.)		1.5N
Free Position (max. F.P.)	From mounting boss and hole center line	14.4mm
	From standoff	18.6mm
Operating Position on NC side O.P. (N.C.)	From mounting boss and hole center line	12.5±0.5mm
	From standoff	16.7±0.5mm
Operating Position on NO side O.P. (N.O.)	From mounting boss and hole center line	12.0±0.5mm
	From standoff	16.2±0.5mm
Release Position on NC side R.P. (N.C.)	From mounting boss and hole center line	12.9±0.5mm
	From standoff	17.1±0.5mm
Release Position on NO side R.P. (N.O.)	From mounting boss and hole center line	12.4±0.5mm
	From standoff	16.6±0.5mm
Over travel on N.C. side (min. O.T. (N.C.))		3.3mm
Over travel on N.O. side (min. O.T. (N.O.))		2.8mm

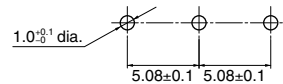
Note: When switching at high speed or under shock, lever endurance may drop. Therefore, please be sure to conduct an endurance evaluation under actual switching conditions.

Mounting hole: 3 mm without boss type

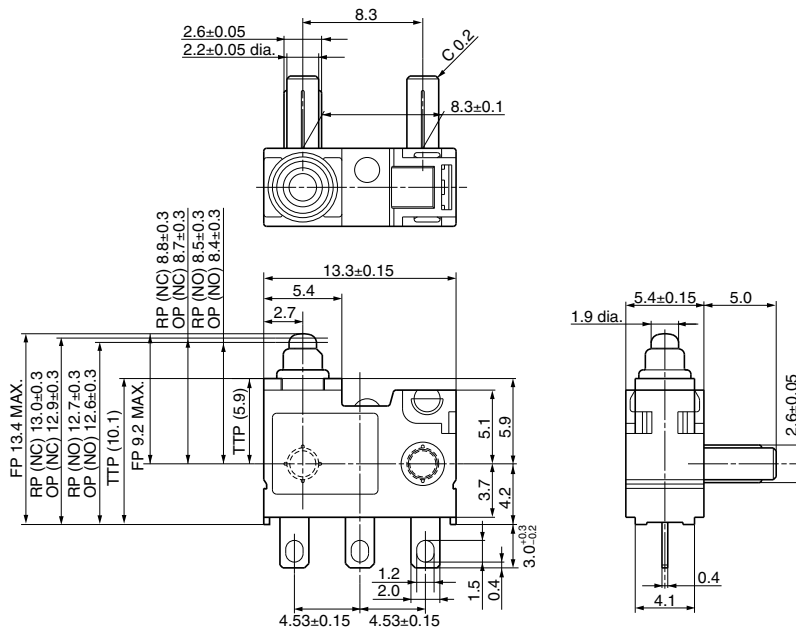
PC board terminal



PC board pattern

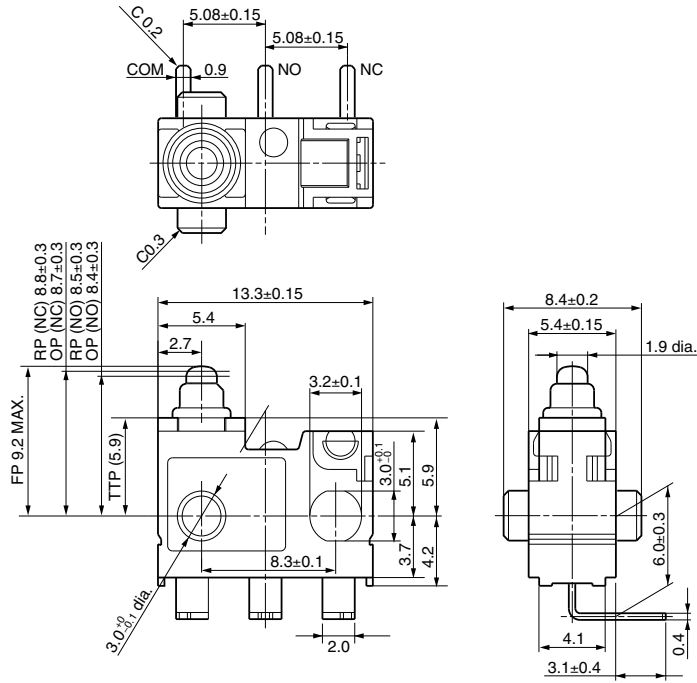


2. Right side pin type (Solder terminal only)

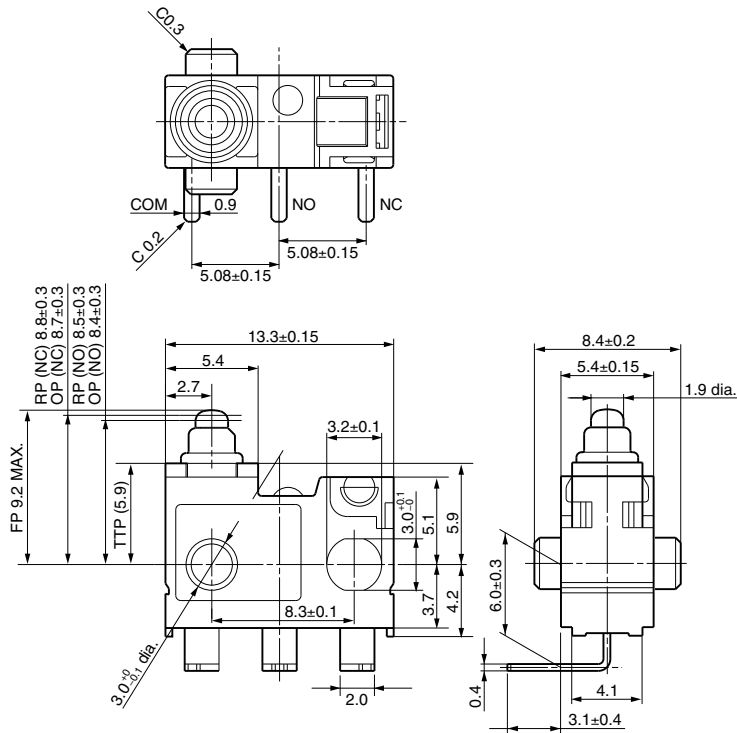


3. Angle terminal type (3 mm standard type only)

Right type

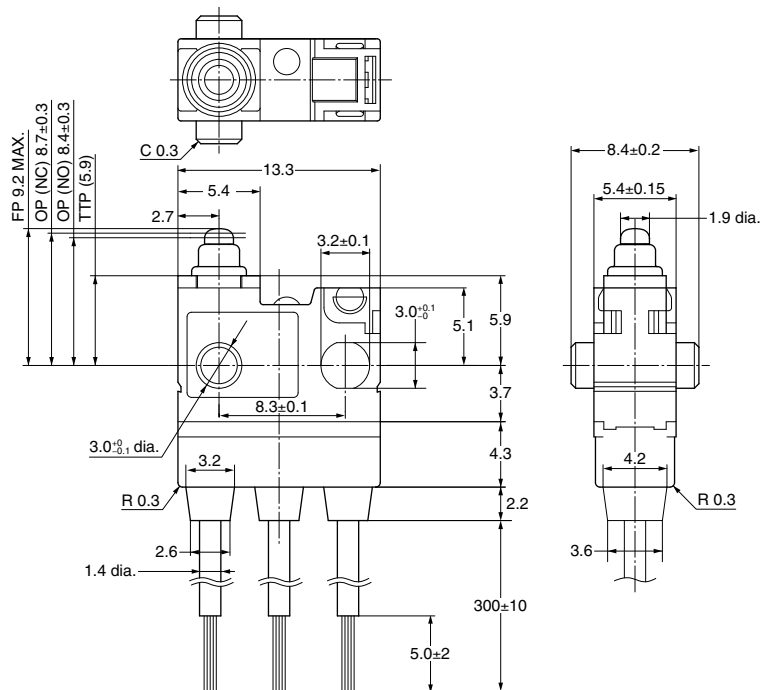


Left type (3 mm standard type only)



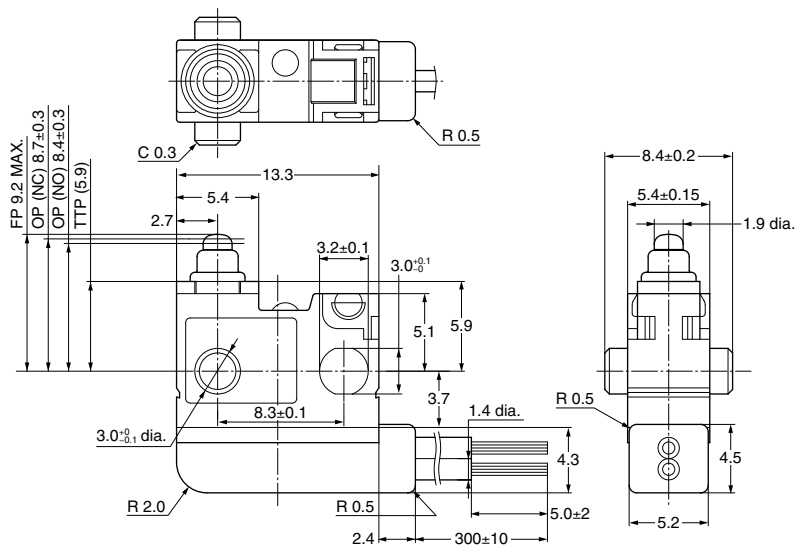
4. Wire leads bottom type: Mounting hole 3mm, standard type

mm General tolerance: ± 0.25



* Wire lead thickness : 0.3mm²
Wire lead color : COM Black
: NC Red
: NO White

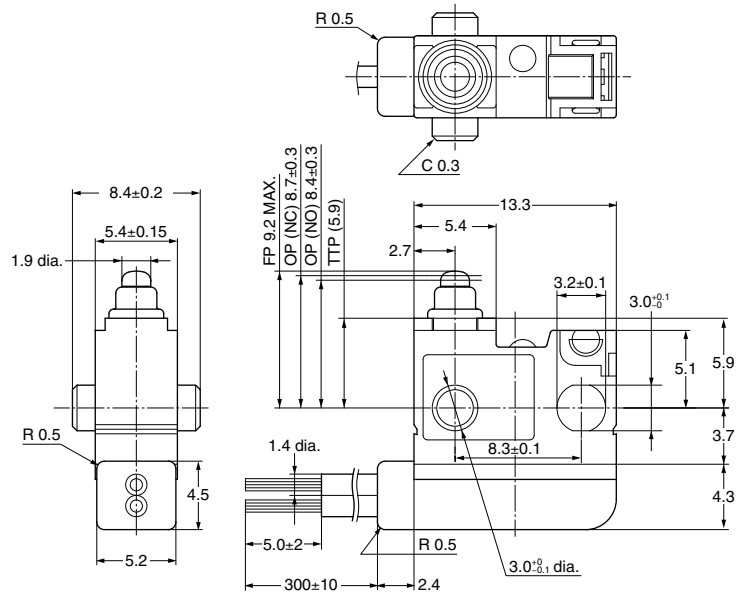
5. Wire leads right side type: Mounting hole 3mm, standard type



* Wire lead thickness : 0.3mm²
Wire lead color : COM Black
: NC Red
: NO White

6. Wire leads left side type: Mounting hole 3mm, standard type

mm General tolerance: ±0.25



* Wire lead thickness : 0.3mm²
 Wire lead color : COM ---- Black
 : NC Red
 : NO White

NOTES

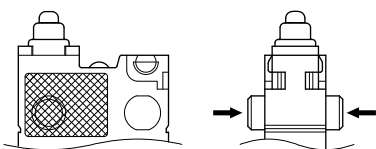
1. Soldering conditions

The application of excessive heat upon the switch when soldering can cause degradation of switch operation. Therefore, be sure to keep within the conditions given below.

- 1) Manual soldering: use soldering irons (max. 350°C, within 3 seconds) capable of temperature adjustment. This is to prevent deterioration due to soldering heat. Care should be taken not to apply force to the terminals during soldering.
- 2) Automatic soldering: Soldering must be done as below;
 260°C: within 6 seconds
 350°C: within 3 seconds

2. Mounting

Please avoid use in which load would be applied to the sides (hatch part (both sides) shown below) of the switch in the direction indicated by the arrows. This could cause erroneous operation. Also, when using a metal installation board, please make allowance for burr direction designation and burr suppressing, etc., so that the burr side will not be on the switch installation side.



- 1) To secure the switch, please use an M3 small screw on a flat surface and tighten using a maximum torque of 0.29 N·m. It is recommended that spring washers be used with the screws and adhesive be applied to lock the screws to prevent loosening of the screws. Please make sure not to apply adhesive onto the moving parts.
- 2) Be sure to maintain adequate insulating clearance between each terminal and ground.
- 3) Although it is possible to directly operate the pin plunger type from the lateral direction, please consult us if doing so.
- 4) After mounting please make sure no tensile load will be applied to the switch terminals.
- 5) Range of possible use: Please set the operation position to within the ranges in the following table so that there is sufficient insulation distance and to maintain contact reliability.

Actuator	Plunger/lever free	
	From mounting boss and hole center line	From standoff
Pin plunger	>9.2	>13.4
Leaf lever	>10.7	>14.9
Simulated leaf lever	>13.5	>17.7

Actuator	Plunger/Lever pushed	
	From mounting boss and hole center line	From standoff
Pin plunger	7.8 to 5.9	12.0 to 10.1
Leaf lever	8.4 to 6.2	12.6 to 10.4
Simulated leaf lever	11.1 to 8.7	15.3 to 12.9

6) PC board terminal type should be used if the products are to be soldered on the PC board. Solder terminal type is not for soldering on PC board.

3. Cautions regarding the circuit

- 1) In order to prevent malfunction in set devices caused by bounce and chattering during the ON-OFF switch operation, please verify the validity of the circuit under actual operating conditions and temperature range.
- 2) When switching inductive loads (relays, solenoids, buzzers, etc.), an arc absorbing circuit is recommended to protect the contacts.

4. Please verify under actual conditions.

Please be sure to conduct quality verification under actual operating conditions in order to increase reliability during actual use.

5. Switch selection

Please make your selection so that there will be no problems even if the operating characteristics vary up to ±20% from the standard values.

6. Oil-proof and chemical-proof characteristics

The rubber cap swells when exposed to oil and chemicals. The extent of swelling will vary widely depending on the type and amount of oil and chemicals.

Check with the actual oil or chemicals used.

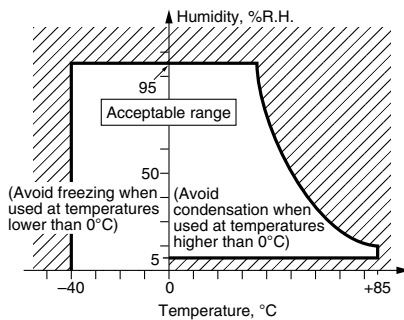
In particular, be aware that solvents such as freon, chlorine, and toluene cannot be used.

7. Environment

• Although continuous operation of the switch is possible within the range of ambient temperature (humidity), as the humidity range differs depending on the ambient temperature, the humidity range indicated below should be used.

Continuous use near the limit of the range should be avoided.

• This humidity range does not guarantee permanent performance.



8. Other

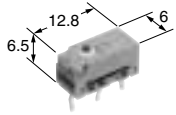
1) Please remember that this switch cannot be used under water. Also, please be warned that switching and sudden temperature changes with the presence of water droplets can cause seepage into the unit.

2) Keep away from environments where silicon based adhesives, oil or grease are present as faulty contacts may result from silicon oxide. Do not use in areas where flammable or explosive gases from gasoline and thinner, etc., may be present.

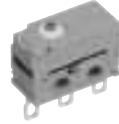
3) When using the lever type, please be careful not to apply unreasonable load from the reverse or lateral directions of operation.

4) Do not exceed the total travel position (TTP) and press the actuator. This could cause operation failure. Also, when switching at high speed or under shock even within the operation limit, the working life may decrease. Therefore, please be sure to verify the quality under actual conditions of use.

5) Please make considerations so that the switch does not become the stopper for the moving part.



Dust protected type



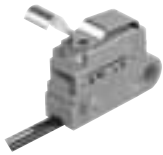
(Mounting hole
2.3mm type)



Immersion protected type
(wire leads bottom type)



(Mounting hole
2.3mm type)



Immersion protected
(wire leads side type)



Long stroke type

FEATURES

- **Ultra-miniature size (12.8×6.5×6 mm)**
- **Sealed construction for use in adverse environment-Sealed construction by epoxy resin and rubber cap greatly reduces possible miscontact due to contaminants such as dust. Conforming to IP67* of IEC protective construction classification**
- **Elastomer double molding technology, an industry first and ultrasonic swaging technology contribute to uniform sealing in high production quantities**
- **UL/CSA approved (Except the long stroke type of ABJ2 and the side wire leads type.)**
- **Long stroke type is available**
Since the repeatability is excellent and the play distance (overtravel) from the operating position is ample, the task of performing adjustments during installation is easy.
Operating position accuracy ±0.4 mm
Overtravel= Min. 2.0 mm
As wide range of high pressure is achieved, a stable reliability is ensured
- **Leaf lever side wire leads type added. We now offer two types.**
M3 type installation hole
Fixed pin type

TYPICAL APPLICATIONS

- **Industrial use video jack**
 - **Automotive (ex. Device for opening and shutting of automobile doors)**
- * Based on the protective construction classification of IEC, items which satisfy the test requirements are denoted with an IP designation.

<http://panasonic-denko.co.jp/ac/e/service/environment>

ORDERING INFORMATION

(If Agency standard required, please refer to the "with Agency standard type". See next page.)

Ex. ABJ 1 4 1 0 4 0

Type of switch	Size of mounting hole	Terminal	Contact arrangement	Actuator	Operating force by pin plunger (max.)	Contact
ABJ: Turquoise switch J type	1: 1.2 mm 2: 2.3 mm 3: 3 mm 4: Fixed pin (right side pin) type Fixed pin (left side pin) type	4: Solder terminal 5: PC board terminal 6: Wire leads (bottom type) 7: Wire leads (right side type) 8: Wire leads (left side type)	1: SPDT 2: SPST-NC (Wire leads type only) 3: SPST-NO (Wire leads type only)	0: Pin plunger 2: Hinge lever 4: Simulated roller lever 6: Roller lever 8: Leaf lever (Mounting hole 3 mm lead wire type only) L: Long stroke type	4: 1.23 N 6: 1.96 N 7: 2.45 N (Long stroke type only)	0: AgNi alloy 1: AgNi alloy + Au clad

Remarks: 1. Standard packing: Dust protected type 100 pcs./carton, 2,000 pcs./case; Immersion protected type 50 pcs./case.
2. Not every combination is available. Please refer to the following table, "PRODUCT TYPES".

ABJ1,2,3,4,5

With Agency standard type

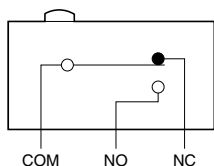
Ex. **ABJ** **1** **4** **1** **0** **4** **0** **9**

Type of switch	Size of mounting hole	Terminal	Contact arrangement	Actuator	Operating force by pin plunger (max.)	Contact	Agency standard
ABJ: Turquoise switch J type	1: 1.2 mm 2: 2.3 mm 3: 3 mm	4: Solder terminal 5: PC board terminal 6: Wire leads (bottom type)	1: SPDT 2: SPST-NC (Wire leads type only) 3: SPST-NO (Wire leads type only)	0: Pin plunger 2: Hinge lever 4: Simulated roller lever 6: Roller lever 8: Leaf lever (Mounting hole 3 mm lead wire type only)	4: 1.23 N 6: 1.96 N	0: AgNi alloy 1: AgNi alloy + Au clad	9: UL/CSA 6×10^3 rated

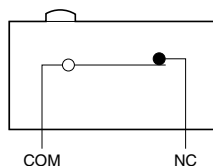
Remarks: 1. Standard packing: Dust protected type 100 pcs./carton, 2,000 pcs./case; Immersion protected type 50 pcs./case.
2. Not every combination is available. Please refer to the following table, "PRODUCT TYPES".

CONTACT ARRANGEMENT

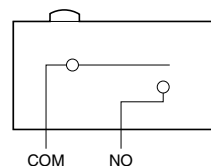
1. SPDT



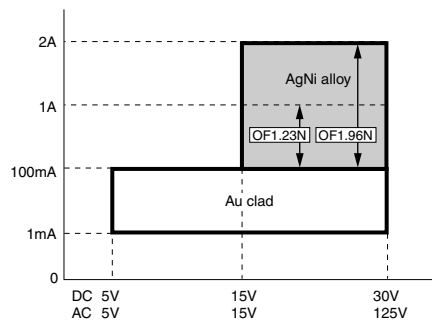
2. SPST-NC (Wire leads type only)



3. SPST-NO (Wire leads type only)



APPLICABLE CURRENT RANGE (reference)



Note) OF: Value of pin plunger

PRODUCT TYPES**1. Dust protected type (Terminal type)**

Mounting hole 1.2mm type / Mounting hole 2.3mm type

AgNi alloy

Actuator	Operating force Max.	Mounting hole 1.2 mm type		Mounting hole 2.3 mm type
		Solder terminal	PC board terminal	Solder terminal
Pin plunger	1.23 N	ABJ1410409	ABJ1510409	ABJ2410409
	1.96 N	ABJ1410609	ABJ1510609	ABJ2410609
Hinge lever	0.39 N	ABJ1412409	ABJ1512409	ABJ2412409
	0.64 N	ABJ1412609	ABJ1512609	ABJ2412609
Simulated roller lever	0.39 N	ABJ1414409	ABJ1514409	ABJ2414409
	0.64 N	ABJ1414609	ABJ1514609	ABJ2414609
Roller lever	0.39 N	ABJ1416409	ABJ1516409	ABJ2416409
	0.64 N	ABJ1416609	ABJ1516609	ABJ2416609

AgNi alloy + Au clad

Actuator	Operating force Max.	Mounting hole 1.2 mm type		Mounting hole 2.3 mm type
		Solder terminal	PC board terminal	Solder terminal
Pin plunger	1.23 N	ABJ1410419	ABJ1510419	ABJ2410419
	1.96 N	ABJ1410619	ABJ1510619	ABJ2410619
Hinge lever	0.39 N	ABJ1412419	ABJ1512419	ABJ2412419
	0.64 N	ABJ1412619	ABJ1512619	ABJ2412619
Simulated roller lever	0.39 N	ABJ1414419	ABJ1514419	ABJ2414419
	0.64 N	ABJ1414619	ABJ1514619	ABJ2414619
Roller lever	0.39 N	ABJ1416419	ABJ1516419	ABJ2416419
	0.64 N	ABJ1416619	ABJ1516619	ABJ2416619

2-(1). Immersion protected type (Bottom wire leads type)

Mounting hole 1.2mm type

AgNi alloy

Actuator	Operating force Max.	Mounting hole 1.2 mm type		
		SPDT	SPST-NC	SPST-NO
Pin plunger	1.23 N	ABJ1610409	ABJ1620409	ABJ1630409
	1.96 N	ABJ1610609	ABJ1620609	ABJ1630609
Hinge lever	0.39 N	ABJ1612409	ABJ1622409	ABJ1632409
	0.64 N	ABJ1612609	ABJ1622609	ABJ1632609
Simulated roller lever	0.39 N	ABJ1614409	ABJ1624409	ABJ1634409
	0.64 N	ABJ1614609	ABJ1624609	ABJ1634609
Roller lever	0.39 N	ABJ1616409	ABJ1626409	ABJ1636409
	0.64 N	ABJ1616609	ABJ1626609	ABJ1636609

Mounting hole 2.3mm type

AgNi alloy + Au clad

Actuator	Operating force Max.	Mounting hole 1.2 mm type		
		SPDT	SPST-NC	SPST-NO
Pin plunger	1.23 N	ABJ1610419	ABJ1620419	ABJ1630419
	1.96 N	ABJ1610619	ABJ1620619	ABJ1630619
Hinge lever	0.39 N	ABJ1612419	ABJ1622419	ABJ1632419
	0.64 N	ABJ1612619	ABJ1622619	ABJ1632619
Simulated roller lever	0.39 N	ABJ1614419	ABJ1624419	ABJ1634419
	0.64 N	ABJ1614619	ABJ1624619	ABJ1634619
Roller lever	0.39 N	ABJ1616419	ABJ1626419	ABJ1636419
	0.64 N	ABJ1616619	ABJ1626619	ABJ1636619

ABJ1,2,3,4,5

Mounting hole 2.3mm type
AgNi alloy

Actuator	Operating force Max.	Mounting hole 2.3 mm type		
		SPDT	SPST-NC	SPST-NO
Pin plunger	1.23 N	ABJ2610409	ABJ2620409	ABJ2630409
	1.96 N	ABJ2610609	ABJ2620609	ABJ2630609
Hinge lever	0.39 N	ABJ2612409	ABJ2622409	ABJ2632409
	0.64 N	ABJ2612609	ABJ2622609	ABJ2632609
Simulated roller lever	0.39 N	ABJ2614409	ABJ2624409	ABJ2634409
	0.64 N	ABJ2614609	ABJ2624609	ABJ2634609
Roller lever	0.39 N	ABJ2616409	ABJ2626409	ABJ2636409
	0.64 N	ABJ2616609	ABJ2626609	ABJ2636609

AgNi alloy + Au clad

Actuator	Operating force Max.	Mounting hole 2.3 mm type		
		SPDT	SPST-NC	SPST-NO
Pin plunger	1.23 N	ABJ2610419	ABJ2620419	ABJ2630419
	1.96 N	ABJ2610619	ABJ2620619	ABJ2630619
Hinge lever	0.39 N	ABJ2612419	ABJ2622419	ABJ2632419
	0.64 N	ABJ2612619	ABJ2622619	ABJ2632619
Simulated roller lever	0.39 N	ABJ2614419	ABJ2622419	ABJ2634419
	0.64 N	ABJ2614619	ABJ2624619	ABJ2634619
Roller lever	0.39 N	ABJ2616419	ABJ2626419	ABJ2636419
	0.64 N	ABJ2616619	ABJ2626619	ABJ2636619

Mounting hole 3mm type (Leaf lever type)
AgNi alloy

Actuator	Operating force Max.	Mounting hole 3 mm type		
		SPDT	SPST-NC	SPST-NO
Leaf lever	0.98 N	ABJ3618409	ABJ3628409	ABJ3638409
	1.27 N	ABJ3618609	ABJ3628609	ABJ3638609

AgNi alloy + Au clad

Actuator	Operating force Max.	Mounting hole 3 mm type		
		SPDT	SPST-NC	SPST-NO
Leaf lever	0.98 N	ABJ3618419	ABJ3628419	ABJ3638419
	1.27 N	ABJ3618619	ABJ3628619	ABJ3638619

2-(2). Immersion protected type (Side wire leads type)

Fixed pin (right side pin) type
AgNi alloy

Actuator	Operating force Max.	Wire leads direction	Wire leads type	
			SPST-NC	SPST-NO
Leaf lever	1.27 N	Right	ABJ472840	ABJ473840
	1.27 N	Left	ABJ482840	—
	1.76 N	Right	ABJ472860	ABJ473860
	1.76 N	Left	ABJ482860	—

AgNi alloy + Au clad

Actuator	Operating force Max.	Wire leads direction	Wire leads type	
			SPST-NC	SPST-NO
Leaf lever	1.27 N	Right	ABJ472841	ABJ473841
	1.27 N	Left	ABJ482841	—
	1.76 N	Right	ABJ472861	ABJ473861
	1.76 N	Left	ABJ482861	—

Fixed pin (left side pin) type
AgNi alloy

Actuator	Operating force Max.	Wire leads direction	Wire leads type	
			SPST-NC	SPST-NO
Leaf lever	1.27 N	Right	ABJ572840	ABJ573840
	1.27 N	Left	ABJ582840	—
	1.76 N	Right	ABJ572860	ABJ573860
	1.76 N	Left	ABJ582860	—

AgNi alloy + Au clad

Actuator	Operating force Max.	Wire leads direction	Wire leads type	
			SPST-NC	SPST-NO
Leaf lever	1.27 N	Right	ABJ572841	ABJ573841
	1.27 N	Left	ABJ582841	—
	1.76 N	Right	ABJ572861	ABJ573861
	1.76 N	Left	ABJ582861	—

Mounting hole 3mm type
AgNi alloy

Actuator	Operating force Max.	Wire leads direction	Wire leads type	
			SPST-NC	SPST-NO
Leaf lever	1.27 N	Left	ABJ382840	—
	1.76 N		ABJ382860	—

AgNi alloy + Au clad

Actuator	Operating force Max.	Wire leads direction	Wire leads type	
			SPST-NC	SPST-NO
Leaf lever	1.27 N	Left	ABJ382841	—
	1.76 N		ABJ382861	—

3. Immersion protected type (Bottom wire leads type) Long stroke type

Mounting hole 2.3mm type
AgNi alloy

Actuator	Operating force Max.	Mounting hole 2.3 mm type		
		SPDT	SPST-NC	SPST-NO
Pin plunger (Horizontal)	2.45 N	*ABJ261L70	ABJ262L70	ABJ263L70

AgNi alloy + Au clad

Actuator	Operating force Max.	Mounting hole 2.3 mm type		
		SPDT	SPST-NC	SPST-NO
Pin plunger (Horizontal)	2.45 N	*ABJ261L71	ABJ262L71	ABJ263L71

SPECIFICATIONS

1. Contact rating

Type	Operating force Max.	Standard rating	Low-level circuit rating
AgNi alloy contact	1.76 N, 1.96 N	2 A 125 V AC 2 A 30 V DC	—
	1.23 N, 1.27 N	1 A 125 V AC 1 A 30 V DC	—
Long stroke type AgNi alloy contact	2.45 N	1 A 125 V AC 1 A 30 V DC	—
AgNi alloy + Au clad contact	1.23 N, 1.27 N 1.76 N, 1.96 N	0.1 A 125 V AC	5 mA 6 V DC 2 mA 12 V DC 1 mA 24 V DC
Long stroke type AgNi alloy + Au clad contact	2.45 N	0.1 A 125 V AC 0.1 A 30 V DC	5 mA 6 V DC 2 mA 12 V DC 1 mA 24 V DC

ABJ1,2,3,4,5

2. Characteristics

Mechanical life (O.T.: Specified value)	Leaf lever, Long stroke type	Min. 5×10^5 (at 60 cpm)
	Wire leads (right & left side type)	Min. 3×10^5 (at 60 cpm)
	Other types	Min. 10^6 (at 60 cpm)
Electrical life at rated load (O.T.: max.)	AgNi alloy contact type	Min. 3×10^4 (at 20 cpm)
	AgNi alloy + Au clad contact type	Min. 10^5 (at 20 cpm)
Insulation resistance		Min. 100 M Ω (at 500 V DC insulation resistance meter)
Dielectric strength		
Between non-continuous terminals		600 Vrms
Between each terminal and other exposed metal parts		1,500 Vrms
Between each terminal and ground		1,500 Vrms
Vibration resistance (Pin plunger type)		10 to 55 Hz at single amplitude of 0.75 mm (Contact opening max. 1 msec.)
Shock resistance (Pin plunger type)		Min. 294 m/s ² {30 G} (Contact opening max. 1 msec.)
Contact resistance (Initial)	Silver contact type	Dust protected type (IP50): Max. 50 m Ω Immersion protected type (IP67): Max. 100 m Ω (By voltage drop 1 A 6 to 8 V DC)
	Gold clad contact type	Dust protected type (IP50): Max. 100 m Ω Immersion protected type (IP67): Max. 150 m Ω (By voltage drop 0.1 A 6 to 8 V DC)
Allowable operating speed (at no load)		1 to 500 mm/sec.
Max. operating cycle rate (at no load)		Other type: 120 cpm Long stroke type: 60 cpm
Ambient temperature		-40°C to +85°C
Unit weight		Approx. 0.5 g (IP50 type)

3. Operating characteristics

Type of actuator	Operating force, Max.	Release force, Min	Pretravel, Max. mm	Movement differential, Max. mm	Overtravel, Min. mm	Operating position, mm
Pin plunger	1.23N	0.15N	0.6	0.12	0.25	Mounting hole: 1.2 5.5 \pm 0.2
	1.96N	0.25N				Mounting hole: 2.3 7.0 \pm 0.2
Hinge lever	0.39N	0.029N	3.0	0.5	0.5	Mounting hole: 1.2 6.8 \pm 1.0
	0.64N	0.049N				Mounting hole: 2.3 8.3 \pm 1.0
Simulated roller lever	0.39N	0.029N	3.0	0.5	0.5	Mounting hole: 1.2 9.8 \pm 1.0
	0.64N	0.049N				Mounting hole: 2.3 11.3 \pm 1.0
Roller lever	0.39N	0.029N	3.0	0.5	0.5	Mounting hole: 1.2 13.1 \pm 1.0
	0.64N	0.049N				Mounting hole: 2.3 14.6 \pm 1.0
Leaf lever	0.98N	0.20N	6.0	1.0	2.5	Mounting hole: 3.0 16.0 \pm 2.0
	1.27N	0.22N	2.6	0.5	1.4	Fixed pin type 10.7 \pm 0.7 Mounting hole: 3.0 16.25 \pm 0.7
	1.76N	0.26N	2.6	0.5	1.4	Fixed pin type 10.7 \pm 0.7 Mounting hole: 3.0 16.25 \pm 0.7
	1.27N	0.29N	6.0	1.0	2.5	Mounting hole: 3.0 16.0 \pm 2.0
Long stroke type	2.45N	0.20N	—	0.5	2.0	2.5 \pm 0.4

Note: The O.P. differs between the 1.2 mm and 2.3 mm dia. installation hole types.

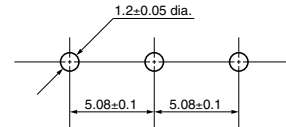
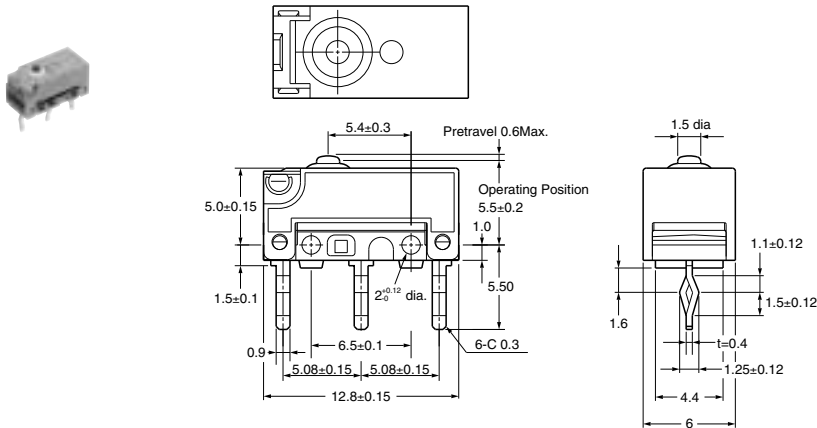
DIMENSIONS

1. Dust protected type

1-(1) PC board terminal

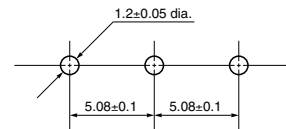
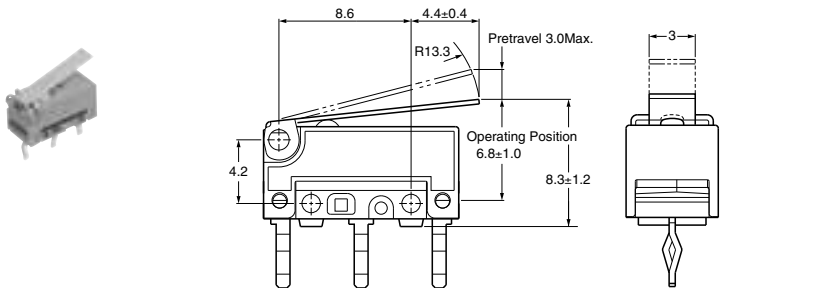
Mounting hole 1.2 mm type

Pin plunger



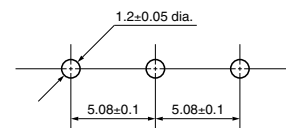
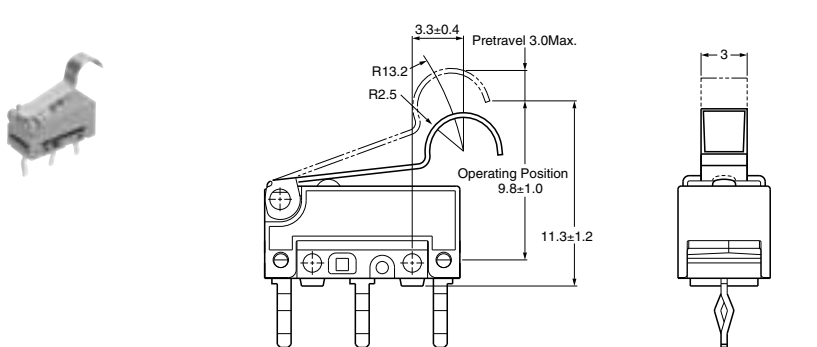
Pretravel, Max. mm	0.6	
Movement differential, Max. mm	0.12	
Overtravel, Min. mm	0.25	
Operating position	Distance from mounting hole, mm	5.5±0.2
	Distance from stand-off, mm	7±0.3

Hinge lever



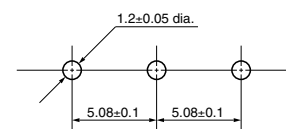
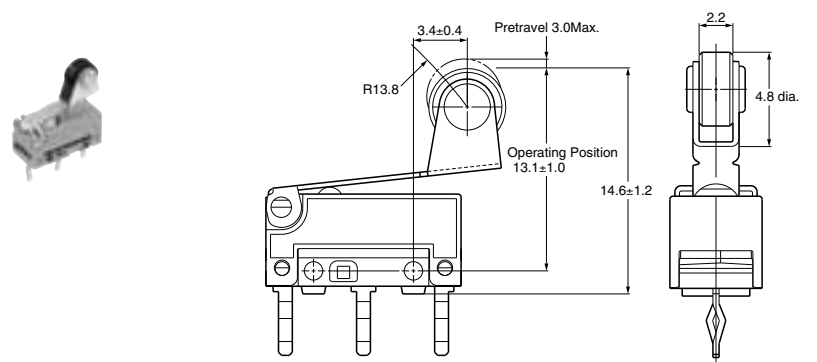
Pretravel, Max. mm	3.0	
Movement differential, Max. mm	0.5	
Overtravel, Min. mm	0.5	
Operating position	Distance from mounting hole, mm	6.8±1.0
	Distance from stand-off, mm	8.3±1.2

Simulated roller lever



Pretravel, Max. mm	3.0	
Movement differential, Max. mm	0.5	
Overtravel, Min. mm	0.5	
Operating position	Distance from mounting hole, mm	9.8±1.0
	Distance from stand-off, mm	11.3±1.2

Roller lever

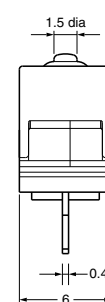
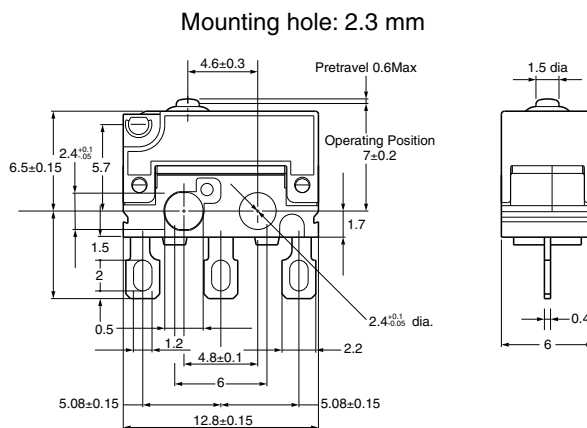
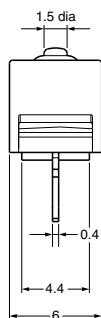
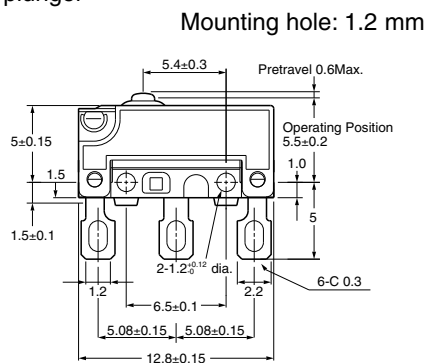


Pretravel, Max. mm	3.0	
Movement differential, Max. mm	0.5	
Overtravel, Min. mm	0.5	
Operating position	Distance from mounting hole, mm	13.1±1.0
	Distance from stand-off, mm	14.6±1.0

ABJ1,2,3,4,5

1-(2) Solder terminal
Pin plunger

mm General tolerance: ± 0.25

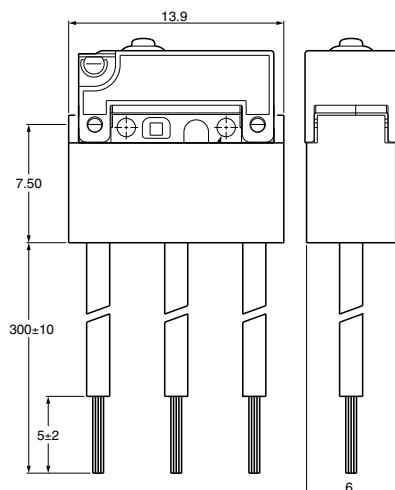


Remarks: Dimensions of the actuator type are the same as corresponding PC board terminal types.

