

# Electronic Components



## Switches

Relays  
Electromechanical

Relays  
Microelectronic

Switches

Connectors

Sensors

Fiber Optic

**OMRON**  
ELECTRONIC COMPONENTS

# Omron Electronic Components LLC

## Stability and Experience

With over 75 years experience, Omron continues to apply the latest technologies providing you with innovative efficient control component solutions. Our wide range of relays, switches, sensors, and connectors allows our customers to streamline vendor lists and reduce the cost of procurement.

## Quality First

### Our commitment, your benefit

Omron makes a conscious choice to relentlessly pursue quality. Our quality engineers are part of the design and manufacturing process from the start. We design and evaluate at the component level, test and adjust during manufacturing, and examine every physical, mechanical, and electrical aspect of each final product before it leaves the factory.

## Customer Support

Omron's sales engineers, inside sales representatives, and customer service staff have experience with all types of electronic applications. No matter what the application or volume, we will find just the right component for your project.

## Broad Product Offering

### Relays:

- MOS FET
- Low Signal
- RF/HF
- RF MEMS
- Power PCB
- Automotive
- General-Purpose
- Solid State

### Switches:

- Snap Action
- Tactile
- DIP
- Dome Array
- Thumbwheel
- Rocker

### Sensors:

- Flow
- Pressure
- Tilt
- Vibration
- NIBP Module

### Connectors:

- FPC
- Industrial
- PCB

### Fiber Optic:

- Tosa/Rosa
- Tx/Rx Module
- Splitters
- MLA

Additional information can be found at [www.components.omron.com](http://www.components.omron.com), or by calling us at: 847.882.2288 Monday through Friday 8:30 AM until 5:00 PM CST. Our inside sales staff will be ready to provide you with detailed product information, technical design support, or the location of your local Omron sales office or authorized distributor.

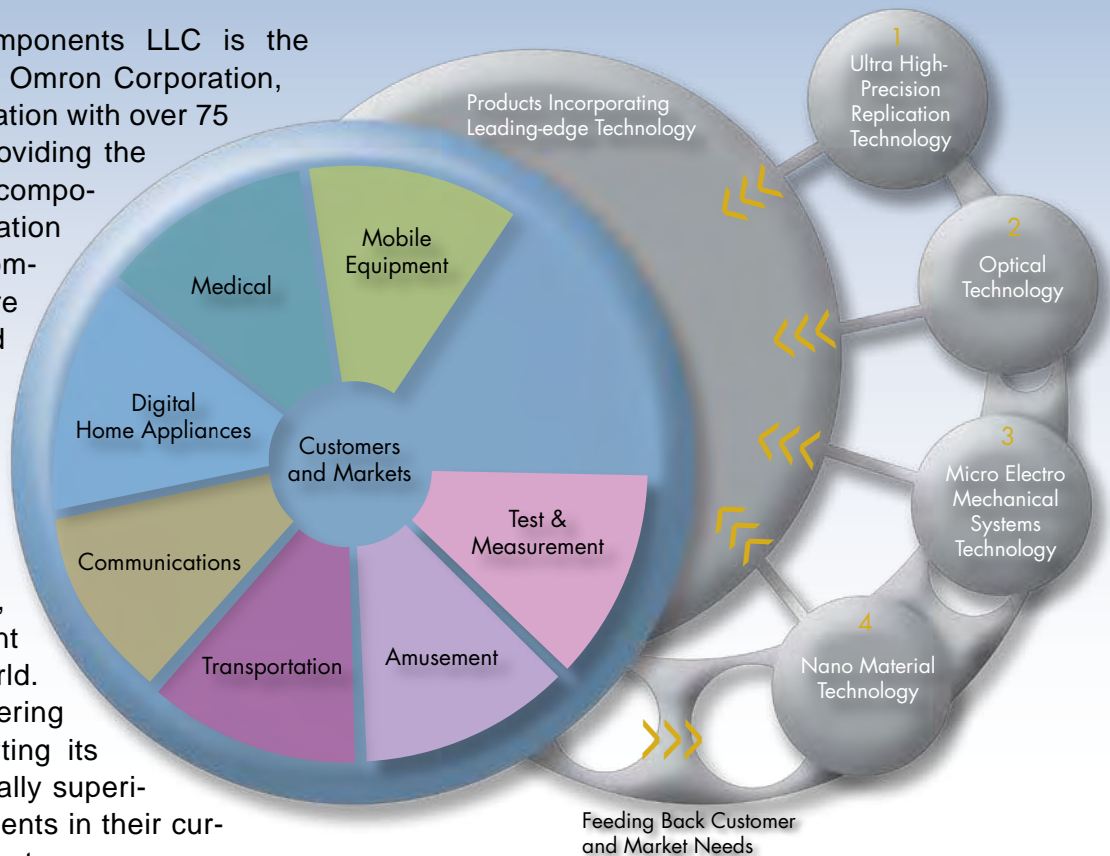


**RoHS**  
COMPLIANT



# Focus Markets

Omron Electronic Components LLC is the Americas subsidiary of Omron Corporation, a leading global corporation with over 75 years experience of providing the market with electronic components, industrial automation controls, automotive components, and healthcare products. Our broad product offering can be found in applications for the communications, transportation, medical, HVAC, appliance, industrial automation, consumer electronics, and test & measurement markets around the world. Omron has an unfaltering commitment to supporting its customers with technically superior, high quality components in their current and emerging markets.



OMRON Responds to IT Evolution with Four Advanced Technologies.

## Core Technologies

In order to provide more value to customers, OMRON has worked to further strengthen our four leading-edge technologies in the electronic components business.