2. Immersion protected type

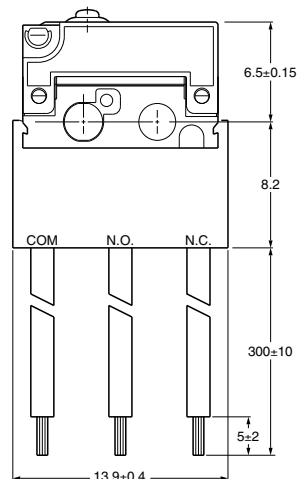
2-(1) Bottom wire leads type
Pin plunger

Mounting hole: 1.2 mm



Thickness of the lead wire: 0.3 mm²
UL/CSA approved type: AWG22
Color of the lead wire:
COM ...Black
N.C. ...Red
N.O. ...White

Mounting hole: 2.3 mm

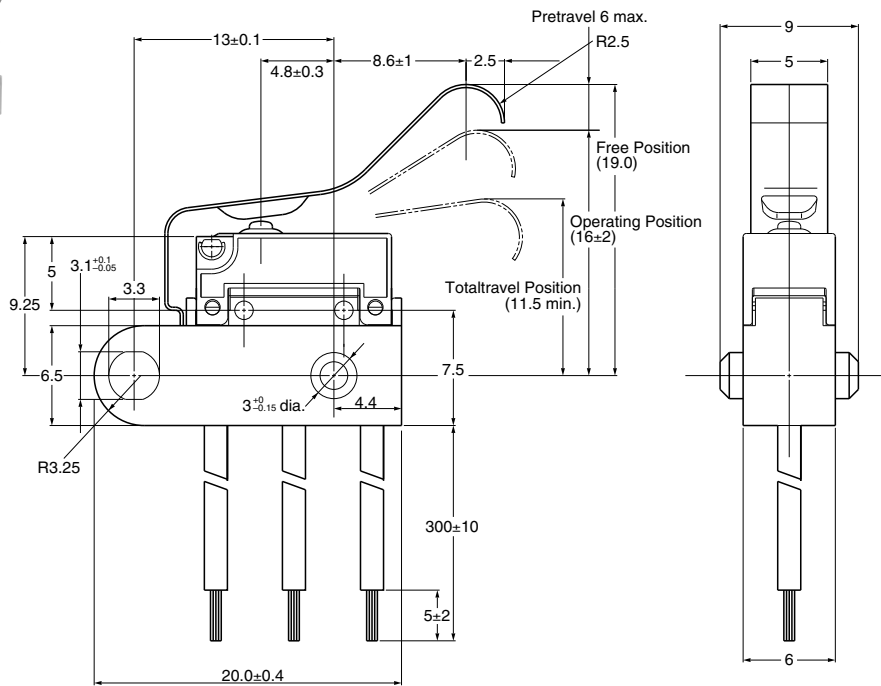
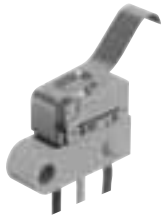


Thickness of the lead wire: 0.3 mm²
UL/CSA approved type: AWG22
Color of the lead wire:
COM ...Black
N.C.Red
N.O. ...White

Remarks: 1. As for M1.2 type, other dimensions are the same as those of corresponding PC board terminal types.
As for M2.3 type, other dimensions are the same as those of corresponding solder terminal types.
2. Dimensions of the actuator type are the same as corresponding PC board terminal types.

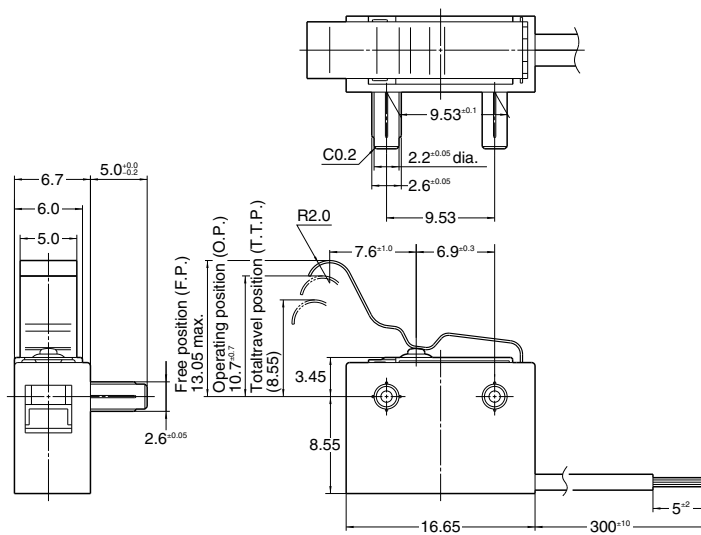
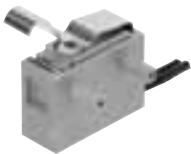
Leaf lever
Mounting hole: 3 mm

mm General tolerance: ± 0.25



Pretravel, Max. mm	6.0
Movement differential, Max. mm	1.0
Overtravel, Min mm	2.5
Operating position	Distance from mounting hole, mm
	16.0 \pm 2.0

2-(2) Side wire leads type
Fixed pin type
Right side pin type
Right wire leads type

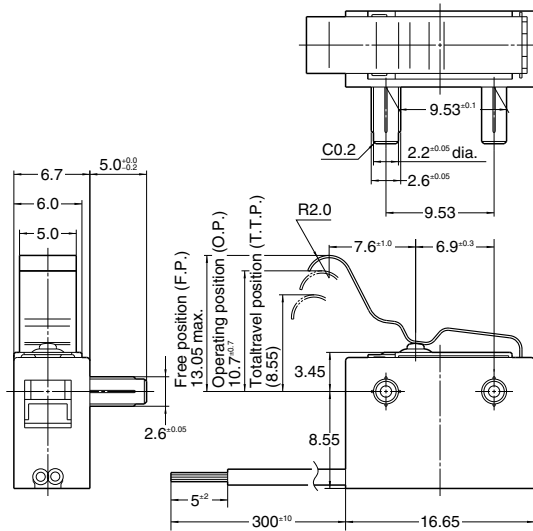
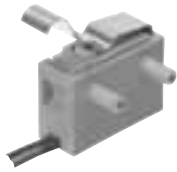


Pretravel, Max. mm	2.6
Movement differential, Max. mm	0.5
Overtravel, Min mm	1.4
Operating position	Distance from mounting hole, mm
	10.7 \pm 0.7

ABJ1,2,3,4,5

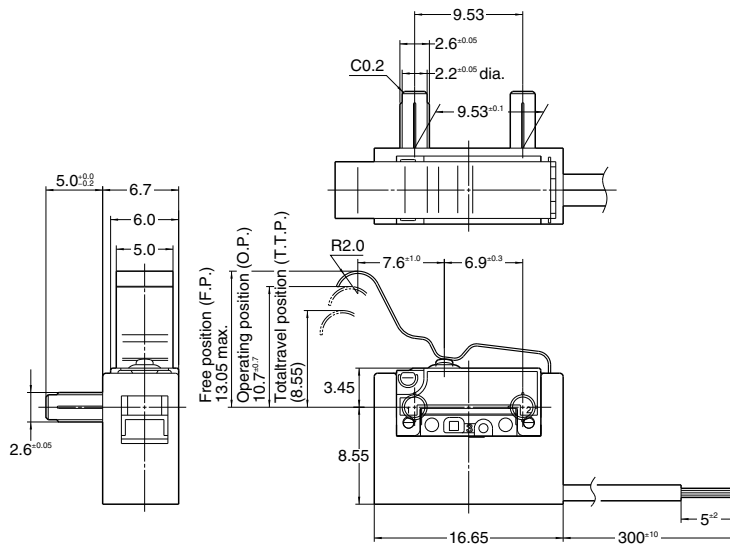
Right side pin type
Left wire leads type

mm General tolerance: ± 0.25



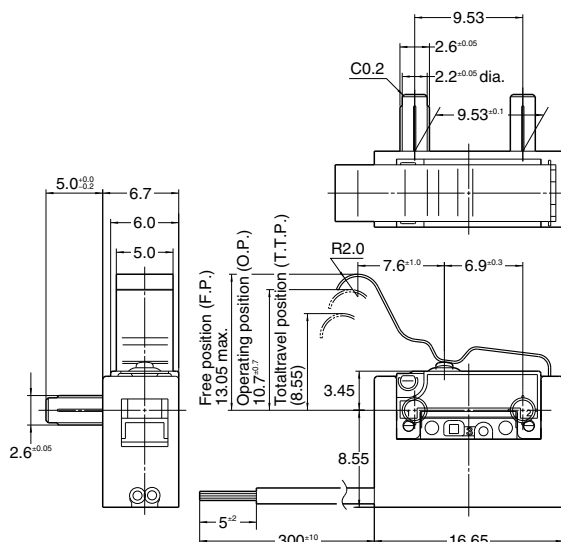
Pretravel, Max. mm	2.6
Movement differential, Max. mm	0.5
Overtravel, Min mm	1.4
Operating position	Distance from mounting hole, mm
	10.7 \pm 0.7

Left side pin type
Right wire leads type



Pretravel, Max. mm	2.6
Movement differential, Max. mm	0.5
Overtravel, Min mm	1.4
Operating position	Distance from mounting hole, mm
	10.7 \pm 0.7

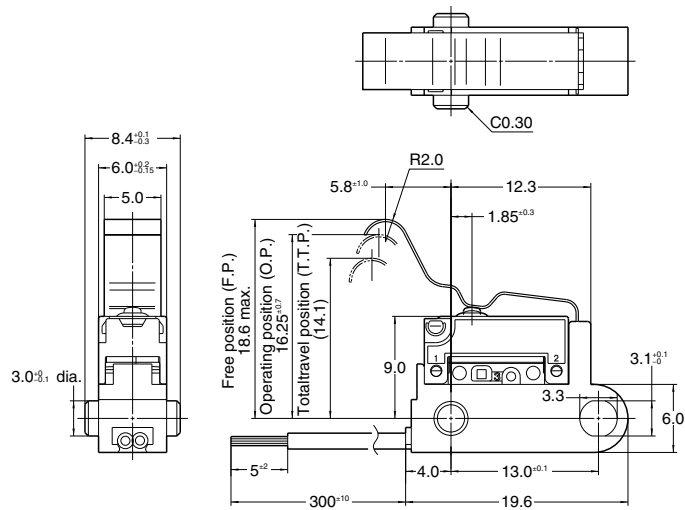
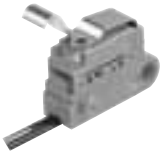
Left side pin type
Left wire leads type



Pretravel, Max. mm	2.6
Movement differential, Max. mm	0.5
Overtravel, Min mm	1.4
Operating position	Distance from mounting hole, mm
	10.7 \pm 0.7

Mounting hole 3mm type

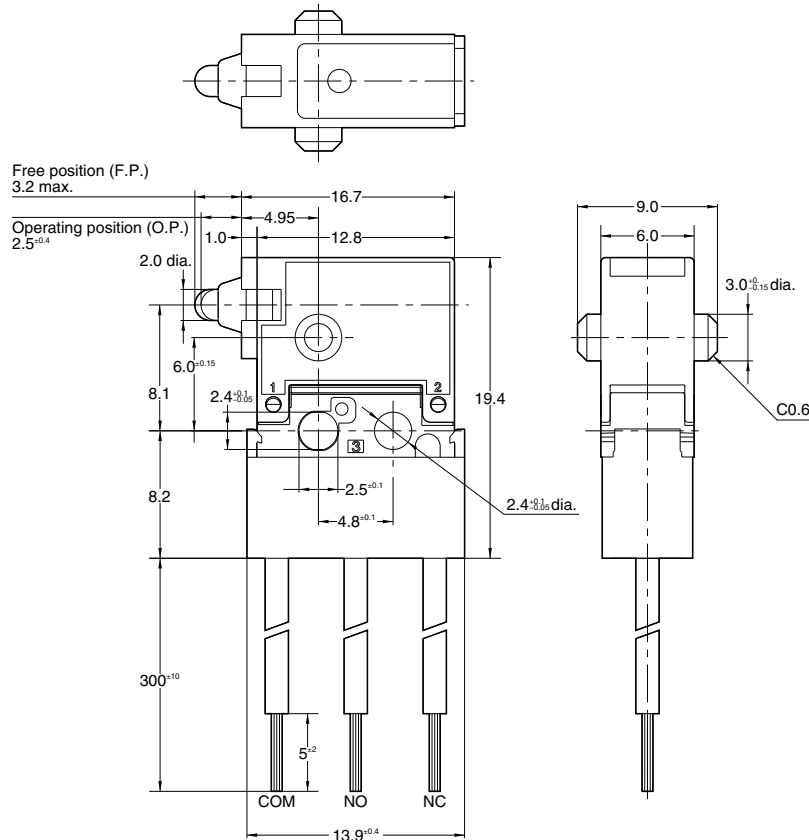
mm General tolerance: ± 0.25



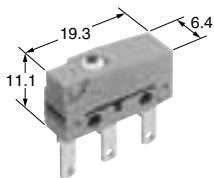
Pretravel, Max. mm		2.6
Movement differential, Max. mm		0.5
Overtravel, Min mm		1.4
Operating position	Distance from mounting hole, mm	16.25 \pm 0.7

3. Immersion protected type (Bottom wire leads type) Long stroke type

Mounting hole: 2.3 mm



Movement differential, Max. mm		0.5
Overtravel, Min mm		2.0
Operating position		2.5 \pm 0.4



FEATURES

- Subminiature size (19.8×11.1×6.4 mm)
- Sealed construction for use in adverse environment-Sealed construction by epoxy resin and rubber cap greatly reduces possible miscontact due to contaminants such as dust. Conforming to IP67* of IEC protective construction classification
- Elastomer double molding technology, an industry first and ultrasonic swaging technology contribute to uniform sealing in high production quantities
- Expansion of low-level circuit type
- We offer a Au clad 2-ply contact type (for small loads) that we developed specifically for small current and voltage loads in the range of 1 mA to 100 mA and 5 V to 30 V.
- UL/CSA/VDE/SEMKO approved
(AS for Au-clad twin layer, VDE and SEMKO are not approved.)

* Based on the protective construction classification of IEC, items which satisfy the test requirements are denoted with an IP designation.

TYPICAL APPLICATIONS

- Automotive
- Home appliances (vacuum cleaner, air purifier)
- Others (gas cooking range)

<http://panasonic-denko.co.jp/ac/e/service/environment>

ORDERING INFORMATION

Ex. ABS 1 1 1 0 4 0 3

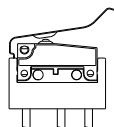
Type of switch	Wire and terminal position	Terminal	Contact arrangement	Actuator	Operating force by pin plunger (max.)	Contact*	Agency standard
ABS: Turquoise switch S type	1: Straight type 4: Right angle 5: Left angle	1: .110 quick-connect terminal 4: Solder terminal 5: PC board terminal 6: Wire leads	1: SPDT 2: SPST-NC 3: SPST-NO	0: Pin plunger 1: Short hinge lever 2: Hinge lever 3: Long hinge lever 4: Simulated roller lever 6: Roller lever 8: Leaf lever	4: 0.98 N 5: 1.47 N	0: AgNi alloy 1: Au-clad triple layer 4: Au-clad double layer	3: UL/CSA/VDE/SEMKO (AgNi alloy contact, Au-clad triple layer type) 9: UL/CSA (Au-clad double layer type)

Remarks: 1. Standard packing: Dust protected type 100 pcs./carton, 1,000 pcs./case; Immersion protected type 50 pcs./case.

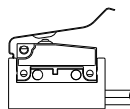
2. SPST-NC and SPST-NO are only available for wire leads type.

3. Leaf lever is only available for wire leads type

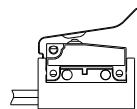
4. As for wire position:



Straight type



Wire opposite to the actuator side type (Right angle)



Wire actuator side type (Left angle)

5. Not every combination is available. Please refer to the following table, "PRODUCT TYPES".

* Contact

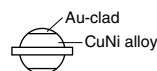
0: AgNi alloy



1: Au-clad triple layer

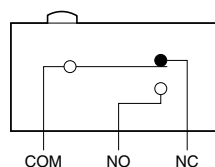


4: Au-clad double layer

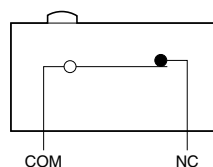


CONTACT ARRANGEMENT

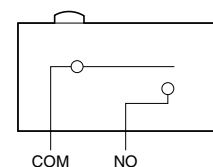
1. SPDT



2. SPST-NC (Wire leads type only)



3. SPST-NO (Wire leads type only)

**PRODUCT TYPES****1. Dust protected type**

AgNi alloy

Actuator	Operating force Max.	.110 quick-connect terminal	Solder terminal	PC board terminal		
				Terminal position		
				Straight	Right angle	Left angle
Pin plunger	0.98 N	ABS1110403	ABS1410403	ABS1510403	ABS4510403	ABS5510403
	1.47 N	ABS1110503	ABS1410503	ABS1510503	ABS4510503	ABS5510503
Short hinge lever	0.39 N	ABS1111403	ABS1411403	ABS1511403	ABS4511403	ABS5511403
	0.59 N	ABS1111503	ABS1411503	ABS1511503	ABS4511503	ABS5511503
Hinge lever	0.34 N	ABS1112403	ABS1412403	ABS1512403	ABS4512403	ABS5512403
	0.54 N	ABS1112503	ABS1412503	ABS1512503	ABS4512503	ABS5512503
Long hinge lever	0.25 N	ABS1113403	ABS1413403	ABS1513403	ABS4513403	ABS5513403
	0.44 N	ABS1113503	ABS1413503	ABS1513503	ABS4513503	ABS5513503
Simulated roller lever	0.34 N	ABS1114403	ABS1414403	ABS1514403	ABS4514403	ABS5514403
	0.54 N	ABS1114503	ABS1414503	ABS1514503	ABS4514503	ABS5514503
Roller lever	0.39 N	ABS1116403	ABS1416403	ABS1516403	ABS4516403	ABS5516403
	0.59 N	ABS1116503	ABS1416503	ABS1516503	ABS4516503	ABS5516503

Au-clad triple layer

Actuator	Operating force Max.	.110 quick-connect terminal	Solder terminal	PC board terminal		
				Terminal position		
				Straight	Right angle	Left angle
Pin plunger	0.98 N	ABS1110413	ABS1410413	ABS1510413	ABS4510413	ABS5510413
	1.47 N	ABS1110513	ABS1410513	ABS1510513	ABS4510513	ABS5510513
Short hinge lever	0.39 N	ABS1111413	ABS1411413	ABS1511413	ABS4511413	ABS5511413
	0.59 N	ABS1111513	ABS1411513	ABS1511513	ABS4511513	ABS5511513
Hinge lever	0.34 N	ABS1112413	ABS1412413	ABS1512413	ABS4512413	ABS5512413
	0.54 N	ABS1112513	ABS1412513	ABS1512513	ABS4512513	ABS5512513
Long hinge lever	0.25 N	ABS1113413	ABS1413413	ABS1513413	ABS4513413	ABS5513413
	0.44 N	ABS1113513	ABS1413513	ABS1513513	ABS4513513	ABS5513513
Simulated roller lever	0.34 N	ABS1114413	ABS1414413	ABS1514413	ABS4514413	ABS5514413
	0.54 N	ABS1114513	ABS1414513	ABS1514513	ABS4514513	ABS5514513
Roller lever	0.39 N	ABS1116413	ABS1416413	ABS1516413	ABS4516413	ABS5516413
	0.59 N	ABS1116513	ABS1416513	ABS1516513	ABS4516513	ABS5516513

Au-clad double layer

Actuator	Operating force Max.	.110 quick-connect terminal	Solder terminal	PC board terminal		
				Terminal position		
				Straight	Right angle	Left angle
Pin plunger	0.98 N	ABS1110449	ABS1410449	ABS1510449	ABS4510449	ABS5510449
	1.47 N	ABS1110549	ABS1410549	ABS1510549	ABS4510549	ABS5510549
Short hinge lever	0.39 N	ABS1111449	ABS1411449	ABS1511449	ABS4511449	ABS5511449
	0.59 N	ABS1111549	ABS1411549	ABS1511549	ABS4511549	ABS5511549
Hinge lever	0.34 N	ABS1112449	ABS1412449	ABS1512449	ABS4512449	ABS5512449
	0.54 N	ABS1112549	ABS1412549	ABS1512549	ABS4512549	ABS5512549
Long hinge lever	0.25 N	ABS1113449	ABS1413449	ABS1513449	ABS4513449	ABS5513449
	0.44 N	ABS1113549	ABS1413549	ABS1513549	ABS4513549	ABS5513549
Simulated roller lever	0.34 N	ABS1114449	ABS1414449	ABS1514449	ABS4514449	ABS5514449
	0.54 N	ABS1114549	ABS1414549	ABS1514549	ABS4514549	ABS5514549
Roller lever	0.39 N	ABS1116449	ABS1416449	ABS1516449	ABS4516449	ABS5516449
	0.59 N	ABS1116549	ABS1416549	ABS1516549	ABS4516549	ABS5516549

* Agency standard: Please refer to "Ordering information".

ABS1,4,5

2. Immersion protected type (3 wire leads type SPDT)

AgNi alloy

Actuator	Operating force Max.	SPDT		
		Straight	Wire position Right angle	Left angle
Pin plunger	0.98 N	ABS1610403	ABS4610403	ABS5610403
	1.47 N	ABS1610503	ABS4610503	ABS5610503
Short hinge lever	0.39 N	ABS1611403	ABS4611403	ABS5611403
	0.59 N	ABS1611503	ABS4611503	ABS5611503
Hinge lever	0.34 N	ABS1612403	ABS4612403	ABS5612403
	0.54 N	ABS1612503	ABS4612503	ABS5612503
Long hinge lever	0.25 N	ABS1613403	ABS4613403	ABS5613403
	0.44 N	ABS1613503	ABS4613503	ABS5613503
Simulated roller lever	0.34 N	ABS1614403	ABS4614403	ABS5614403
	0.54 N	ABS1614503	ABS4614503	ABS5614503
Roller lever	0.39 N	ABS1616403	ABS4616403	ABS5616403
	0.59 N	ABS1616503	ABS4616503	ABS5616503

Au-clad triple layer

Actuator	Operating force Max.	SPDT		
		Straight	Wire position Right angle	Left angle
Pin plunger	0.98 N	ABS1610413	ABS4610413	ABS5610413
	1.47 N	ABS1610513	ABS4610513	ABS5610513
Short hinge lever	0.39 N	ABS1611413	ABS4611413	ABS5611413
	0.59 N	ABS1611513	ABS4611513	ABS5611513
Hinge lever	0.34 N	ABS1612413	ABS4612413	ABS5612413
	0.54 N	ABS1612513	ABS4612513	ABS5612513
Long hinge lever	0.25 N	ABS1613413	ABS4613413	ABS5613413
	0.44 N	ABS1613513	ABS4613513	ABS5613513
Simulated roller lever	0.34 N	ABS1614413	ABS4614413	ABS5614413
	0.54 N	ABS1614513	ABS4614513	ABS5614513
Roller lever	0.39 N	ABS1616413	ABS4616413	ABS5616413
	0.59 N	ABS1616513	ABS4616513	ABS5616513

Au-clad double layer

Actuator	Operating force Max.	SPDT		
		Straight	Wire position Right angle	Left angle
Pin plunger	0.98 N	ABS1610449	ABS4610449	ABS5610449
	1.47 N	ABS1610549	ABS4610549	ABS5610549
Short hinge lever	0.39 N	ABS1611449	ABS4611449	ABS5611449
	0.59 N	ABS1611549	ABS4611549	ABS5611549
Hinge lever	0.34 N	ABS1612449	ABS4612449	ABS5612449
	0.54 N	ABS1612549	ABS4612549	ABS5612549
Long hinge lever	0.25 N	ABS1613449	ABS4613449	ABS5613449
	0.44 N	ABS1613549	ABS4613549	ABS5613549
Simulated roller lever	0.34 N	ABS1614449	ABS4614449	ABS5614449
	0.54 N	ABS1614549	ABS4614549	ABS5614549
Roller lever	0.39 N	ABS1616449	ABS4616449	ABS5616449
	0.59 N	ABS1616549	ABS4616549	ABS5616549

* Agency standard: Please refer to "Ordering information".

3. Immersion protected type (2 wire leads type SPST-NC)

AgNi alloy

Actuator	Operating force Max.	SPST-NC		
		Straight	Wire position Right angle	Left angle
Pin plunger	0.98 N	ABS1620403	ABS4620403	ABS5620403
	1.47 N	ABS1620503	ABS4620503	ABS5620503
Short hinge lever	0.39 N	ABS1621403	ABS4621403	ABS5621403
	0.59 N	ABS1621503	ABS4621503	ABS5621503
Hinge lever	0.34 N	ABS1622403	ABS4622403	ABS5622403
	0.54 N	ABS1622503	ABS4622503	ABS5622503
Long hinge lever	0.25 N	ABS1623403	ABS4623403	ABS5623403
	0.44 N	ABS1623503	ABS4623503	ABS5623503
Simulated roller lever	0.34 N	ABS1624403	ABS4624403	ABS5624403
	0.54 N	ABS1624503	ABS4624503	ABS5624503
Roller lever	0.39 N	ABS1626403	ABS4626403	ABS5626403
	0.59 N	ABS1626503	ABS4626503	ABS5626503

Au-clad triple layer

Actuator	Operating force Max.	SPST-NC		
		Straight	Wire position Right angle	Left angle
Pin plunger	0.98 N	ABS1620413	ABS4620413	ABS5620413
	1.47 N	ABS1620513	ABS4620513	ABS5620513
Short hinge lever	0.39 N	ABS1621413	ABS4621413	ABS5621413
	0.59 N	ABS1621513	ABS4621513	ABS5621513
Hinge lever	0.34 N	ABS1622413	ABS4622413	ABS5622413
	0.54 N	ABS1622513	ABS4622513	ABS5622513
Long hinge lever	0.25 N	ABS1623413	ABS4623413	ABS5623413
	0.44 N	ABS1623513	ABS4623513	ABS5623513
Simulated roller lever	0.34 N	ABS1624413	ABS4624413	ABS5624413
	0.54 N	ABS1624513	ABS4624513	ABS5624513
Roller lever	0.39 N	ABS1626413	ABS4626413	ABS5626413
	0.59 N	ABS1626513	ABS4626513	ABS5626513

Au-clad double layer

Actuator	Operating force Max.	SPST-NC		
		Straight	Wire position Right angle	Left angle
Pin plunger	0.98 N	ABS1620449	ABS4620449	ABS5620449
	1.47 N	ABS1620549	ABS4620549	ABS5620549
Short hinge lever	0.39 N	ABS1621449	ABS4621449	ABS5621449
	0.59 N	ABS1621549	ABS4621549	ABS5621549
Hinge lever	0.34 N	ABS1622449	ABS4622449	ABS5622449
	0.54 N	ABS1622549	ABS4622549	ABS5622549
Long hinge lever	0.25 N	ABS1623449	ABS4623449	ABS5623449
	0.44 N	ABS1623549	ABS4623549	ABS5623549
Simulated roller lever	0.34 N	ABS1624449	ABS4624449	ABS5624449
	0.54 N	ABS1624549	ABS4624549	ABS5624549
Roller lever	0.39 N	ABS1626449	ABS4626449	ABS5626449
	0.59 N	ABS1626549	ABS4626549	ABS5626549

* Agency standard: Please refer to "Ordering information".

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4. Immersion protected type (2 wire leads type SPST-NO)

AgNi alloy

Actuator	Operating force Max.	SPST-NO		
		Straight	Wire position Right angle	Left angle
Pin plunger	0.98 N	ABS1630403	ABS4630403	ABS5630403
	1.47 N	ABS1630503	ABS4630503	ABS5630503
Short hinge lever	0.39 N	ABS1631403	ABS4631403	ABS5631403
	0.59 N	ABS1631503	ABS4631503	ABS5631503
Hinge lever	0.34 N	ABS1632403	ABS4632403	ABS5632403
	0.54 N	ABS1632503	ABS4632503	ABS5632503
Long hinge lever	0.25 N	ABS1633403	ABS4633403	ABS5633403
	0.44 N	ABS1633503	ABS4633503	ABS5633503
Simulated roller lever	0.34 N	ABS1634403	ABS4634403	ABS5634403
	0.54 N	ABS1634503	ABS4634503	ABS5634503
Roller lever	0.39 N	ABS1636403	ABS4636403	ABS5636403
	0.59 N	ABS1636503	ABS4636503	ABS5636503

Au-clad triple layer

Actuator	Operating force Max.	SPST-NO		
		Straight	Wire position Right angle	Left angle
Pin plunger	0.98 N	ABS1630413	ABS4630413	ABS5630413
	1.47 N	ABS1630513	ABS4630513	ABS5630513
Short hinge lever	0.39 N	ABS1631413	ABS4631413	ABS5631413
	0.59 N	ABS1631513	ABS4631513	ABS5631513
Hinge lever	0.34 N	ABS1632413	ABS4632413	ABS5632413
	0.54 N	ABS1632513	ABS4632513	ABS5632513
Long hinge lever	0.25 N	ABS1633413	ABS4633413	ABS5633413
	0.44 N	ABS1633513	ABS4633513	ABS5633513
Simulated roller lever	0.34 N	ABS1634413	ABS4634413	ABS5634413
	0.54 N	ABS1634513	ABS4634513	ABS5634513
Roller lever	0.39 N	ABS1636413	ABS4636413	ABS5636413
	0.59 N	ABS1636513	ABS4636513	ABS5636513

Au-clad double layer

Actuator	Operating force Max.	SPST-NO		
		Straight	Wire position Right angle	Left angle
Pin plunger	0.98 N	ABS1630449	ABS4630449	ABS5630449
	1.47 N	ABS1630549	ABS4630549	ABS5630549
Short hinge lever	0.39 N	ABS1631449	ABS4631449	ABS5631449
	0.59 N	ABS1631549	ABS4631549	ABS5631549
Hinge lever	0.34 N	ABS1632449	ABS4632449	ABS5632449
	0.54 N	ABS1632549	ABS4632549	ABS5632549
Long hinge lever	0.25 N	ABS1633449	ABS4633449	ABS5633449
	0.44 N	ABS1633549	ABS4633549	ABS5633549
Simulated roller lever	0.34 N	ABS1634449	ABS4634449	ABS5634449
	0.54 N	ABS1634549	ABS4634549	ABS5634549
Roller lever	0.39 N	ABS1636449	ABS4636449	ABS5636449
	0.59 N	ABS1636549	ABS4636549	ABS5636549

* Agency standard: Please refer to "Ordering information".

5. Immersion protected type (3 wire leads type SPDT)

- Leaf lever type
- AgNi alloy

Actuator	Operating force Max.	SPDT		
		Straight	Wire position Right angle	Left angle
Leaf lever	0.88 N	ABS1618403	ABS4618403	ABS5618403
	1.08 N	ABS1618503	ABS4618503	ABS5618503

Au-clad triple layer

Actuator	Operating force Max.	SPDT		
		Straight	Wire position Right angle	Left angle
Leaf lever	0.88 N	ABS1618413	ABS4618413	ABS5618413
	1.08 N	ABS1618513	ABS4618513	ABS5618513

Au-clad double layer

Actuator	Operating force Max.	SPDT		
		Straight	Wire position Right angle	Left angle
Leaf lever	0.88 N	ABS1618449	ABS4618449	ABS5618449
	1.08 N	ABS1618549	ABS4618549	ABS5618549

6. Immersion protected type (2 wire leads type SPST-NC)

- Leaf lever type
- AgNi alloy

Actuator	Operating force Max.	SPST-NC		
		Straight	Wire position Right angle	Left angle
Leaf lever	0.88 N	ABS1628403	ABS4628403	ABS5628403
	1.08 N	ABS1628503	ABS4628503	ABS5628503

Au-clad triple layer

Actuator	Operating force Max.	SPST-NC		
		Straight	Wire position Right angle	Left angle
Leaf lever	0.88 N	ABS1628413	ABS4628413	ABS5628413
	1.08 N	ABS1628513	ABS4628513	ABS5628513

Au-clad double layer

Actuator	Operating force Max.	SPST-NC		
		Straight	Wire position Right angle	Left angle
Leaf lever	0.88 N	ABS1628449	ABS4628449	ABS5628449
	1.08 N	ABS1628549	ABS4628549	ABS5628549

7. Immersion protected type (2 wire leads type SPST-NO)

- Leaf lever type
- AgNi alloy

Actuator	Operating force Max.	SPST-NO		
		Straight	Wire position Right angle	Left angle
Leaf lever	0.88 N	ABS1638403	ABS4638403	ABS5638403
	1.08 N	ABS1638503	ABS4638503	ABS5638503

Au-clad triple layer

Actuator	Operating force Max.	SPST-NO		
		Straight	Wire position Right angle	Left angle
Leaf lever	0.88 N	ABS1638413	ABS4638413	ABS5638413
	1.08 N	ABS1638513	ABS4638513	ABS5638513

* Agency standard: Please refer to "Ordering information".

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Au-clad double layer

Actuator	Operating force Max. gf	SPST-NO		
		Straight	Wire position Right angle	Left angle
Leaf lever	0.89 N	ABS1638449	ABS4638449	ABS5638449
	1.08 N	ABS1638549	ABS4638549	ABS5638549

* Agency standard: Please refer to "Ordering information".

SPECIFICATIONS

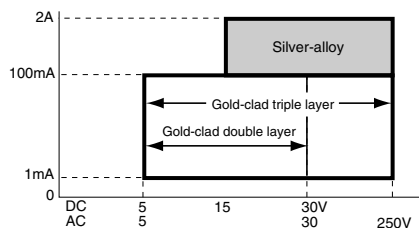
1. Contact rating

Voltage	AgNi alloy contact type		Au-clad contact type	
			Au-clad triple layer	Au-clad twin layer
	Resistive load	Inductive load	Resistive load	
125 V AC	2 A	2 A	0.1 A	—
250 V AC	2 A	2 A	0.1 A	—
30 V DC	2 A	2 A	0.1 A	0.1 A
125 V DC	0.4 A	0.05 A	—	—

Low-level circuit rating (Au-clad contact type)

Rated voltage	Resistive load
6 V DC	5 mA
12 V DC	2 mA
24 V DC	1 mA

Recommended contact material chart classified by load voltage & current (reference)



Remarks: If the contact is being used in the constant low-level circuit load range, the Au-clad twin layer contact is recommended. If there is a danger of the current being less than 0.5 A, for instance if the contact is being turned on and off, the Au-clad triple layer type is recommended.

2. Characteristics

Mechanical life (O.T.: Specified value)	Leaf lever	Min. 5x10 ⁵ (at 60 cpm)
	Other types	Min. 5x10 ⁶ (at 60 cpm)
Electrical life at rated load (O.T.: Max.)	AgNi alloy contact type	Min. 5x10 ⁴ (at 20 cpm)
	Au-clad contact type	Min. 2x10 ⁵ (at 20 cpm)
Insulation resistance	Min. 100 MΩ (at 500 V DC insulation resistance meter)	
Dielectric strength	Between non-continuous terminals	1,000 Vrms
	Between each terminal and other exposed metal parts	1,500 Vrms
	Between each terminal and ground	1,500 Vrms
		1,500 Vrms
Vibration resistance (Pin plunger type)	10 to 55 Hz at single amplitude of 0.75 mm (Contact opening Max. 1 msec.)	
Shock resistance (Pin plunger type)	Min. 294 m/s ² (Contact opening Max. 1 msec.)	
Contact resistance (Initial)	AgNi alloy contact type	Dust protected type (IP50): Max. 50 mΩ Immersion protected type (IP67): Max. 100 mΩ (By voltage drop 1 A 6 to 8 V DC)
	Au-clad contact type	Dust protected type (IP50): Max. 100 mΩ Immersion protected type (IP67): Max. 150 mΩ (By voltage drop 0.1 A 6 to 8 V DC)
Allowable operating speed (at no load)	0.1 to 500 mm/sec.	
Max. operating cycle rate (at no load)	120 cpm	
Ambient temperature	-40°C to +85°C	
Unit weight	Approx. 2 g (IP50 type)	

3. Operating characteristics

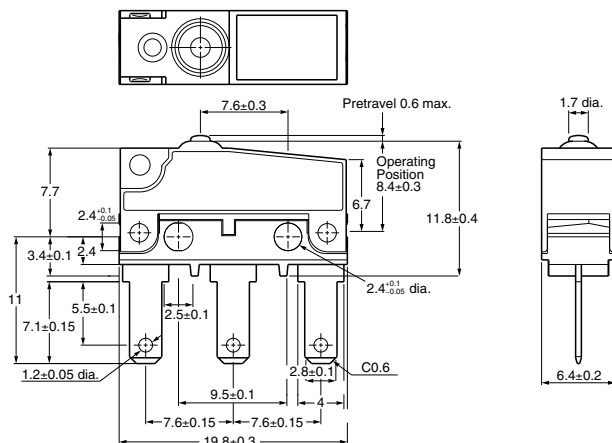
Type of actuator	Operating force, Max.		Release force, Min.		Pretravel, Max. mm	Movement differential, Max. mm	Overtravel, Min. mm	Operating position, mm
	0.98N	1.47N	0.15N	0.20N				
Pin plunger	0.39N	0.59N	0.034N	0.039N	0.6	0.1	0.4	8.4±0.3
Short hinge lever	0.34N	0.54N	0.029N	0.034N	2.5	0.5	0.8	8.8±0.8
Hinge lever	0.25N	0.44N	0.025N	0.029N	2.8	0.8	1.2	8.8±0.8
Long hinge lever	0.34N	0.54N	0.029N	0.034N	3.5	1.0	1.6	8.8±1.2
Simulated roller lever	0.39N	0.59N	0.034N	0.039N	2.8	0.8	1.2	11.65±0.8
Roller lever	0.88N	1.08N	0.17N	0.20N	2.5	0.5	0.8	14.5±0.8
Leaf lever	0.88N	1.08N	0.17N	0.20N	4.5	1.0	2.5	14.5±1.5

DIMENSIONS

1. Dust protected type

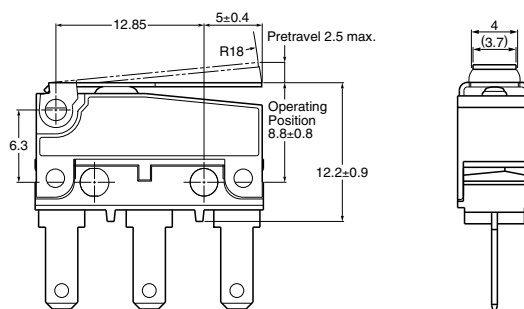
1-(1) .110 quick-connect terminal

Pin plunger



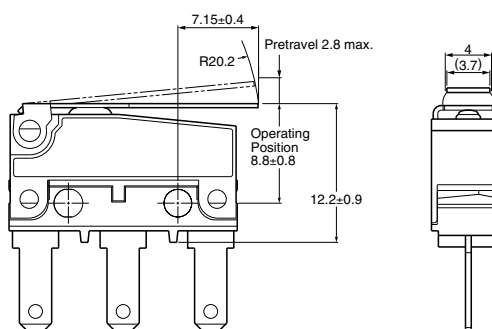
Pretravel, Max. mm		0.6
Movement differential, Max. mm		0.1
Overtravel, Min. mm		0.4
Operating position	Distance from mounting hole, mm	8.4±0.3
	Distance from stand-off, mm	11.8±0.4

Short hinge lever



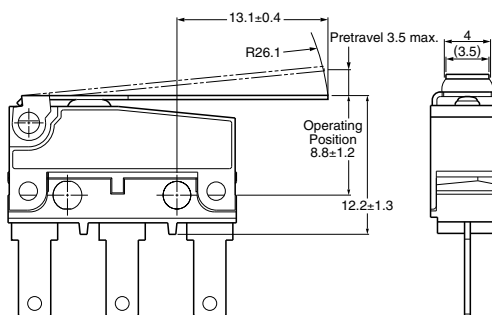
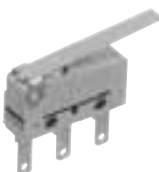
Pretravel, Max. mm		2.5
Movement differential, Max. mm		0.5
Overtravel, Min. mm		0.8
Operating position	Distance from mounting hole, mm	8.8±0.8
	Distance from stand-off, mm	12.2±0.9

Hinge lever



Pretravel, Max. mm		2.8
Movement differential, Max. mm		0.8
Overtravel, Min. mm		1.2
Operating position	Distance from mounting hole, mm	8.8±0.8
	Distance from stand-off, mm	12.2±0.9

Long hinge lever

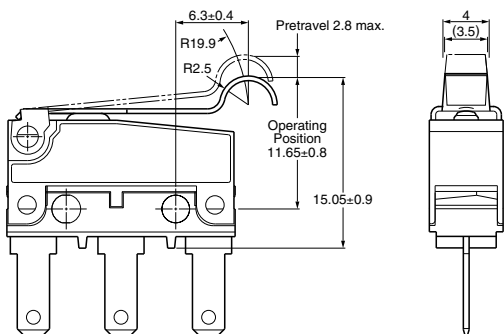
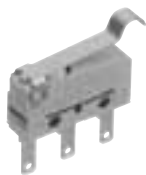


Pretravel, Max. mm		3.5
Movement differential, Max. mm		1
Overtravel, Min. mm		1.6
Operating position	Distance from mounting hole, mm	8.8±1.2
	Distance from stand-off, mm	12.2±1.3

ABS1,4,5

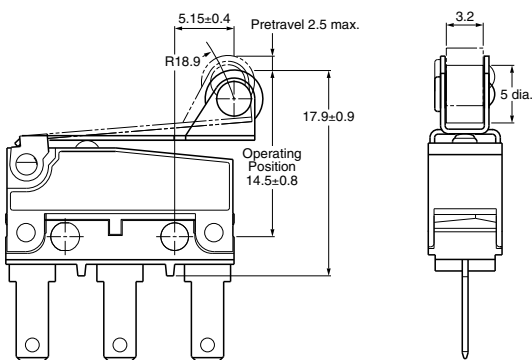
Simulated roller lever

mm General tolerance: ± 0.25



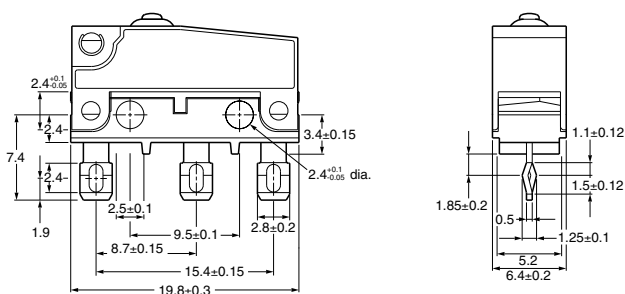
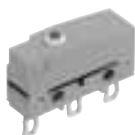
Pretravel, Max. mm	2.8	
Movement differential, Max. mm	0.8	
Overtravel, Min. mm	1.2	
Operating position	Distance from mounting hole, mm	11.65±0.8
	Distance from stand-off, mm	15.05±0.9

Roller lever



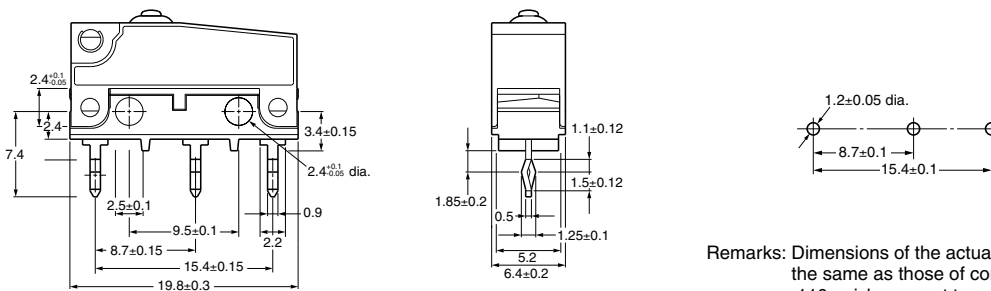
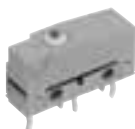
Pretravel, Max. mm	2.5	
Movement differential, Max. mm	0.5	
Overtravel, Min. mm	0.8	
Operating position	Distance from mounting hole, mm	14.5±0.8
	Distance from stand-off, mm	17.9±0.9

1-(2) Solder terminal



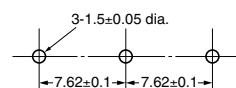
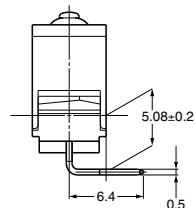
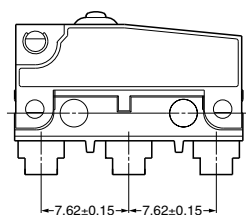
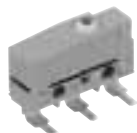
Remarks: Dimensions of the actuator types are the same as those of corresponding .110 quick-connect terminal types.