### Ultra High-Precision Replication

The first is an ultra-precise replication technology that is accurate down to a single micrometer. This technology is indispensable to optical communications, optical displays, illumination, high-frequency devices and subminiature mechanical devices.

### Optical / Fiber

The second is optical control technology, which uses the wave nature of light to efficiently control the direction of light movement. Omron's technology supports the continuing evolution of Passive Optical Networks (PON), Video Over Fiber devices and IT devices used for data communication.

### Micro Electro Mechanical Systems

The third is micro-electro-mechanical systems (MEMS) technology, which helps support the Digital Age by allowing materials to be processed with micrometer- to nanometer-level precision. This contributes to the micro-miniaturization of mobile devices, biotechnology products, consumer, industrial, and automobile applications.

### Nano Materials

The fourth is nano-material technology, which is used to develop materials at the molecular level. Omron continues to incorporate nano-materials in to its new, state-of-the-art components.

# SWITCHES

Omron is one of the most recognized world leaders in switch design and manufacturing. Omron delivers innovative control components that allow customers to reduce product size, add more function capability, and assemble product more cost effectively. As a world class manufacturer, the company provides local technical support and global logistics coordination to expertly facilitate design in one country, fabrication in another, and on-time delivery wherever product is needed. Omron's comprehensive quality commitment means improved manufacturing yields, reduced field failures, on-time product launches, and a reputation for product reliability.

## Detection Switches

Omron's range of high quality precision detection switches satisfy most industries including automotive, white goods, HVAC, security, vending and office automation and include general purpose, industry standard types and sealed switches as well as a number of models designed for specific applications or industries.

### Applications

- Automotive
- Appliance
- Security
- Vending
- Office Automation
- HVAC

## DIP Switches

Dual in-line package switches to suit most production methods including fully sealed types. Our switches can be supplied in tubes for auto insertion and come with a number of actuator variations. Ultra-low profile, surface mount models are also available and deliver a 63% reduction in mounting space compared with conventional models.

### Applications

- Access Control (Building Control)
- Security
- Industrial Automation Equipment
- Office Automation

## Tactile Switches

Omron's comprehensive range of high quality tactile switches is available with various forces of operation to suit most applications. Omron's B32 keycaps may be used with a projected plunger tactile switch, or, you can design your own actuator or overlay for use with the Switches or Dome Arrays. The broad selection offers further design flexibility by offering through-hole and surface mount models, radial taped or bulk packaging, top or side actuated models, and includes one of the industry's smallest SMT tactile switches!

### Applications

- Appliance
- Telecom
- Security
- Building control
- Industrial Automation

**Customized Service...** Our detection switches are available with a number of standard actuators including pin plunger, hinge levers and roller levers. In addition, we can offer a design service and undertake the manufacturing of customized levers (including special length, width or formed levers). We can also offer customized wire harnesses in volume, including varying lengths of wire, sleeving and termination with a variety of connectors. Connection can be provided by solder/quick connect, PCB, screw or wire leads.

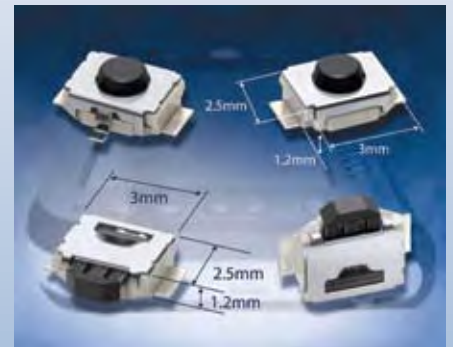
**Detection Switch**



**DIP Switch**



**Tactile Switch**





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# Omron Electronic Components, LLC

## Terms and Conditions of Sales

### I. GENERAL

1. **Definitions:** The words used herein are defined as follows.
  - (a) **Terms:** These terms and conditions
  - (b) **Seller:** Omron Electronic Components LLC and its subsidiaries
  - (c) **Buyer:** The buyer of Products, including any end user in section III through VI
  - (d) **Products:** Products and/or services of Seller
  - (e) **Including:** Including without limitation
2. **Offer: Acceptance:** These Terms are deemed part of all quotations, acknowledgments, invoices, purchase orders and other documents, whether electronic or in writing, relating to the sale of Products by Seller. Seller hereby objects to any Terms proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms.
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2. **Discounts:** Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (a) the invoice is paid according to Seller's payment terms and (b) Buyer has no past due amounts owing to Seller.
3. **Interest:** Seller, at its option, may charge Buyer 1.5% interest per month or the maximum legal rate, whichever is less, on any balance not paid within the stated terms.
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  - (c) Seller will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
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- (b) Use in consumer Products or any use in significant quantities.
  - (c) Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
  - (d) Systems, machines, and equipment that could present a risk to life or property.
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4. **Amendment:** These Terms constitute the entire agreement between Buyer and Seller relating to the Products, and no provision may be changed or waived unless in writing signed by the parties.
5. **Severability:** If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision.



# Certain Precautions on Specifications and Use

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1. **Suitability for Use.** Seller shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in Buyer's application or use of the Product. At Buyer's request, Seller will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases but the following is a non-exhaustive list of applications for which particular attention must be given:
  - (i) Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
  - (ii) Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
  - (iii) Use in consumer products or any use in significant quantities.
  - (iv) Systems, machines and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
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5. **Errors and Omissions.** The information in this publication has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors, or omissions.
6. **RoHS Compliance.** Where indicated, our products currently comply, to the best of our knowledge as of the date of this publication, with the requirements of the European Union's Directive on the Restriction of certain Hazardous Substances ("RoHS"), although the requirements of RoHS do not take effect until July 2006. These requirements may be subject to change. Please consult our website for current information.

# MEMO



## Snap Action Switches

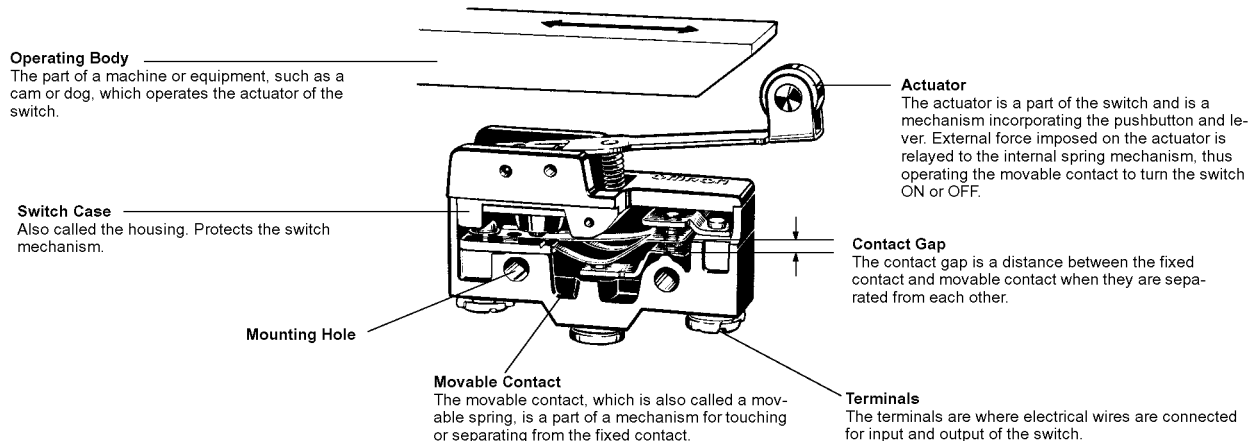
# Technical Information

## Glossary

### General Terms

<b>Basic Switch (Snap Action Switch)</b>	A small-size switch which has contacts slightly separated and a snap action mechanism. Its contacts are enclosed in a case and operated by externally applying a specific force to an actuator provided on the case.
<b>Contact Form</b>	A configuration of switch contacts to input or output an external signal.
<b>Switch with Contacts</b>	A type of switch which uses, as opposed to a solid-state switch, mechanical contacts to break or make the external circuit.
<b>Ratings</b>	Various parameters, such as current or voltage values, within which the normal operation of the basic switch is guaranteed.
<b>Molded Terminal</b>	A terminal which is molded with resin after being connected to the internal circuit of the switch with a lead to eliminate exposed current-carrying metal parts and thereby to enhance the drip-proof properties of the switch.
<b>Insulation Resistance</b>	The resistance between discontinuous terminals, between terminals and non-current-carrying metal parts, and between terminals and ground.
<b>Dielectric Strength</b>	The threshold value up to which insulation will not be destroyed when a high voltage is applied for 1 minute to a predetermined measurement location.
<b>Contact Resistance</b>	The electrical resistance of the contact point of contacts. Generally, the contact resistance includes the conductive resistance of the spring or terminal section
<b>Vibration Resistance</b>	Malfunction: The range of vibration for which closed contacts will not open for longer than a specific time when vibration is applied to a switch currently in operation.
<b>Shock Resistance</b>	Destruction: The range of shock for which the components of the switch will not be damaged and for which operating characteristics are maintained when mechanical shock is applied to a switch during transportation or installation. Malfunction: The range of shock for which closed contacts will not open for longer than a specific time when shock is applied to a switch currently in operation.

### Terms for Configuration & Structure



### Terms Related to Life Expectancy

<b>Mechanical Service Life</b>	The duration in which the normal switching operation is performed without the contacts energized as long as the switch is used with the rated overtravel (OT).
<b>Electrical Service Life</b>	The duration in which the normal switching operation is performed under the rated load (resistive) as long as the switch is used with the rated overtravel (OT).

Life Expectancy is also commonly referred to as "Durability".

### Standard Test Conditions

Switches are tested under the following conditions;

- Ambient temperature  $20 \pm 2^\circ\text{C}$
- Relative humidity:  $65 \pm 5\%$
- Atmospheric pressure: 101.3 kPa




### N-level Reference Value

The N-level reference value indicates the failure rate of the switch.

The following formula indicates that the failure rate is 1/2,000,000 at a reliability level of 60% ( $\lambda_{60}$ ).

$$\lambda_{60} = 0.5 \times 10^{-6} / \text{operations}$$

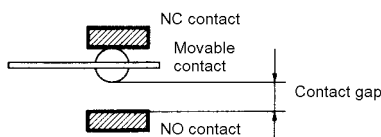
## ■ Contact Shape and Type

Shape	Type	Main Material	Processing Method	Main Application
	Crossbar contact	Gold or silver alloy	Welding or riveting	Crossbar contacts are used for ensuring high contact reliability for switching micro loads. The movable contact and fixed contact come in contact with each other at a right angle. Crossbar contacts are made with materials that are environment-resistant, such as gold alloy. In order to ensure excellent contact reliability, bifurcated crossbar contacts may be used.
	Needle	Silver		Needle contacts are used for ensuring improvement in contact reliability for switching loads, such as relays. A needle contact is made from a rivet contact by reducing the bending radius of the rivet contact to approximately 1 mm for the purpose of improving the contact pressure per unit area.
	Rivet	Silver Silver plated Silver alloy Gold plated		Rivet contacts are used in a wide application range from standard to heavy loads. The fixed rivet contact is usually processed so that it has a groove to eliminate compounds that may be generated as a result of switching. Furthermore, to prevent the oxidation or sulphuration of the silver contacts while the switch is stored, the contacts may be gold-plated. Contacts made with silver alloy are used for switching high current, such as the current supplied to TV sets.