1-(3) PC board terminal Straight type



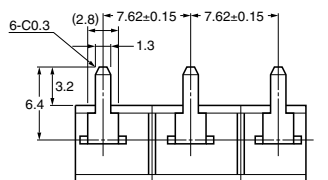
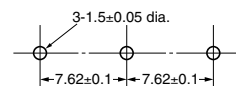
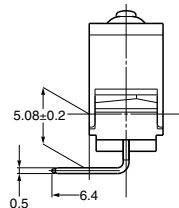
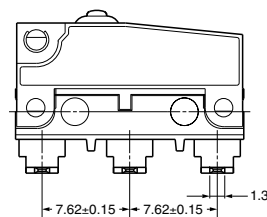
Remarks: Dimensions of the actuator types are the same as those of corresponding .110 quick-connect terminal types.

Right angle type



Remarks: Dimensions of the actuator types are the same as those of corresponding .110 quick-connect terminal types.

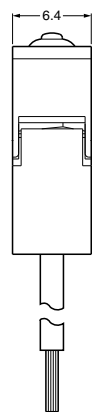
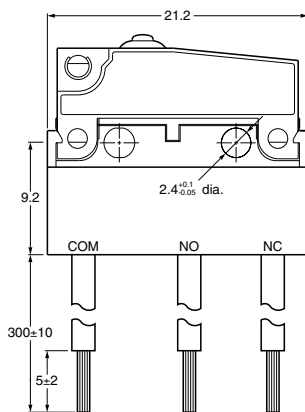
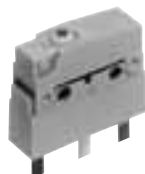
Left angle type



Remarks: Dimensions of the actuator types are the same as those of corresponding .110 quick-connect terminal types.

2. Immersion protected type

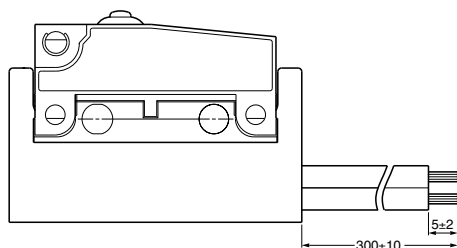
Wire leads
Pin plunger
Straight type



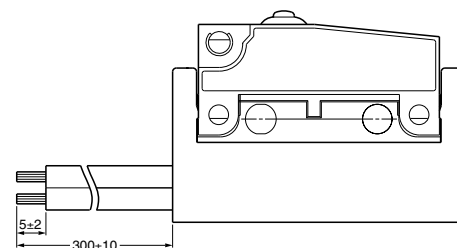
Thickness of the lead wire: 0.5 mm²
UL/CSA approved type and Right/Left angle type:
AWG #20
Color of the lead wire:
COM ... Black
N.C. ... Red
N.O. ... White

Remarks: 1. Other dimensions are the same as those of .110 quick-connect terminal types.
2. Dimensions of the actuator types are the same as those of corresponding .110 quick-connect terminal types.

Right angle type



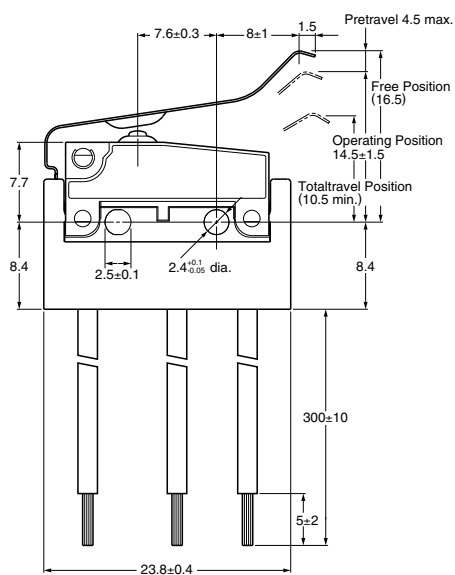
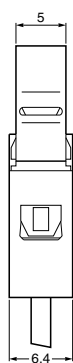
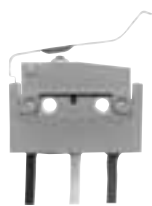
Left angle type



ABS1,4,5

Leaf lever
Straight type

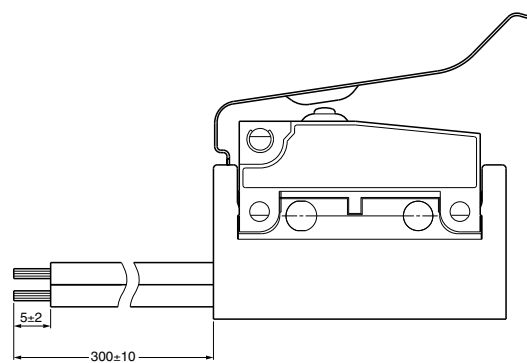
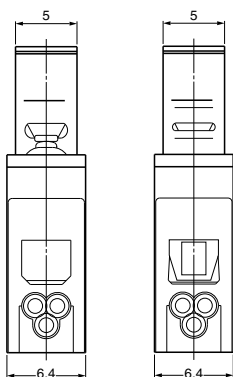
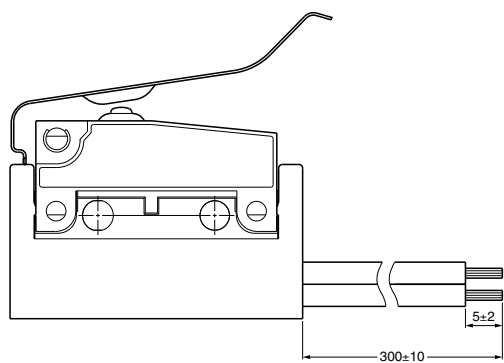
mm General tolerance: ± 0.25

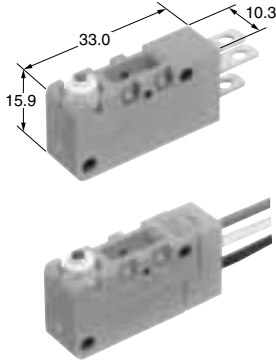


Thickness of the lead wire: 0.5 mm²
 UL/CSA approved type and Right/Left angle type:
 AWG #20
 Color of the lead wire:
 COM ... Black
 N.C. ... Red
 N.O. ... White

Right angle type

Left angle type





FEATURES

- Miniature size (33×15.9×10.3 mm)
- Sealed construction for use in adverse environment-Sealed construction by epoxy resin and rubber cap greatly reduces possible miscontact due to contaminants such as dust. Conforming to IP67* of IEC protective construction classification
- Elastomer double molding technology, an industry first and ultrasonic swaging technology contribute to uniform sealing in high production quantities
- UL/CSA/VDE/SEMKO approved

* Based on the protective construction classification of IED, items which satisfy the test requirements are denoted with an IP designation.

TYPICAL APPLICATIONS

- Automotive
- Agricultural devices
- Industrial equipment

<http://panasonic-denko.co.jp/ac/e/service/environment>

ORDERING INFORMATION

Ex. ABV1 2 1 0 4 1 3 R

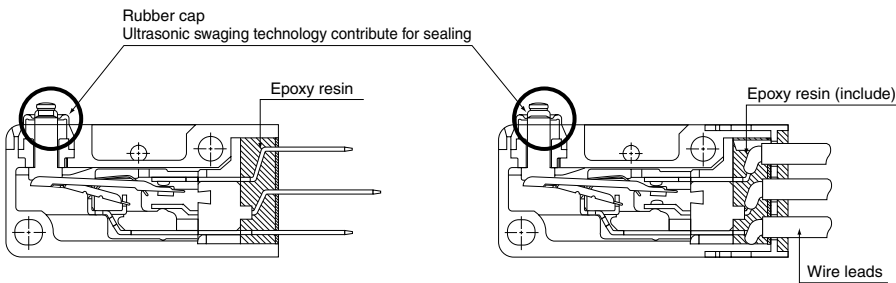
Type of switch	Terminal	Contact arrangement	Actuator	Operating force by pin plunger (max.)	Contact	Agency standard	Short roller lever
ABV1: Turquoise switch V type	2: .187 quick-connect terminal 6: Wire leads	1: SPDT 2: SPST-NC 3: SPST-NO	0: Pin plunger 2: Hinge lever 4: Simulated roller lever 5: Short roller lever 6: Roller lever	4: 0.98 N 5: 1.96 N	0: AgNi alloy 1: AgNi alloy + Au clad	3: UL/CSA/VDE/SEMKO	R: Improved short roller lever

Remarks: 1. Standard packing: Dust protected type 50 pcs./carton, 500 pcs./case; Immersion protected type 50 pcs./case.
2. Not every combination is available. Please refer to the following table, "PRODUCT TYPES".

CONSTRUCTION

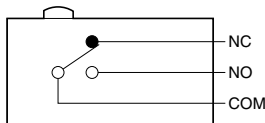
.187 quick-connect terminal

Wire leads

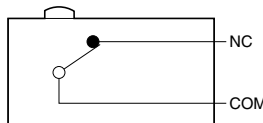


CONTACT ARRANGEMENT

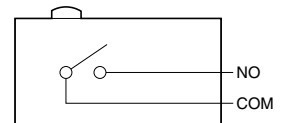
1. SPDT



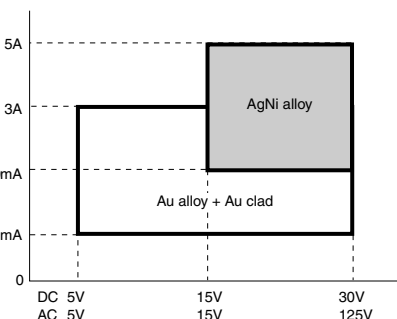
2. SPST-NC



3. SPST-NO



APPLICABLE CURRENT RANGE (Reference only)



PRODUCT TYPES

AgNi alloy

Contact	Actuator	Contact Arrangement	Operating force, Max.	187 Quick-connect terminal	Wire Leads
AgNi alloy	Pin plunger	SPDT	0.98 N	ABV1210403	ABV1610403
			1.96 N	ABV1210503	ABV1610503
		SPST-NC	0.98 N	ABV1220403	ABV1620403
			1.96 N	ABV1220503	ABV1620503
		SPST-NO	0.98 N	ABV1230403	ABV1630403
			1.96 N	ABV1230503	ABV1630503
	Hinge lever	SPDT	0.59 N	ABV1212403	ABV1612403
			1.18 N	ABV1212503	ABV1612503
		SPST-NC	0.59 N	ABV1222403	ABV1622403
			1.18 N	ABV1222503	ABV1622503
		SPST-NO	0.59 N	ABV1232403	ABV1632403
			1.18 N	ABV1232503	ABV1632503
	Simulated roller lever	SPDT	0.59 N	ABV1214403	ABV1614403
			1.18 N	ABV1214503	ABV1614503
		SPST-NC	0.59 N	ABV1224403	ABV1624403
			1.18 N	ABV1224503	ABV1624503
		SPST-NO	0.59 N	ABV1234403	ABV1634403
			1.18 N	ABV1234503	ABV1634503
	Short roller lever	SPDT	1.08 N	ABV1215403R	ABV1615403R
			2.16 N	ABV1215503R	ABV1615503R
		SPST-NC	1.08 N	ABV1225403R	ABV1625403R
			2.16 N	ABV1225503R	ABV1625503R
		SPST-NO	1.08 N	ABV1235403R	ABV1635403R
			2.16 N	ABV1235503R	ABV1635503R
Roller lever	SPDT	0.59 N	ABV1216403	ABV1616403	
		1.18 N	ABV1216503	ABV1616503	
	SPST-NC	0.59 N	ABV1226403	ABV1626403	
		1.18 N	ABV1226503	ABV1626503	
	SPST-NO	0.59 N	ABV1236403	ABV1636403	
		1.18 N	ABV1236503	ABV1636503	

AgNi alloy + Au clad

Contact	Actuator	Contact Arrangement	Operating force, Max.	187 Quick-connect terminal	Wire Leads
AgNi alloy + Au clad	Pin plunger	SPDT	0.98 N	ABV1210413	ABV1610413
			1.96 N	ABV1210513	ABV1610513
		SPST-NC	0.98 N	ABV1220413	ABV1620413
			1.96 N	ABV1220513	ABV1620513
		SPST-NO	0.98 N	ABV1230413	ABV1630413
			1.96 N	ABV1230513	ABV1630513
	Hinge lever	SPDT	0.59 N	ABV1212413	ABV1612413
			1.18 N	ABV1212513	ABV1612513
		SPST-NC	0.59 N	ABV1222413	ABV1622413
			1.18 N	ABV1222513	ABV1622513
		SPST-NO	0.59 N	ABV1232413	ABV1632413
			1.18 N	ABV1232513	ABV1632513
	Simulated roller lever	SPDT	0.59 N	ABV1214413	ABV1614413
			1.18 N	ABV1214513	ABV1614513
		SPST-NC	0.59 N	ABV1224413	ABV1624413
			1.18 N	ABV1224513	ABV1624513
		SPST-NO	0.59 N	ABV1234413	ABV1634413
			1.18 N	ABV1234513	ABV1634513
	Short roller lever	SPDT	1.08 N	ABV1215413R	ABV1615413R
			2.16 N	ABV1215513R	ABV1615513R
		SPST-NC	1.08 N	ABV1225413R	ABV1625413R
			2.16 N	ABV1225513R	ABV1625513R
		SPST-NO	1.08 N	ABV1235413R	ABV1635413R
			2.16 N	ABV1235513R	ABV1635513R
	Roller lever	SPDT	0.59 N	ABV1216413	ABV1616413
			1.18 N	ABV1216513	ABV1616513
		SPST-NC	0.59 N	ABV1226413	ABV1626413
			1.18 N	ABV1226513	ABV1626513
SPST-NO		0.59 N	ABV1236413	ABV1636413	
		1.18 N	ABV1236513	ABV1636513	

PECIFICATIONS

Contact rating

Type	Standard rating	Low-level rating
AgNi alloy + Au clad contact	3 A 250 V AC (O.F. 1.96 N) 1 A 250 V AC (O.F. 0.98 N)	5 mA 6 V DC 2 mA 12 V DC 1 mA 24 V DC
AgNi alloy	5 A 250 V AC (O.F. 1.96 N) 3 A 250 V AC (O.F. 0.98 N)	—

Characteristics

Mechanical life (O.T.: Specified value)	Min. 5x10 ⁶ (at 60 cpm)	
Electrical life	Nominal rating (O.T.: Max.)	Min. 10 ⁵ (at 20 cpm)*1
	Low-level rating (O.T.: Specified value)	Min. 10 ⁶ (at 20 cpm)
Insulation resistance	Min. 100 MΩ (at 500 V DC insulation resistance meter)	
Dielectric strength		
Between non-continuous terminals	1,000 Vrms	
Between each terminal and other exposed metal parts	2,000 Vrms	
Between each terminal and ground	2,000 Vrms	
Vibration resistance	10 to 55 Hz at single amplitude of 0.75 mm (Contact opening: max. 1 msec.)	
Shock resistance	Min. 294 m/s ² (Contact opening: Max. 1 msec.)	
Contact resistance	AgNi alloy contact type	Dust protected type (IP50): Max. 50 mΩ Immersion protected type (IP67): Max. 100 mΩ (By voltage drop 1 A 6 to 8 V DC)
	AgNi alloy + Au clad contact type	Dust protected type (IP50): Max. 50 mΩ Immersion protected type (IP67): Max. 100 mΩ (By voltage drop 0.1 A 6 to 8 V DC)
Allowable operating speed (at no load)	1 to 500 mm/sec.	
Max. operating cycle rate (at no load)	120 cpm	
Ambient temperature (at no load)	-40°C to +85°C	
Unit weight	Approx. 7 g (IP50 type)	

Note: *1 O.F. 0.98N type is Min 5 × 10⁵ (at 20 com)

Operating characteristics

Type of actuator	Operating force, Max.		Release force, Min.		Pretravel, Max. mm	Movement differential, Max. mm	Overtravel, Min. mm	Operating position, mm
	1.96N	0.98N	0.39N	0.25N				
Pin plunger	1.96N	0.98N	0.39N	0.25N	1.6	0.4	0.8	14.7±0.6
Single lever	1.18N	0.59N	0.13N	0.098N	3.2	1.2	1.2	15.3±1.2
Simulated roller lever	1.18N	0.59N	0.13N	0.098N	3.2	1.2	1.2	18.5±1.2
Short roller lever	2.16N	1.08N	0.39N	0.20N	1.6	0.5	0.8	20.7±0.8
Roller lever	1.18N	0.59N	0.13N	0.098N	3.2	1.2	1.2	20.7±1.2

Note: (): Low force type

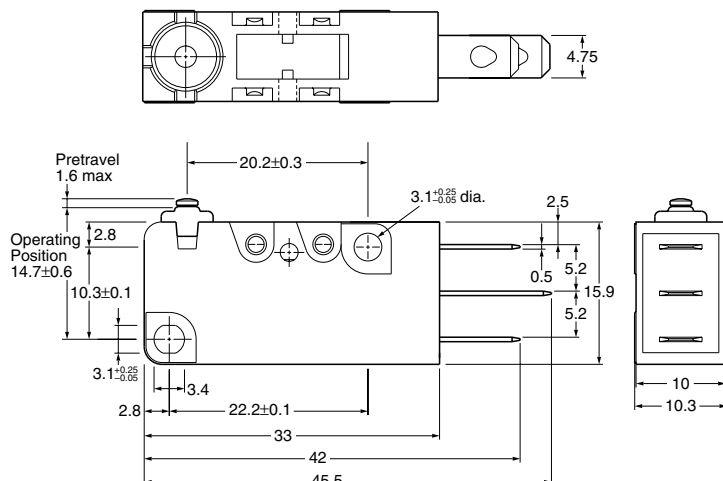
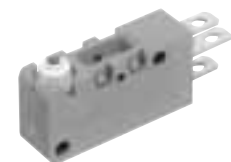
DIMENSIONS

mm General tolerance: ±0.4

Dust protected type

(1) .187 quick-connect terminal

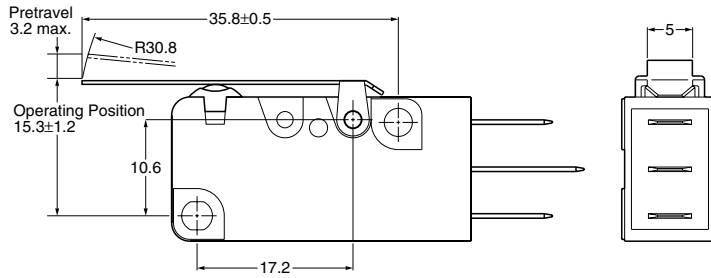
Pin plunger



Pretravel, Max. mm	1.6
Movement differential, Max. mm	0.4
Overtravel, Min. mm	0.8
Operating position, mm	14.7±0.6

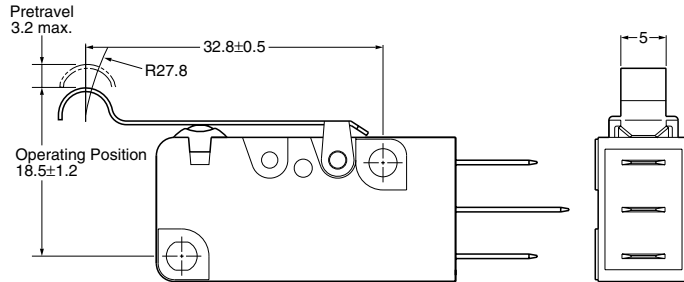
Hinge lever

mm General tolerance: ± 0.1



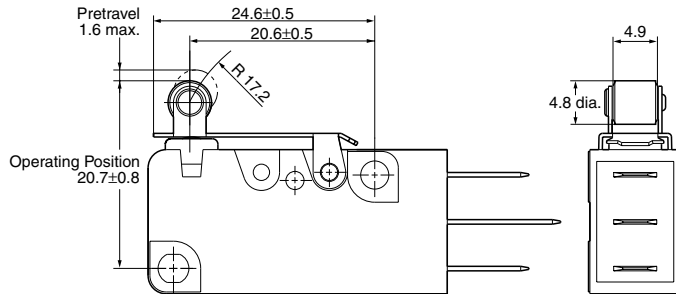
Pretravel, Max. mm	3.2
Movement differential, Max. mm	1.2
Overtravel, Min. mm	1.2
Operating position, mm	15.3±1.2

Simulated roller lever



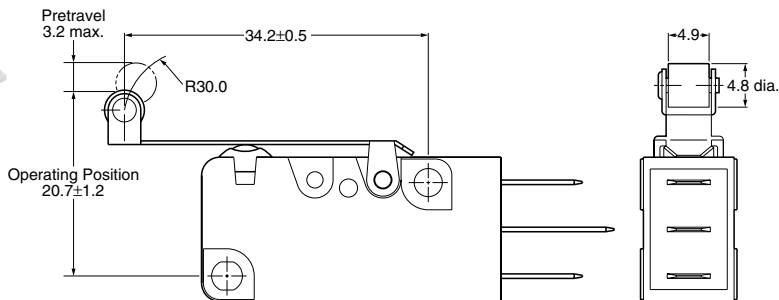
Pretravel, Max. mm	3.2
Movement differential, Max. mm	1.2
Overtravel, Min. mm	1.2
Operating position, mm	18.5±1.2

Short roller lever



Pretravel, Max. mm	1.6
Movement differential, Max. mm	0.5
Overtravel, Min. mm	0.8
Operating position, mm	20.7±0.8

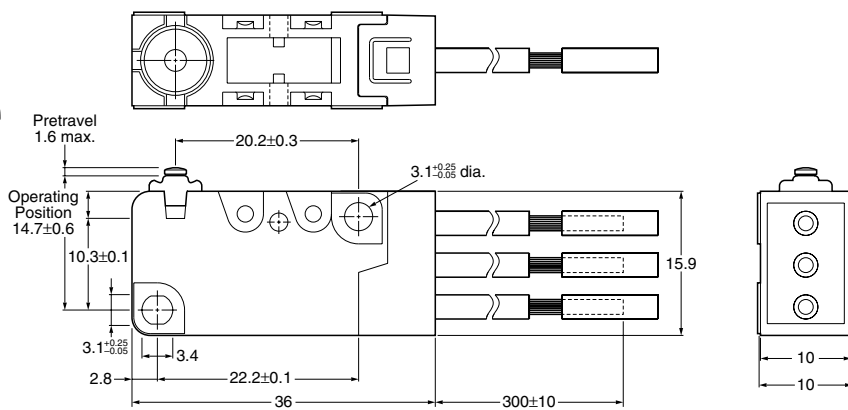
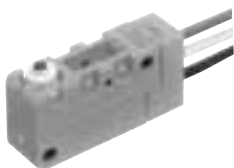
Roller lever



Pretravel, Max. mm	3.2
Movement differential, Max. mm	1.2
Overtravel, Min. mm	1.2
Operating position, mm	20.7±1.2

2. Immersion protected type

Wire Leads



Thickness of the lead wire
 Standard type: 0.75mm²
 UL/CSA approved type:
 AWG #18
 Color of the lead wire
 COM ...black
 N.C.red
 N.O.white

FEATURES

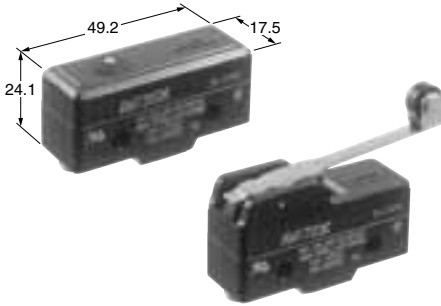
- 10 A High current switching capacity and high precision
- Wide allowance of operating speed
- Versatile variety of actuators
- UL/C-UL approved

TYPICAL APPLICATION

- General industrial machinery
- Medical equipment
- Measuring instruments
- Transportation equipment
- Home electric appliances

About Cd-free contacts

We have introduced cadmium-free type products to reduce material which is not good for our environment. (The suffix "F" denotes such part.) Please replace parts containing cadmium with Cd-free products and evaluate them with your actual application before use because the life of a relay depends on the contact material and load.



<http://panasonic-denko.co.jp/ac/e/service/environment>

ORDERING INFORMATION

Ex. AM 1 5 0 1 K F

Type of switch	Upper body cover shape & terminal	Basic specifications	Actuators	Contact
NZ basic (AM1) switch	1: Flat, solder terminal 3: Flat, screw terminal 5: Grooved, solder terminal 7: Grooved, screw terminal Upper body cover shape <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Flat</p> </div> <div style="text-align: center;"> <p>Grooved</p> </div> </div>	0: Standard type 1: Oil tight type 3: Reversed action type 4: One way type	0: Pin plunger 1: Hinge lever (leaf spring) 3: Hinge roller lever (roller, leaf, spring) 4: Hinge short roller lever 5: Overtravel plunger 6: Compact overtravel plunger 7: Panel mount plunger 811: Panel mount roller plunger 812: Panel mount cross roller plunger	F: Cadmium free

Remarks: Not every combination is available. Please refer to the following table, "PRODUCT TYPES".

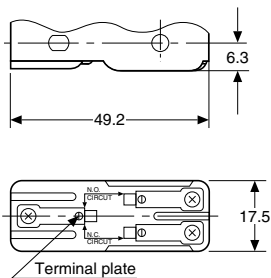
TERMINAL VARIATION

Standard types, reversed action types and oil tight types are available in two terminal designs, solder and screw terminals, as shown in the above columns:

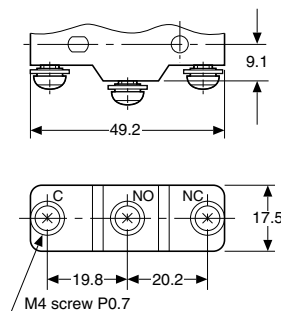
Differences in dimension between solder and screw terminals are as follows;

mm

Solder terminal



Screw terminal



PRODUCT TYPES

1. Standard type

Actuator	Solder terminal	Screw terminal
Pin plunger	AM1100KF	AM1300KF
Over travel plunger	AM1105KF	AM1305KF
Compact over travel plunger	AM1106KF	AM1306KF
Panel mount plunger	AM1107KF	AM1307KF
Panel mount roller plunger	AM110811KF	AM130811KF
Panel mount cross roller plunger	AM110812KF	AM130812KF
Flexible leaf lever	AM1101KF	AM1301KF
Flexible roller leaf lever	AM1103KF	AM1303KF
Rigid lever	AM1501KF	AM1701KF
Rigid short roller lever	AM1504KF	AM1704KF
Rigid roller lever	AM1503KF	AM1703KF
One way type•Rigid short roller lever	AM1544KF	AM1744KF
One way type•Rigid roller lever	AM1543KF	AM1743KF
Reversed action type•Rigid lever	AM1531KF	AM1731KF
Reversed action type •Rigid short roller lever	AM1534KF	AM1734KF
Reversed action type•Rigid roller lever	AM1533KF	AM1733KF

2. Oil tight types

Actuator	Solder terminal	Screw terminal
Rigid lever	AM1511KF	AM1711KF
Rigid short roller lever	AM1514KF	AM1714KF
Rigid roller lever	AM1513KF	AM1713KF

Remarks: 1. Standard part number indicates UL/C-UL mark.
2. Standard packing for inner carton: 20cps.

SPECIFICATIONS

1. Contact Rating

Type	Voltage	Resistive load ($\cos \phi = 1$)	Inductive load ($\cos \phi = 0.6$ to 0.7)	Motor or lamp load	
				N.C.	N.O.
Standard types One way types Reversed action types	125 V AC	10 A	6 A	3 A	1.5 A
	250 V AC	10 A	6 A	2 A	1 A
	480 V AC	1 A	0.5 A	—	—
	125 V DC	0.5 A	0.05 A	—	—
	250 V DC	0.25 A	0.03 A	—	—
Oil tight types	125 V AC	10 A	6 A	3 A	1.5 A
	250 V AC	10 A	6 A	2 A	1.0 A
	125 V DC	0.5 A	0.05 A	—	—

2. Characteristics

Item		Specifications
Expected life	Mechanical	Pin plunger types (O.T.: specified value)
		Other types (O.T.: specified value)
	Electrical (O.T.: Max.)	
Insulation resistance		Min. 100 M Ω (at 500 V DC)
Dielectric strength	Between open terminals	1,000 Vrms for 1 min.
	Between each terminal and other exposed metal parts	2,000 Vrms for 1 min.
	Between each terminal and ground	2,000 Vrms for 1 min.
Contact resistance (initial) (by voltage drop, 1 A, 6–8 V DC)		Max. 50 m Ω
Vibration resistance (Pin plunger type)		Single amplitude: 0.75 mm, 10 to 55 Hz (contact opening: max. 1 msec.)
Shock resistance	Pin plunger types	Min. 300 m/s ² (contact opening: max. 1 msec.)
	Other types	Min. 50 m/s ² (contact opening: max. 1 msec.)
Allowable operating speed (at no load)		0.1 to 1,000 mm/sec. (at pin plunger position)
Max. operating cycle rate (at no load)		240 cpm
Ambient temperature		–25°C to +80°C (no freezing at low temperature)
Weight		Approx. 20 to 55 g

OPERATING CHARACTERISTICS**Standard types**

Types of actuator	Pin plunger	Overtravel plunger	Compact overtravel plunger	Panel mount plunger
Operating force, max.	3.63 N			
Release force, min.	1.12 N			
Pretravel, max. mm	0.4			
Movement differential, max. mm	0.05			
Overtravel, min. mm	0.13	1.5	1.5	5.6
Operating position, mm	15.9±0.4	28.2±0.5	21.2±0.5	21.8±0.8

Types of actuator	Panel mount roller plunger	Panel mount cross roller plunger	Flexible leaf lever	Flexible roller leaf lever
Operating force, max.	3.63 N		1.47 N	
Release force, min.	1.12 N		0.14 N	
Pretravel, max. mm	0.4		4	
Movement differential, max. mm	0.05		1.3	
Overtravel, min. mm	3.6		1.6	
Operating position, mm	33.3±1.2		17.5±0.8	28.6±0.8

Standard types (cont' d)

Types of actuator	Rigid lever	Rigid short roller lever	Rigid roller lever
Operating force, max.	0.69 N	1.57 N	0.98 N
Release force, min.	0.14 N	0.42 N	0.2 N
Pretravel, max. mm	10	4.5	7.5
Movement differential, max. mm	1.3	0.7	1.3
Overtravel, min. mm	5.6	2.4	3.6
Operating position, mm	19.1±0.7	30.2±0.4	30.2±0.7

One way types

Types of actuator	Rigid short roller lever	Rigid roller lever
Operating force, max.	2.23 N	1.67 N
Release force, min.	0.42 N	0.42 N
Pretravel, max. mm	3.5	4.5
Movement differential, max. mm	0.4	0.5
Overtravel, min. mm	1.5	2.4
Free position, max. mm	31.8	43.3
Operating position, mm	30.2±0.4	41.3±0.4

Reversed action types

Types of actuator	Rigid lever	Rigid short roller lever	Rigid roller lever
Operating force, max.	1.67 N	5.30 N	2.35 N
Release force, min.	0.27 N	1.67 N	0.56 N
Pretravel, max. mm	5.0	2.5	3.6
Movement differential, max. mm	0.9	0.4	0.7
Overtravel, min. mm	5.6	2.0	4.0
Operating position, mm	19.1±0.8	30.2±0.5	30.2±0.8

Oil tight types

Types of actuator	Rigid lever	Rigid short roller lever	Rigid roller lever
Operating force, max.	0.69 N	1.67 N	0.98 N
Release force, min.	0.14 N	0.42 N	0.20 N
Pretravel, max. mm	10	4.5	7.5
Movement differential, max. mm	1.5	0.7	1.3
Overtravel, min. mm	5.6	2.4	3.6
Operating position, mm	19.1±0.7	30.2±0.4	30.2±0.7

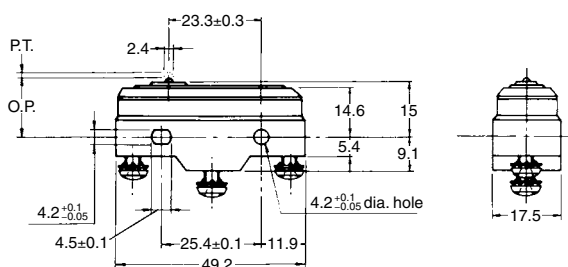
DIMENSIONS

1. Standard types

Pin plunger



AM1100KF (Solder terminal)
AM1300KF (Screw terminal)

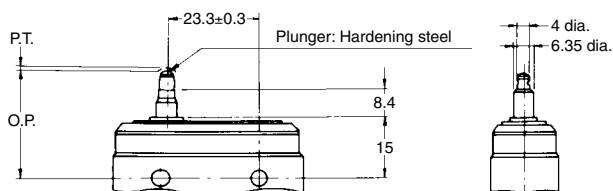


Operating force, max.	3.63 N
Release force, min.	1.12 N
Pretravel, max. mm	0.4
Movement differential, max. mm	0.05
Overtravel, min. mm	0.13
Operating position, mm	15.9±0.4

Overtravel plunger



AM1105KF (Solder terminal)
AM1305KF (Screw terminal)

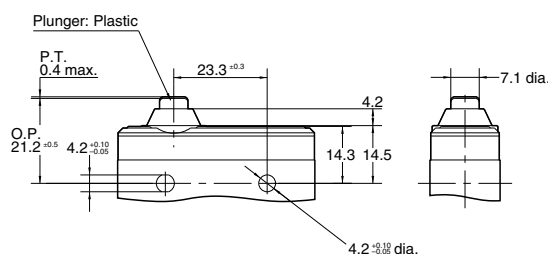


Operating force, max.	3.63 N
Release force, min.	1.12 N
Pretravel, max. mm	0.4
Movement differential, max. mm	0.05
Overtravel, min. mm	1.5
Operating position, mm	28.2±0.5

Compact over plunger



AM1106KF (Solder terminal)
AM1306KF (Screw terminal)

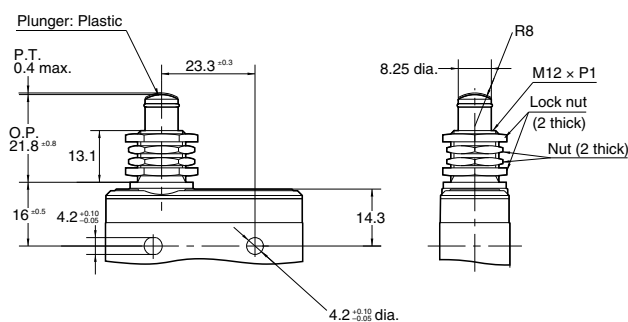


Operating force, max.	3.63 N
Release force, min.	1.12 N
Pretravel, max. mm	0.4
Movement differential, max. mm	0.05
Overtravel, min. mm	1.5
Operating position, mm	21.2±0.5

Panel mount plunger



AM1107KF (Solder terminal)
AM1307KF (Screw terminal)



Operating force, max.	3.63 N
Release force, min.	1.12 N
Pretravel, max. mm	0.4
Movement differential, max. mm	0.05
Overtravel, min. mm	5.6
Operating position, mm	21.8±0.8

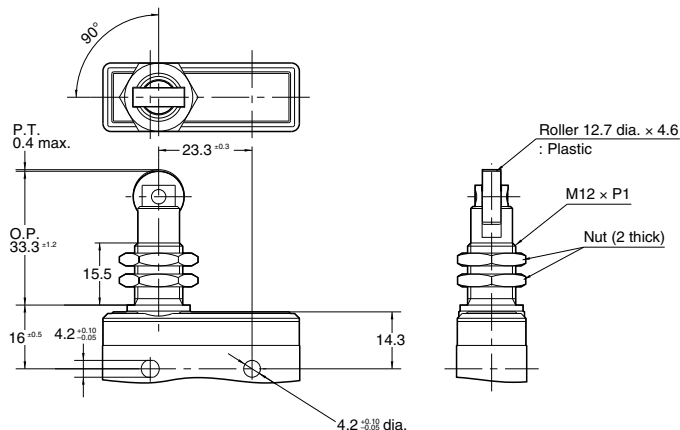
AM1

Panel mount roller plunger

mm General tolerance: ± 0.4



AM110811KF (Solder terminal)
AM130811KF (Screw terminal)

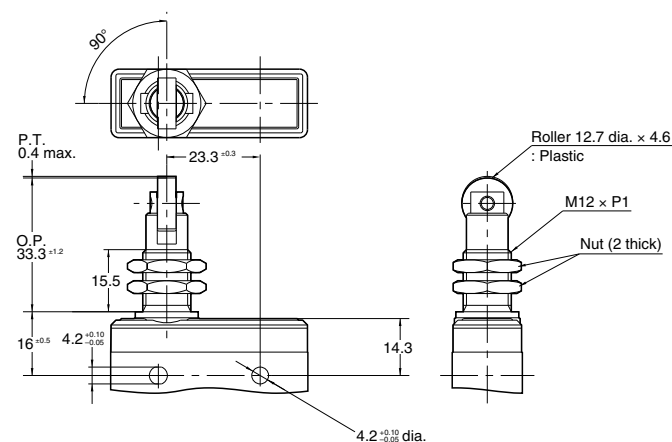


Operating force, max.	3.63 N
Release force, min.	1.12 N
Pretravel, max. mm	0.4
Movement differential, max. mm	0.05
Overtravel, min. mm	3.6
Operating position, mm	33.3 ± 1.2

Panel mount cross roller plunger



AM110812KF (Solder terminal)
AM130812KF (Screw terminal)



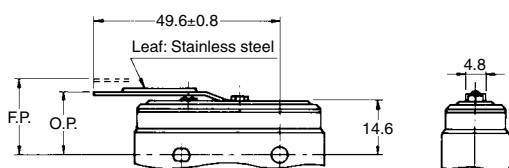
Operating force, max.	3.63 N
Release force, min.	1.12 N
Pretravel, max. mm	0.4
Movement differential, max. mm	0.05
Overtravel, min. mm	3.6
Operating position, mm	33.3 ± 1.2

Dimensions and Operating characteristics are the same as those of Panel mount roller plunger type. However, the roller joins the switch body at an angle of 90°.