## ■ Contact Gap

The contact gap is either 0.25, 0.5, 1.0, or 1.8 mm. Check the contact gap of the switch to be used if a minimum contact gap is required. The standard contact gap is 0.5 mm. The smaller the contact gap of a switch mechanism is, the less the movement differential (MD) is and the more sensitivity and longer life the switch has. Such a switch cannot ensure, however, excellent switching performance, vibration resistance, or shock resistance.

A switch becomes less sensitive when the movement differential (MD) increases along with the contact gap due to the wear and tear of the contacts as a result of current switching operations. If a switch with a contact gap of 0.25mm is used for its high sensitivity, it will be necessary to minimize the switching current in order to prevent the wear and tear of the contacts as a result of current switching operations. A switch with a wide contact gap excels in vibration resistance, shock resistance, and switching performance.



Character displayed	Contact gap	DC switching	MD	Accuracy and life expectancy	Vibration and shock resistance	Feature
H	0.25 mm	Inferior	Minimal	Excellent	Inferior	High precision and long life
G	0.50 mm	Ordinary	Short	Good	Ordinary	General-purpose
F	1.00 mm	Good	Medium	Ordinary	Good	Performance level between G & E
E	1.80 mm	Excellent	Long	Inferior	Excellent	Highly vibration & shock resistive



## ■ Terms Related to Operating Characteristics

Definitions of Operating Characteristics	Classification	Term	Abbreviation	Unit	Dispersion	Definition
	Force	Operating Force	OF	N{gf, kgf}	Max.	The force applied to the actuator required to operate the switch contacts from the Free Position to the Operating Position.
		Releasing Force	RF	N{gf, kgf}	Min.	The value to which the force on the actuator must be reduced to allow the contacts to return to the Free Position.
		Total Travel Force	TTF	N{gf, kgf}	—	The force required for the actuator to reach the Total Travel Position from the Free Position.
	Travel	Pretravel	PT	mm or degrees	Max.	The distance or angle through which the actuator moves from the Free Position to the Operating Position.
		Overtravel	OT	mm or degrees	Min.	The distance or angle of the actuator movement beyond the operating position to the Total Travel Position.
		Movement Differential	MD	mm or degrees	Max.	The distance or angle from the Operating Position to the Releasing Position.
		Total Travel	TT	mm or degrees	—	The distance or angle of the actuator movement from the Free Position to the Total Travel Position. (The sum of the Pretravel and Total overtravel expressed as a distance or angle.)
	Position	Free Position	FP	mm or degrees	Max.	The initial position of the actuator when no external force is applied.
		Operating Position	OP	mm or degrees	±	The position of the actuator at which the contacts snap to the operated contact position.
		Releasing Position	RP	mm or degrees	—	The position of the actuator at which the contacts snap from the operated contact position to their Free Position.
		Total Travel Position	TTP	mm or degrees	—	The position of the actuator when it reaches the stopper.

Example of Fluctuation:

V-21-1□6 with max. operating force of 3.92 N {400 gf}

The above means that each switch sample operates with a maximum operating force (OF) of 3.92 N when increasing the OF imposed on the actuator from 0.

## ■ Terminal Symbol and Contact Form

Contact	Terminal symbol
COM	Common terminal
NC	Normally closed terminal
NO	Normally open terminal

## ■ Terminal Types

Type	Shape
Solder terminal	
Quick-connect (#110, 187, and 250)	
Screw terminal	
PCB terminal	
PCB angle terminal	

**Note:** In addition to the above, molded terminals with lead wires and snap-on mounting connectors are available.

## ■ Contact Form

Symbol	Name	Model example
	SPDT	Standard snap-action switch
	SPST-NC	V
	SPST-NO	V
	Split-contact type	Z-10FY-B
	Maintained-contact type	Z-15ER
	DPDT	DZ

**Note:** The above illustrations show typical examples. For the contact form of each product, refer to the individual datasheets.

## ■ Terms Related to EN61058-1 Standards

**Electric Shock Protective Class:** Indicates the electric shock preventive level. The following classes are provided.

Class 0:	Electric shocks are prevented by basic insulation only.
Class I:	Electric shocks are prevented by basic insulation and grounding.
Class II:	Electric shocks are prevented by double insulation or enforced insulation with no grounding required.
Class III:	No countermeasures against electric shocks are required because the electric circuits in use operate in a low-enough voltage range (50 VAC max. or 70 VDC max.)

**Proof Tracking Index (PTI):** Indicates the index of tracking resistance, that is, the maximum dielectric strength with no short-circuiting between two electrodes attached to the switch sample while 50 drops of 0.1% ammonium chloride solution are dropped between the electrodes drop by drop. Five levels are provided. The following table indicates the relationship between these PTI levels and CTI values according to the UL Plastics Recognized Directory.

PTI	CTI Classified by UL
500	PLC level 1: $400 \leq \text{CTI} < 600$ (Check with material manufacturer if the material meets CTI 500)
375	PLC level 2: $250 \leq \text{CTI} < 400$ (Check with material manufacturer if the material meets CTI 375)
300	PLC level 2: $250 \leq \text{CTI} < 400$ (Check with material manufacturer if the material meets CTI 300)
250	PLC level 2: $250 \leq \text{CTI} < 400$
175	PLC level 3: $175 \leq \text{CTI} < 250$

**Number of Operations:** Indicates the operation number of durability test provided by the standard. They are classified into the following levels and the switch must bear the corresponding symbol. A switch with high switching frequency must withstand 50,000 switching operations and that with low switching frequency must withstand 10,000 operations to satisfy IEC standards.

Number of Operations	Symbol
100,000	1E5
50,000	5E4
25,000	25E3
10,000	No symbol required
6,000	6E3
3,000	3E3
1,000	1E3
300	3E2

**Ambient Temperature:** Indicates the operating temperature range of the switch. If the temperature range is not between 0°C and 55°C, the switch must bear the symbol of the temperature range. Refer to the following example.

Symbol	T85	25T85
Temperature range	0°C to 85°C	-25°C to 85°C

**Solder Terminal Type 1:** A type of solder terminal classified by heat resistance under the following test conditions.

**Dip soldering bath applied:** The terminal must not wobble or make any change in insulation distance after the terminal is dipped for a specified depth and period into a dip soldering bath at a temperature of 235°C at specified speed.

**Soldering iron applied:** The terminal must not wobble or make any change in insulation distance after the terminal is soldered by applying wire solder that is 0.8mm in diameter for two to three seconds by using a soldering iron, the tip temperature of which is 350°C.

**Solder Terminal Type 2:** A type of solder terminal classified by heat resistance under the following test conditions.

**Dip soldering bath applied:** The terminal must not wobble or make any change in insulation distance after the terminal is dipped for a specified depth and period into a dip soldering bath at a temperature of 260°C at specified speed.

**Soldering iron applied:** The terminal must not wobble or make any change in insulation distance after the terminal is soldered by applying wire solder that is 0.8 mm in diameter for 5 seconds by using a soldering iron, the tip temperature of which is 350°C.

**Clearance distance:** The minimum space distance between two charged parts or between a charged part and a metal foil stuck to the non-metal switch housing.

**Creepage distance:** The minimum distance on the surface of the insulator between two charged parts or between a charged part and a metal foil stuck to the non-metal switch housing.

**Distance through insulation:** The minimum direct distance between the charged part and a metal foil stuck to the non-metal switch housing through air plus any other insulator thickness including the housing itself. The distance through insulation will be the insulator thickness when there is no distance through air.

# Cautions

## General Precautions

### Mounting

Before mounting, dismantling, wiring, or inspecting the Switch, be sure to turn OFF the power supply to the Switch, otherwise an electric shock may be received or the Switch may burn.

When mounting the Switch to the mounting panel, keep a sufficient insulation distance between the mounting panel and the Switch. If the insulation distance is insufficient, add an appropriate insulation guard or separator. This is especially important if the Switch is mounted to a metal object.

### Wiring

Do not wire the Switch or touch any terminal of the Switch while power is connected to the Switch, otherwise an electric shock may be received. The Basic Switch does not incorporate a ground terminal. Do not mount the Basic Switch while power is being supplied.

Follow the instructions provided in *Correct Use* for all wiring and soldering work. Using a switch with improper wiring or soldering may result in abnormal heating when power is supplied, possibly resulting in burning.

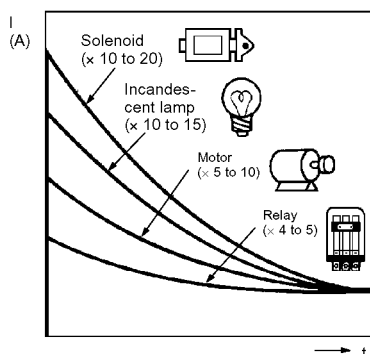
### Contact Load

Select suitable switch ratings after confirming contact load. If the contact load is excessive for the contacts, the contacts may weld or shift, possibly resulting in short-circuits or burning when power is supplied.

### Load Type

Some types of load have a large difference between steady-state current and inrush current. Make sure that the inrush current is within the permissible value. The higher the inrush current in the closed circuit is, the more the contact abrasion or shift will be. Consequently, contact weld, contact separation failures, or insulation failures may result. Furthermore, the Switch may break or become damaged.

Types of Load vs. Inrush Current



The switching capacity of each Switch appearing on a datasheet is the rated capacity. When applying the Switch to a circuit with a special load with unusual inrush and switching current and voltage waveforms, be sure to test the Switch under the actual conditions before use.

If the load is a micro voltage or current load, use a dedicated Switch for micro loads. The reliability of silver-plated contacts, which are used by standard Switch models, is insufficient in such a case.

### Operating Atmosphere

Do not use switches in atmospheres containing combustible or explosive gases. Arc or heat generated by switching may cause fires or explosions.

### Shock on Individual Switches

Do not drop or disassemble switches. Not only will characteristics be jeopardized, but also damage, electric shock, or burning may result.

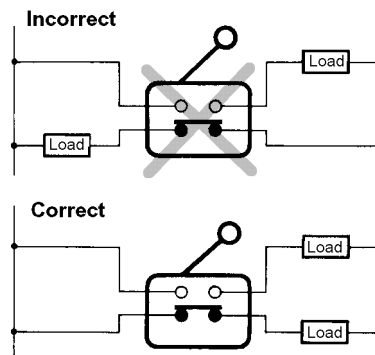
## Life Expectancy

The life of the Switch greatly varies with switching conditions. Before using the Switch, be sure to test the Switch under actual conditions. Make sure that the number of switching operations is within the permissible range. If a deteriorated Switch is used continuously, insulation failures, contact weld, contact failures, Switch damage, or Switch burnout may result.

## Load Connections

### Example of Power Source Connection (Different Polarity)

The power source may short-circuit in failure mode if the loads are connected in the same way as the "incorrect" circuit below.