Flexible leaf lever



AM1101KF (Solder terminal)
AM1301KF (Screw terminal)

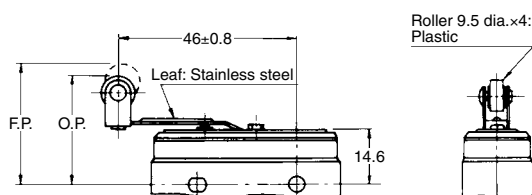


Operating force, max.	1.47 N
Release force, min.	0.14 N
Pretravel, max. mm	4
Movement differential, max. mm	1.3
Overtravel, min. mm	1.6
Operating position, mm	17.5 ± 0.8

Flexible roller leaf lever



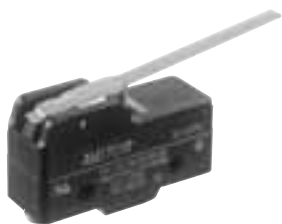
AM1103KF (Solder terminal)
AM1303KF (Screw terminal)



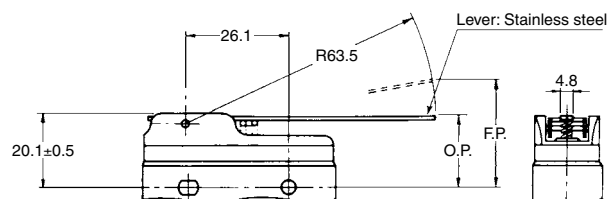
Operating force, max.	1.47 N
Release force, min.	0.14 N
Pretravel, max. mm	4
Movement differential, max. mm	1.3
Overtravel, min. mm	1.6
Operating position, mm	28.6 ± 0.8

Rigid lever

mm General tolerance: ± 0.4



AM1501KF (Solder terminal)
AM1701KF (Screw terminal)

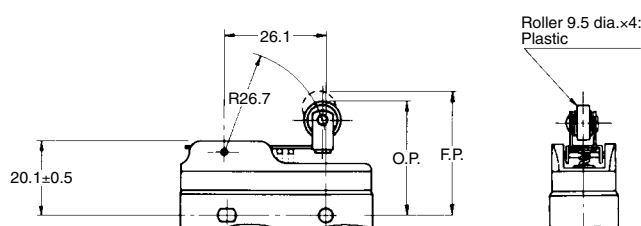


Operating force, max.	0.69 N
Release force, min.	0.14 N
Pretravel, max. mm	10
Movement differential, max. mm	1.3
Overtravel, min. mm	5.6
Operating position, mm	19.1 \pm 0.7

Rigid short roller lever



AM1504KF (Solder terminal)
AM1704KF (Screw terminal)

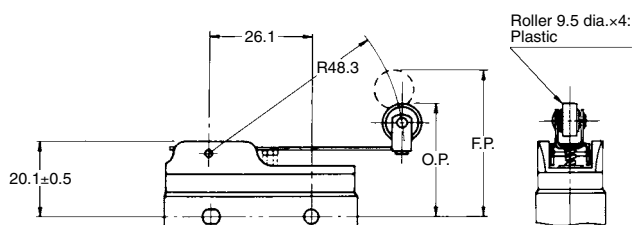


Operating force, max.	1.57 N
Release force, min.	0.42 N
Pretravel, max. mm	4.5
Movement differential, max. mm	0.7
Overtravel, min. mm	2.4
Operating position, mm	30.2 \pm 0.4

Rigid roller lever



AM1503KF (Solder terminal)
AM1703KF (Screw terminal)



Operating force, max.	0.98 N
Release force, min.	0.2 N
Pretravel, max. mm	7.5
Movement differential, max. mm	1.3
Overtravel, min. mm	3.6
Operating position, mm	30.2 \pm 0.7

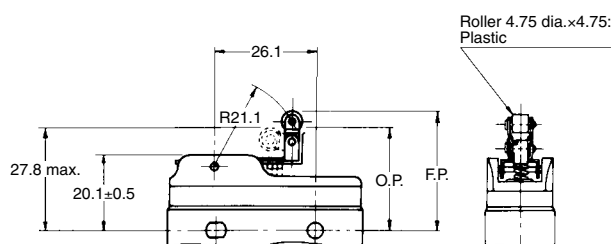
2. One way types

This type is operated only to one direction, not to the reversed direction by the construction of the roller lever, pivoting away from the cam on the return stroke.

Rigid short roller lever



AM1544KF (Solder terminal)
AM1744KF (Screw terminal)

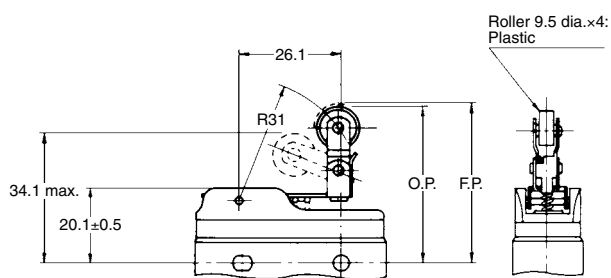
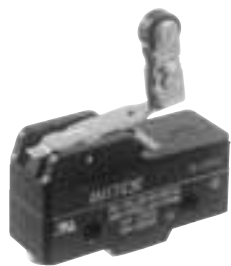


Operating force, max.	2.23 N
Release force, min.	0.42 N
Pretravel, max. mm	3.5
Movement differential, max. mm	0.4
Overtravel, min. mm	1.5
Operating position, mm	30.2 \pm 0.4

AM1

Rigid roller lever

mm General tolerance: ± 0.4



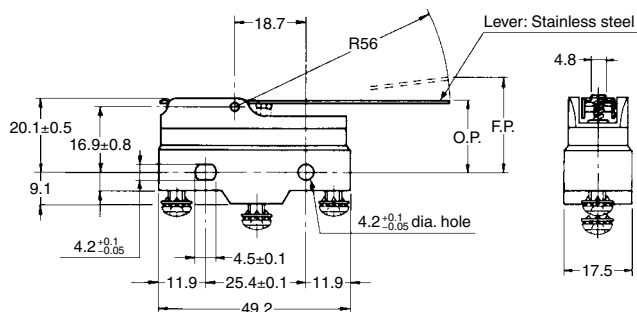
AM1543KF (Solder terminal)
AM1743KF (Screw terminal)

Operating force, max.	1.67 N
Release force, min.	0.42 N
Pretravel, max. mm	4.5
Movement differential, max. mm	0.5
Overtravel, min. mm	2.4
Operating position, mm	41.3 ± 0.4

3. Reversed action types

When the actuator is operated, the switching mechanism returns to the free position. Extraordinary force by pushing the plunger too much is not put on the switching mechanism, which means stability in life.

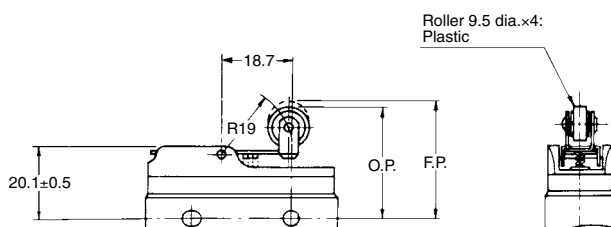
Rigid lever



AM1531KF (Solder terminal)
AM1731KF (Screw terminal)

Operating force, max.	1.67 N
Release force, min.	0.27 N
Pretravel, max. mm	5.0
Movement differential, max. mm	0.9
Overtravel, min. mm	5.6
Operating position, mm	19.1 ± 0.8

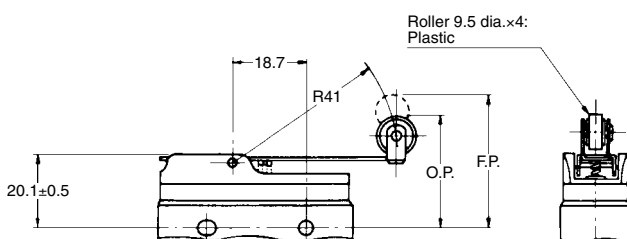
Rigid short roller lever



AM1534KF (Solder terminal)
AM1734KF (Screw terminal)

Operating force, max.	5.30 N
Release force, min.	1.67 N
Pretravel, max. mm	2.5
Movement differential, max. mm	0.4
Overtravel, min. mm	2.0
Operating position, mm	30.2 ± 0.5

Rigid roller lever



AM1533KF (Solder terminal)
AM1733KF (Screw terminal)

Operating force, max.	2.35 N
Release force, min.	0.56 N
Pretravel, max. mm	3.6
Movement differential, max. mm	0.7
Overtravel, min. mm	4.0
Operating position, mm	30.2 ± 0.8

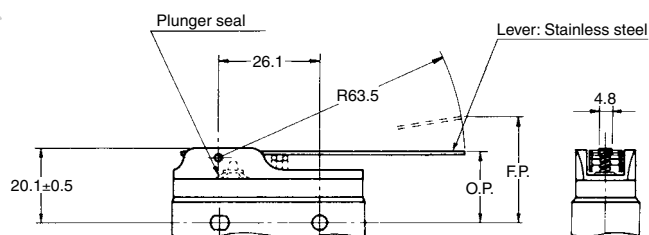
4. Oil tight types

The pushbutton part is sealed with the rubber cap and the connected part between the cap and body is also coated with resin so that these parts are kept away from foreign matters. This type has resistance to oil.

Rigid lever



AM1511KF (Solder terminal)
AM1711KF (Screw terminal)

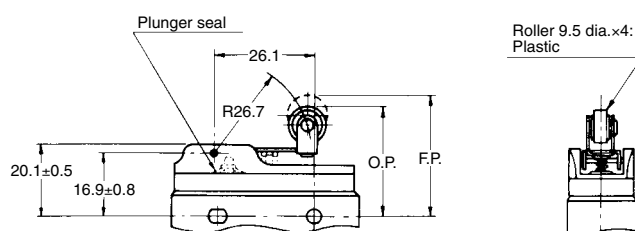


Operating force, max.	0.69 N
Release force, min.	0.14 N
Pretravel, max. mm	10
Movement differential, max. mm	1.5
Overtravel, min. mm	5.6
Operating position, mm	19.1±0.7

Rigid short roller lever

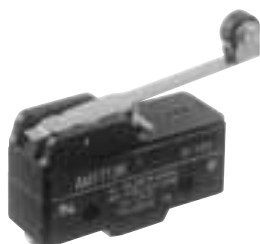


AM1514KF (Solder terminal)
AM1714KF (Screw terminal)

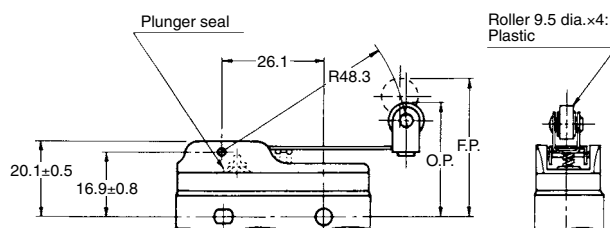


Operating force, max.	1.67 N
Release force, min.	0.42 N
Pretravel, max. mm	4.5
Movement differential, max. mm	0.7
Overtravel, min. mm	2.4
Operating position, mm	30.2±0.4

Rigid roller lever



AM1513KF (Solder terminal)
AM1713KF (Screw terminal)



Operating force, max.	0.98 N
Release force, min.	0.20 N
Pretravel, max. mm	7.5
Movement differential, max. mm	1.3
Overtravel, min. mm	3.6
Operating position, mm	30.2±0.7

NOTES

1. Regarding fastening of switch body

1) In fastening the switch body, use M4 mounting screws to attach switches with the torque 1.5 N·m or less.

2) After mounting and wiring, the insulation distance between ground and each terminal should be confirmed as sufficient.

2. Adjustment of the operating device

The operating device should be positioned so that it applies no stress to the pushbutton or actuator when the switch is in the open position. If this condition is exceeded, the mechanical and electrical performance will be impaired. In addition, the force applied by the operating device should be in a perpendicular direction. Even if the pushbutton is used in the full total travel position, there will be no influence on the life of the switch.

3. Soldering operations

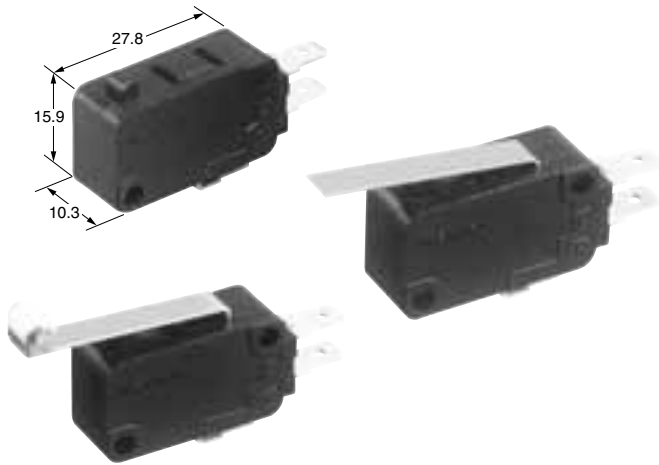
Soldering should be done in less than 5 seconds, with a 60 watt iron (tip temperature = 350°C max.). Care should be taken not to apply force to the terminal during soldering.

4. Avoid using switches in the following conditions:

- In corrosive gases such as hydrogen sulfide.
- In flammable or explosive gases such as gasoline or thinner etc.
- In a dusty environment.
- In an ambient humidity over 85%.
- In conditions where the perpendicular operating speed is less than 0.1 mm/sec. or more than 1,000 mm/sec.
- In a silicon atmosphere.

5. Others

Caution should be taken not to drop switches.



Standard type contact gap is 1mm. Please consult us if you need more than 1mm contact gap.

<http://panasonic-denko.co.jp/ac/e/service/environment>

FEATURES

- High precision as a result of designing ideal spring by using computer analysis
O.P. 14.7±0.4mm
- Reliable design with shock resistance min. 980 m/s²
- High inrush resistance 160A
- Wide variety of contact ratings and terminal types
- UL/C-UL, ENEC/VDE approved

TYPICAL APPLICATION

- Home appliances
- Vending machines
- Amusement and communication equipment
- Copies
- General industrial machines

About Cd-free contacts

We have introduced cadmium-free type products to reduce material which is not good for our environment. (The suffix "N" denotes such part.)

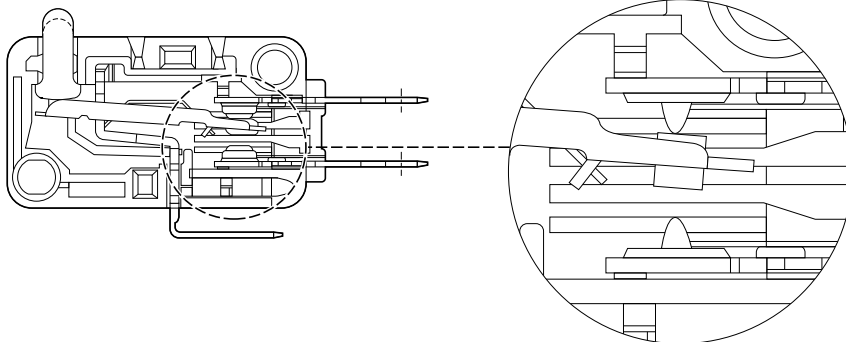
Please replace parts containing cadmium with Cd-free products and evaluate them with your actual application before use because the life of a relay depends on the contact material and load.

(Note: The suffix "N" is required only for 11 A and 16 A type. 0.1 A and 6 A type are originally cadmium free and the suffix "N" is not required.)

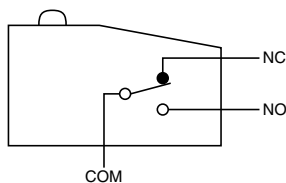
CONSTRUCTION

1. Silver alloy contact

2. Gold clad contact

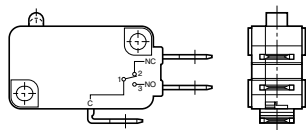


CONTACT ARRANGEMENT

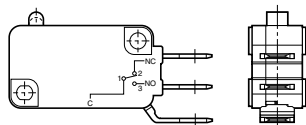


TERMINALS

.187 Quick-connect terminal
.187 Quick-connect/solder terminal
 Bottom COM terminal

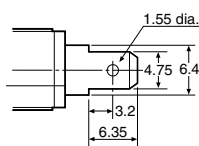


Side COM terminal



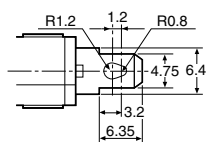
Dimensions

.187 Quick-connect terminal

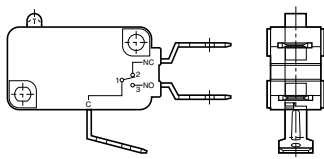


Dimensions

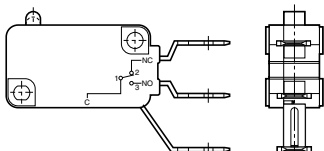
.187 Quick-connect/solder terminal



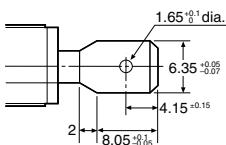
.250 Quick-connect terminal
 Bottom COM terminal



Side COM terminal



Dimensions



OPERATION FORCE CHART

7th digit of Part Number/Actuator	Operation Force, Max. by actuator				
	3	4	5	6	7
Pin plunger	0.49N	0.98N	1.96N	2.94N	3.92N
Short hinge lever	0.59N	1.08N	2.16N	3.14N	4.12N
Hinge lever	0.29N	0.59N	1.18N	1.77N	2.35N
Long hinge lever	0.15N	0.29N	0.59N	0.88N	1.18N
Simulated roller lever	0.29N	0.59N	1.18N	1.77N	2.35N
Short roller lever	0.59N	1.08N	2.16N	3.14N	4.12N
Roller lever	0.29N	0.59N	1.18N	1.77N	2.35N

ORDERING INFORMATION

0.1A type

Ex. AM5 0 0 1 0 C 5 3

Type of switch	Contact rating	Terminals	Actuators	Terminals	Operating force by pin plunger (max.)	Agency standard
AM5: QV switch	00: 0.1 A (Gold clad)	1: Bottom COM, SPDT 2: Bottom COM, SPST-NC 3: Bottom COM, SPST-NO 4: Side COM, SPDT 5: Side COM, SPST-NC 6: Side COM, SPST-NO	0: Pin plunger 1: Short hinge lever 2: Hinge lever 3: Long hinge lever 4: Simulated roller lever 5: Short roller lever 6: Roller lever	A: .187 Quick-connect/solder terminal C: .187 Quick-connect terminal	3: 0.49 N 4: 0.98 N 5: 1.96 N	3: UL/C-UL rated, ENEC/VDE approved

Remarks: 1. Not every combination is available. Please refer to the table, "PRODUCT TYPES".
2. Please refer to the Standard Chart regarding Agency Standard

6A type

Ex. AM5 0 6 1 0 C 5 3

Type of switch	Contact rating	Terminals	Actuators	Terminals	Operating force by pin plunger (max.)	Agency standard
AM5: QV switch	06: 6 A (Silver alloy)	1: Bottom COM, SPDT 2: Bottom COM, SPST-NC 3: Bottom COM, SPST-NO 4: Side COM, SPDT 5: Side COM, SPST-NC 6: Side COM, SPST-NO	0: Pin plunger 1: Short hinge lever 2: Hinge lever 3: Long hinge lever 4: Simulated roller lever 5: Short roller lever 6: Roller lever	A: .187 Quick-connect/solder terminal C: .187 Quick-connect terminal	3: 0.49 N	3: UL/C-UL rated, ENEC/VDE approved

Remarks: 1. Not every combination is available. Please refer to the table, "PRODUCT TYPES".
2. Please refer to the Standard Chart regarding Agency Standard

11A type

Ex. AM5 1 1 1 0 C 4 3 N

Type of switch	Contact rating	Terminals	Actuators	Terminals	Operating force by pin plunger (max.)	Agency standard	Contact
AM5: QV switch	11: 11 A (Silver alloy)	1: Bottom COM, SPDT 2: Bottom COM, SPST-NC 3: Bottom COM, SPST-NO 4: Side COM, SPDT 5: Side COM, SPST-NC 6: Side COM, SPST-NO	0: Pin plunger 1: Short hinge lever 2: Hinge lever 3: Long hinge lever 4: Simulated roller lever 5: Short roller lever 6: Roller lever	A: .187 Quick-connect/solder terminal C: .187 Quick-connect terminal D: .250 Quick-connect terminal	4: 0.98 N	3: UL/C-UL rated, ENEC/VDE approved	N: Cadmium free

Remarks: 1. Not every combination is available. Please refer to the table, "PRODUCT TYPES".
2. Please refer to the Standard Chart regarding Agency Standard

16A type

Ex. AM5 1 6 1 0 C 5 3 N

Type of switch	Contact rating	Terminals	Actuators	Terminals	Operating force by pin plunger (max.)	Agency standard	Contact
AM5: QV switch	16: 16 A (Silver alloy)	1: Bottom COM, SPDT 2: Bottom COM, SPST-NC 3: Bottom COM, SPST-NO 4: Side COM, SPDT 5: Side COM, SPST-NC 6: Side COM, SPST-NO	0: Pin plunger 1: Short hinge lever 2: Hinge lever 3: Long hinge lever 4: Simulated roller lever 5: Short roller lever 6: Roller lever	A: .187 Quick-connect/solder terminal C: .187 Quick-connect terminal D: .250 Quick-connect terminal	5: 1.96 N 6: 2.94 N 7: 3.92 N	3: UL/C-UL rated, ENEC/VDE approved	N: Cadmium free

Remarks: 1. Not every combination is available. Please refer to the table, "PRODUCT TYPES".
2. Please refer to the Standard Chart regarding Agency Standard

PRODUCT TYPES**0.1A type (Gold clad contact)**

.187 Quick-connect terminal

1) Bottom COM terminal

Actuator	Operating force, Max.	Contact arrangement		
		SPDT	SPST-NC	SPST-NO
Pin plunger	0.49N	AM50010C33	AM50020C33	AM50030C33
	0.98N	AM50010C43	AM50020C43	AM50030C43
	1.96N	AM50010C53	AM50020C53	AM50030C53
Short hinge lever	0.59N	AM50011C33	AM50021C33	AM50031C33
	1.08N	AM50011C43	AM50021C43	AM50031C43
	2.16N	AM50011C53	AM50021C53	AM50031C53
Hinge lever	0.29N	AM50012C33	AM50022C33	AM50032C33
	0.59N	AM50012C43	AM50022C43	AM50032C43
	1.18N	AM50012C53	AM50022C53	AM50032C53
Long hinge lever	0.15N	AM50013C33	AM50023C33	AM50033C33
	0.29N	AM50013C43	AM50023C43	AM50033C43
	0.59N	AM50013C53	AM50023C53	AM50033C53
Simulated roller lever	0.29N	AM50014C33	AM50024C33	AM50034C33
	0.59N	AM50014C43	AM50024C43	AM50034C43
	1.18N	AM50014C53	AM50024C53	AM50034C53
Short roller lever	0.59N	AM50015C33	AM50025C33	AM50035C33
	1.08N	AM50015C43	AM50025C43	AM50035C43
	2.16N	AM50015C53	AM50025C53	AM50035C53
Roller lever	0.29N	AM50016C33	AM50026C33	AM50036C33
	0.59N	AM50016C43	AM50026C43	AM50036C43
	1.18N	AM50016C53	AM50026C53	AM50036C53

2-1) Side COM terminal

Actuator	Operating force, Max.	Contact arrangement		
		SPDT	SPST-NC	SPST-NO
Pin plunger	0.49N	AM50040C33	AM50050C33	AM50060C33
	0.98N	AM50040C43	AM50050C43	AM50060C43
	1.96N	AM50040C53	AM50050C53	AM50060C53
Short hinge lever	0.59N	AM50041C33	AM50051C33	AM50061C33
	1.08N	AM50041C43	AM50051C43	AM50061C43
	2.16N	AM50041C53	AM50051C53	AM50061C53
Hinge lever	0.29N	AM50042C33	AM50052C33	AM50062C33
	0.59N	AM50042C43	AM50052C43	AM50062C43
	1.18N	AM50042C53	AM50052C53	AM50062C53
Long hinge lever	0.15N	AM50043C33	AM50053C33	AM50063C33
	0.29N	AM50043C43	AM50053C43	AM50063C43
	0.59N	AM50043C53	AM50053C53	AM50063C53
Simulated roller lever	0.29N	AM50044C33	AM50054C33	AM50064C33
	0.59N	AM50044C43	AM50054C43	AM50064C43
	1.18N	AM50044C53	AM50054C53	AM50064C53
Short roller lever	0.59N	AM50045C33	AM50055C33	AM50065C33
	1.08N	AM50045C43	AM50055C43	AM50065C43
	2.16N	AM50045C53	AM50055C53	AM50065C53
Roller lever	0.29N	AM50046C33	AM50056C33	AM50066C33
	0.59N	AM50046C43	AM50056C43	AM50066C43
	1.18N	AM50046C53	AM50056C53	AM50066C53

6A type (Silver alloy contact)

.187 Quick-connect terminal

1) Bottom COM terminal

Actuator	Operating force, Max.	Contact arrangement	Contact arrangement	
		SPDT	SPST-NC	SPST-NO
Pin plunger	0.49N	AM50610C33	AM50620C33	AM50630C33
Short hinge lever	0.59N	AM50611C33	AM50621C33	AM50631C33
Hinge lever	0.29N	AM50612C33	AM50622C33	AM50632C33
Long hinge lever	0.15N	AM50613C33	AM50623C33	AM50633C33
Simulated roller lever	0.29N	AM50614C33	AM50624C33	AM50634C33
Short roller lever	0.59N	AM50615C33	AM50625C33	AM50635C33
Roller lever	0.29N	AM50616C33	AM50626C33	AM50636C33

2-1) Side COM terminal

Actuator	Operating force, Max.	Contact arrangement	Contact arrangement	
		SPDT	SPST-NC	SPST-NO
Pin plunger	0.49N	AM50640C33	AM50650C33	AM50660C33
Short hinge lever	0.59N	AM50641C33	AM50651C33	AM50661C33
Hinge lever	0.29N	AM50642C33	AM50652C33	AM50662C33
Long hinge lever	0.15N	AM50643C33	AM50653C33	AM50663C33
Simulated roller lever	0.29N	AM50644C33	AM50654C33	AM50664C33
Short roller lever	0.59N	AM50645C33	AM50655C33	AM50665C33
Roller lever	0.29N	AM50646C33	AM50656C33	AM50666C33

Remarks: Also .187 Quick-connect/solder terminal is available. When ordering, change the eighth digit of part number C to A.

<ex.> .187 Quick-connect terminal .187 Quick-connect/solder terminal
 AM50610C4 → AM50610A4

11A type (Silver alloy contact)

.187 Quick-connect terminal

1) Bottom COM terminal

Actuator	Operating force, Max.	Contact arrangement	Contact arrangement	
		SPDT	SPST-NC	SPST-NO
Pin plunger	0.98N	AM51110C43N	AM51120C43N	AM51130C43N
Short hinge lever	1.08N	AM51111C43N	AM51121C43N	AM51131C43N
Hinge lever	0.59N	AM51112C43N	AM51122C43N	AM51132C43N
Long hinge lever	0.29N	AM51113C43N	AM51123C43N	AM51133C43N
Simulated roller lever	0.59N	AM51114C43N	AM51124C43N	AM51134C43N
Short roller lever	1.08N	AM51115C43N	AM51125C43N	AM51135C43N
Roller lever	0.59N	AM51116C43N	AM51126C43N	AM51136C43N

2-1) Side COM terminal

Actuator	Operating force, Max.	Contact arrangement	Contact arrangement	
		SPDT	SPST-NC	SPST-NO
Pin plunger	0.98N	AM51140C43N	AM51150C43N	AM51160C43N
Short hinge lever	1.08N	AM51141C43N	AM51151C43N	AM51161C43N
Hinge lever	0.59N	AM51142C43N	AM51152C43N	AM51162C43N
Long hinge lever	0.29N	AM51143C43N	AM51153C43N	AM51163C43N
Simulated roller lever	0.59N	AM51144C43N	AM51154C43N	AM51164C43N
Short roller lever	1.08N	AM51145C43N	AM51155C43N	AM51165C43N
Roller lever	0.59N	AM51146C43N	AM51156C43N	AM51166C43N

Remarks: 1. Also .187 Quick-connect/solder terminal is available. When ordering, change the eighth digit of part number C to A.

<ex.> .187 Quick-connect terminal .187 Quick-connect/solder terminal
 AM51110C4 → AM51110A4

2. .250 Quick-connect terminal is available. When ordering, change the eighth digit of part number C to D.

<ex.> .187 Quick-connect terminal .250 Quick-connect terminal
 AM51110C4 → AM51110D4

AM5

16A type (Silver alloy contact)

.187 Quick-connect terminal

1) Bottom COM terminal

Actuator	Operating force, Max.	Contact arrangement		
		SPDT	SPST-NC	SPST-NO
Pin plunger	1.96N	AM51610C53N	AM51620C53N	AM51630C53N
	2.94N	AM51610C63N	AM51620C63N	AM51630C63N
	3.92N	AM51610C73N	AM51620C73N	AM51630C73N
Short hinge lever	2.16N	AM51611C53N	AM51621C53N	AM51631C53N
	3.14N	AM51611C63N	AM51621C63N	AM51631C63N
	4.12N	AM51611C73N	AM51621C73N	AM51631C73N
Hinge lever	1.18N	AM51612C53N	AM51622C53N	AM51632C53N
	1.77N	AM51612C63N	AM51622C63N	AM51632C63N
	2.35N	AM51612C73N	AM51622C73N	AM51632C73N
Long hinge lever	0.59N	AM51613C53N	AM51623C53N	AM51633C53N
	0.88N	AM51613C63N	AM51623C63N	AM51633C63N
	1.18N	AM51613C73N	AM51623C73N	AM51633C73N
Simulated roller lever	1.18N	AM51614C53N	AM51624C53N	AM51634C53N
	1.77N	AM51614C63N	AM51624C63N	AM51634C63N
	2.35N	AM51614C73N	AM51624C73N	AM51634C73N
Short roller lever	1.18N	AM51615C53N	AM51625C53N	AM51635C53N
	3.14N	AM51615C63N	AM51625C63N	AM51635C63N
	4.12N	AM51615C73N	AM51625C73N	AM51635C73N
Roller lever	1.18N	AM51616C53N	AM51626C53N	AM51636C53N
	1.77N	AM51616C63N	AM51626C63N	AM51636C63N
	2.35N	AM51616C73N	AM51626C73N	AM51636C73N

2-1) Side COM terminal

Actuator	Operating force, Max.	Contact arrangement		
		SPDT	SPST-NC	SPST-NO
Pin plunger	1.96N	AM51640C53N	AM51650C53N	AM51660C53N
	2.94N	AM51640C63N	AM51650C63N	AM51660C63N
	3.92N	AM51640C73N	AM51650C73N	AM51660C73N
Short hinge lever	2.16N	AM51641C53N	AM51651C53N	AM51661C53N
	3.14N	AM51641C63N	AM51651C63N	AM51661C63N
	4.12N	AM51641C73N	AM51651C73N	AM51661C73N
Hinge lever	1.18N	AM51642C53N	AM51652C53N	AM51662C53N
	1.77N	AM51642C63N	AM51652C63N	AM51662C63N
	2.35N	AM51642C73N	AM51652C73N	AM51662C73N
Long hinge lever	0.59N	AM51643C53N	AM51653C53N	AM51663C53N
	0.88N	AM51643C63N	AM51653C63N	AM51663C63N
	1.18N	AM51643C73N	AM51653C73N	AM51663C73N
Simulated roller lever	1.18N	AM51644C53N	AM51654C53N	AM51664C53N
	1.77N	AM51644C63N	AM51654C63N	AM51664C63N
	2.35N	AM51644C73N	AM51654C73N	AM51664C73N
Short roller lever	2.16N	AM51645C53N	AM51655C53N	AM51665C53N
	3.14N	AM51645C63N	AM51655C63N	AM51665C63N
	4.12N	AM51645C73N	AM51655C73N	AM51665C73N
Roller lever	1.18N	AM51646C53N	AM51656C53N	AM51666C53N
	1.77N	AM51646C63N	AM51656C63N	AM51666C63N
	2.35N	AM51646C73N	AM51656C73N	AM51666C73N

Remarks: 1. .187 Quick-connect/solder terminal is available. When ordering, change the eighth digit of part number C to A.

<ex.> .187 Quick-connect terminal .187 Quick-connect/solder terminal

AM51610C5 → AM51610A5

2. .250 Quick-connect terminal is available. When ordering, change the eighth digit of part number C to D.

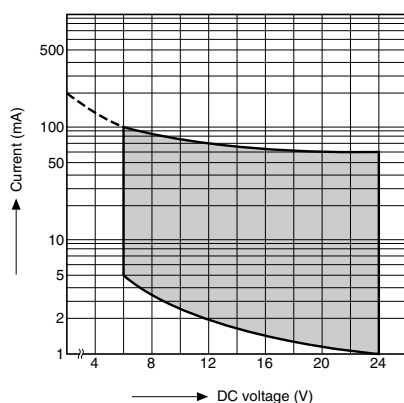
<ex.> .187 Quick-connect terminal .250 Quick-connect terminal

AM51610C5 → AM51610D5

DATA

Gold-clad type

Range of low-level current voltage

**SPECIFICATIONS****1. Contact rating**

Type		Voltage	Resistive load (cos=1)	Inductive load (cos nearly equal 0.6 to 0.7)
Gold clad contact	0.1A type	250V AC	0.1A	0.1A
		125V AC	0.1A	0.1A
		30V DC	0.1A	0.1A
Silver alloy contact	6A type	250V AC	6A	3A
		125V AC	6A	3A
		125V DC	0.5A	0.5A
	11A type	250V AC	11A	6A
		125V AC	11A	6A
		125V DC	0.6A	0.6A
	16A type	250V AC	16A	10A
		125V AC	16A	10A
		125V DC	0.6A	0.6A
Gold clad contact for low level circuit		6V DC	5mA	—
		12V DC	2mA	—
		24V DC	1mA	—

Remark: The inductive load for DC should have a time constant of 7 ms or less.

2. Characteristics

Type		16, 11, 6A type (Silver alloy)	0.1A type (Gold clad)
Expected life (min.)	Mechanical	10 ⁷ operations (at 60 cpm)	
	Electrical	10 ⁵ Operations (at rated load 20 cpm)	10 ⁵ operations (at rated load) 2 × 10 ⁶ operations (at low-level circuit rating)
Insulation resistance		100MΩ (at 500V DC)	
Dielectric strength	Between terminals	1,000Vrms for 1 min.	
	Between terminals and other exposed metal parts	2,000Vrms for 1 min.	
	Between terminals and ground	2,000Vrms for 1 min.	
Contact resistance (initial)		50mΩ (by voltage drop at 1A 6 to 8V DC)	50mΩ (by voltage drop at 0.1A 6 to 8V DC)
Vibration resistance (by pin plunger)		10 to 55Hz at simple amplitude of 0.75mm (Contact opening: max. 1msec.)	
Shock resistance (by pin plunger) (contact opening: max. 1msec.)		O.F. 0.49N max. type Min. 98m/s ² O.F. 0.98N max. type Min. 196m/s ² O.F. 1.96N to 3.92N max. type Min. 294m/s ²	O.F. 0.15N to 0.49N max. type Min. 98m/s ² O.F. 0.98N max. type Min. 196m/s ² O.F. 1.96N max. type Min. 294m/s ²
Allowable operating speed		0.1 to 1,000mm/sec. (at pin plunger)	
Maximum operating cycle rate		600cpm	
Ambient temperature		-25 to +105°C (Not freezing below 0°C)	
Weight		6.3g	

AM5

3. Operating characteristics

Pin plunger

7th digit of part No.	3	4	5	6	7
Operating force, max.	0.49N	0.98N	1.96N	2.94N	3.92N
Release force, min.	0.12N	0.25N	0.49N	0.74N	0.98N
Pretravel, max. mm	1.4				
Movement differential, max. mm	0.4				
Overtravel, min. mm	1.0				
Operating position mm	14.7±0.4				

Short hinge lever

7th digit of part No.	3	4	5	6	7
Operating force, max.	0.59N	1.08N	2.16N	3.14N	4.12N
Release force, min.	0.098N	0.20N	0.39N	0.59N	0.78N
Pretravel, max. mm	1.6				
Movement differential, max. mm	0.5				
Overtravel, min. mm	0.9				
Operating position mm	15.3±0.5				

Hinge lever

7th digit of part No.	3	4	5	6	7
Operating force, max.	0.29N	0.59N	1.18N	1.77N	2.35N
Release force, min.	0.049N	0.098N	0.20N	0.29N	0.39N
Pretravel, max. mm	3.2				
Movement differential, max. mm	1.0				
Overtravel, min. mm	1.4				
Operating position mm	15.3±1.0				

Long hinge lever

7th digit of part No.	3	4	5	6	7
Operating force, max.	0.15N	0.29N	0.59N	0.88N	1.18N
Release force, min.	0.025N	0.049N	0.098N	0.15N	0.20N
Pretravel, max. mm	7.5				
Movement differential, max. mm	2.0				
Overtravel, min. mm	2.2				
Operating position mm	15.3±2.6				

Simulated roller lever

7th digit of part No.	3	4	5	6	7
Operating force, max.	0.29N	0.59N	1.18N	1.77N	2.35N
Release force, min.	0.049N	0.098N	0.20N	0.29N	0.39N
Pretravel, max. mm	3.2				
Movement differential, max. mm	1.0				
Overtravel, min. mm	1.4				
Operating position mm	18.5±1.0				

Short roller lever

7th digit of part No.	3	4	5	6	7
Operating force, max.	0.59N	1.08N	2.16N	3.14N	4.12N
Release force, min.	0.098N	0.20N	0.39N	0.59N	0.78N
Pretravel, max. mm	1.6				
Movement differential, max. mm	0.5				
Overtravel, min. mm	0.9				
Operating position mm	20.7±0.5				

Roller lever

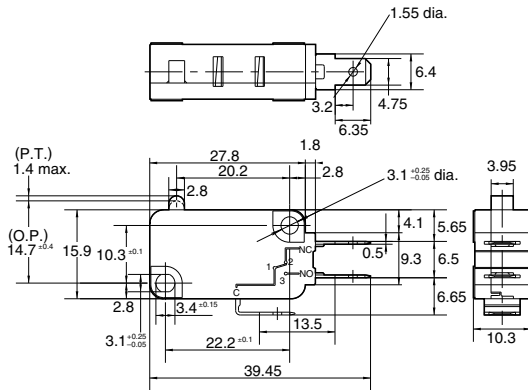
7th digit of part No.	3	4	5	6	7
Operating force, max.	0.29N	0.59N	1.18N	1.77N	2.35N
Release force, min.	0.049N	0.098N	0.20N	0.29N	0.39N
Pretravel, max. mm	3.2				
Movement differential, max. mm	1.0				
Overtravel, min. mm	1.4				
Operating position mm	20.7±1.0				

DIMENSIONS

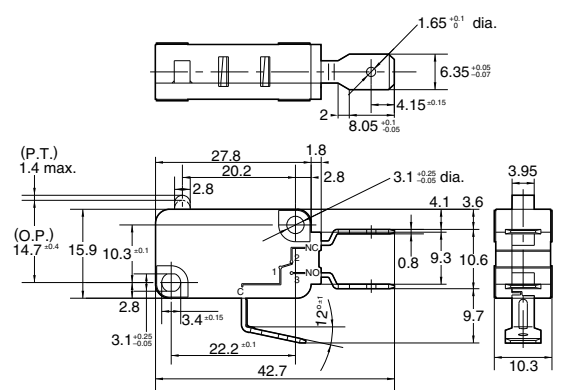
1. Pin plunger
Bottom COM terminal



.187 Quick-connect terminal



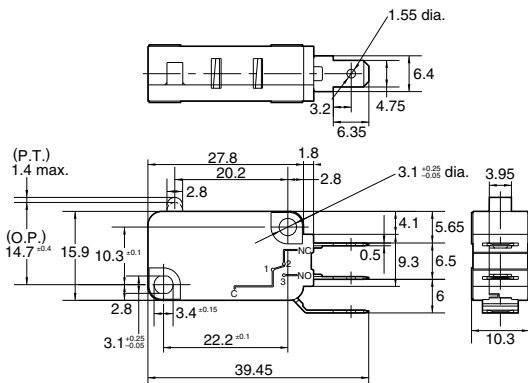
.250 Quick-connect terminal



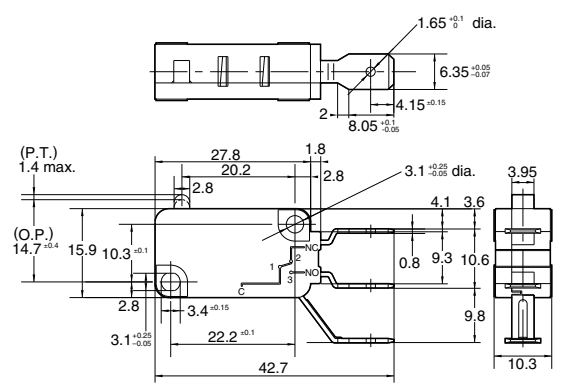
Side COM terminal



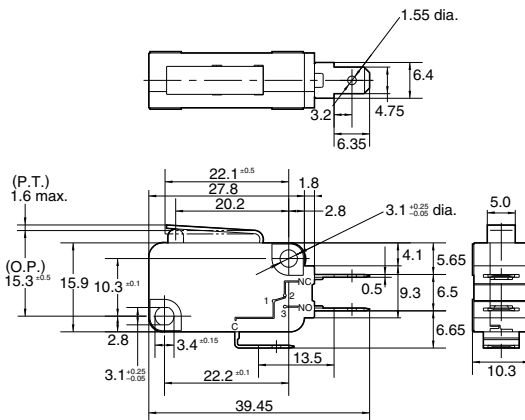
.187 Quick-connect terminal



.250 Quick-connect terminal



2. Short hinge lever

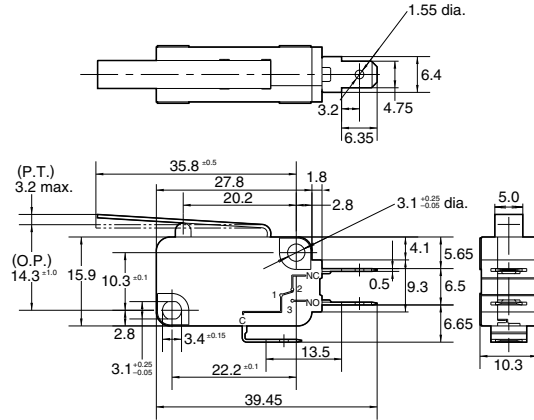


The dimensions other than drawn above are same as pin plunger type.

AM5

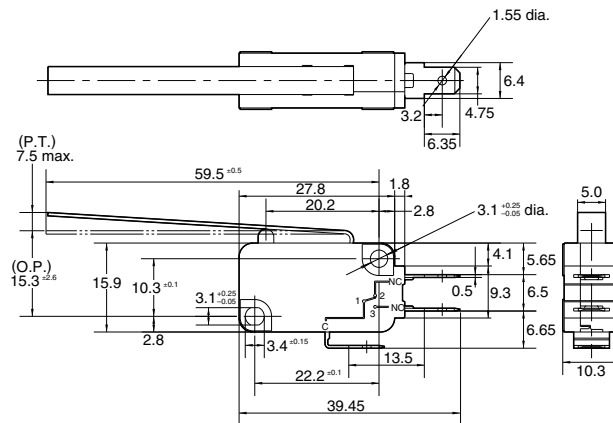
3. Hinge lever

mm General tolerance: ± 0.25



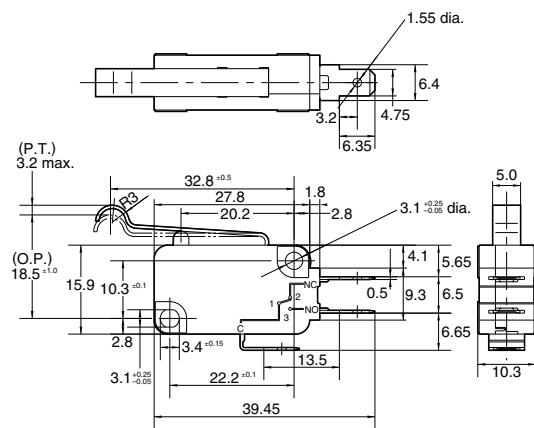
The dimensions other than drawn above are same as pin plunger type.

4. Long hinge lever



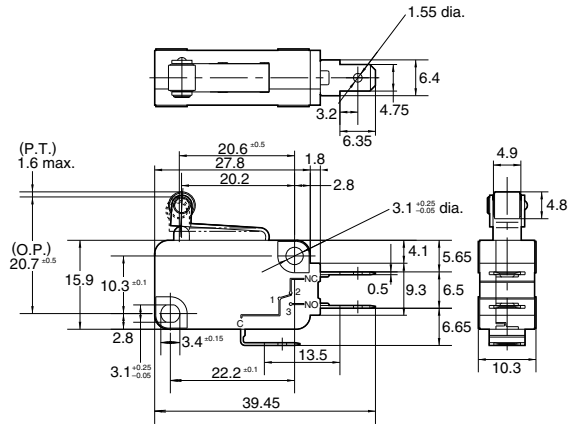
The dimensions other than drawn above are same as pin plunger type.

5. Simulated roller lever



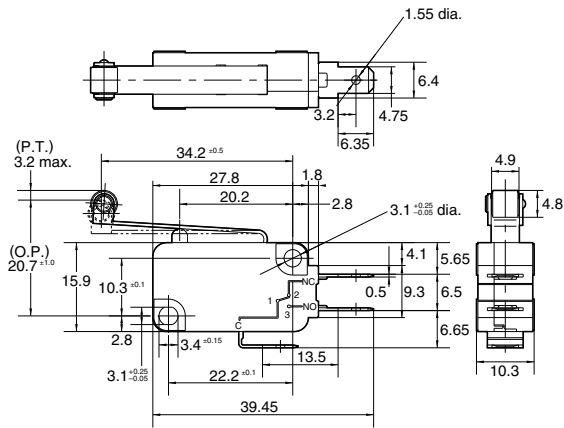
The dimensions other than drawn above are same as pin plunger type.

6. Short roller lever



The dimensions other than drawn above are same as pin plunger type.

7. Hinge Roller lever



The dimensions other than drawn above are same as pin plunger type.

NOTES

1. Fastening of the switch body

- 1) Use flat filister head M3 screws to mount switches with less than a 0.49 N·m torque. Use of screws washers or adhesive lock is recommended to prevent loosening of the screws.
- 2) Check insulation distance between ground and each terminal.
- 3) When the operation object is in the free position, force should not be applied directly to the actuator or pin plunger. Also force should be applied to the pin plunger from vertical direction to the switch.
- 4) The standard value of overtravel should be the range of 70% to 100% of the rated O.T. value.

2. Soldering operations

Soldering should be accomplished in less than 5 seconds, with a 60 watt iron. Care should be taken not to apply force to the terminal during soldering.

3. Variance of operating characteristics

When specifying the switch, allow +20% to the listed operating and release forces.

4. Environment

Avoid using the switches in the following conditions;

- In corrosive gases, such as silicon gas
- In a dusty environment

5. For switching of inductive loads (relays, solenoids, etc.)

- 1) In order to prevent damage to contacts due to the occurrence of arcing, an arc absorbing circuit should be applied.
- 2) Care should be taken that occurrence in AC load possibly shorten the expected life.

6. Please assure the quality and reliability of the switch under the actual service condition.

7. It is recommended to use Gold clad contact type in use of low-level circuit rating.

8. Cover and body are press-fitted. Once it is taken apart, it may cause change of characteristics.

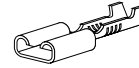
9. Cover and body are press-fitted. Once it is taken apart, it may cause change of characteristics.

USE OF CONNECTOR

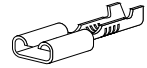
The .187 Quick-connect terminal and .250 Quick-connect terminal accept the all kinds of 1 polarity connectors and the "Positive Lock" connectors. Please contact the manufacturers directly.

• receptacle terminal

.250 series

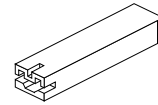


.187 series

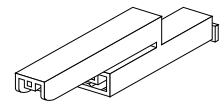


• "Positive Lock" connector. (equipped with the lock construction of low insertion type)

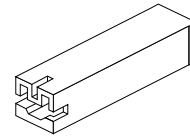
.187 type
(1 polarity)



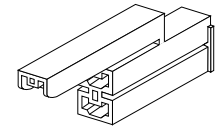
.187 type
(2 polarities)



.250 type
(1 polarity)



.187 type
(3 polarities)





**MINIATURE SWITCHES
WITH HIGH PRECISION
(Contact gap:
more than 1mm type)**

**AM5 (QV)
SWITCHES**



- **Conforms with the IEC950 standards for secondary circuit insulation distance.
Assures a contact gap of at least 1mm**
- **Can handle high-capacity loads on the secondary side that S-type size switches cannot**
- **High inrush and hard impacts resistant**
- **Excellent operating position precision**
- **UL/CSA/VDE/SEMKO/TÜV approved**

We have introduced Cadmium free type products to reduce the material which is not good for our environment. (The suffix "N" should be added to the part number.) (Note: The Suffix "N" is required only for 11A and 16A type only. 0.1A and 6A type are originally Cadmium free and the suffix "N" is not required.)

If you are still using the Cadmium containing parts, which don't have "N" on the suffix of the part number, please use Cadmium free parts from now on. The life of the Cadmium free parts may be shorter than the Cadmium containing parts based on the load condition, so please evaluate the Cadmium free parts with your actual application before use.

<http://panasonic-denko.co.jp/ac/e/service/environment>

PRODUCT TYPES

Contact rating: 0.1A, 6A, 11A, 16A (250V AC)

Terminal shape: .187 Quick connect terminal, .187 Quick connect/solder terminal

For other specifications, please consult us.

DIMENSIONS AND NOTES

Please refer to Standard QV switches catalog for dimensions and notes.

SPECIFICATIONS

• Contact ratings (0.1 to 16 A)

Voltage	Resistive load ($\cos \phi = 1.0$)				Inductive load ($\cos \phi \approx 0.6$ to 0.7)				
	Type	0.1A	6A	11A	16A	0.1A	6A	11A	16A
250V AC	0.1A	6A	11A	16A	0.1A	3A	6A	10A	
125V AC	0.1A	6A	11A	16A	0.1A	3A	6A	10A	
125V DC	0.1A	0.5A	0.6A	0.6A	0.1A	0.5A	0.6A	0.6A	

• 0.1A type minimum load:

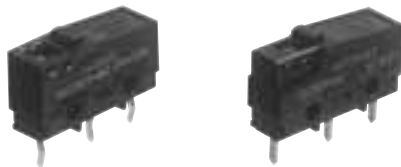
- 6V DC 5mA (Resistive load)
- 12V DC 2mA (Resistive load)
- 24V DC 1mA (Resistive load)

Remark: The inductive load for DC should have a time constant of 7 ms or less.

Please consult us for further information.

**NEW SUBMINIATURE
SWITCHES
WITH HIGH PRECISION**

**AV (FS•FS-T)
SWITCHES**



FS

FS-T

FEATURES

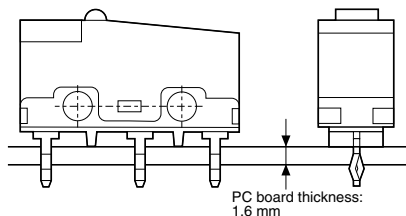
- Consistent quality and high precision through sophisticated automatic fabrication system —O.P.: 8.4 ± 0.3 mm (O.P. of conventional subminiature switches: 8.4 ± 0.5)
- Flux-resistant construction with integrally molded terminals
- Solder terminal; Self-standing, internationally common pitch, right angle, left angle terminals for PC board; Quick connect .110 terminals for easy mounting
- Insulation guard available for safety mounting

- 2 lever pivot positions available for applications where low operating force is required

**TYPICAL
APPLICATIONS**

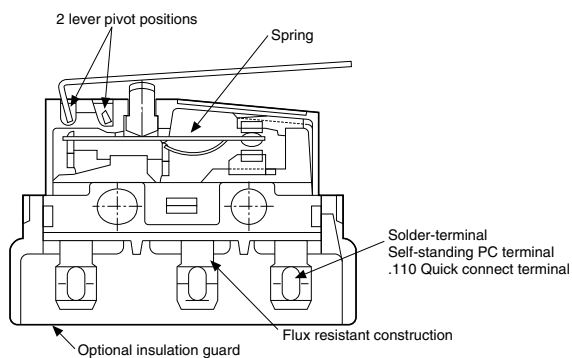
- Communication equipment
- Vending machines
- Security systems
- Data systems
- Medical equipment
- VCR

<http://panasonic-denko.co.jp/ac/e/service/environment>

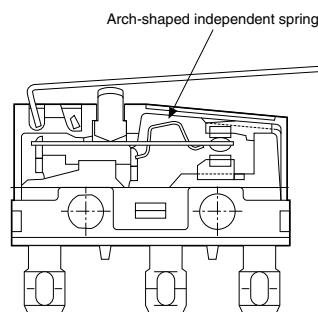


CONSTRUCTION (Example: AV3/AVM3 type)

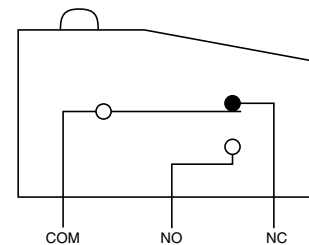
Standard version



Long life version



**CONTACT
ARRANGEMENT**



Remark: As for FS-T switches, the terminals are the different shape.

ORDERING INFORMATION

1.FS switches

Ex. AV 3 2 0 2 [] [] 3

Type of switch	Version	Terminals	Actuators	Operating force by pin plunger, max.	Lever position	Contacts	International standard
AV3(FS) switch	3: Standard	1: Solder terminal with guard 2: Solder terminal without guard 3: Solder terminal with opposite side guard 4: Self-standing PC terminal 5: Internationally common pitch PC terminal 6: Right angle terminal 7: Left angle terminal 8: .110 Quick-connect terminal	0: Pin plunger 1: Short hinge lever 2: Hinge lever 3: Long hinge lever 4: Simulated roller lever 5: Roller lever	0: 0.25 N (Gold-clad contact only) 2: 0.49 N 4: 0.98 N	Nil: Standard [11: forward]	Nil: AgNi alloy 61: Gold-clad triple layer*	3: UL/CSA/VDE/SEMKO

Ex. AV M3 2 0 2 [] [] 3

Type of switch	Version	Terminals	Actuators	Operating force by pin plunger, max.	Lever position	Contacts	International standard
AV3 (FS long life ver.) switch	M3: Long life	1: Solder terminal with guard 2: Solder terminal without guard 3: Solder terminal with opposite side guard 4: Self-standing PC terminal 5: Internationally common pitch PC terminal 6: Right angle terminal 7: Left angle terminal 8: .110 Quick-connect terminal	0: Pin plunger 1: Short hinge lever 2: Hinge lever 3: Long hinge lever 4: Simulated roller lever 5: Roller lever	5: 1.47 N	Nil: Standard [11: forward]	Nil: AgNi alloy 61: Gold-clad triple layer*	3: UL/CSA/VDE/SEMKO

2.FS-T switches

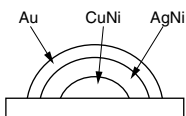
Ex. AV T3 2 0 2 [] [] 3

Type of switch	Version	Terminals	Actuators	Operating force by pin plunger, max.	Lever position	Contacts	Agency standard
AVT3 (FS-T) switch	T3: Standard	2: Solder terminal 4: PC terminal 8: .110 Quick-connect terminal	0: Pin plunger 1: Short hinge lever 2: Hinge lever 3: Long hinge lever 4: Simulated roller lever 5: Roller lever	0: 0.25 N (Gold-clad contact only) 2: 0.49 N 4: 0.98 N	Nil: Standard [11: forward]	Nil: AgNi alloy (Not applicable to 0.25 N type) 61: Gold-clad triple layer*	3: UL/CSA/VDE/SEMKO

Ex. AV L3 2 0 2 [] [] 3

Type of switch	Version	Terminals	Actuators	Operating force by pin plunger, max.	Lever position	Contacts	Agency standard
AVL3 (FS-T long life ver.) switch	L3: Long life	2: Solder terminal 4: PC terminal 8: .110 Quick-connect terminal	0: Pin plunger 1: Short hinge lever 2: Hinge lever 3: Long hinge lever 4: Simulated roller lever 5: Roller lever	5: 1.47 N	Nil: Standard [11: forward]	Nil: AgNi alloy (Not applicable to 0.25 N type) 61: Gold-clad triple layer*	3: UL/CSA/VDE/SEMKO

* Gold-clad triple layer contact



AV3,AVM3/AVT3,AVL3

APPLICABLE CURRENT RANGE

Type	Contact	Rating				O.F.			
		1mA	100mA	3A	5A	0.25 N	0.49 N	0.98 N	1.47 N
Standard version	Silver alloy contact						●	●	
	Gold-clad triple layer contact type					●	●	●	
Long life version	Silver alloy contact								●
	Gold-clad triple layer contact type								●

Remark: For high capacity contact rating up to 10.1 A, please refer to PS (AVM3□□□P) switches catalog.

PRODUCT TYPES

1. FS switches (In-line terminal type)

Standard type

	Actuator	Operating force, Max.	Part No.					
			Self-standing solder terminal			Self-standing PC terminal	Internationally common pitch PC terminal	
			Without guard	With guard	With opposite side guard			
AgNi alloy contact type	Pin plunger	0.49N	AV32023	AV31023	AV33023	AV34023	AV35023	
		0.98N	AV32043	AV31043	AV33043	AV34043	AV35043	
	Short hinge lever	0.20N	AV32123	AV31123	AV33123	AV34123	AV35123	
		0.39N	AV32143	AV31143	AV33143	AV34143	AV35143	
	Hinge lever	0.16N	AV32223	AV31223	AV33223	AV34223	AV35223	
		0.34N	AV32243	AV31243	AV33243	AV34243	AV35243	
	Long hinge lever	0.12N	AV32323	AV31323	AV33323	AV34323	AV35323	
		0.25N	AV32343	AV31343	AV33343	AV34343	AV35343	
	Simulated roller lever	0.16N	AV32423	AV31423	AV33423	AV34423	AV35423	
		0.34N	AV32443	AV31443	AV33443	AV34443	AV35443	
	Roller lever	0.20N	AV32523	AV31523	AV33523	AV34523	AV35523	
		0.39N	AV32543	AV31543	AV33543	AV34543	AV35543	
	Gold-clad triple layer contact type	Pin plunger	0.25N	AV3200613	AV3100613	AV3300613	AV3400613	AV3500613
			0.49N	AV3202613	AV3102613	AV3302613	AV3402613	AV3502613
0.98N			AV3204613	AV3104613	AV3304613	AV3404613	AV3504613	
Short hinge lever		0.098N	AV3210613	AV3110613	AV3310613	AV3410613	AV3510613	
		0.20N	AV3212613	AV3112613	AV3312613	AV3412613	AV3512613	
		0.39N	AV3214613	AV3114613	AV3314613	AV3414613	AV3514613	
Hinge lever		0.078N	AV3220613	AV3120613	AV3320613	AV3420613	AV3520613	
		0.16N	AV3222613	AV3122613	AV3322613	AV3422613	AV3522613	
		0.34N	AV3224613	AV3124613	AV3324613	AV3424613	AV3524613	
Long hinge lever		0.12N	AV3232613	AV3132613	AV3332613	AV3432613	AV3532613	
		0.25N	AV3234613	AV3134613	AV3334613	AV3434613	AV3534613	
Simulated roller lever		0.16N	AV3242613	AV3142613	AV3342613	AV3442613	AV3542613	
		0.34N	AV3244613	AV3144613	AV3344613	AV3444613	AV3544613	
Roller lever		0.20N	AV3252613	AV3152613	AV3352613	AV3452613	AV3552613	
		0.39N	AV3254613	AV3154613	AV3354613	AV3454613	AV3554613	

	Actuator	Operating force, Max.	Part No.			
			Right angle terminal	Left angle terminal	.110 Quick-connect	
AgNi alloy contact type	Pin plunger	0.49N	AV36023	AV37023	AV38023	
		0.98N	AV36043	AV37043	AV38043	
	Short hinge lever	0.20N	AV36123	AV37123	AV38123	
		0.39N	AV36143	AV37143	AV38143	
	Hinge lever	0.16N	AV36223	AV37223	AV38223	
		0.34N	AV36243	AV37243	AV38243	
	Long hinge lever	0.12N	AV36323	AV37323	AV38323	
		0.25N	AV36343	AV37343	AV38343	
	Simulated roller lever	0.16N	AV36423	AV37423	AV38423	
		0.34N	AV36443	AV37443	AV38443	
	Roller lever	0.20N	AV36523	AV37523	AV38523	
		0.39N	AV36543	AV37543	AV38543	
	Gold-clad triple layer contact type	Pin plunger	0.25N	AV3600613	AV3700613	AV3800613
			0.49N	AV3602613	AV3702613	AV3802613
0.98N			AV3604613	AV3704613	AV3804613	
Short hinge lever		0.098N	AV3610613	AV3710613	AV3810613	
		0.20N	AV3612613	AV3712613	AV3812613	
		0.39N	AV3614613	AV3714613	AV3814613	
Hinge lever		0.078N	AV3620613	AV3720613	AV3820613	
		0.16N	AV3622613	AV3722613	AV3822613	
		0.34N	AV3624613	AV3724613	AV3824613	
Long hinge lever		0.12N	AV3632613	AV3732613	AV3832613	
		0.25N	AV3634613	AV3734613	AV3834613	
Simulated roller lever		0.16N	AV3642613	AV3742613	AV3842613	
		0.34N	AV3644613	AV3744613	AV3844613	
Roller lever		0.20N	AV3652613	AV3752613	AV3852613	
	0.39N	AV3654613	AV3754613	AV3854613		

Remark: When ordering, please refer to "Remarks" of ordering information.

AV3,AVM3/AVT3,AVL3

2. FS-T switches (Cross-line terminal type)

Standard type

	Actuator	Operating force, Max.	Part No.			
			Solder terminal without guard	PC terminal	.110 Quick-connect terminal	
AgNi alloy contact type	Pin plunger	0.49N	AVT32023	AVT34023	AVT38023	
		0.98N	AVT32043	AVT34043	AVT38043	
	Short hinge lever	0.20N	AVT32123	AVT34123	AVT38123	
		0.39N	AVT32143	AVT34143	AVT38143	
	Hinge lever	0.16N	AVT32223	AVT34223	AVT38223	
		0.34N	AVT32243	AVT34243	AVT38243	
	Long hinge lever	0.12N	AVT32323	AVT34323	AVT38323	
		0.25N	AVT32343	AVT34343	AVT38343	
	Simulated roller lever	0.16N	AVT32423	AVT34423	AVT38423	
		0.34N	AVT32443	AVT34443	AVT38443	
	Roller lever	0.20N	AVT32523	AVT34523	AVT38523	
		0.39N	AVT32543	AVT34543	AVT38543	
	Gold-clad triple layer contact type	Pin plunger	0.25N	AVT3200613	AVT3400613	AVT3800613
			0.49N	AVT3202613	AVT3402613	AVT3802613
0.98N			AVT3204613	AVT3404613	AVT3804613	
Short hinge lever		0.098N	AVT3210613	AVT3410613	AVT3810613	
		0.20N	AVT3212613	AVT3412613	AVT3812613	
		0.39N	AVT3214613	AVT3414613	AVT3814613	
Hinge lever		0.078N	AVT3220613	AVT3420613	AVT3820613	
		0.16N	AVT3222613	AVT3422613	AVT3822613	
		0.34N	AVT3224613	AVT3424613	AVT3824613	
Long hinge lever		0.12N	AVT3232613	AVT3432613	AVT3832613	
		0.25N	AVT3234613	AVT3434613	AVT3834613	
Simulated roller lever		0.16N	AVT3242613	AVT3442613	AVT3842613	
		0.34N	AVT3244613	AVT3444613	AVT3844613	
Roller lever		0.20N	AVT3252613	AVT3452613	AVT3852613	
	0.39N	AVT3254613	AVT3454613	AVT3854613		

3. FS switches (In-line terminal type)

Long life version

	Actuator	Operating force, Max.	Part No.				
			Self-standing solder terminal			Self-standing PC terminal	Internationally common pitch PC terminal
			Without guard	With guard	With opposite side guard		
AgNi alloy contact type	Pin plunger	1.47N	AVM32053	AVM31053	AVM33053	AVM34053	AVM35053
	Short hinge lever	0.59N	AVM32153	AVM31153	AVM33153	AVM34153	AVM35153
	Hinge lever	0.54N	AVM32253	AVM31253	AVM33253	AVM34253	AVM35253
	Long hinge lever	0.44N	AVM32353	AVM31353	AVM33353	AVM34353	AVM35353
	Simulated roller lever	0.54N	AVM32453	AVM31453	AVM33453	AVM34453	AVM35453
	Roller lever	0.59N	AVM32553	AVM31553	AVM33553	AVM34553	AVM35553
Gold-clad triple layer contact type	Pin plunger	1.47N	AVM3205613	AVM3105613	AVM3305613	AVM3405613	AVM3505613
	Short hinge lever	0.59N	AVM3215613	AVM3115613	AVM3315613	AVM3415613	AVM3515613
	Hinge lever	0.54N	AVM3225613	AVM3125613	AVM3325613	AVM3425613	AVM3525613
	Long hinge lever	0.44N	AVM3235613	AVM3135613	AVM3335613	AVM3435613	AVM3535613
	Simulated roller lever	0.54N	AVM3245613	AVM3145613	AVM3345613	AVM3445613	AVM3545613
	Roller lever	0.59N	AVM3255613	AVM3155613	AVM3355613	AVM3455613	AVM3555613

	Actuator	Operating force, Max.	Part No.		
			Right angle terminal	Left angle terminal	.110 Quick-connect
			Without guard	With guard	With opposite side guard
AgNi alloy contact type	Pin plunger	1.47N	AVM36053	AVM37053	AVM38053
	Short hinge lever	0.59N	AVM36153	AVM37153	AVM38153
	Hinge lever	0.54N	AVM36253	AVM37253	AVM38253
	Long hinge lever	0.44N	AVM36353	AVM37353	AVM38353
	Simulated roller lever	0.54N	AVM36453	AVM37453	AVM38453
	Roller lever	0.59N	AVM36553	AVM37553	AVM38553
Gold-clad triple layer contact type	Pin plunger	1.47N	AVM3605613	AVM3705613	AVM3805613
	Short hinge lever	0.59N	AVM3615613	AVM3715613	AVM3815613
	Hinge lever	0.54N	AVM3625613	AVM3725613	AVM3825613
	Long hinge lever	0.44N	AVM3635613	AVM3735613	AVM3835613
	Simulated roller lever	0.54N	AVM3645613	AVM3745613	AVM3845613
	Roller lever	0.59N	AVM3655613	AVM3755613	AVM3855613

Remark: When ordering, please refer to "Remarks" of ordering information.

4. FS-T switches (Cross-line terminal type)

Long life version

	Actuator	Operating force, Max.	Part No.		
			Solder terminal Without guard	PC terminal	.110 Quick-connect terminal
AgNi alloy contact type	Pin plunger	1.47N	AVL32053	AVL34053	AVL38053
	Short hinge lever	0.59N	AVL32153	AVL34153	AVL38153
	Hinge lever	0.54N	AVL32253	AVL34253	AVL38253
	Long hinge lever	0.44N	AVL32353	AVL34353	AVL38353
	Simulated roller lever	0.54N	AVL32453	AVL34453	AVL38453
	Roller lever	0.59N	AVL32553	AVL34553	AVL38553
Gold-clad triple layer contact type	Pin plunger	1.47N	AVL3205613	AVL3405613	AVL3805613
	Short hinge lever	0.59N	AVL3215613	AVL3415613	AVL3815613
	Hinge lever	0.54N	AVL3225613	AVL3425613	AVL3825613
	Long hinge lever	0.44N	AVL3235613	AVL3435613	AVL3835613
	Simulated roller lever	0.54N	AVL3245613	AVL3445613	AVL3845613
	Roller lever	0.59N	AVL3255613	AVL3455613	AVL3855613

Remark: When ordering, please refer to "Remarks" of ordering information.

AV3,AVM3/AVT3,AVL3

SPECIFICATIONS

1.Contact rating

Voltage	Standard version			Long life version		
	AgNi alloy contact type		Gold-clad contact type	AgNi alloy contact type		Gold-clad contact type
	Resistive load ($\cos\phi \doteq 1$)	Inductive load ($\cos\phi \doteq 0.6-0.7$)	Triple layer	Resistive load ($\cos\phi \doteq 1$)	Resistive load ($\cos\phi \doteq 1$)	Inductive load ($\cos\phi \doteq 0.6-0.7$)
125V AC	3A	2A	0.1A	5A	3A	0.1A
250V AC	3A	2A	0.1A	5A	3A	0.1A
30V DC	3A	2A	0.1A	5A	3A	0.1A
125V DC	0.4A	0.05A	—	0.4A	0.05A	—

Remark: Time constant shall be less than 7 msec. for DC inductive loads.

2.Characteristics

	Standard version		Long life version	
	AgNi alloy contact type	Gold-clad contact type	AgNi alloy contact type	Gold-clad contact type
Electrical life at rated load (O.T.max.)	5×10^4 at 20 cpm	2×10^5 at 20 cpm	5×10^4 at 20 cpm	2×10^5 at 20 cpm
Mechanical life	5×10^5 at 60 cpm (O.T.max.)		3×10^7 (O.T.: Specified value) 10^7 (O.T.max.) at 60 cpm	
Insulation resistance	Min.100M Ω at 500V DC			
Dielectric strength	1,000 Vrms			
Between non-continuous terminals	1,500 Vrms			
Between each terminal and other exposed metal parts	1,500 Vrms			
Between each terminal and ground	1,500 Vrms			
Vibration resistance (Pin plunger type)	10 to 55 Hz at single amplitude of 1.5mm (Contact opening: max.1 msec.)			
Shock resistance (Pin plunger type) (Contact opening: less than 1 msec.)	294 m/s ² min. (O.F. 0.98 N) 147 m/s ² min. (O.F. 0.49 N)	294 m/s ² min. (O.F. 0.98 N) 147 m/s ² min. (O.F. 0.49 N) 49 m/s ² min. (O.F. 0.25 N)	294 m/s ² min.	
Contact resistance (Initial)	50 m Ω max. (by voltage drop 1 A 6 to 8V DC)	100 m Ω max. (by voltage drop 0.1 A 6 to 8V DC)	Au: 50 m Ω max. (by voltage drop 0.1 A 6 to 8V DC) Ag: 50 m Ω max. (by voltage drop 1 A 6 to 8V DC)	
Allowable operating speed	0.1 to 1,000 mm/sec.			
Max.operating cycle rate	300 cpm			
Ambient temperature	-25°C to +85°C (no freezing below 0°C)			
Unit weight	Approx.2g			

3.Operating characteristics

1) Pin plunger

4th digit number of Part No.	O.F.max.	R.F.min.	P.T.max.	M.D.max.	O.T.max.	O.P.
0	0.25N	0.020N	0.6mm	0.1mm	0.4mm	Distance from mounting holes: 8.4 \pm 0.3mm Distance from stand-off: FS 11.8 \pm 0.4mm FS-T 11.7 \pm 0.4mm
2	0.49N	0.074N				
4	0.98N	0.15N				
5	1.47N	0.20N				

2) Short hinge lever

4th digit number of Part No.	O.F.max.	R.F.min.	P.T.max.	M.D.max.	O.T.max.	O.P.
0	0.098N	0.004N	2.5mm	0.5mm	0.8mm	Distance from mounting holes: 8.8 \pm 0.8mm Distance from stand-off: FS 12.2 \pm 0.9mm FS-T 12.1 \pm 0.9mm
2	0.20N	0.017N				
4	0.39N	0.034N				
5	0.59N	0.039N				

3) Hinge lever

4th digit number of Part No.	O.F.max.	R.F.min.	P.T.max.	M.D.max.	O.T.max.	O.P.
0	0.078N	0.003N	2.8mm	0.8mm	1.2mm	Distance from mounting holes: 8.8±0.8mm Distance from stand-off: FS 12.2±0.9mm FS-T 12.1±0.9mm
2	0.16N	0.015N				
4	0.34N	0.029N				
5	0.54N	0.034N				

4) Long hinge lever

4th digit number of Part No.	O.F.max.	R.F.min.	P.T.max.	M.D.max.	O.T.max.	O.P.
0	—	—	3.5mm	1.0mm	1.6mm	Distance from mounting holes: 8.8±1.2mm Distance from stand-off: FS 12.2±1.3mm FS-T 12.1±1.3mm
2	0.12N	0.012N				
4	0.25N	0.025N				
5	0.44N	0.029N				

5) Simulated roller lever

4th digit number of Part No.	O.F.max.	R.F.min.	P.T.max.	M.D.max.	O.T.max.	O.P.
0	—	—	2.8mm	0.8mm	1.2mm	Distance from mounting holes: 11.65±0.8mm Distance from stand-off: FS 15.05±0.9mm FS-T 14.95±0.9mm
2	0.16N	0.015N				
4	0.34N	0.029N				
5	0.54N	0.034N				

6) Roller lever

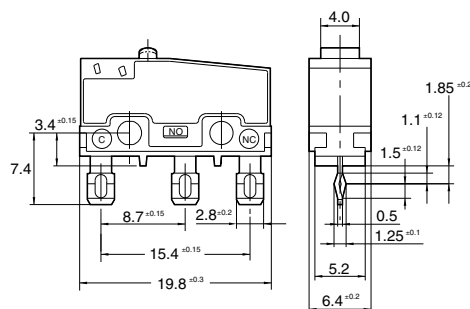
4th digit number of Part No.	O.F.max.	R.F.min.	P.T.max.	M.D.max.	O.T.max.	O.P.
0	—	—	2.5mm	0.5mm	0.8mm	Distance from mounting holes: 14.5±0.8mm Distance from stand-off: FS 17.9±0.9mm FS-T 17.8±0.9mm
2	0.20N	0.017N				
4	0.39N	0.034N				
5	0.59N	0.039N				

DIMENSIONS

mm General tolerance: ±0.25

1. FS switches (In-line terminal type)

1-(1) Solder terminal (without guard)

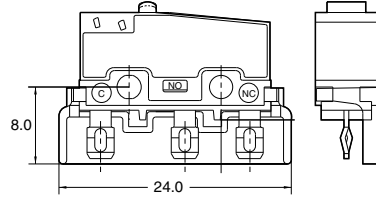


Dimensions other than drawn above is same as self-standing PC board terminal.

AV3,AVM3/AVT3,AVL3

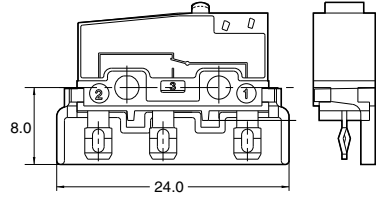
1-(2) Solder terminal (with guard)

mm General tolerance: ± 0.25



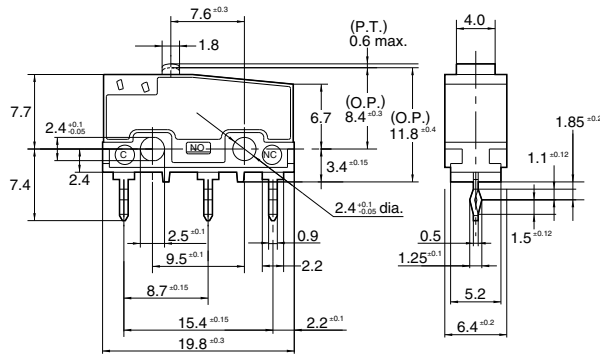
Dimensions other than drawn above is same as guardless type.

1-(3) Solder terminal (with opposite side guard)

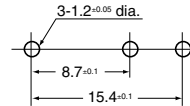


Dimensions other than drawn above is same as guardless type.

1-(4) Self-standing PC terminal
Pin plunger

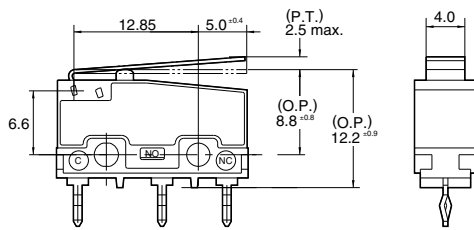


PC board pattern



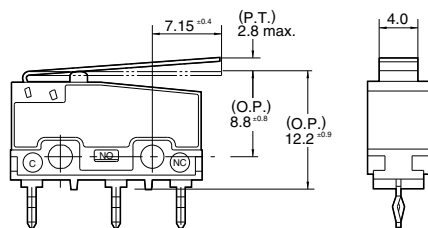
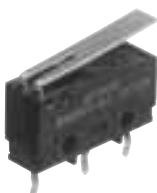
Pretravel, Max. mm		0.6
Movement differential, Max. mm		0.1
Overtravel, Min. mm		0.4
Operating position	Distance from mounting hole, mm	8.4±0.3
	Distance from standoff, mm	11.8±0.4

Short hinge lever



Pretravel, Max. mm		2.5
Movement differential, Max. mm		0.5
Overtravel, Min. mm		0.8
Operating position	Distance from mounting hole, mm	8.8±0.8
	Distance from standoff, mm	12.2±0.9

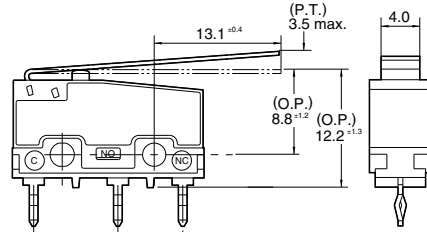
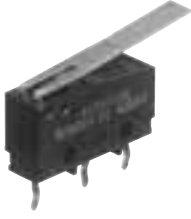
Hinge lever



Pretravel, Max. mm		2.8
Movement differential, Max. mm		0.8
Overtravel, Min. mm		1.2
Operating position	Distance from mounting hole, mm	8.8±0.8
	Distance from standoff, mm	12.2±0.9

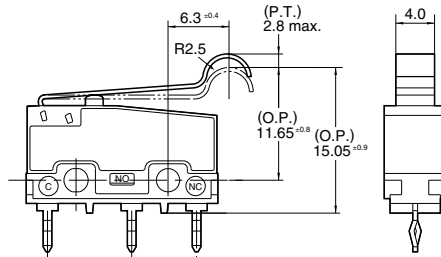
Long hinge lever

mm General tolerance: ± 0.25



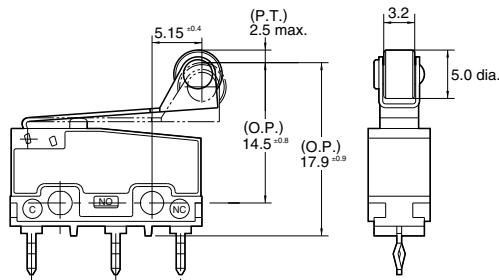
Pretravel, Max. mm		3.5
Movement differential, Max. mm		1.0
Overtravel, Min. mm		1.6
Operating position	Distance from mounting hole, mm	8.8±1.2
	Distance from standoff, mm	12.2±1.3

Simulated roller lever



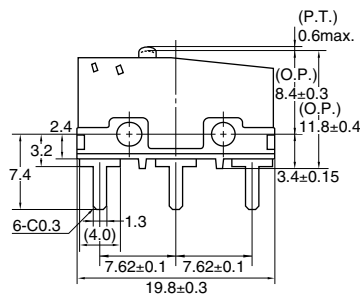
Pretravel, Max. mm		2.8
Movement differential, Max. mm		0.8
Overtravel, Min. mm		1.2
Operating position	Distance from mounting hole, mm	11.65±0.8
	Distance from standoff, mm	15.05±0.9

Roller lever

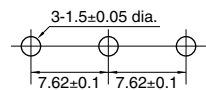


Pretravel, Max. mm		2.5
Movement differential, Max. mm		0.5
Overtravel, Min. mm		0.8
Operating position	Distance from mounting hole, mm	14.5±0.8
	Distance from standoff, mm	17.9±0.9

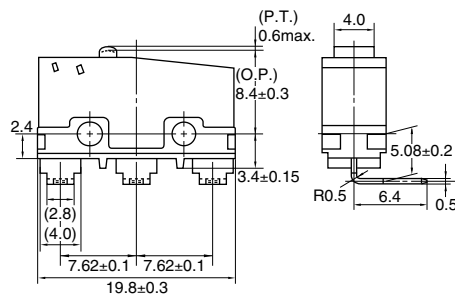
1-(5) Internationally common pitch PC terminal



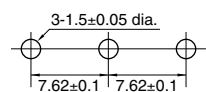
PC board pattern



1-(6) Right angle terminal



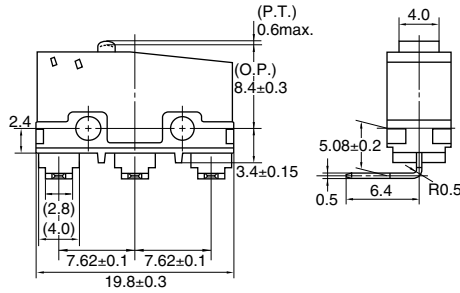
PC board pattern



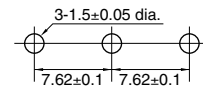
AV3,AVM3/AVT3,AVL3

1-(7) Left angle terminal

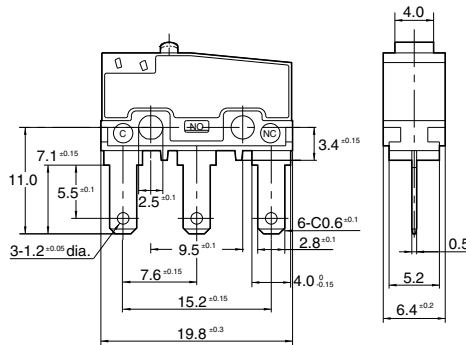
mm General tolerance: ± 0.25



PC board pattern



1-(8) .110 Quick-connect terminal

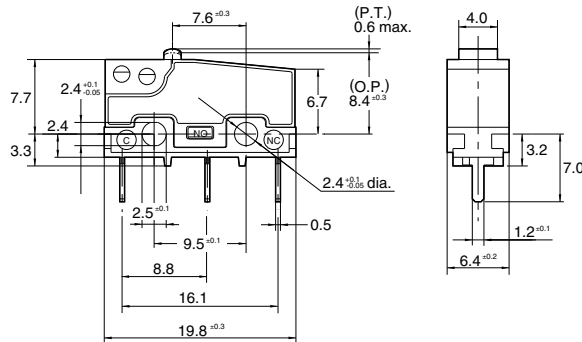


Dimensions other than drawn above is same as self-standing PC board terminal.

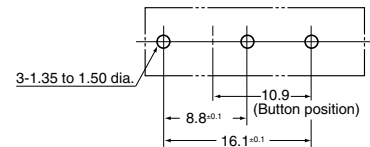
2.FS-T switches (Cross-line terminal type)

2-(1) PC board terminal

Pin plunger

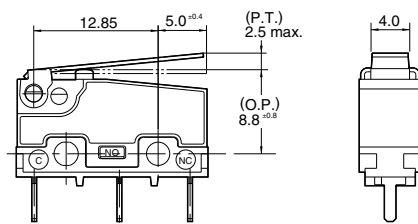


PC board pattern



Pretravel, Max. mm		0.6
Movement differential, Max. mm		0.1
Overtravel, Min. mm		0.4
Operating position	Distance from mounting hole, mm	8.4±0.3
	Distance from standoff, mm	11.7±0.4

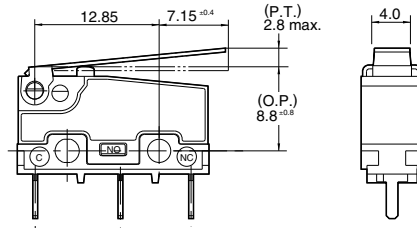
Short hinge lever



Pretravel, Max. mm		2.5
Movement differential, Max. mm		0.5
Overtravel, Min. mm		0.8
Operating position	Distance from mounting hole, mm	8.8±0.8
	Distance from standoff, mm	12.1±0.9

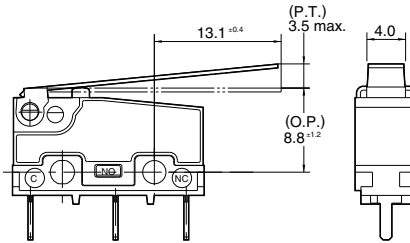
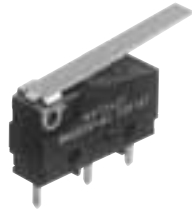
Hinge lever

mm General tolerance: ± 0.25



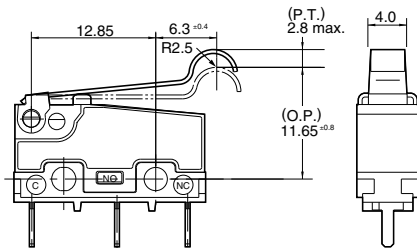
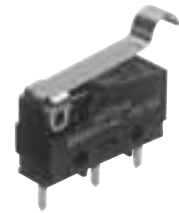
Pretravel, Max. mm		2.8
Movement differential, Max. mm		0.8
Overtravel, Min. mm		1.2
Operating position	Distance from mounting hole, mm	8.8 \pm 0.8
	Distance from standoff, mm	12.1 \pm 0.9

Long hinge lever



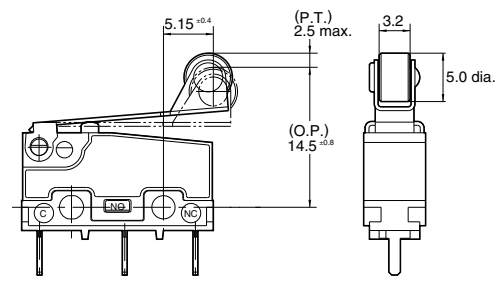
Pretravel, Max. mm		3.5
Movement differential, Max. mm		1.0
Overtravel, Min. mm		1.6
Operating position	Distance from mounting hole, mm	8.8 \pm 1.2
	Distance from standoff, mm	12.1 \pm 1.3

Simulated roller lever



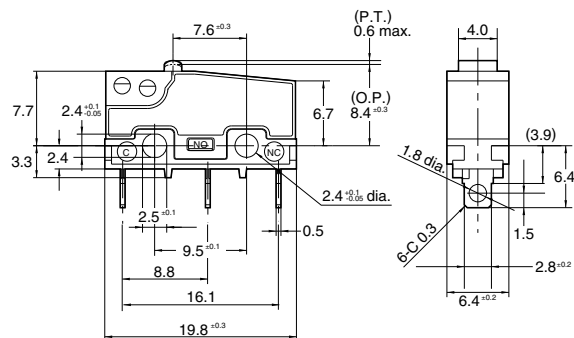
Pretravel, Max. mm		2.8
Movement differential, Max. mm		0.8
Overtravel, Min. mm		1.2
Operating position	Distance from mounting hole, mm	11.65 \pm 0.8
	Distance from standoff, mm	14.95 \pm 0.9

Roller lever

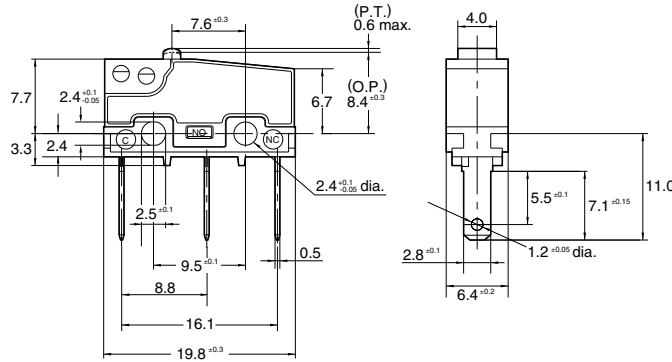
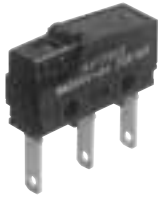


Pretravel, Max. mm		2.5
Movement differential, Max. mm		0.5
Overtravel, Min. mm		0.8
Operating position	Distance from mounting hole, mm	14.5 \pm 0.8
	Distance from standoff, mm	17.8 \pm 0.9

2-(2) Solder terminal



As for the dimensions of lever types, dimensions other than terminals are same as self-standing solder terminal.