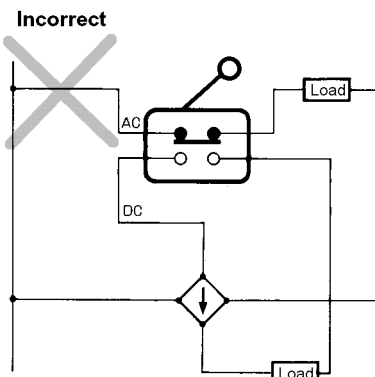


Connect the same polarities to the load.

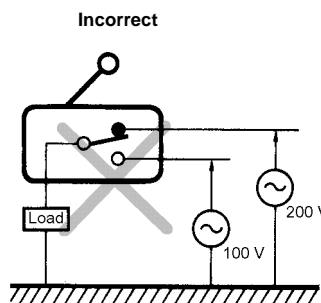
Even in a "correct" circuit, note that the insulation performance of the switch may deteriorate and the switch life may be shortened because one load is connected to one contact.

### Example of Incorrect Connection of Power Source (Different Current Type)

The DC and AC power may be mixed.



Do not configure a circuit that may place a voltage between the contacts of the Switch; otherwise metal deposition will occur between the contacts.



## Correct Use

### ■ Using Switches

When Switches are actually used, unforeseen accidents may occur. Before using a switch, perform all possible testing in advance.

Unless otherwise specified, ratings and performances given in this catalog are for standard test conditions (i.e., 15 to 35°C, 25% to 75% humidity, and 86 to 106 kPa atmospheric pressure). When performing testing in the actual application, always use the same conditions as will be used in actual usage conditions for both the load and the operating environment.

Reference data provided in this catalog represents actual measurements from production samples in graph form. All reference data values are nominal.

All ratings and performance values provided in this catalog are the results of a single test. Each rating and performance value therefore may not be met for composite conditions.

### ■ Selecting Correct Switches

Select an appropriate switch for the operating environment and load conditions.

#### Switches for Micro Loads

Use a dedicated Switch for micro loads, otherwise contact failures may result. Be sure to connect the Switch to a load within the permissible range. Even if the load is within the permissible range, the inrush current of the load may deteriorate the contacts, thus shortening the life of the Switch. Therefore, if necessary, insert the proper contact protective circuit.

- It is not recommended to use a switch for a large current to switch a micro current, in terms of contact reliability. Select a switch that is suitable for the current actually being switched.
- Use a sealed switch in environments subject to water, other liquids and excessive dirt or dust.

### ■ Electrical Conditions

#### Load

The switching capacity of the Switch significantly differs depending on whether the Switch is used to break an alternating current or a direct current. Be sure to check both the AC and DC ratings of the Switch by referring to its datasheet. The control capacity will drop drastically if it is a DC load. This is because a DC load, unlike an AC load, has no current zero cross point. Therefore, if an arc is generated, it may continue for a comparatively long time. Furthermore, the current direction is always the same, which results in contact relocation phenomena, and the contacts hold each other with ease and will not separate if the surfaces of the contacts are uneven.

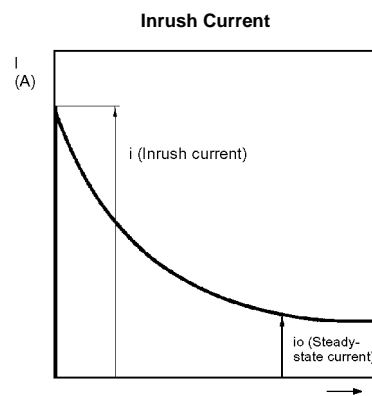
If the load is inductive, counter-electromotive voltage will be generated. The higher the voltage is, the higher the generated energy is, which increase the abrasion of the contacts and contact relocation phenomena. Make sure to use the Switch within the rated conditions.

If the Switch is used for switching both minute and heavy loads, be sure to connect relays suitable to the loads.

The rated loads of the Switch are as follows:

- Inductive Load: A load having a minimum power factor of 0.4 (AC) or a maximum time constant of 7 ms (DC).
- Lamp Load: A load having an inrush current ten times the steady-state current.
- Motor Load: A load having an inrush current six times the steady-state current.

**Note:** It is important to know the time constant (L/R) of an inductive load in a DC circuit.



#### Application of Switch to Electronic Circuits

The Basic Switch in switching operation may cause contact bouncing or chattering, thus generating noise or pulse signals that may interfere the operation of electronic circuits or audio equipment. To prevent this, take the following countermeasures.

- Design the circuits so that they include appropriate CR circuits to absorb noise or pulse signals.
- Use Switches incorporating gold-plated contacts for minute loads, which are more resistive to environmental conditions than standard Switches.

# Contact Protective Circuit

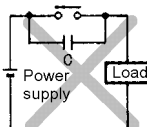
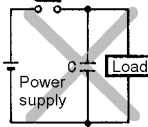
Apply a contact protective circuit to extend contact life, prevent noise, and suppress the generation of carbide or nitric acid. Be sure to apply the contact protective circuit properly, otherwise an adverse effect may result. The use of the contact protective circuit may delay the response time of the load.

The following provides typical examples of contact protective circuits. If the Switch is used in an excessively humid place for switching a load that generates arcs with ease, such as an inductive load, the arcs may generate nitrous oxides, which will change into  $\text{HNO}_3$  (nitric acid) if it reacts with moisture. Consequently, the internal metal part may be corroded and result in an operating failure of the Switch. Be sure to select the best contact preventive circuit from the following in order to prevent this.

## Typical Examples of Contact Protective Circuit

Circuit example	Applicable current		Feature	Element selection
	AC	DC		
CR circuit	See note	Yes	<b>Note:</b> When AC is switched, the load impedance must be lower than the CR impedance.	C: 0.5 to 1 $\mu\text{F}$ per switching current (1 A) R: 0.5 to 1 $\Omega$ per switching voltage (1 V) The values may change according to the characteristics of the load. The capacitor suppresses the spark discharge of current when the contacts are open. The resistor limits the inrush current when the contacts are closed again. Consider these roles of the capacitor and resistor and determine the ideal capacitance and resistance values from experimentation. Use a capacitor that has low dielectric strength. When AC is switched, make sure that the capacitor has no polarity. If, however, the ability to control arcs between contacts is a problem for high DC voltage, it may be more effective to connect a capacitor and resistor between the contacts across the load. Check the results by testing in the actual application.
	Yes	Yes	The operating time will increase if the load is a relay or solenoid. It is effective to connect the CR circuit in parallel to the load when the power supply voltage is 24 or 48 V and in parallel to the contacts when the power supply voltage is 100 to 200 V.	
Diode Method	No	Yes	Energy stored in the coil is changed into current by the diode connected in parallel to the load. Then the current flowing to the coil is consumed and Joule heat is generated by the resistance of the inductive load. The reset time delay in this method is longer than that of the CR method.	The diode must withstand a peak inverse voltage 10 times higher than the circuit voltage and a forward current as high as or higher than the load current.
Diode and Zener diode method	No	Yes	This method will be effective if the reset time delay caused by the diode method is too long.	Zener voltage for a Zener diode must be about 1.2 times higher than the power source since the load may not work under some circumstances.
Varistor method	Yes	Yes	This method makes use of constant-voltage characteristic of the varistor so that no high-voltage is imposed on the contacts. This method causes a reset time delay more or less. It is effective to connect varistor in parallel to the load when the supply voltage is 24 to 48 V and in parallel to the contacts when the supply voltage is 100 to 200V.	Select the varistor so that the following condition is met for the cut voltage $V_C$ . For AC currents, the value must be multiplied by $\sqrt{2}$ . $V_C > (\text{Current Voltage} \times 1.5)$ If $V_C$ is set too high, however, the voltage cut for high voltages will no longer be effective, diminishing the effect.

Do not apply contact protective circuits as shown below.

	<p>This circuit effectively suppresses arcs when the contacts are OFF. The capacitance will be charged, however, when the contacts are OFF. Consequently, when the contacts are ON again, short-circuited current from the capacitance may cause contact weld.</p>		<p>This circuit effectively suppresses arcs when the contacts are OFF. When the contacts are ON again, however, charge current flows to the capacitor, which may result in contact weld.</p>
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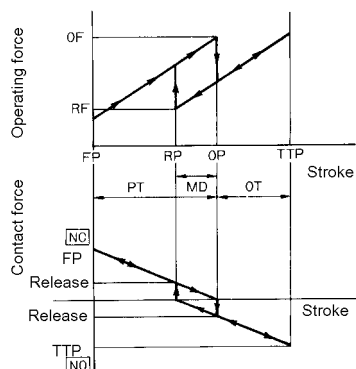
## Mechanical Conditions

### Operating Stroke Setting

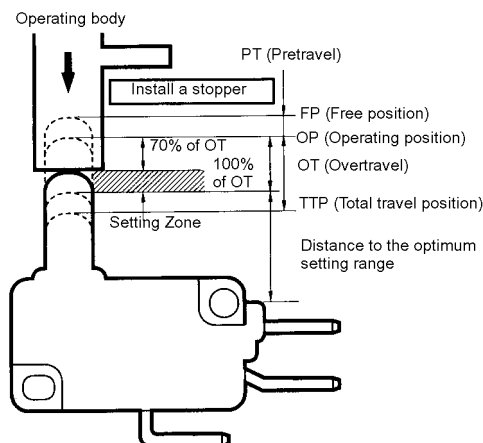
The setting of the stroke is very important for the Switch to operate with high reliability.

The chart below shows the relationship among operating force, stroke, and contact reliability. To obtain high reliability from the Switch, the Switch actuator must be manipulated within an appropriate range of operating force.

Be sure to pay the utmost attention when mounting the Switch.



Make sure that operating body returns the actuator to the free position when the operating body has moved if the Switch is used to form a normally closed (NC) circuit. If the Switch is used to form a normally open (NO) circuit, the operating body must move the Switch actuator to a distance of 70% to 100% of the rated overtravel (OT) of the Switch.

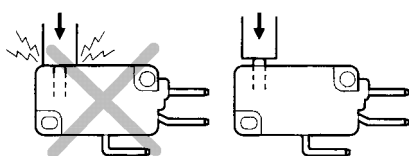


If the stroke is set in the vicinity of the operating position (OP) or at the releasing position (RP), switching operation may become unstable. As a result, the Switch cannot ensure high reliability. Furthermore, the Switch may malfunction due to vibration or shock.

If the stroke is at the total travel position (TTP), the momentary inertia of the operating body may damage the actuator or the Switch itself. Furthermore, the life of the Switch may be shortened.

Incorrect

Correct



### Switching Speed and Frequency

The switching frequency and speed of a Switch have a great influence on the performance of the Switch. Pay attention to the following.

- If the actuator is operated too slowly, the switching operation may become unstable, causing faulty contact or contact weld.
- If the actuator is operated too quickly, the Switch may be damaged by shock.
- If the switching frequency is too high, the switching of the contacts cannot catch up with the operating speed of the actuator.
- If the operating frequency is extremely low (i.e., once a month or less frequent), a film may be generated on the surface of the contacts, which may cause contact failures.