As for the dimensions of lever types, dimensions other than terminals are same as self-standing solder terminal.

NOTES

1.Regarding fastening of switch body

In fastening the switch body, use flat filister head M2.3 screws, with tightening torque of not more than 0.29N·m. To prevent loosening of the screws, it is recommended that spring washers be used with the screws and adhesive be applied to lock the screws.

After mounting the switch and making wiring connections, the insulation distance between ground and each terminal should be confirmed as sufficient.

The positioning of the switch should be such that the pushbutton or actuator for the switch should not directly apply force to the operating section in the free condition. For a pushbutton, the force from the pushbutton should be applied in a perpendicular direction.

In setting the movement after operation, the over-travel should be set not less than 70% as a standard. Setting the movement at less than 70% of O.T. may cause troubles such as mis-contact and welding due to small contact force of the switch.

2.Soldering operation

For manual soldering: 60W soldering iron, soldering completed within 3 seconds; do not apply force to the terminals.

For automatic soldering tank: 250°C immersion, completed within 6 seconds, 350°C immersion, completed within 3 seconds.

Terminal portions must not be moved in min. 1 minute after soldering. Also no tensile strength of lead wires should be applied to terminals.

3.Regarding connector connections (.110 quick connect terminals)

For making connections, a dedicated receptacle for .110 quick connect terminals should be used, and the terminals should be inserted parallel to the receptacle. Consideration should be given to mounting so that no tensile load is applied to the lead wires.

4.In making the switch selection

Consideration should be given to provide for no interference up to +20% variation of the standard characteristics values.

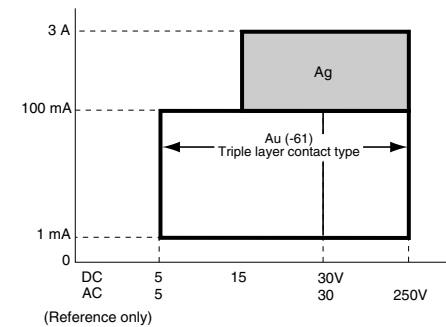
5.Environment

Locations where corrosive gases having a bad influence on contacts are present, and locations where there is an excessive amount of siliceous or other abrasive dust should be avoided.

6.Cautions regarding use

This subminiature switch has been designed as a dedicated switch for AC use, but it can be used for low capacity DC circuits.

Please select gold-clad contact types when loads are in the low-level area of 1mA up to 100mA and 5V up to 30V.

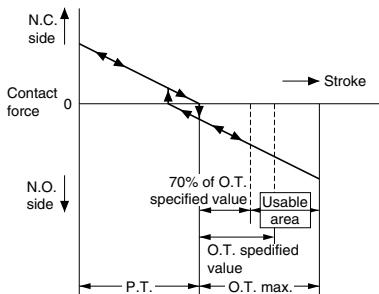


For switching of inductive loads (relays, solenoids, buzzers, etc.), in order to prevent damage to contacts due to the occurrence of arcing, an arc absorbing circuit should be applied

7.Quality check under Actual Loading Condition

To assure reliability, check the switch under actual loading conditions. Avoid any situation that may adversely affect switching performance.

8. When using lever type switch, care should be taken not to apply undue force on the body from the opposite side or side ways to its operating direction.





FEATURES

- Conforming to IEC950
- Contact gap of greater than 1mm
- UL/CSA/VDE/SEMKO under application

TYPICAL APPLICATIONS

- Office equipment (printers, copiers)

<http://panasonic-denko.co.jp/ac/e/service/environment>

ORDERING INFORMATION

Ex. AV 3 2 5 5 G 3

Type of switch	Version	Terminals	Actuators	Operating force by pin plunger, max.	Contact gap	Agency standard
FS switch	3: Standard	2: Self-standing solder terminal without guard 4: Self-standing PC terminal 8: .110 Quick-connect terminal	0: Pin plunger 1: Short hinge lever 2: Hinge lever 3: Long hinge lever 4: Simulated roller lever 5: Roller lever	5: 1.47 N	G: More than 1 mm type	3: UL/CSA/TÜV/SEMKO

PRODUCT TYPES

Actuator	Operating force Max.	Solder terminal	PC board terminal	.110 Quick-connect terminal
		Without guard		
Pin plunger	1.47 N	AV3205G3	AV3405G3	AV3805G3
Short hinge lever	0.59 N	AV3215G3	AV3415G3	AV3815G3
Hinge lever	0.54 N	AV3225G3	AV3425G3	AV3825G3
Long hinge lever	0.44 N	AV3235G3	AV3435G3	AV3835G3
Simulated roller lever	0.54 N	AV3245G3	AV3445G3	AV3845G3
Roller lever	0.59 N	AV3255G3	AV3455G3	AV3855G3

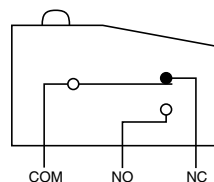
Remark: Unless you request otherwise, the switch comes with a stamp indicating its conformance to standards.

SPECIFICATIONS

1. Contact rating

- Silver alloy contact type

Voltage	Resistive road ($\cos \phi \cong 1$)
30 V DC	3 A



2. Characteristics

Item	Characteristics	
Expected life	Mechanical (O.T.: Specified value)	Min. 5×10^5 (at 60cpm)
	Electrical (O.T. max.)	Min. 10^4 (at 20cpm)
Breakdown voltage	Between non-continuous terminals	1,000 Vrms for 1 min. (at 10mA)
	Between each terminal and other exposed metal parts	2,000 Vrms for 1 min. (at 10mA)
	Between each terminal and ground	2,000 Vrms for 1 min. (at 10mA)
Insulation resistance	Min. $100M\Omega$ (at 500 V DC)	
Contact resistance (Initial)	Max. $50m\Omega$ (by voltage drop 6 to 8 V DC 1A)	
Vibration resistance	10 to 55 Hz at single amplitude of 0.75 mm (Contact opening: Max. 1 msec.)	
Shock resistance	Pin plunger type	$294m/s^2$ (Contact distance: Max. 1 msec.)
	Lever type	$147m/s^2$ (Contact distance: Max. 1 msec.)
Allowable operation speed (No load)	0.1 to 1,000 mm/s	
Max. switching frequency (No load)	300 cpm.	
Ambient temperature	-25°C to $+85^\circ\text{C}$ (Not freezing below 0°C)	

Remark: Test conditions are in accordance with JIS C 4505.

3. Operating characteristics

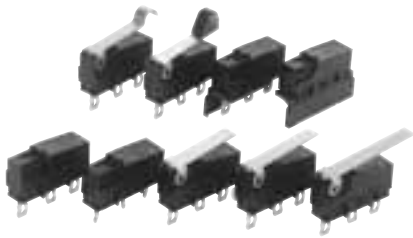
Actuator	Operating force, Max.	Release force, Min.	Pretravel, Max. mm	Movement differential, Max. mm	Overtravel, Min. mm	Operating position, mm
Pin plunger	1.47 N	0.064 N	0.7	0.2	0.3	8.4 ± 0.3
Short hinge lever	0.59 N	0.015 N	2.5	0.8	0.6	8.8 ± 0.8
Hinge lever	0.54 N	0.013 N	2.8	1.0	0.8	8.8 ± 0.8
Long hinge lever	0.44 N	0.0098 N	3.5	1.2	1.2	8.8 ± 1.2
Simulated roller lever	0.54 N	0.013 N	2.8	1.0	0.8	11.65 ± 0.8
Roller lever	0.59 N	0.015 N	2.5	0.8	0.6	14.5 ± 0.8

DIMENSIONS

The same size as the standard FS/FS-T switches.

Please refer to "FS/FS-T switches pages" or our web site.

URL: <http://panasonic-denko.co.jp/ac/e/>



<http://panasonic-denko.co.jp/ac/e/service/environment>

FEATURES

- 10.1 Amp. high contact capacity is available
- Long life
- Precise operating position ($\pm 0.25\text{mm}$: Pin plunger type)
- Flux-resistant construction with integrally molded terminals
- In-line terminals make soldering works easy
- UL/CSA approved

TYPICAL APPLICATIONS

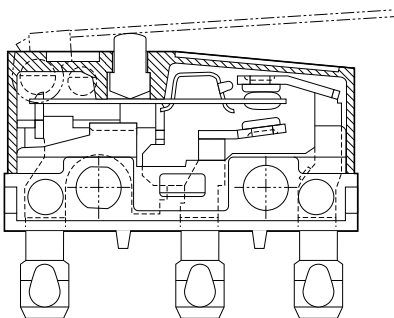
- Heaters
- Electric rice cookers
- Copiers
- Printers
- Facsimiles
- Vending machines
- Measuring equipment
- Audio equipment

ORDERING INFORMATION

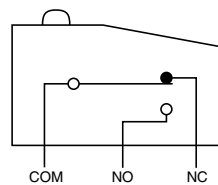
Ex. AVM3 1 0 5 P 9

Type of switch	Terminals	Actuators	Operating force by pin plunger, max.	Capacity	Agency standard
PS switch	1: Self-standing solder terminal with guard 2: Self-standing solder terminal without guard 3: Self-standing solder terminal with opposite side guard 4: Self-standing PC terminal	0: Pin plunger 1: Short hinge lever 2: Hinge lever 3: Long hinge lever 4: Simulated roller lever 5: Roller lever	5: 1.47 N	P: High capacity (10.1 A)	9: UL/CSA

CONSTRUCTION

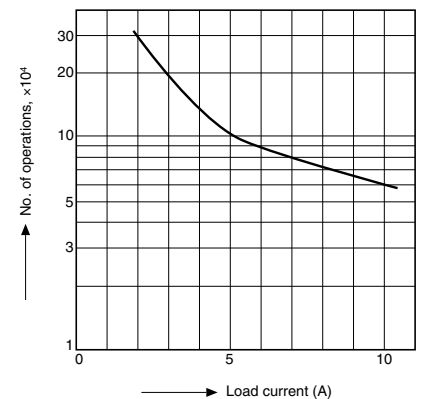


CONTACT ARRANGEMENT: SPDT



DATA

Electrical life curve



PRODUCT TYPES

Contact	Actuator	Part No.			
		Self-standing solder terminal			Self-standing PC terminal
		Without guard	With guard	With opposite side guard	
Gold-clad	Pin plunger	AVM3205P9	AVM3105P9	AVM3305P9	AVM3405P9
	Short hinge lever	AVM3215P9	AVM3115P9	AVM3315P9	AVM3415P9
	Hinge lever	AVM3225P9	AVM3125P9	AVM3325P9	AVM3425P9
	Long hinge lever	AVM3235P9	AVM3135P9	AVM3335P9	AVM3435P9
	Simulated roller lever	AVM3245P9	AVM3145P9	AVM3345P9	AVM3445P9
	Roller lever	AVM3255P9	AVM3155P9	AVM3355P9	AVM3455P9

SPECIFICATIONS

1. Contact rating

Resistive load (cos φ ≅ 1)	10.1A, 250V AC
----------------------------	----------------

2. Characteristics

Expected life	Electrical	Min. 5 × 10 ⁴ (at 20 cpm) (O.T. max.)
	Mechanical	Min. 3 × 10 ⁷ (O.T.: Specified value), at 60 cpm
Dielectric strength	Between terminals	1,000 Vrms for 1 min. (at 10 mA)
	Between terminals and other exposed metal parts	2,000 Vrms for 1 min. (at 10 mA)
	Between terminals and ground	2,000 Vrms for 1 min. (at 10 mA)
Insulation resistance		Min. 100MΩ (at 500V DC)
Contact resistance (initial)		Max. 50mΩ (By voltage drop, 1A 6 to 8V DC)
Allowable operating speed (at no load)		0.1 to 1,000 mm/sec.
Max. operating cycle rate (at no load)		300 cpm
Ambient temperature		-25 to +85°C (Not freezing below 0°C)
Unit weight		Approx. 2g
Contact material		AgNi alloy

3. Operating characteristics

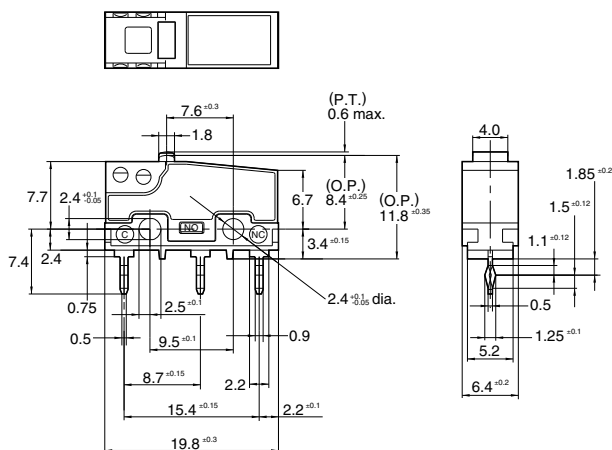
Actuator	Operating force, Max.	Release force, Min.	Pretravel, Max. mm	Movement differential, Max. mm	Overtravel, Min. mm	Operating position mm
Pin plunger	1.47 N	0.20 N	0.6 mm	0.1 mm	0.4 mm	8.4±0.25 mm
Short hinge lever	0.59 N	0.039 N	2.5 mm	0.5 mm	0.8 mm	8.8±0.8 mm
Hinge lever	0.54 N	0.034 N	2.8 mm	0.8 mm	1.2 mm	8.8±0.8 mm
Long hinge lever	0.44 N	0.029 N	3.5 mm	1.0 mm	1.6 mm	8.8±1.2 mm
Simulated roller lever	0.54 N	0.034 N	2.8 mm	0.8 mm	1.2 mm	11.65±0.8 mm
Roller lever	0.59 N	0.039 N	2.5 mm	0.5 mm	0.8 mm	14.5±0.8 mm

DIMENSIONS

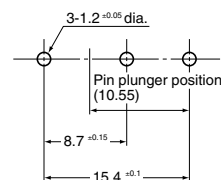
mm General tolerance: ±0.25

1. Self-standing PC terminal (Without guard)

Pin plunger



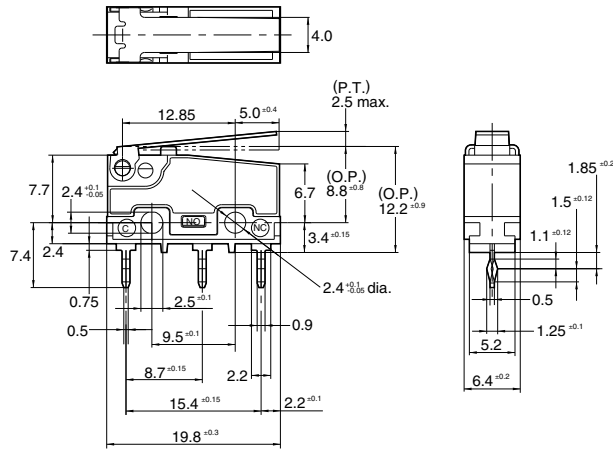
PC board pattern



Pretravel, Max. mm	0.6
Movement differential, Max. mm	0.1
Overtravel, Min mm	0.4
Operating position	Distance from mounting hole, mm
	8.4±0.25

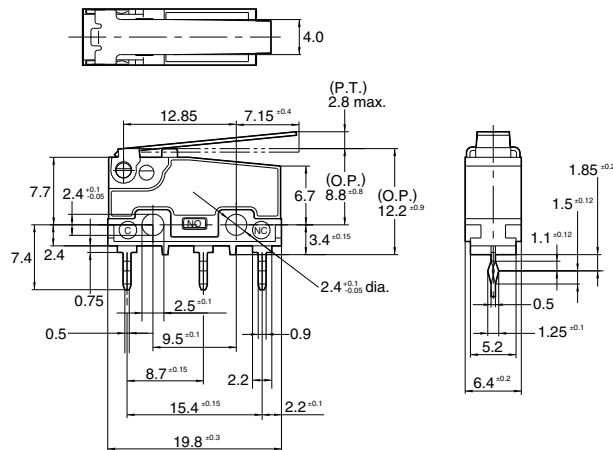
Short hinge lever

mm General tolerance: ±0.25



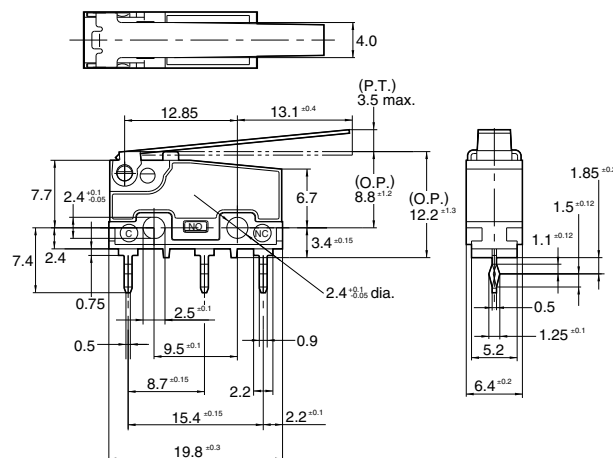
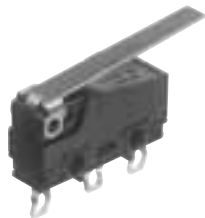
Pretravel, Max. mm	2.5
Movement differential, Max. mm	0.5
Overtravel, Min mm	0.8
Operating position	Distance from mounting hole, mm
	8.8±0.8

Hinge lever



Pretravel, Max. mm	2.8
Movement differential, Max. mm	0.8
Overtravel, Min mm	1.2
Operating position	Distance from mounting hole, mm
	8.8±0.8

Long hinge lever

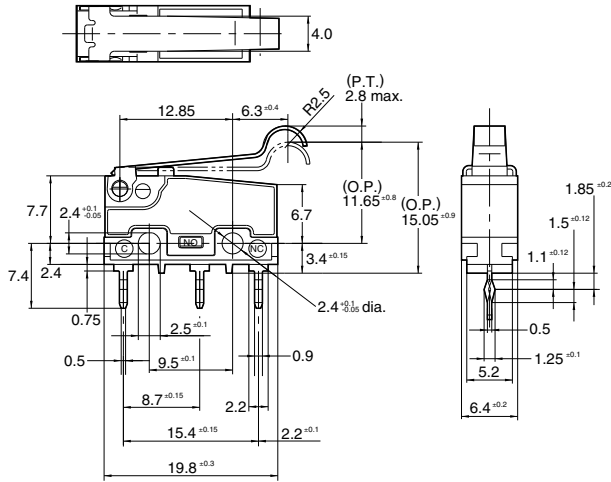


Pretravel, Max. mm	3.5
Movement differential, Max. mm	1.0
Overtravel, Min mm	1.6
Operating position	Distance from mounting hole, mm
	8.8±1.2

AVM3□□□P

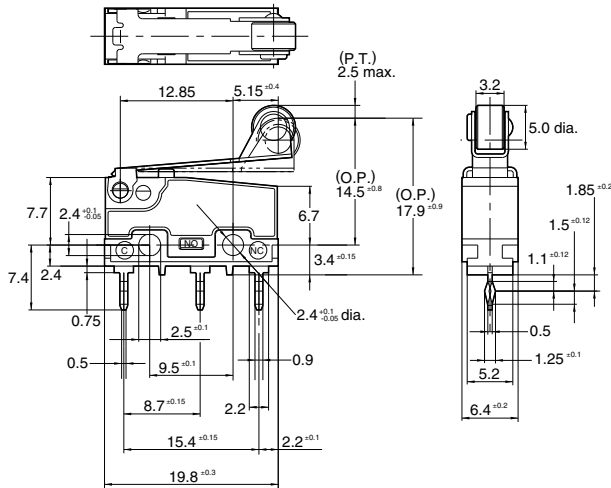
Simulated roller lever

mm General tolerance: ± 0.25



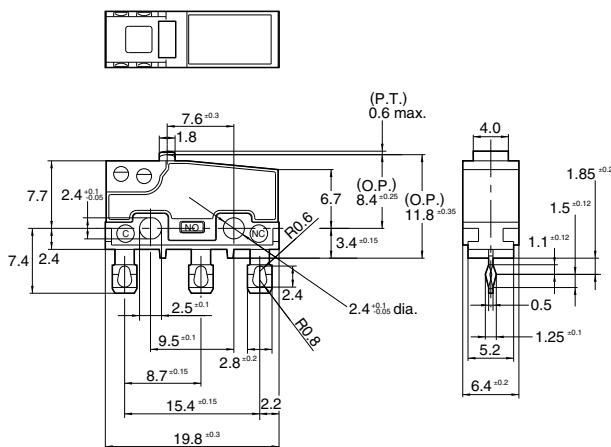
Pretravel, Max. mm	2.8	
Movement differential, Max. mm	0.8	
Overtravel, Min mm	1.2	
Operating position	Distance from mounting hole, mm	11.65 \pm 0.8

Roller lever



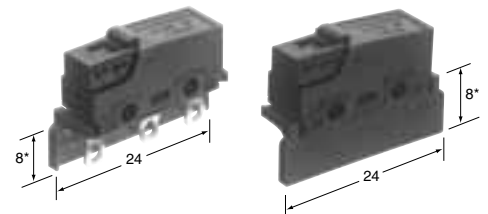
Pretravel, Max. mm	2.5	
Movement differential, Max. mm	0.5	
Overtravel, Min mm	0.8	
Operating position	Distance from mounting hole, mm	14.5 \pm 0.8

2. Self-standing solder terminal Pin plunger



With guard

With opposite side guard



* The height from the center of mounting hole to the edge of guard.

NOTES

1. Fastening of the switch body

- 1) Use flat filister head M2.3 screws to mount switches with less than a 0.29 N·m torque. Use of screws washers or adhesive lock is recommended to prevent loosening of the screws.
- 2) Check insulation distance between ground and each terminal.
- 3) When the operation object is in the free position, force should not be applied directly to the actuator or pin plunger from vertical direction to the switch.
- 4) In setting the movement after operation, the over-travel should be set more than 70% as a standard. Setting the movement at less than 70% of O.T. may cause troubles such as miscontact and welding due to small contact force of the switch.
- 5) For a lever type, the force from the reverse and side to the operation direction should not be applied.

2. Soldering operations

For manual soldering:
Soldering should be accomplished in less than 3 seconds, with a 60 watt iron. Care should be taken not to apply force to the terminal during soldering.

For automatic soldering:
Soldering should be done less than 6 seconds in 260°C soldering bath or less than 3 seconds in 350°C soldering bath. Terminal portions should not be moved within 1 minute after soldering.

Also no tensile strength of lead wires should be applied to the terminals.

3. Selection of the switch

When specifying the switch, allow $\pm 20\%$ to the listed operating characteristics.

4. Environment

Avoid using the switches in the following conditions;

- In corrosive gases, such as silicon gas
- In a dusty environment

5. Cautions regarding use

When switching low-level circuits (6V DC 5mA, 12V DC 2mA, 24V DC 1mA), AV, AV3/AVT3, AVL3 Au clad contact type switches are recommended. When used to switch inductive loads (relays, solenoids, buzzers, etc.), it is recommended that a proper spark quench circuit is inserted in the switch to prevent contact faults caused by electric arcs. Care should be taken that occurrence in AC load possibly shorten the expected life.

6. Quality check under actual loading conditions

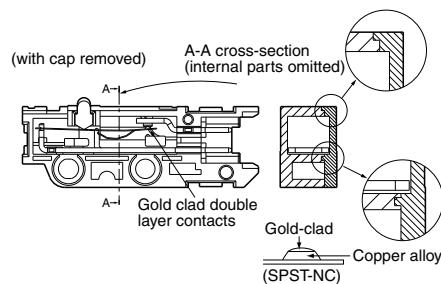
To assure reliability, check the switch under actual loading conditions. Avoid any situation that may adversely affect switching performance.

FEATURES

- Using a connector for connections significantly improves operation effectiveness.

Applicable connector:
XA connector produced by JST Mfg. Co., Ltd.
- Contact: SXA-001T-P0.6
- Housing: XAP-02V-1

- Contact reliability is achieved by simple dust prevention guard and gold-clad double layer contacts

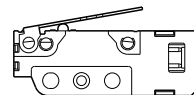


- The contact arrangement is available in two types, the SPST-NC and the SPST-NO.

- The lever position is available in two types.

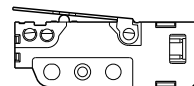
Standard lever position

“Standard lever position” refers to a position in which the lever is installed with the plunger close to the reference.



Backward lever position

“Backward lever position” refers to a position in which the lever is installed with the plunger far away from the reference.



TYPICAL APPLICATIONS

- Detection of vending machine condition whether cans are out of stock
- Ball detection of pinball game machine
- PPC (Plain Paper Copier)
- LBP (Laser Beam Printer)

<http://panasonic-denko.co.jp/ac/e/service/environment>

ORDERING INFORMATION

Ex. AV6 2 2 2 12 64

Type of switch	Contact arrangement	Actuators	O.F. (by pin plunger)	Lever position	Contacts
AV6: CS switch	2: SPST-NC 3: SPST-NO	0: Pin plunger 2: Hinge lever 4: Simulated roller lever 5: Roller lever	2: 0.50 N 5: 1.50 N	Nil: Standard 12: Backward	64: Gold clad double layer

Remarks: 1. Standard packing Inner carton: 100 pcs. Outer carton: 1,000 pcs.
2. When ordering UL, CSA and TÜV approved types, please attach suffix “3” to the part no.

PRODUCT TYPES

1. Lever position: Standard

Actuator	Operating force, Max.	Contact arrangement	
		SPST-NC	SPST-NO
Pin plunger	0.50N	AV620264	AV630264
	1.50N	AV620564	AV630564
Hinge lever	0.20N	AV622264	AV632264
	0.50N	AV622564	AV632564
Simulated roller lever	0.20N	AV624264	AV634264
	0.50N	AV624564	AV634564
Roller lever	0.20N	AV625264	AV635264
	0.50N	AV625564	AV635564

Remarks: 1. When ordering UL, CSA and TÜV approved (under application) types, please attach suffix "3" to the part no.

2. Lever position: Backward

Actuator	Operating force, Max.	Contact arrangement	
		SPST-NC	SPST-NO
Hinge lever	0.35N	AV62221264	AV63221264
	1.00N	AV62251264	AV63251264
Simulated roller lever	0.35N	AV62421264	AV63421264
	1.00N	AV62451264	AV63451264
Roller lever	0.35N	AV62521264	AV63521264
	1.00N	AV62551264	AV63551264

Remarks: 1. When ordering UL, CSA and TÜV approved (under application) types, please attach suffix "3" to the part no.

SPECIFICATIONS

1. Contact rating

Contact	Voltage	Resistive load ($\cos \phi \cong 1$)
Gold clad double layer	30[V] DC	0.1[A]
	5[V] DC	1[mA] Low-level circuit rating

2. Characteristics

Expected life	Mechanical	Min. 5×10^5 (at 60 cpm) (O.T. max.)
	Electrical (Rated load)	Min. 2×10^5 (at 20 cpm) (O.T. max.)
Insulation resistance		Min. 100M Ω
Dielectric strength	Between terminals	1,000 Vrms for 1 min.
	Between terminals and other exposed metal parts	1,500 Vrms for 1 min.
	Between terminals and ground	1,500 Vrms for 1 min.
Contact resistance (initial)		100M Ω max. (by voltage drop 0.1A 6 to 8 VDC) Value includes the resistance between the connector and the lead (#AWG28, length: 50 mm)
Vibration resistance		10 to 55 Hz at single amplitude of 0.75mm (Contact opening: max. 1msec.)
Shock resistance		Applied shock 1.50N type: Min.300m/s ² {Contact opening: Max. 1msec.} 0.50N type: Min.150m/s ² {Contact opening: Max. 1msec.}
Connector insertion force		Max. 20N (inserted in removal direction)
Connector holding force		Min. 20N (extracted by static load, in removal direction)
Connector removal operating times		Max. 5 times (in removal direction)
Allowable operating speed (No load)		0.1 to 1,000 mm/s (at pin plunger)
Max. operating cycle rate (No load)		300 cpm
Ambient temperature		-25 to +85°C (No freezing and condensing)
Unit weight		Approx. 2.5g (pin plunger type)

3. Operating characteristics

1) Lever position: Standard

Type of actuator	Operating force, Max.	Release force, Min.	Pretravel, Max. mm	Movement differential, Max, mm	Overtravel, Min. mm	Operating position, mm
Pin plunger	0.50N	0.04N	0.6	0.1	0.4	8.4±0.3
	1.50N	0.25N				
Hinge lever	0.20N	0.02N	2.6	0.8	1.2	10.0±0.8
	0.50N	0.06N				
Simulated roller lever	0.20N	0.02N	2.6	0.8	1.2	12.2±0.8
	0.50N	0.06N				
Roller lever	0.20N	0.02N	2.6	0.8	1.2	15.7±0.8
	0.50N	0.06N				

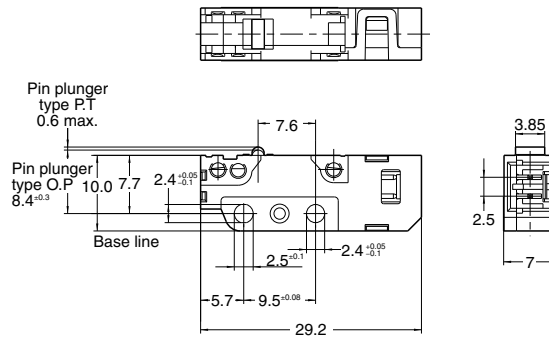
2) Lever position: Backward

Type of actuator	Operating force, Max.	Release force, Min.	Pretravel, Max. mm	Movement differential, Max, mm	Overtravel, Min. mm	Operating position, mm
Hinge lever	0.35N	0.03N	1.4	0.6	0.7	9.2±0.6
	1.00N	0.10N				
Simulated roller lever	0.35N	0.03N	1.4	0.6	0.7	11.3±0.6
	1.00N	0.10N				
Roller lever	0.35N	0.03N	1.4	0.6	0.7	14.9±0.6
	1.00N	0.10N				

DIMENSIONS

mm General tolerance: ±0.25

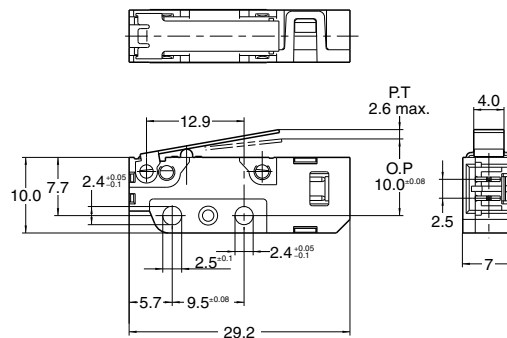
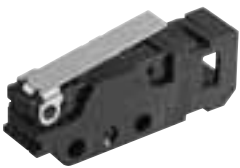
1. Pin plunger



Pretravel, Max. mm	0.6
Movement differential, Max. mm	0.1
Overtravel, Min. mm	0.4
Operating position	Distance from mounting hole, mm
	8.4±0.3

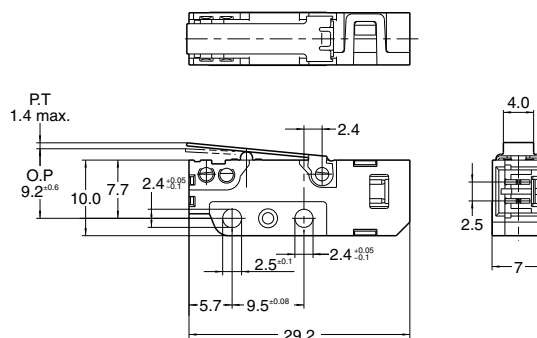
2. Hinge lever

Lever position: Standard



Pretravel, Max. mm	2.6
Movement differential, Max. mm	0.8
Overtravel, Min. mm	1.2
Operating position	Distance from mounting hole, mm
	10.0±0.8

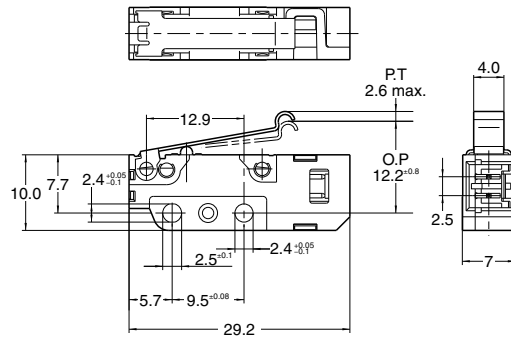
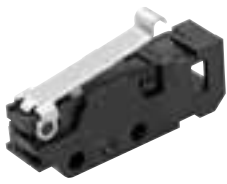
Lever position: Backward



Pretravel, Max. mm	1.4
Movement differential, Max. mm	0.6
Overtravel, Min. mm	0.7
Operating position	Distance from mounting hole, mm
	9.2±0.6

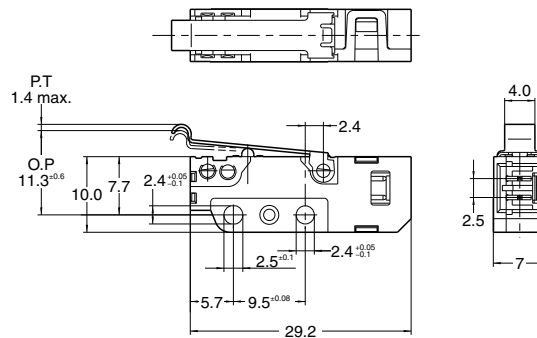
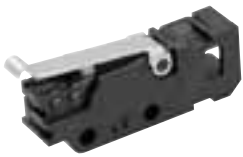
3. Simulated roller lever

Lever position: Standard



Pretravel, Max. mm	2.6
Movement differential, Max. mm	0.8
Overtravel, Min. mm	1.2
Operating position	Distance from mounting hole, mm
	12.2±0.8

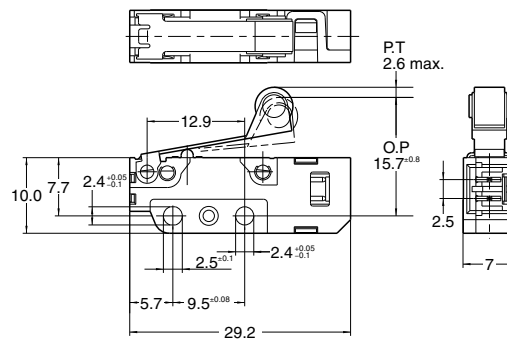
Lever position: Backward



Pretravel, Max. mm	1.4
Movement differential, Max. mm	0.6
Overtravel, Min. mm	0.7
Operating position	Distance from mounting hole, mm
	11.3±0.6

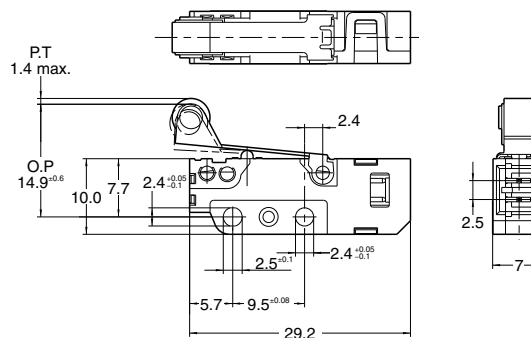
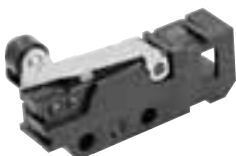
4. Roller lever

Lever position: Standard



Pretravel, Max. mm	2.6
Movement differential, Max. mm	0.8
Overtravel, Min. mm	1.2
Operating position	Distance from mounting hole, mm
	15.7±0.8

Lever position: Backward



Pretravel, Max. mm	1.4
Movement differential, Max. mm	0.6
Overtravel, Min. mm	0.7
Operating position	Distance from mounting hole, mm
	14.9±0.6

NOTES

1. Fastening of the switch body

- 1) Use flat filister head M2.3 screws to mount switches with less than a 0.29N·m torque. Use of screws washers or adhesive lock is recommended to prevent loosening of the screws.
- 2) Check insulation distance between ground and each terminal.
- 3) When the operation object is in the free position, force should not be applied directly to the actuator or pin plunger. Also force should be applied to the pin plunger from vertical direction to the switch.
- 4) In setting the movement after operation, the over-travel should be set more than 70% as a standard. With the lever type, do not apply excessive force in the direction opposite to the movement, or from the horizontal direction.
- 5) For a lever type, the force from the reverse to the operation direction should not be applied.

2. About the connector

- 1) The connector on the AV6 switch is designed to fit with the XA connector produced by JST Mfg. Co., Ltd. Do not use any connector other than the specified connector, or solder the terminals directly.
- 2) Make sure leads are arranged so that no constant force is applied to them when the connectors are mated.
- 3) Keep the connector straight when inserting it. If it is inserted at an angle, it may snag near the entrance, or it may be inserted too forcefully.
- 4) Problems thought to be caused by the XA connector, which is specified as conforming to the AV6 switch connector, are not covered by the warranty. Please contact JST Mfg., Co., Ltd. and request cooperation in resolving the problem.

3. Selection of the switch

When specifying the switch, allow $\pm 20\%$ to the listed operating characteristics.

4. Environment

Avoid using the switches in the following conditions;

- In corrosive gases, such as silicon gas
- In a dusty environment

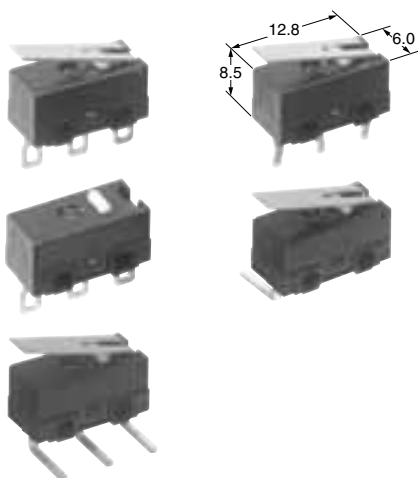
When cleaning the switch, use a diluted form of a neutral cleaning agent. Using acidic or alkali solvents can adversely affect the performance of the switch.

5. Precautions concerning circuits

The AV6 switch is designed specifically for low-voltage, low-current loads. Avoid using it at loads that exceed the resistive load.

6. Quality check under actual loading conditions

To assure reliability, check the switch under actual loading conditions. Avoid any situation that may adversely affect switching performance.



FEATURES

- Integrally molded terminal block—prevents soldering flux from entering into housing
- Compact size—minimizes size of equipment
- Flat terminal shape—makes soldering easy
- Low-level circuit type available
- Self-standing PC board terminal type available

TYPICAL APPLICATIONS

- Computer mouse
- Charger unit for mobile phone
- Detection of key position for automobiles

<http://panasonic-denko.co.jp/ac/e/service/environment>

ORDERING INFORMATION

Ex. AH 1 4 8 0 61 9

Product Name	Terminal	Operating force by pin plunger (max.)	Actuator	Contact	Agency standard
FJ	4: 2.0 mm Self-standing PC board terminal with stand off 5: Straight PC board terminal with stand off 6: 2.0 mm solder terminal with stand off 7: 2.0 mm PC board right angle terminal 8: 2.0 mm PC board left angle terminal	6: 1.47 N with stand off 8: 0.74 N with stand off	0: Pin plunger 2: Hinge lever 4: Simulated roller lever	Nil: AgNi alloy 61: AgNi alloy + Gold-clad	9: UL/CSA

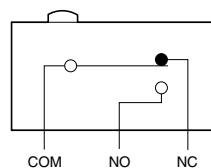
Remark: 2.0 mm PC board terminal straight type is available. For details, please consult us.

PRODUCT TYPES

The color of:

Type	Color	Body	Cap	Plunger
Standard		Black	Black	White
Low-level circuit		Black	Black	Red

CONTACT ARRANGEMENT



1. Self-standing PC board terminal

Actuators	Operating force, Max.	Standard (AgNi alloy contact)	Low-level circuit (AgNi alloy + Gold-clad contact)
		SPDT	SPDT
Pin plunger	0.74 N	AH14809	AH1480619
	1.47 N	AH14609	AH1460619
Hinge lever	0.25 N	AH14829	AH1482619
	0.49 N	AH14629	AH1462619
Simulated roller lever	0.26 N	AH14849	AH1484619
	0.54 N	AH14649	AH1464619

AH1

2. Solder terminal

Actuators	Operating force, Max.	Standard (AgNi alloy contact)	Low-level circuit (AgNi alloy + Gold-clad contact)
		SPDT	SPDT
Pin plunger	0.74 N	AH16809	AH1680619
	1.47 N	AH16609	AH1660619
Hinge lever	0.25 N	AH16829	AH1682619
	0.49 N	AH16629	AH1662619
Simulated roller lever	0.26 N	AH16849	AH1684619
	0.54 N	AH16649	AH1664619

3. Straight PC board terminal

Actuators	Operating force, Max.	Standard (AgNi alloy contact)	Low-level circuit (AgNi alloy + Gold-clad contact)
		SPDT	SPDT
Pin plunger	0.74 N	AH15809	AH1580619
Pin plunger	1.47 N	AH15609	AH1560619
Hinge lever	0.25 N	AH15829	AH1582619
Hinge lever	0.49 N	AH15629	AH1562619
Simulated roller lever	0.26 N	AH15849	AH1584619
Simulated roller lever	0.54 N	AH15649	AH1564619

4. PC board terminal right angle

Actuators	Operating force, Max.	Standard (AgNi alloy contact)	Low-level circuit (AgNi alloy + Gold-clad contact)
		SPDT	SPDT
Pin plunger	0.74 N	AH17809	AH1780619
Pin plunger	1.47 N	AH17609	AH1760619
Hinge lever	0.25 N	AH17829	AH1782619
Hinge lever	0.49 N	AH17629	AH1762619
Simulated roller lever	0.26 N	AH17849	AH1784619
Simulated roller lever	0.54 N	AH17649	AH1764619

5. PC board terminal left angle

Actuators	Operating force, Max.	Standard (AgNi alloy contact)	Low-level circuit (AgNi alloy + Gold-clad contact)
		SPDT	SPDT
Pin plunger	0.74 N	AH18809	AH1880619
	1.47 N	AH18609	AH1860619
Hinge lever	0.25 N	AH18829	AH1882619
	0.49 N	AH18629	AH1862619
Simulated roller lever	0.26 N	AH18849	AH1884619
	0.54 N	AH18649	AH1864619

Remarks: 1. The appearance of right and left angle types are as below.

Right angle



Left angle



2. Standard packing: 50 pcs./tube.

3. Please consult us for the delivery schedule of PC board terminal SPST-NO type.

APPLICABLE CURRENT RANGE

Contact	Applicable current range				Max. operating force for operation (at pin plunger)	
	1 mA	0.1 A	1 A	3 A	0.74 N	1.47 N
Standard type (AgNi alloy)			●		●	
			●			●
Low level circuit type (AgNi alloy + Gold-clad)	●				●	
	●					●

SPECIFICATIONS

1. Contact rating (resistive load)

		Standard rating	Minimum rating
Standard type	O.F. 0.74N	1A 125V AC, 1A 30V DC	—
	O.F. 1.47N	3A 125V AC, 2A 30V DC	—
Low-level circuit type		0.1A 125V AC, 0.1A 30V DC	5mA 6V DC, 2mA 12V DC, 1mA 24V DC

2. Characteristics

Contact arrangement	Standard type	Low-level circuit type
Expected life (Min. operations) Electrical (at rated load, 20 cpm) (O.T.: Max.)	3×10^4	10^5
Expected life (Min. operations) Mechanical (at 60 cpm) (O.T.: Specified value)	O.F. 0.74 N: 10^6 O.F. 1.47 N: 5×10^5	
Dielectric strength (initial) Between terminals Between terminals and other exposed parts Between terminals and ground	600 Vrms for 1 min. 1,500 Vrms for 1 min. 1,500 Vrms for 1 min.	
Insulation resistance (Min. at 500V DC)	100 M Ω	
Initial contact resistance	Max. 30 m Ω (by voltage drop, 1A 6 to 8V DC)	Max. 100 m Ω (by voltage drop, 0.1A 6 to 8V DC)
Allowable operating speed (No load)	1 to 500 mm/sec.	
Max. operating cycle rate (No load)	120 cpm	
Ambient temperature	-25 to +85°C (Not freezing below 0°C)	
Shock resistance (Pin plunger type)	Min. 294 m/s ² (Contact opening: Max. 1 msec.)	
Vibration resistance (Pin plunger type)	10 to 55 Hz at single amplitude of 0.75mm (Contact opening: Max. 1 msec.)	

3. Operating characteristics

1) Pin plunger

3th digit of Part No.	Operating force, Max.	Release force, Min.	Pretravel, Max. mm	Movement differential, Max. mm	Overtravel, Min. mm	Operating position mm
1	1.47 N	0.29 N	0.5	0.12	0.2	5.5±0.2 (Distance from mounting hole)
6	0.47 N	0.20 N			0.25	7±0.3 (Distance from stand off) 5.5±0.2 (Distance from mounting hole)
8	0.74 N	0.098 N			7±0.3 (Distance from stand off) 5.5±0.2 (Distance from mounting hole)	

2) Hinge lever

3th digit of Part No.	Operating force, Max.	Release force, Min.	Pretravel, Max. mm	Movement differential, Max. mm	Overtravel, Min. mm	Operating position mm
1	0.74 N	0.098 N	2.1	0.5	0.55	6.8±1.5 (Distance from mounting hole)
6	0.49 N	0.049 N				8.3±1.2 (Distance from stand off) 6.8±1.0 (Distance from mounting hole)
8	0.25 N	0.025 N				8.3±1.2 (Distance from stand off) 6.8±1.0 (Distance from mounting hole)

3) Simulated roller lever

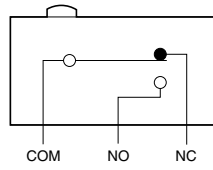
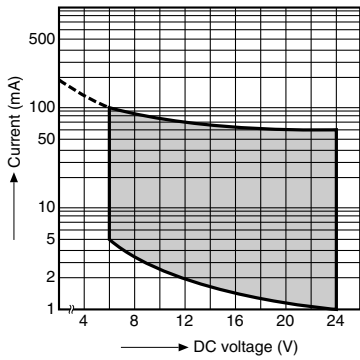
3th digit of Part No.	Operating force, Max.	Release force, Min.	Pretravel, Max. mm	Movement differential, Max. mm	Overtravel, Min. mm	Operating position mm
6	0.54 N	0.039 N	2.1	0.5	0.5	11.0±1.2 (Distance from stand off) 9.5±1.0 (Distance from mounting hole)
8	0.26 N	0.020 N				11.0±1.2 (Distance from stand off) 9.5±1.0 (Distance from mounting hole)

DATA

Gold-clad type

Range of low-level current voltage

CONTACT ARRANGEMENT

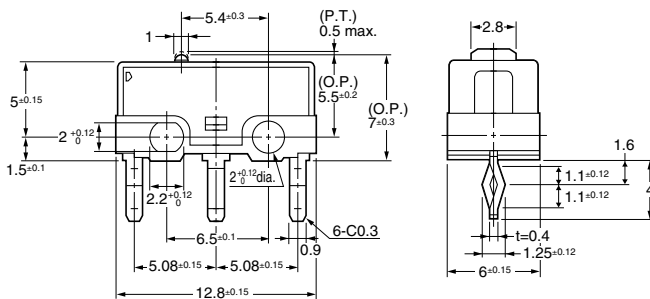


DIMENSIONS

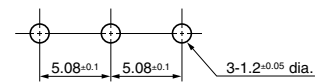
mm

1. Self-standing PC board terminal (Standard type)

Pin plunger

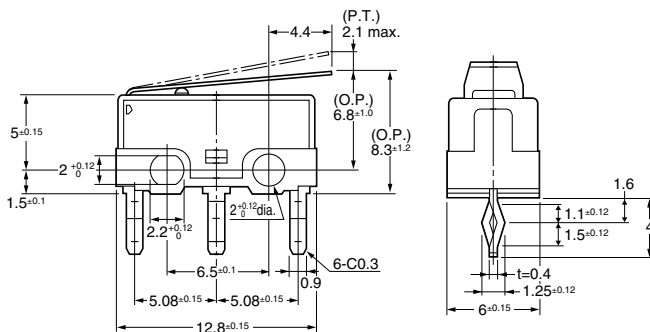


PC board pattern

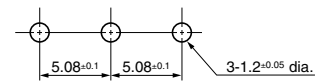


Pretravel, Max. mm	0.5	
Movement differential, Max. mm	0.12	
Overtravel, Min. mm	0.25	
Operating position	Distance from mounting hole, mm	5.5±0.2
	Distance from standoff, mm	7±0.3

Hinge lever

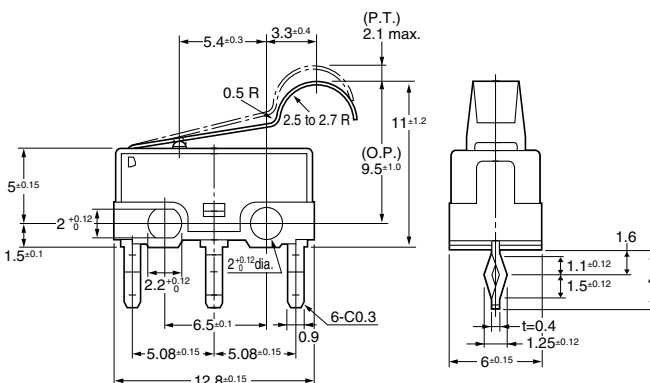


PC board pattern

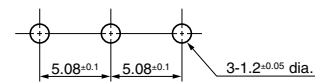


Pretravel, Max. mm	2.1	
Movement differential, Max. mm	0.5	
Overtravel, Min. mm	0.5	
Operating position	Distance from mounting hole, mm	6.8±1.0
	Distance from standoff, mm	8.3±1.2

Simulated roller lever



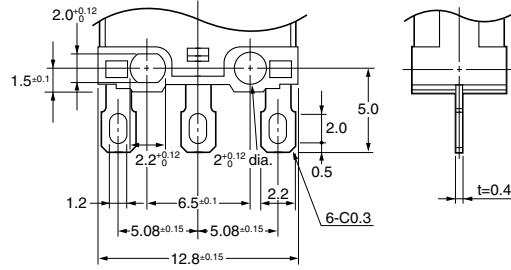
PC board pattern



Pretravel, Max. mm	2.1	
Movement differential, Max. mm	0.5	
Overtravel, Min. mm	0.5	
Operating position	Distance from mounting hole, mm	9.5±1.0
	Distance from standoff, mm	11.0±1.2

2. Solder terminal

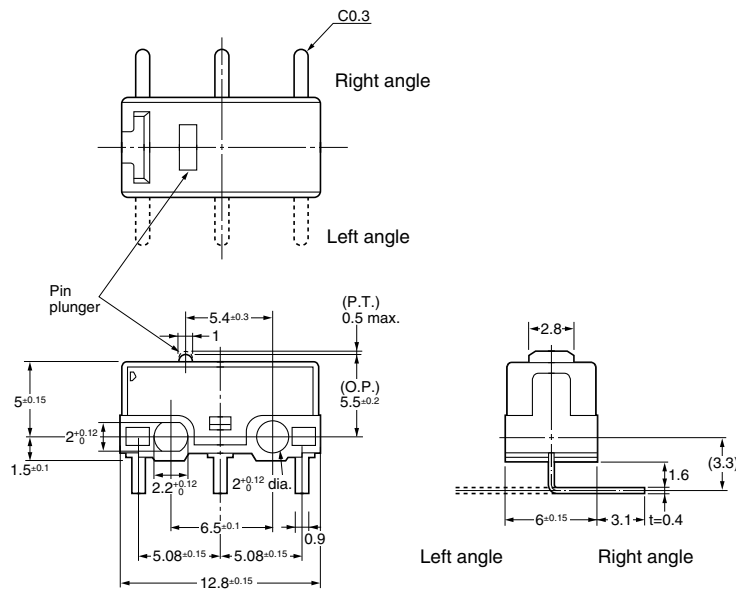
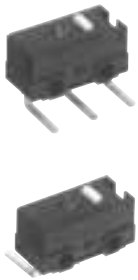
Pin plunger



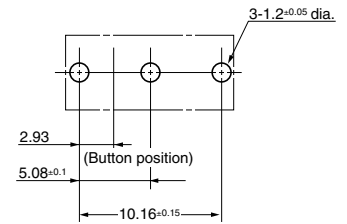
Remark: As for other actuator types, dimensions are the same as those of corresponding standard PC board terminal type.

3. PC board terminal (Right/Left angle type)

Pin plunger



Recommended PC board pattern (top view)



Remark: As for other actuator types, dimensions are the same as those of corresponding standard PC board terminal type.

NOTES

1. Fixing

- 1) Use 2mm mounting screws to attach switches with Max. 0.098 N-m torque. Use of screw washers or adhesive lock is recommended.
- 2) When the operation object is in the free position, force should not be applied directly to the actuator or to the pin plunger. Also force should be applied to the pin plunger from vertical direction to the switch.
- 3) In setting the movement after operation, the over-travel should be set from 70% to 100%. Setting the movement less than 70% may cause degrading of the electrical mechanical performance.

2. When specifying AH1 switches, allow ±20% to the listed operating and release forces.

3. Soldering operation

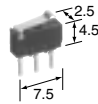
- 1) For manual soldering: 18 W soldering iron, soldering completed within 3 seconds; do not apply force to the terminals.
- 2) For automatic soldering tank: 260°C immersion, completed within 5 seconds, 350°C immersion, completed within 3 seconds.

4. When switching low-level circuits, AH1 low-level circuit type is recommended.

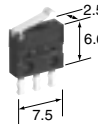


FEATURES

- Superminiature type, light-weight snap action switch
- PC board terminal type (0.2g)



- Solder terminal type with mounting holes (0.3g)

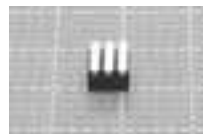


mm

- Mechanical life of 300,000 operations minimum

Stainless steel plated silver or gold is used for actuating spring

- Switches can be mounted close together in any directions



<http://panasonic-denko.co.jp/ac/e/service/environment>

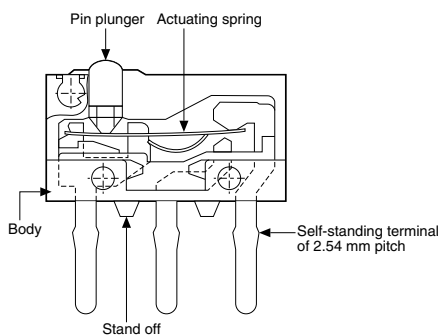
ORDERING INFORMATION

Ex. AV 4 4 0 4 61

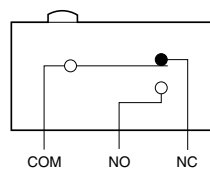
Product Name	Terminals	Actuators	Operating force, max. (by pin plunger)	Contacts
FU	0: Solder terminal with mounting holes (1.65 mm dia.) 4: PC board straight terminal 5: PC board right angle terminal 6: PC board left angle terminal	0: Pin plunger 2: Hinge lever 4: Simulated roller lever	4: 0.98 N	Nil: Ag plate contact 61: Au plate contact

CONSTRUCTION

PC board straight terminal type



CONTACT ARRANGEMENT



PRODUCT TYPES

Type of contacts	Actuator	Operating force, Max.	Type No.			
			PC board terminal			Solder terminal with mounting holes
			Straight terminal	Angle terminal	Reverse angle terminal	
Silver plated contact type	Pin plunger	0.98 N	AV4404	AV4504	AV4604	AV4004
	Hinge lever	0.25 N	AV4424	AV4524	AV4624	AV4024
	Simulated roller lever	0.29 N	AV4444	AV4544	AV4644	AV4044
Gold plated contact type	Pin plunger	0.98 N	AV440461	AV450461	AV460461	AV400461
	Hinge lever	0.25 N	AV442461	AV452461	AV462461	AV402461
	Simulated roller lever	0.29 N	AV444461	AV454461	AV464461	AV404461

SPECIFICATIONS

1. Contact rating

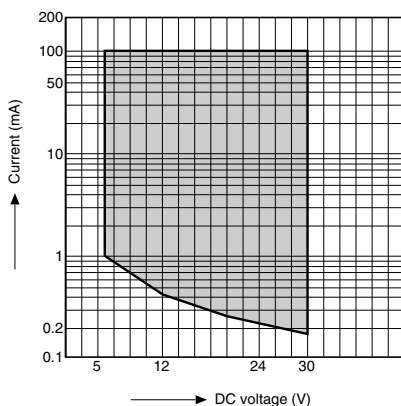
Type of contact	Resistive load ($\cos\phi \approx 1$)
Silver plated contact	0.5A 30V DC
Gold plated contact	0.1A 30V DC

2. Characteristics

Items		Characteristics	
Life	Mechanical	Min. 3×10^5 operations (at 60 cpm)	
	Electrical	Silver plated contact	Min. 2×10^4 operations (0.5A 30V DC; at 20 cpm)
		Gold plated contact	Min. 2×10^5 operations (0.1A 30V DC; at 20 cpm)
Insulation resistance		Min. 100 M Ω (250V DC by insulation resistance meter)	
Voltage withstand	Between non-continuous terminals	500V AC for 1 min.	
	Between each terminal and other exposed metal parts	500V AC for 1 min.	
	Between each terminal and ground	500V AC for 1 min.	
Vibration resistance	Pin plunger type	10 to 55 Hz at single amplitude of 0.75mm (contact opening: max. 1 msec.)	
	Lever type	10 to 55 Hz at single amplitude of 0.15mm (contact opening: max. 1 msec.)	
Shock resistance	Pin plunger type	Min. 294m/s ² (contact opening: max. 1 msec.)	
	Lever type	Min. 147m/s ² (contact opening: max. 1 msec.)	
Contact resistance (initial value)		Max. 200 m Ω (by YHP4328A)	
Allowable operation speed		0.1mm/s to 500mm/s (pin plunger type)	
Mechanical max. switching frequency		60 operations/min.	
Ambient temperature		-25 to +80°C (Not freezing below 0°C)	
Unit weight		PC board terminal type: Approx. 0.2g Solder terminal with mounting holes type: Approx. 0.3g	

DATA

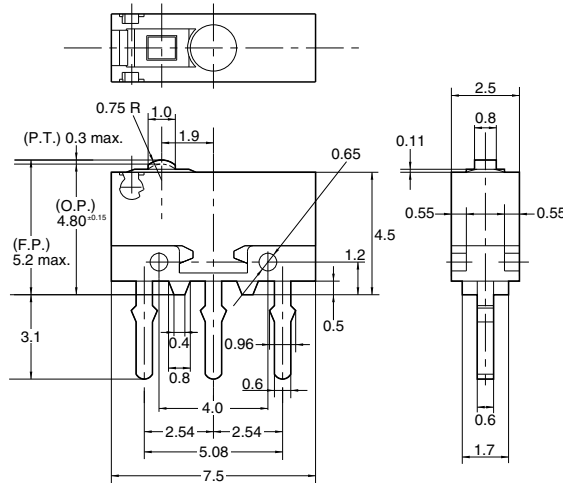
Gold plate contact type
Range of low-level current and voltage
(Reference only)



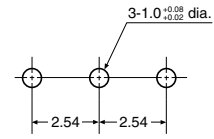
DIMENSIONS

mm General tolerance: ± 0.15

1. PC board terminal Straight terminal Pin plunger type

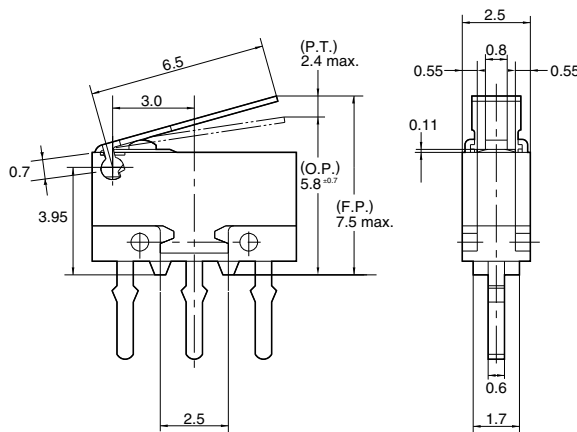


PC board pattern



Pretravel	0.3 max.
Movement Differential	0.1 max.
Overtravel	0.1 min.
Operating Position	4.8±0.15
Free Position	5.2 max.

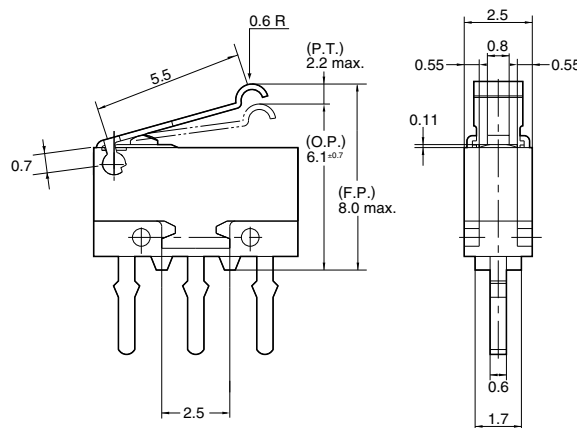
Hinge lever type



Pretravel	2.4 max.
Movement Differential	0.7 max.
Overtravel	0.4 min.
Operating Position	5.8±0.7
Free Position	7.5 max.

Note: All other dimensions are the same as those of pin plunger type.

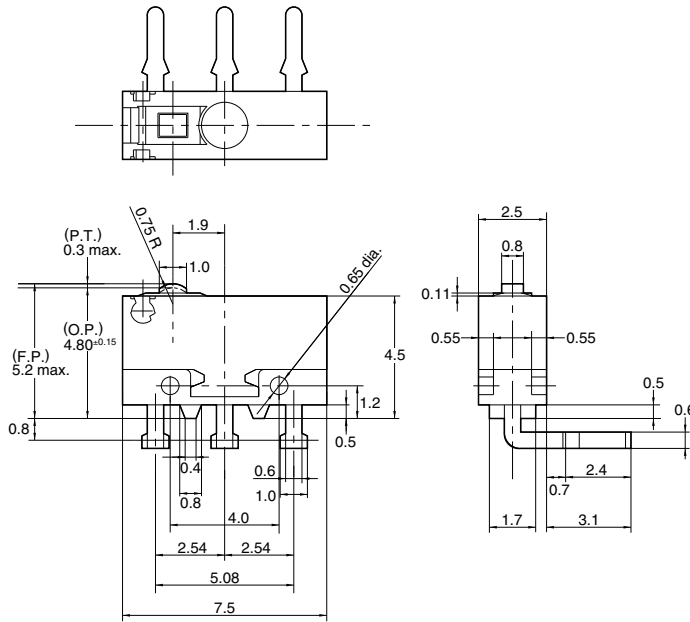
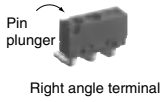
Simulated roller lever type



Pretravel	2.2 max.
Movement Differential	0.7 max.
Overtravel	0.3 min.
Operating Position	6.1±0.7
Free Position	8.0 max.

Note: All other dimensions are the same as those of pin plunger type.

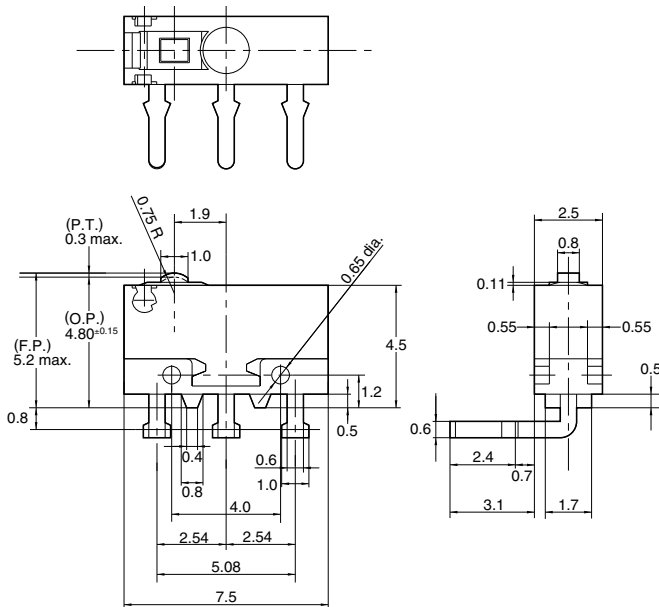
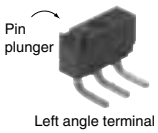
2. Angle terminal
Right angle terminal
Pin plunger type



Pretravel	0.3 max.
Movement Differential	0.1 max.
Overtravel	0.1 min.
Operating Position	4.8±0.15
Free Position	5.2 max.

Note: All other dimensions of hinge lever type and simulated roller lever type are the same as those of straight terminal types.

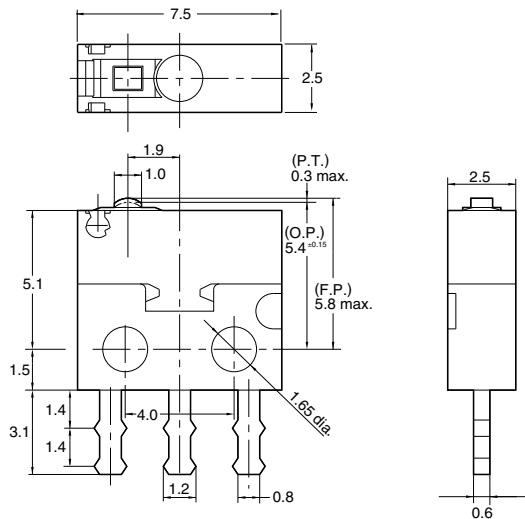
Left angle terminal
Pin plunger type



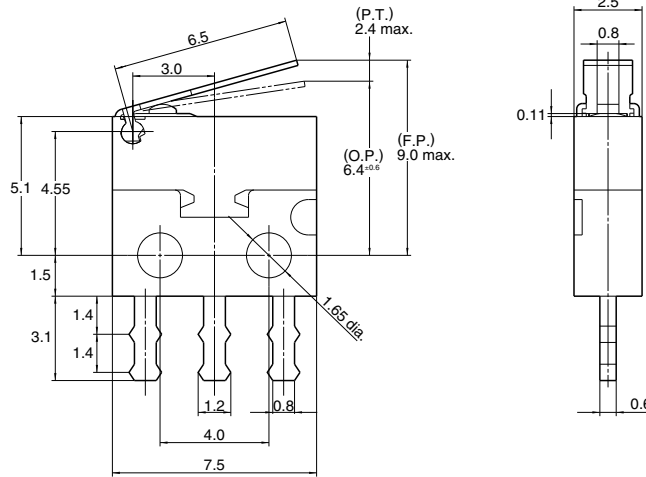
Pretravel	0.3 max.
Movement Differential	0.1 max.
Overtravel	0.1 min.
Operating Position	4.8±0.15
Free Position	5.2 max.

Note: All other dimensions of hinge lever type and simulated roller lever type are the same as those of straight terminal types.

3. Solder terminal with mounting holes
Pin plunger type



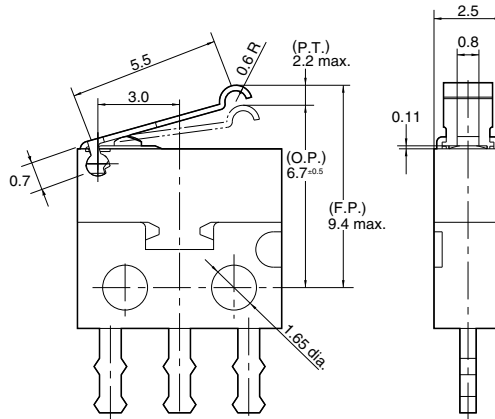
Pretravel	0.3 max.
Movement Differential	0.1 max.
Overtravel	0.1 min.
Operating Position	5.4±0.15
Free Position	5.8 max.



Pretravel	2.4 max.
Movement Differential	0.7 max.
Overtravel	0.4 min.
Operating Position	6.4±0.6
Free Position	9.0 max.

Note: All other dimensions are the same as those of pin plunger type.

Simulated roller lever type



Pretravel	2.2 max.
Movement Differential	0.7 max.
Overtravel	0.3 min.
Operating Position	6.7±0.5
Free Position	9.4 max.

Note: All other dimensions are the same as those of pin plunger type.

NOTES

1. Mounting

- 1) After mounting and wiring, the insulation distance between ground and each terminal should be confirmed as sufficient.
- 2) When the operation object is in the free position, force should not be applied to the actuator or to the pin plunger. Also force should be applied to the pin plunger from vertical direction to the switch.
- 3) In setting the movement after operation, the over-travel should be set within the range of the specified O.T. value.
- 4) In fastening the switch body, use the M1.4 screw, with tightening torque of not more than 0.098 N·m.

2. Soldering

- 1) Hand soldering should be accomplished in less than 5 seconds with an iron below 18 watts. Keep the soldering tip temperature less than 320°C. Avoid applying force to the terminals.
- 2) Terminal portion must not be moved within 1 minute after soldering. Also no tensile strength of lead wires should be applied to the terminals.
- 3) When using the angle terminal type, insert an insulation separator between the switch body and the printed circuit board (Insulation separator 0.2 to 0.4mm thick) to prevent the soldering flux from flowing under the PC board.

3. Cleaning

As AV4 switch is not completely sealed construction, avoid cleaning.

4. Selection of switch

When specifying AV4 switches, allow $\pm 20\%$ to the listed operating characteristics.

5. Avoid using and keeping switches in the following conditions:

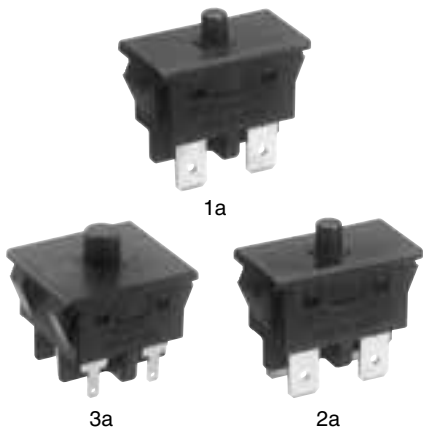
- In corrosive gases
- In a dusty environment
- Where silicon atmosphere prevails

6. When switching low-level circuits (max. 100 mA), gold plate contact types are recommended.

7. When using the lever type, avoid applying force from the reverse and side direction of actuating.

SAFETY INTERLOCK SWITCH SMALL SIZE & LIGHT FORCE

AGX (GX) SWITCHES



FEATURES

- Constructed with dual restoration springs and double cut-off for safety
- Contact gap of greater than 4mm (Conforming to IEC 950)
- As for 3 Form A type, combination of power contact and signal contact is available
- UL/C-UL/ENEC/VDE approved

TYPICAL APPLICATIONS

- Door interlock of copiers, printers, facsimiles
- Door interlock of other compact appliances

About Cd-free contacts

We have introduced cadmium-free type products to reduce material which is not good for our environment. (The suffix "F" denotes such part.) Please replace parts containing cadmium with Cd-free products and evaluate them with your actual application before use because the life of a relay depends on the contact material and load.

<http://panasonic-denko.co.jp/ac/e/service/environment>

ORDERING INFORMATION

Ex. AGX F

Product Name	Contact arrangement	Capacity and mounting method	Terminals	Contact
GX	1: 1 Form A Power switching contact 2: 2 Form A Power switching contact 3: 3 Form A Power switching contact 6: 1 Form A Power switching contact and 2 Form A Signal switching contact 7: 2 Form A Power switching contact and 1 Form A Signal switching contact	0: Standard type 10.1 A (Snap-in mounting)	5: .250 Quick-connect terminal (O.T. 2 mm) 6: .250 Quick-connect terminal (O.T. 4 mm)	F: Cadmium free

PRODUCT TYPES

Rating	Overtravel (O.T.) Min. mm	Contact arrangement	Switching timing		Part number	
			1st ON	2nd ON		
Standard type 10.1A 250V AC	2	1 Form A Power switching contact	—	—	AGX105F	
		2 Form A Power switching contact	—	—	AGX205F	
	4	3 Form A	1 Form A Power switching contact	—	—	AGX106F
			2 Form A Power switching contact	—	—	AGX206F
		3 Form A Power switching contact	3a power	—	AGX306F	
		1 Form A Power switching contact 2 Form A Signal switching contact	1a power	2a signal	AGX606F	
		2 Form A Power switching contact 1 Form A Signal switching contact	2a power	1a signal	AGX706F	

SPECIFICATIONS

1. Contact rating

Number of contact	Resistive load ($\cos \phi \cong 1$)	Motor load* (EN61058-1) ($\cos \phi \cong 0.6$)
Standard type power switching contact	10.1A 125V AC 10.1A 250V AC 6A 30V DC 3A 48V DC (3 Form A type only)	3A 125V AC 3A 250V AC
Signal switching contact (3 Form A only)	0.1A 48V DC Contact Low-level circuit: 1mA 5V DC	—

Remark: Motor load designates an inrush current switching capability of 6 times the indicated rating

2. Characteristics

Type	Standard type
Expected life	10 ⁶ min.
Mechanical (at 60 cpm)	
Electrical (at 20 cpm, operating speed: 10mm/sec.)	10 ⁵ (at 10.1A 250V AC)
Insulation resistance	100M Ω at 500V DC
Dielectric strength	2,000Vrms for 1 minute
Between terminals	
Between terminals and other exposed metal parts	2,500Vrms for 1 minute
Between terminals and ground	2,000Vrms for 1 minute
Initial contact resistance	100m Ω Max. (by voltage drop at 1A, 6 to 8V DC)
Temperature rise (terminal portion)	Initial 45 deg. Max., After test 55 deg. Max.
Vibration resistance	10 to 55Hz at single amplitude of 0.75mm
Shock resistance	Min. 294m/s ²
Actuator strength	49N for 1 minute (For operating direction)
Tensile terminal strength	Min. 147N (Pulling for operating direction)
Allowable operating speed	Min. 10 to 300mm/second
Allowable operating cycle rate	60 cpm
Temperature resistance	-40°C to -45°C: 48 hours, +80°C to +90°C: 48 hours
Ambient temperature	-25°C to +85°C (Not freezing nor condensing)
Flame retardancy	Min. UL 94V-1
Tracking resistance (CTI)	Min. 175
Contact material	AgCuO alloy

*Remark: Test condition and judgement are complying with "JIS C4505", "EN61058" and "UL1054".

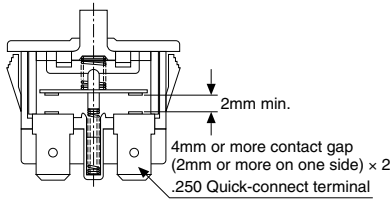
3. Operating characteristics

Contact arrangement	Part number	Operating force (O.F.) Max.	Total operating force (T.F.) Max. Push button position: 2.4mm	Free position (F.P.) Max. mm	Operating position (O.P.) mm	Total travel position (T.T.P.) mm	Over travel (O.T.) Min. mm	
Standard type 10.1A 250V AC	1 Form A	AGX105F	3.92 N	4.90 N	8	4.8±0.4	2.4	2.0
	2 Form A	AGX205F	3.92 N	4.90 N	8	4.8±0.4	2.4	2.0
	1 Form A	AGX106F	3.92 N	6.86 N	10	7.0±0.4	2.4	4.0
	2 Form A	AGX206F	3.92 N	6.86 N	10	7.0±0.4	2.4	4.0
	3 Form A	AGX306F	2.94 N	5.88 N	10	7.0±0.4	2.4	4.0

Remark: With the 3 Form A type sequence operation type, the specifications for the contact where the operation position turns ON first are as per the above table. However, the specifications for the contact where the operation position turns ON later are delayed by approximately 0.8 mm compared with the above table.

CONSTRUCTION

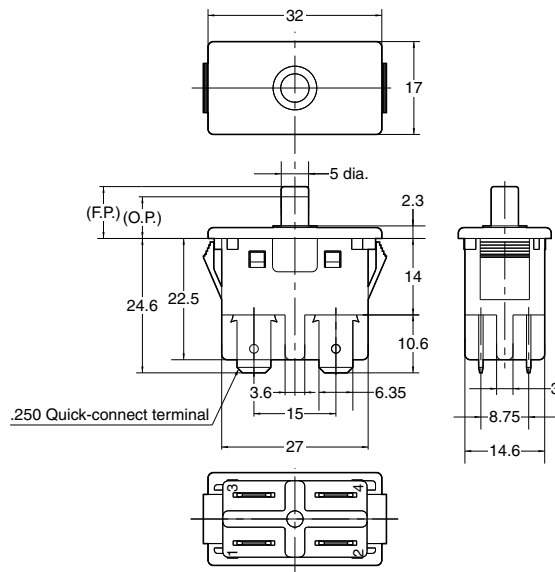
- Dual safety construction
- Dual restoration spring
 - Double cut-off type



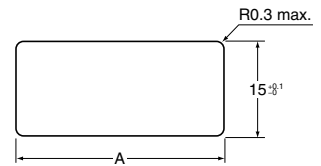
DIMENSIONS

mm General tolerance: ±0.4

1 Form A



Hole cutting dimension



Panel thickness	1.0 to 1.75	1.75 to 2.5
Dimension A	30.2 ^{+0.1} ₋₀	30.5 ^{+0.1} ₋₀

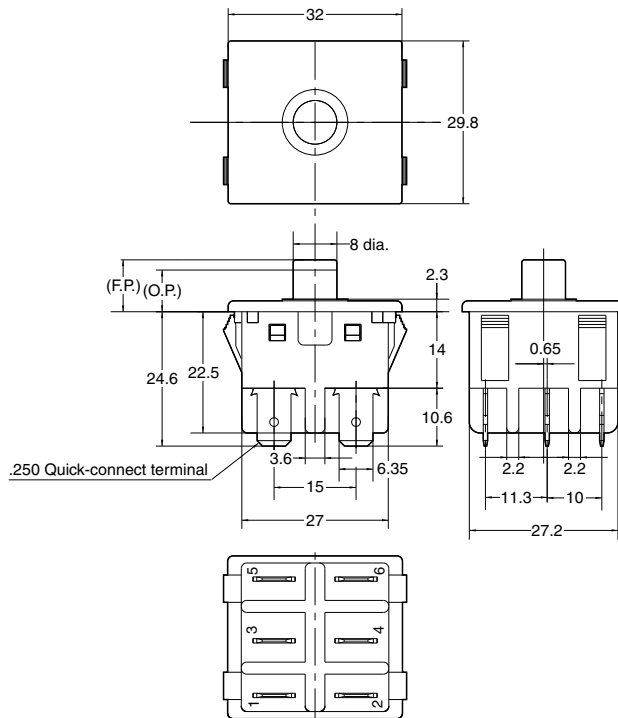
(Copper is standard as panel material)

Remark: 1 Form A type does not have terminal No.1 nor No.2

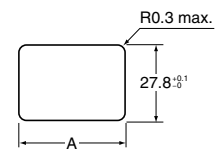
2 Form A



3 Form A



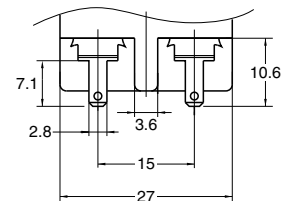
Hole cutting dimension



Panel thickness	0.8 to 1.75	1.75 to 2.5
Dimension A	30.2 ^{+0.1} ₋₀	30.5 ^{+0.1} ₋₀

(Copper is standard as panel material)

• Signal switching contact



Remark: Power switching contact type has .250 Quick-connect terminal and signal switching contact type has .110 Quick-connect terminal.

Power switching contact



Signal switching contact

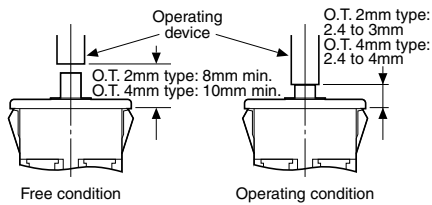
NOTES

1. Switch mounting

Mount the switch with the hole cutting dimensions shown in the drawing.

2. Adjustment of the operating device:

With respect to the position of the operating device and the switch body, set the position as indicated in the condition on the right. If this condition is exceeded, the mechanical and electrical performance will be impaired. In addition, the force applied by the operating device should be in a perpendicular direction. Even if the pushbutton is used in the full total travel position, there will be no influence on the life of the switch.



3. Confirming insulating distance

Before mounting and wiring, the insulating distance between terminals and between the terminals and ground should be checked for assurance of proper distance. With respect to the terminal connections, it is recommended that receptacles with insulating sleeves or "Positive Lock Connector*" be used. Also consideration should be given to the wiring not to apply force to the terminal section normally.

*Registered by AMP, Ltd.

4. Regarding fastening lead wires to terminals

Use .250 receptacle (terminal thickness 0.8mm) or .110 receptacle (terminal thickness 0.5mm) should be used for connection. Make sure the sockets are straight. If they are skewed, the terminals will require excessive insertion force. The insertion force varies according to manufacturer's specifications. Check it for

the sockets you are using.

5. Material of the panel

Steel sheet is recommended as the panel material. When using soft material, confirm the condition for actual use.

6. Quality check under actual loading conditions

To improve reliability, check the switch under actual loading conditions. Avoid any situation that may adversely affect switching performance.

7. Avoid using and keeping switches in the following conditions.

- In corrosive gases
- In a dusty environment
- Where silicon atmosphere prevails

REFERENCE

1. Outline of UL1054 test

Overload test

Standard type: 12.5A 250V AC
(Power factor 0.75 to 0.8)

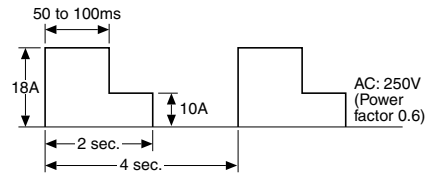
Endurance test

Standard type: 10A 250V AC
(Power factor 0.75 to 0.8)

After testing, temperature rise of terminals should be less than 30°C and no abnormality should be observed in characteristics.

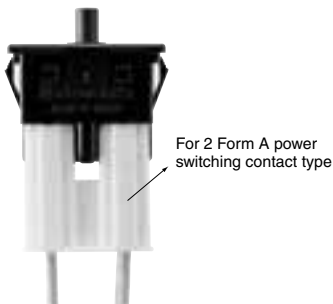
2. Outline of EN61058-1 test

After switching 25,000 times on the above 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.



INTRODUCTION OF CONNECTORS (made by Nippon Tanshi co.,Ltd)

1. For 2 Form A power switching contact type



Applicable AGX switch part No.:
AGX205F, AGX206F

* Housing

Model number: N1620-4204

* Receptacle

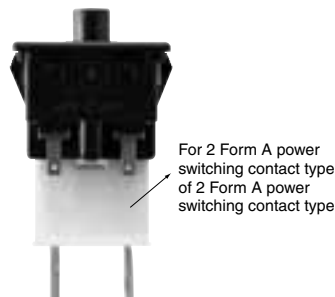
Model numbers

17168-2 (for narrow wires, post-plated product)

17168-M2 (for narrow wires, wood veneer plated product)

172131-M2 (for thick wires)

2. For 2 Form A power switching contact type of 2 Form A power switching contact + 1 Form A signal switching contact



Applicable AGX switch part No.:
AGX706F

* Housing

Model number: N3220-4204

* Receptacle

Model numbers

17901-M2, 17902-M2, 17903-M3 (wire size differences)

Remark: Please consult us if you need above connectors.

SAFETY INTERLOCK SWITCH CONSTRUCTED WITH DUAL RESTORATION SPRINGS

AV1 (GW) SWITCHES



FEATURES

- 8mm or more is assured as insulation distance between contacts (Snap-in mounting 2 Form A and 3 Form A type)
 - Durability of 100,000 times (10.1A 250V AC) is assured for UL interlock circuit
 - Constructed with easy-to-connect terminals
- Terminal specifications is .250 Quick-Connect (based on DIN standards) Connection can be made with insulating sleeve on connecting lug
- UL/C-UL, ENEC (VDE) approved

TYPICAL APPLICATIONS

- Office equipment**
 - Copiers
 - Facsimiles
 - Projectors
- Home appliances**
 - Microwave ovens
 - Refrigerators

About Cd-free contacts

We have introduced cadmium-free type products to reduce material which is not good for our environment. (The suffix "F" denotes such part.) Please replace parts containing cadmium with Cd-free products and evaluate them with your actual application before use because the life of a relay depends on the contact material and load.

<http://panasonic-denko.co.jp/ac/e/service/environment>

ORDERING INFORMATION

Ex. AV1 4 6 5 3 F

Type of switch	Contact arrangement	Mounting method	Agency standard	Contact
AV1: GW switch	1: 3 Form A (contact gap: 8 mm) 2: 2 Form A (contact gap: 8 mm) 3: 2 Form A (contact gap: 6 mm) 4: 1 Form A 1 Form B 5: 1 Form B 6: 1 Form A	6: Screw mounting (10.1 A) 7: Snap-in mounting type (10.1 A) 8: Snap-in mounting type with button guard (10.1 A)	3: UL/C-UL, ENEC/VDE (10.1 A 250 V AC 1 × 10 ⁵)	F: Cadmium free

PRODUCT TYPES

Mounting method	Button guard	Type		Part number
		Contact arrangement	Contact gap mm	
Screw mounting	Without	1 Form A	Min. 6	AV16653F
		1 Form B	Min. 3	AV15653F
		1 Form A 1 Form B	Max. 3	AV14653F
		2 Form A	Min. 6	AV13653F
Snap-in mounting	Without	2 Form A	Min. 8	AV12753F
		3 Form A	Min. 8	AV11753F
	With	2 Form A	Min. 8	AV12853F
		3 Form A	Min. 8	AV11853F

SPECIFICATIONS

1. Contact rating

No. of load	Resistive load ($\cos \phi \cong 1$)	VDE motor load ($\cos \phi \cong 0.6$)
125V AC	10.1A	3A
250V AC	10.1A	3A

* The VDE motor load rating is in accordance with VDE 0630 motorload rating which designates an inrush current switching capability of 6 times the indicating rating.

2. Characteristics

Expected life	Mechanical (at 60 cpm)	10 ⁶
	Electrical (at 20 cpm, operating speed: 10mm/sec.)	10 ⁵ (10.1A 250V AC) 5 × 10 ⁴ (10(3)A 250V~)
Insulation resistance		Min. 100MΩ at 500V DC
Dielectric strength	Between terminals	2,000 Vrms for 1 min.
	Between terminals and other exposed metal parts	2,500 Vrms for 1 min.
	Between terminals and ground	2,000 Vrms for 1 min.
Initial contact resistance, max. (by voltage drop at 1A 6 to 8V DC)		Max. 100mΩ
Temperature rise		Initial 45 deg. Max., After test 55 deg. Max.
Vibration resistance		10 to 55Hz at double amplitude of 1.5mm (Contact opening Max. 1 msec.)
Shock resistance		Min. 294 m/s ²
Actuator strength		49 N for 1 minute
Tensile terminal strength		Min. 147 N
Min. operating speed		10 to 300mm/sec.
Max. operating cycle rate		60 cpm
Temperature resistance		-40°C to -45°C: 48 hours, +80°C to +90°C: 48 hours
Ambient temperature		-25 to +85°C (Not freezing below 0°C)
Flame retardancy		UL 94V-1
Tracking resistance (CTI)		Min. 175
Contact material		AgCuO alloy

*Remark: Test condition and judgement are complying with "NECA C4505", "EN61058" and "UL1054".

3. Operating characteristics

1) Screw mounting type

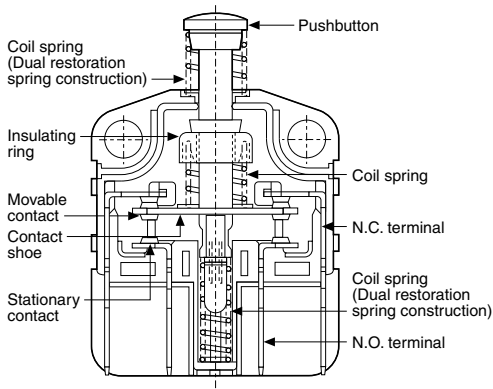
Contact arrangement	Max. O.F.	Max. T.F. pushbutton position: 10mm	Max. F.P.	O.P.	Min. T.T.P.	Min. O.T.
1 Form A	(N.O. contact to ON) 4.90N	6.37N	16.6mm	(N.O. contact to ON) 12.7±0.4mm	10mm	2.1mm
1 Form B	(N.C. contact to OFF) 2.94N	7.35N	15.3mm	(N.C. contact to OFF) 14.9±0.4mm	10mm	4.3mm
1 Form A 1 Form B	(N.O. contact to ON) 5.88N	7.35N	15.3mm	(N.O. contact to ON) 12.7±0.4mm	10mm	2.1mm
1 Form A 1 Form B	(N.C. contact to OFF) 2.94N	7.35N	15.3mm	(N.C. contact to OFF) 14.9±0.4mm	10mm	2.1mm
2 Form A	(N.O. contact to ON) 7.85N	9.81N	16.6mm	(N.O. contact to ON) 12.7±0.4mm	10mm	2.1mm

2) Snap-in mounting type

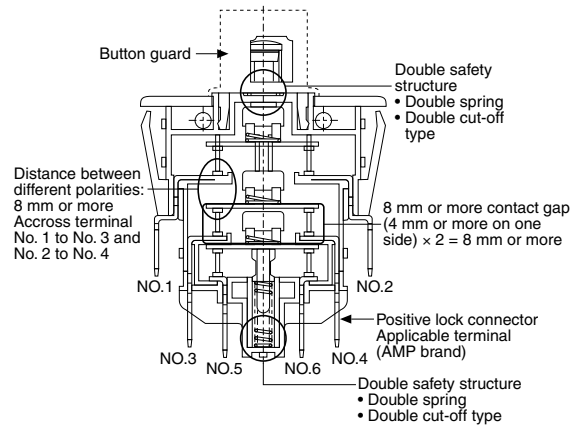
Contact arrangement	Max. O.F.	Max. T.F. pushbutton position: 10mm	Max. F.P.	O.P.	Min. T.T.P.	Min. O.T.
2 Form A	(N.O. contact to ON) 7.85N	9.81N	14mm	(N.O. contact to ON) 9.3±0.4mm	7.5mm	2.1mm
3 Form A	(N.O. contact to ON) 9.81N	14.7N	14mm	(N.O. contact to ON) 9.3±0.4mm	7.5mm	2.1mm

CONSTRUCTION

[Screw mounting type (1 Form A 1 Form B)]



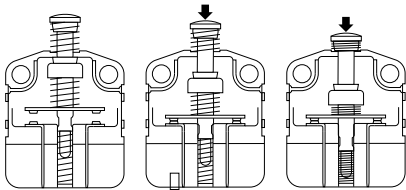
[Snap-in mounting type (3 Form A)]



CONTACT OPERATION CHART

• 1 Form A

- 1. Free position
- 2. Operating position
- 3. Total travel position

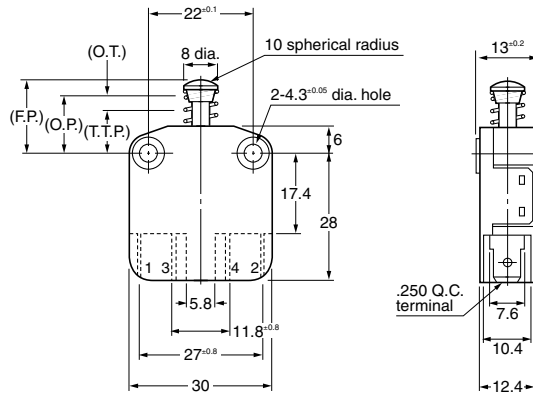


DIMENSIONS

mm General tolerance: ±0.1

1. Screw mounting type

1 Form A, 1 Form B, 1 Form A 1 Form B



Contact gap

1 Form A: Min. 6mm

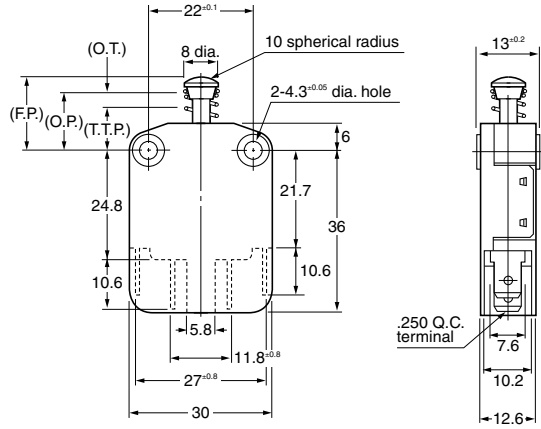
1 Form B: Min. 3mm

1 Form A 1 Form B: Max. 3mm

Remarks: Terminal no. 3 & 4 are for 1 Form A Terminal no. 1 & 2 are for 1 Form B.

AV1

2 Form A



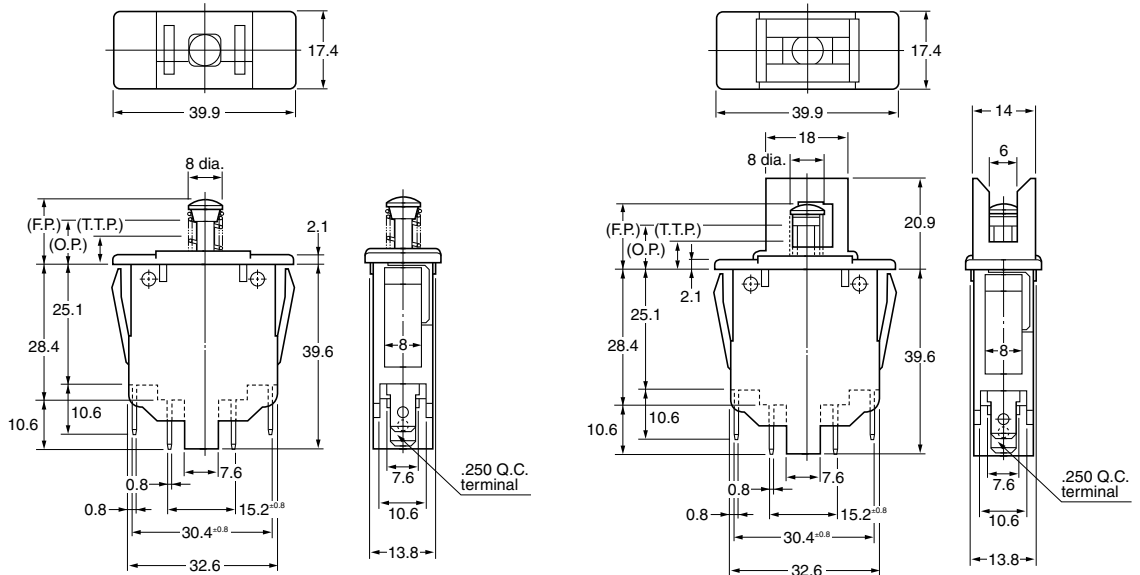
Contact gap
2 Form A: Min. 6mm

2. Snap-in mounting type

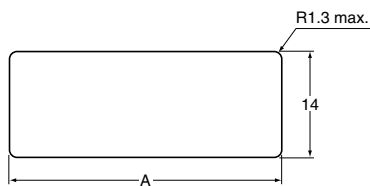
2 Form A type without button guard

2 Form A type with button guard

2 Form A



Recommended panel opening dimensions (common)



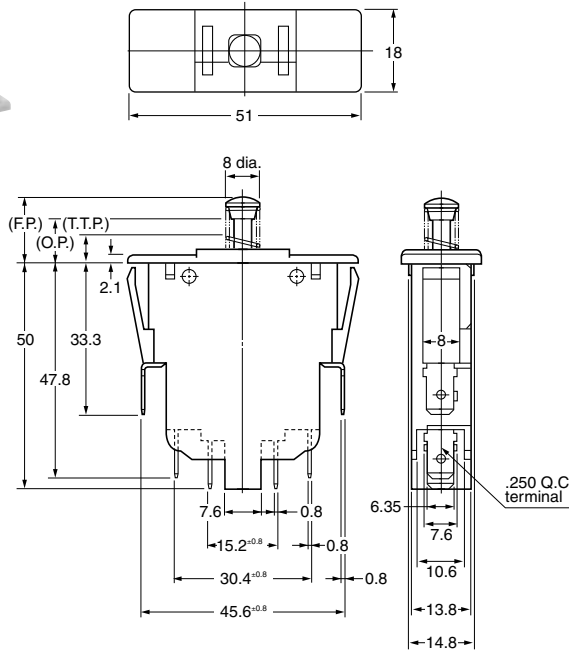
Contact gap
2 Form A: Min. 8mm

Panel thickness	1.0	2.5
Dimension A	36.7	37.7

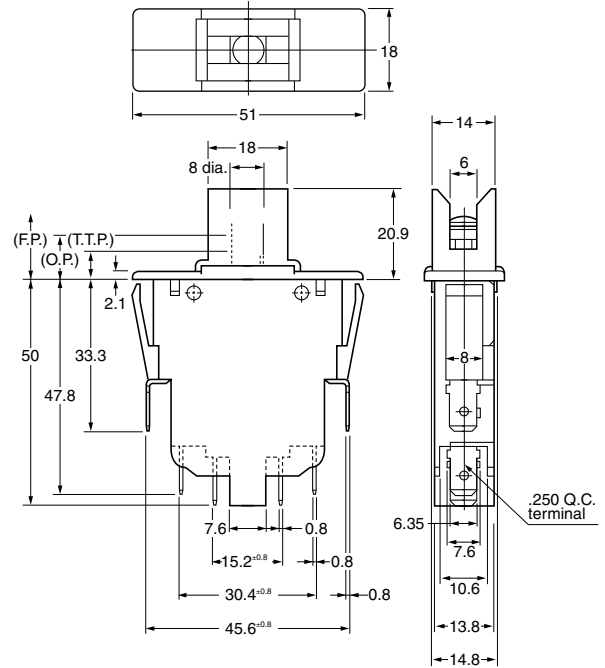
3 Form A



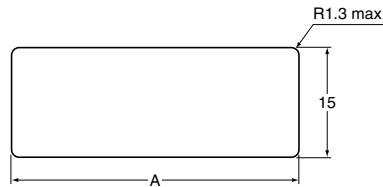
3 Form A type without button guard



3 Form A type with button guard



Recommended panel opening dimensions (common)



Contact gap
3 Form A: Min. 8mm

Panel thickness	1.0	2.5
Dimension A	47.0	47.3

NOTES

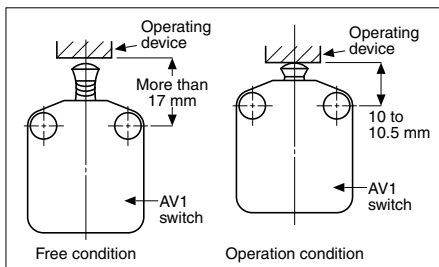
1. Switch mounting

Mount the switch to a smooth surface using M4 screws. Tighten the screws with 0.3 to 0.5 N-m {3 to 5 kg-cm} torque. To prevent loosening of the mounting screws, it is recommended that spring washers be used in combination with adhesive material for locking the screws.

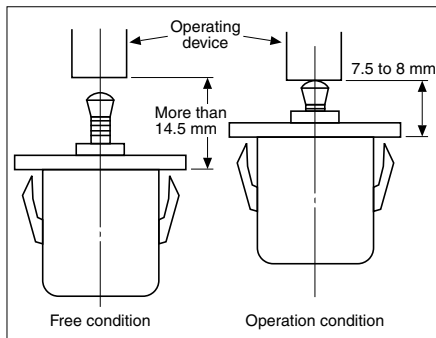
2. Adjustment of the operating device:

With respect to the position of the operating device and the switch body, set the position as indicated in the condition on the right. If this condition is exceeded, the mechanical and electrical performance will be impaired. In addition, the force applied by the operating device should be in a perpendicular direction. Even if the pushbutton is used in the full total travel position, there will be no influence on the life of the switch.

Screw mounting type



Snap-in mounting type



3. Confirming insulating distance:

Before mounting and wiring, the insulating distance between terminals and between terminals and ground should be checked for assurance of proper distance. With respect to the terminal connections, it is recommended that receptacles with insulating sleeves be used.

Also, consideration should be given to the wiring not to apply force to the terminal section normally.

4. Avoid using AV1 switches in the following conditions:

- Locations where hydrogen sulfide gas or other corrosive gases exist.
- Locations where gasoline, thinner, or other inflammable or explosive gases exist.
- Locations where there is dust and refuse.
- For operation where the perpendicular operating speed is less than 10mm/sec.
- For operation frequency of make/break exceeding 60 cpm.
- For ambient temperatures exceeding the range of -25°C to +85°C.
- For ambient humidity exceeding 85% R.H.
- For use in a silicon atmosphere.

5. For use of AV14653F (1a1b type):

For the type AV14653F, the air distance between the N.O. and N.C. contacts is less than the required value of VDE. The N.O. and the N.C. contacts can carry only the same electric potential.



<http://panasonic-denko.co.jp/ac/e/service/environment>

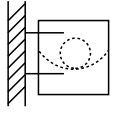
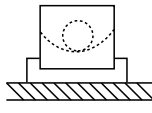
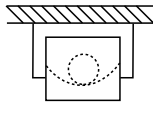
FEATURES

- Realizes miniaturization of equipment and spaces saving. Size of body: 9.5×9.5×9.3 mm
- The contact type is equivalent to normally closed contacts, which satisfies the PL Act.
- The internal sphere can be used over an operation angle of 360 degrees in the circumferential direction.
- There are three standard terminal profiles which can be selected according to the mounting direction of the PCB.
- The terminals are tin-plated for long-term solderability.

TYPICAL APPLICATIONS

- Gas heaters
- Electric fans
- Water vallet
- Infrared treatment device
- Electric pots with warming function

ORDERING INFORMATION

Mounting direction	Vertical mounting	Horizontal mounting	Reverse mounting
Part No.	AHF21	AHF22	AHF23
PCB mounting condition			

Remark: Standard Packaging: Tube 50 pcs.

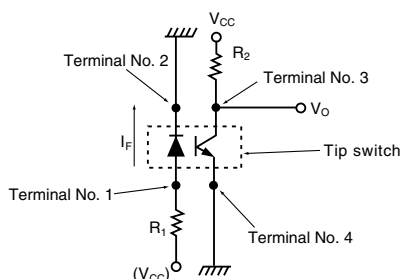
CONTACT TYPE

Normally closed type (The photo transistor is ON when the sensor is being used.)

APPLICABLE CIRCUIT

Refer to the dimensional diagram for the terminal Nos.

- $V_{CC} = 5\text{ V}$
- $R_2 = 100\text{ k}\Omega$
- Forward current, I_F of the LED: 19 mA
($V_{CC} = 5\text{ V}$, $R_1 = 200\ \Omega$)
- Forward voltage, V_F of the LED: Typ = 1.2 V



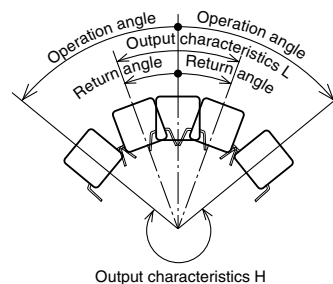
BASIC CHARACTERISTICS

For $T_a = 25^\circ\text{C}$ and applicable circuit conditions

1) Operation characteristics

(Operation speed 6 degrees/second)

- Operation angle (Output: $V_{OL} \rightarrow V_{OH}$): 25 to 60 degrees
- Return angle (Output: $V_{OH} \rightarrow V_{OL}$): Min. 20 degrees



2) Output (V_o) characteristics (The sphere must be stationary.)

- V_{OL} (photo transistor ON): Max. 1.0 V (horizontal)
- V_{OH} (photo transistor OFF): Min. 4.0 V (inclined at an angle of at least 60 degrees)

SPECIFICATIONS

Item	Specificaitons
Electrical and mechanical life	Min. 10 ⁵ (Using the applicable circuit) At 6 cpm; Opening and closing position: 0 deg. ↔ 90 deg. (The internal shpere must be stationary for at least 500 ms at angles of 0 and 90 deg. respectively.)
Vibration resistance	10 to 400 Hz acceleration 2.9 m/s ² applied for 7 days 5 to 10 Hz at half amplitude of 5 mm, 5×10 ⁵ cycles
Shock resistance	588 m/s ² applied 3 times in each of 6 directions
Terminal strength	Min. 9.8 N (each direction)
Dropping individual part	Three times from height of 100 cm
High temperature, high humidity storage ability	Leave for 500 hours at 85°C and 85% RH (No freezing at low temperature)
High temperature storage ability	Leave for 500 hours at 85°C
Low temperature storage ability	Leave for 500 hours at -25°C (No freezing at low temperature)
Shock and heat resistance	Subject to 100 cycles each consisting of 30 minutes at -25°C and 30 minutes at 85°C.
Resistance to hydrogen sulfide	Leave for 500 hours in an atmosphere containing 3 ppm of hydrogen sulfide at 40°C and 75% RH.
Resistance to sulfur dioxide gas	Leave for 500 hours in an atmosphere containing 10 ppm of sulfur dioxide at 40°C and 95% RH
Resistance to ammonia gas	Leave for 96 hours in an atmosphere containing 3% of ammonia gas at normal temperature and humidity.
Resistance to dust	Mix with 2 kg/m ³ talcum powder or fly ash and leave to stand for 8 hours
Ambient temperature	-20 to +80°C (No freezing nor condensation at low temperature)

Notes:

1. Without any indications, specifications are measured at following conditions

- Temperature: 15 to 35°C
- Humidity: 25 to 85% RH
- Atmospheric pressure: 86 to 106 kpa.

2. The evaluation criteria for performance are as follows:

Basic characteristics – T_a = 25°C and applicable circuit conditions

1) Operation characteristics (operation speed 6 degrees/sec.)

• Operation angle (Output: V_{OL} → V_{OH}): 25 to 60 degrees

• Return angle (Output: V_{OH} → V_{OL}): 20 degrees min.

2) Output (V_O) characteristics (The sphere must be stationary.)

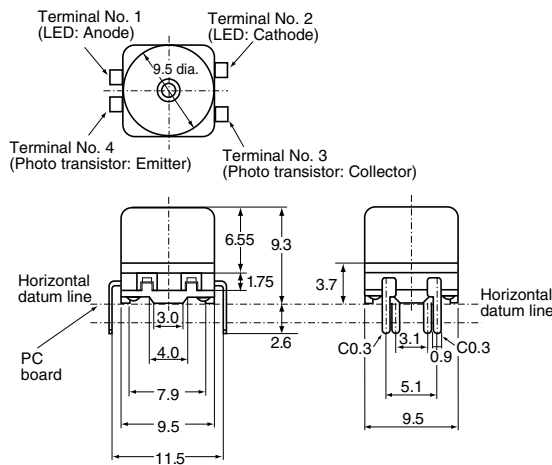
• V_{OL} (photo transistor ON): 1.2 V max. (horizontal)

• V_{OH} (photo transistor OFF): 3.8 V min. (inclined at an angle of at least 60 degrees)

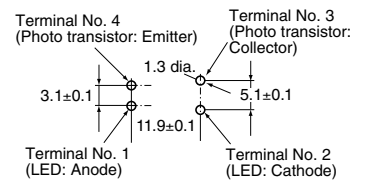
DIMENSIONS

mm

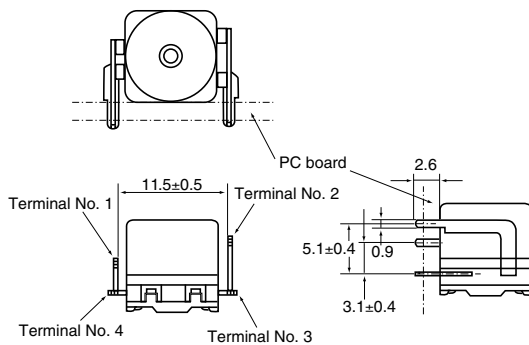
• Horizontal mounting type



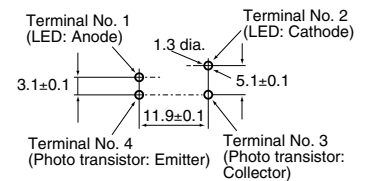
PC board pattern (Bottom view)

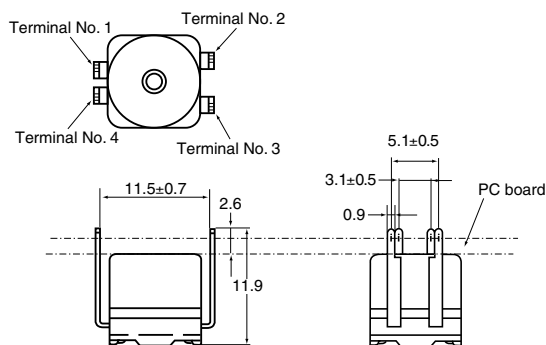


• Vertical mounting type

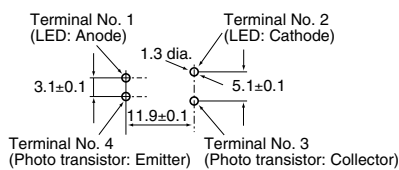


PC board pattern (Bottom view)

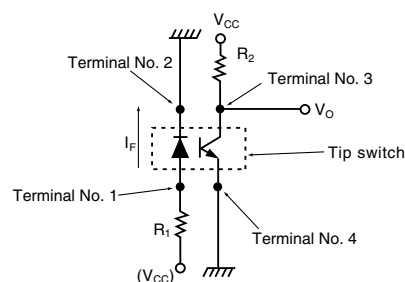




PC board pattern (Bottom view)



[Internal circuit and applicable circuit]



NOTES

1. Handling

1) In the event that a voltage or current that exceeds the maximum rating is applied to, or passed between the terminals, the photo-transistor will no longer function normally. In such a case, do not reuse the photo-transistor but discard it.

2) Be careful not to apply an excessively large load to the terminals because this may damage the photo-transistor.

2. Soldering

1) When soldering by hand, use a 18W soldering iron that has a temperature regulator (iron tip temperature must be no more than 350°C) and apply the tip to the joint for no more than 3 seconds.

2) When performing automatic soldering, ensure that the board does not remain in the solder bath for more than 10 seconds at 260°C, or more than 3 seconds at 350°C.

3) Be careful not to move the terminals for one minute after soldering them.

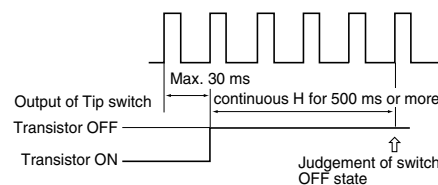
3. Environment

This product is a non-contact type tip detection switch containing a photo-interrupter. It is intended for installation in equipment. Because of the nature of a semiconductor, if this product is used continuously for a long period in a high temperature, low temperature and/or humid environment, according to the

optic quantities decrease of luminescent diode output characteristics may be significantly affected. In such a case, take suitable measures, such as inserting a comparator at the output side, to provide a greater degree of margin with respect to change in the output characteristics, and thereby improve the reliability of the product.

4. Preventing a malfunction

1) The tip sensor uses an internal sphere, hence chattering occurs if it is subjected to vibration or shock. To prevent chattering, continuously read pulses of 30 ms max. using a microprocessor, and set the microprocessor so that the switch goes L (ON) or H (OFF) if the output level exceeds 500 ms continuously. Also, take steps to keep induction and RF noise away from the sensor.



2) The switch should be mounted keeping away from the vibration generator such as motor. Fix the PC board firmly in order to prevent resonance with the vibration generator, or the contact chattering of a switch may occur by the movement of a

ball inside. The allowable vibration level which the chattering does not occur would be less than {0.3G} at 10 to 260Hz and 320 to 400Hz. The range 260 to 320Hz may have a resonance point and the level should be less than 0.1G.

5. Others

1) Depending on the circuitry and the environmental conditions, solder migration may occur and short a circuit. Please confirm that the insulation distance is large enough in the actual application.

2) To prevent a malfunction, the switch should be kept away from the direct sunlight and any other light sources.

3) The noises caused by electrostatics, surge voltage and inductives may break the photo-interrupter.

4) The reflow soldering and cleaning are not allowed.

5) The switch should be mounted with the tolerance ± 3 degree.

6. Confirmations in the actual use.

Each items in this spec sheet was tested and confirmed independently at a certain duration. To get a higher reliability of the equipment, please confirm the switch quality with the actual load and environmental conditions before using.

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 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. Snap-action switches and detection switches are certified based on their product numbers.

Item		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 switches J type (ABJ1, ABJ2, ABJ3)	Silver alloy contact type	E35901	6 × 10 ³ times rating O.F. 125g: 1A 125V AC O.F. 200g: 2A 125V AC	LR23413	6 × 10 ³ times rating O.F. 125g: 1A 125V AC O.F. 200g: 2A 125V AC	—	—	—	—	Excluding ABJ2 long stroke type, ABJ4 and ABJ5 types	
	Gold-clad contact type	E35901	6 × 10 ³ times rating 10 ⁵ times rating 0.1A 125V AC	LR23413	6 × 10 ³ times rating 10 ⁵ times rating 0.1A 125V AC	—	—	—	—		
Turquoise switches S type (ABS1, ABS4, ABS5)	Silver alloy contact type	E35901	6 × 10 ³ times rating 2A 250V AC	LR23413	6 × 10 ³ times rating 2A 250V AC	90446	5 × 10 ⁴ times rating 2A 250V AC (T85)	9421091	5 × 10 ⁴ times rating 2A 250V AC (T85)		
	Gold-clad double layer type	E35901	6 × 10 ³ times rating 10 ⁵ times rating 0.1A 30V DC	LR23413	6 × 10 ³ times rating 10 ⁵ times rating 0.1A 30V DC	—	—	—	—		
	Gold-clad triple layer type	E35901	6 × 10 ³ times rating 10 ⁵ times rating 0.1A 250V AC	LR23413	6 × 10 ³ times rating 10 ⁵ times rating 0.1A 250V AC	90446	5 × 10 ⁴ times rating 0.1A 250V AC (T85)	415647	5 × 10 ⁴ times rating 0.1A 250V AC (T85)		
Turquoise switches V type (ABV1)	Gold alloy contact type	E35901	6 × 10 ³ times rating O.F. 0.98N type: 1A 250V AC O.F. 1.96N, 2.94N type: 3A 250V AC	LR23413	6 × 10 ³ times rating O.F. 0.98N type: 1A 250V AC O.F. 1.96N, 2.94N type: 3A 250V AC	090421	10 ⁴ times rating O.F. 0.98N type: 1A 250V AC O.F. 1.96N, 2.94N type: 3A 250V AC	415646	10 ⁴ times rating O.F. 0.98N type: 1A 250V AC O.F. 1.96N, 2.94N type: 3A 250V AC		
			10 ⁵ times rating 0.1A 250V AC		10 ⁵ times rating 0.1A 250V AC		5 × 10 ⁴ times rating 0.1A 250V AC		5 × 10 ⁴ times rating 0.1A 250V AC		
	Silver alloy contact type		6 × 10 ³ times rating O.F. 0.98N type: 3A 250V AC O.F. 1.96N, 2.94N type: 5A 250V AC		6 × 10 ³ times rating O.F. 0.98N type: 3A 250V AC O.F. 1.96N, 2.94N type: 5A 250V AC		10 ⁴ times rating O.F. 0.98N type: 3A 250V AC O.F. 1.96N, 2.94N type: 5A 250V AC		10 ⁴ times rating O.F. 0.98N type: 3A 250V AC O.F. 1.96N, 2.94N type: 5A 250V AC		
			10 ⁵ times rating 0.5A 250V AC		10 ⁵ times rating O.F. 1.96N, 2.94N type: 0.5A 250V AC		5 × 10 ⁴ times rating 0.5A 250V AC		5 × 10 ⁴ times rating 0.5A 250V AC		
NZ basic switches (AM1)		E35901	10A 125, 250V AC or 1A 480V AC 1/8 HP 125V AC, 1/4 HP 250V AC 1/2 A 125V DC, 1/4 A 250V DC	C-UL certified	10A 125, 250V AC or 1A 480V AC 1/8 HP 125V AC, 1/4 HP 250V AC 1/2 A 125V DC, 1/4 A 250V DC	—	—	—	—		
QV switches (AM5)	Silver alloy contact type	6A type	E35901	6 × 10 ³ times rating 6A 250V AC (T105) 10 ⁵ times rating 6A 250V AC 3A 30V DC (T105)	LR23413	6 × 10 ³ times rating 6A 250V AC (T105) 10 ⁵ times rating 6A 250V AC 3A 30V DC (T105)	109234	6(1) A 250V -AC (T105) ENEC certified	—	—	C-UL certified
		11A type	E35901	6 × 10 ³ times rating 11A 250V AC (T105) 10 ⁵ times rating 6A 250V AC 4A 30V DC (T105)	LR23413	6 × 10 ³ times rating 11A 250V AC (T105) 10 ⁵ times rating 6A 250V AC (T105) 4A 30V DC (T105)	—	11(2) A 250V -AC (T105) ENEC certified	—	—	C-UL certified
		16A type	E35901	6 × 10 ³ times rating 16A 250V AC 10 ⁵ times rating 12A 250V AC 6A 30V DC (T105) *	LR23413	6 × 10 ³ times rating 16A 250V AC 10 ⁵ times rating 12A 250V AC 6A 30V DC (T105) *	—	16(3) A 250V -AC (T105) 6A 30V...DC ENEC certified	—	—	* For the OF=3.92N (pin plunger) type with a UL and CSA 10 ⁵ times rating, the values are as follows: 12 A 250V AC 8 A 30V DC C-UL certified
	Gold-clad contact type	0.1A type	E35901	6 × 10 ³ times rating 0.1A 250V AC (T105) 10 ⁵ times rating 0.1A 250V AC (T105)	LR23413	6 × 10 ³ times rating 0.1A 250V AC (T105) 10 ⁵ times rating 0.1A 250V AC (T105)	—	0.1A 250V-AC (T105) ENEC certified	—	—	C-UL certified
FS•FS-T switches (AV3, AVM3/ AVT3, AVL3)	Standard version	Silver alloy contact type	E35901	6 × 10 ³ times rating 3A 250V AC 10 ⁵ times rating 2A 250V AC 2A 30V DC	LR23413	6 × 10 ³ times rating 3A 250V AC 10 ⁵ times rating 2A 250V AC 2A 30V DC	6168	10 ⁴ times rating (T85) O.F. 50g: 3A 250V 5 × 10 ⁴ times rating (T85) O.F. 100g: 3A 250V~	9711097 9750138	10 ⁴ times rating (T85) O.F. 50g: 3A 250V~ 5 × 10 ⁴ times rating (T85) O.F. 100g: 3A 250V~	
		Gold-clad double layer type	E35901	6 × 10 ³ times rating 0.1A 30V DC 10 ⁵ times rating 0.1A 30V DC	LR23413	6 × 10 ³ times rating 0.1A 30V DC 10 ⁵ times rating 0.1A 30V DC	—	—	—	—	
		Gold-clad triple layer type	E35901	6 × 10 ³ times rating 0.1A 250V AC 10 ⁵ times rating 0.1A 250V AC	LR23413	6 × 10 ³ times rating 0.1A 250V AC 10 ⁵ times rating 0.1A 250V AC	6168	5 × 10 ⁴ times rating 0.1A 250V	9711097 9750138	5 × 10 ⁴ times rating 0.1A 250V	
	Long life version	Silver alloy contact type	E35901	6 × 10 ³ times rating 5A 250V AC 10 ⁵ times rating 2A 250V AC 2A 30V DC	LR23413	6 × 10 ³ times rating 5A 250V AC 10 ⁵ times rating 2A 250V AC 2A 30V DC	6168	10 ⁴ times rating (T85) 5A 250V~	9711097 9750138	10 ⁴ times rating (T85) 5A 250V~	
		Gold-clad double layer type	E35901	6 × 10 ³ times rating 0.1A 30V DC 10 ⁵ times rating 0.1A 30V DC	LR23413	6 × 10 ³ times rating 0.1A 250V DC 10 ⁵ times rating 0.1A 250V DC	—	—	—	—	
		Gold-clad triple layer type	E35901	6 × 10 ³ times rating 0.1A 250V AC 10 ⁵ times rating 0.1A 250V AC	LR23413	6 × 10 ³ times rating 0.1A 30V AC 10 ⁵ times rating 0.1A 30V AC	6168	5 × 10 ⁴ times rating 0.1A 250V	9711097 9750138	5 × 10 ⁴ times rating (T85) 0.1A 250V	
FS switches (Contact gap: more than 1mm type)		E35901	3A 30V DC 10 ⁴ times rating	LR23413	3A 30V DC 10 ⁴ times rating	—	(TÜV approved)	9711097	3A 30V DC 10 ⁴ times rating		

Standards Chart

Item			UL (Recognized)		CSA (Certified)		VDE (Certified)		SEMKO (Certified)		Remarks
			File No.	Rating (Recognized)	File No.	Rating (Certified)	File No.	Rating (Certified)	File No.	Rating	
PS switches (AVM3)			E35901	6 × 10 ³ times rating 10.1A 250V AC	LR23413	6 × 10 ³ times rating 10.1A 250V AC	—	—	—	—	
FJ switches (AH1)	Standard type	M1, 2 mounting hole type	E35901	3A 125V AC	LR23413	3A 125V AC	—	—	—	—	
		M2 mounting hole type	E35901	O.F. 75g: 1A 125V AC O.F. 150g: 3A 125V AC	LR23413	O.F. 75g: 1A 125V AC O.F. 150g: 3A 125V AC	—	—	—	—	
	Low-level circuit type	M1, 2 mounting hole type	E35901	3A 125V AC	LR23413	3A 125V AC	—	—	—	—	
		M2 mounting hole type	E35901	6 × 10 ³ times rating 0.1A 125V AC 10 ⁵ times rating 0.1A 125V AC	LR23413	6 × 10 ³ times rating 0.1A 125V AC 10 ⁵ times rating 0.1A 125V AC	—	—	—	—	
GX switches 1a, 2a, 3a (AGX1, 2, 3-7)	Standard type		E35901	10 ⁵ times rating 10.1A 250V AC 6A 30V DC	LR23413	10 ⁵ times rating 10.1A 250V AC 6A 30V DC	88838	5 × 10 ⁴ times rating 10(3) A 250V-(T85) ENEC certified	—	—	C-UL certified
GW switches (AV1)			E35901	Interlock rating 10 ⁵ times rating 10.1A 250V AC	LR23413	Interlock rating 10 ⁵ times rating 10.1A 250V AC	—	ENEC/VDE 40014475	—	—	C-UL certified

Notes) 1. Some product numbers for VDE standard and SEMKO standard products of the NV type marked with an asterisk have not yet been certified. Please contact us for specific information.

- In the table above, if the UL/CSA standard has not been indicated as either a 6 × 10³ times rating or a 10⁵ times rating, it means that the standard is a 6 × 10³ times rating.
- In the table above, if the VDE or SEMKO standard has not been indicated as either a 10⁴ times rating or a 5 × 10⁴ times rating, it means that the standard is a 5 × 10⁴ times rating.
- In cases where products are indicated as meeting all of the standards, the standard versions of GX switches and FS contact gap min. 1mm type have been certified for all of the standards, but for snap-action switches such as the QV, FS, and FS-T, the product number suffix will be either 3 or 31. Please contact us for specific information.