The permissible switching speed and switching frequency of a Switch indicates the operational reliability of the Switch. The life of the Switch may vary with the switching speed if the Switch is operated within the permissible switching speed and frequency ranges. Test a Switch sample under the actual conditions to ascertain its life expectancy.

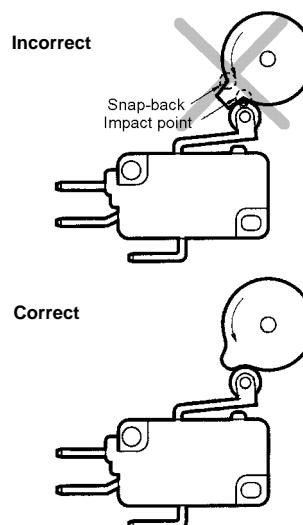
### Operating Condition

Do not leave the Switch actuated for a long time, otherwise the parts of the Switch may soon deteriorate and changes in its characteristic performance may result.

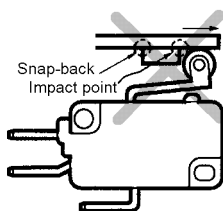
### Switching Method

The switching method has a great influence on the performance of the Switch. Consider the following before operating the Switch.

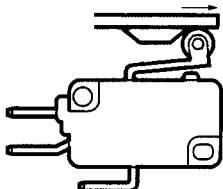
- Design the operating body (i.e., the cam or dog) so that it will operate the actuator smoothly. If the actuator snaps backwards quickly or receives damage due to the shape of the operating body, its life expectancy may be shortened.



Incorrect

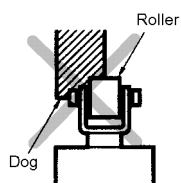


Correct

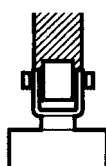


- Make sure that no improper load is imposed on the actuator, otherwise the actuator may incur local abrasion. As a result, the actuator may become damaged or its life expectancy shortened.

Incorrect



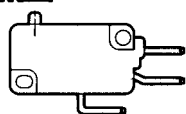
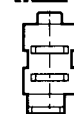
Correct



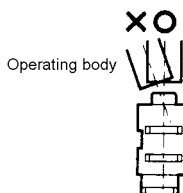
Operating body



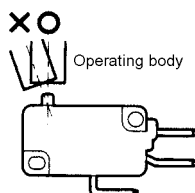
Operating body



- Make sure that the operating body moves in a direction where the actuator moves. If the actuator is a pin plunger type, make sure that the operating body presses the pin plunger vertically.



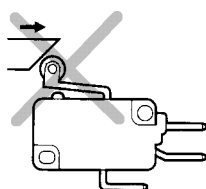
Operating body



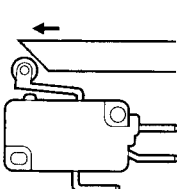
Operating body

- Operate the actuator of a roller hinge lever or simulated hinge lever type in the direction shown below. Set the angle of the cam or dog ( $\theta$ ) for roller levers and similar actuators to the range of 30° and 45°. If the angle is too large, an abnormally large horizontal stress will be applied to the lever.

Incorrect



Correct



- Do not modify the actuator to change the operating position (OP). If the actuator is modified, excessive external force may be applied to the internal switch mechanism, characteristics may change and the switch may stop functioning.
- If an external actuator is used as an operating object, check the material and thickness of the lever and make sure that the force imposed on the lever is within the permissible range.

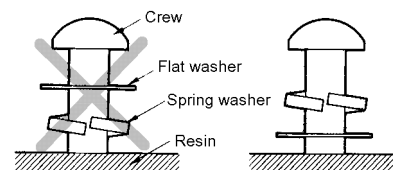
## ■ Mounting

When mounting the Switch, pay attention to the following.

### Securing

When mounting the Switch, be sure to use the specified mounting screws and tighten the screws with flat washers and spring washers securely.

However, the Switch housing may incur crack damage if it comes into contact with the spring washers directly. In that case make sure that the flat washers come into contact with the Switch housing as shown below. Do not subject the switch to excessive shock or high-frequency vibrations when mounting (e.g., do not use an impact driver) as it may cause contact stick or switch damage.



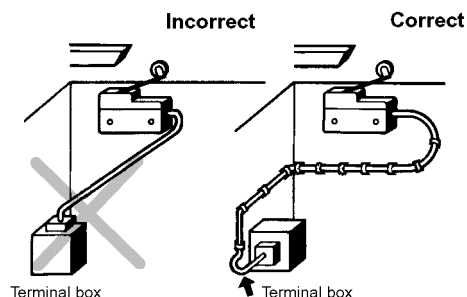
- Do not modify the Switch in any way, for example, by widening the mounting holes

### Locking Agent

If glue or locking agent is applied, make sure that it does not stick to the movable parts or intrude into the interior of the Switch, otherwise the Switch may work improperly or cause contact failure. Some types of glue or locking agent may generate gas that has a bad influence on the Switch. Pay the utmost attention when selecting the glue or locking agent.

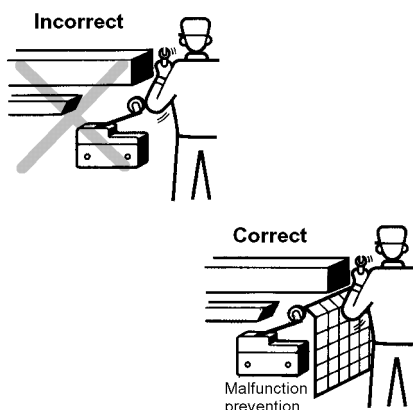
### Wiring

Make sure that the lead wires are connected with no inappropriate pulling force and that the wires are supported securely.



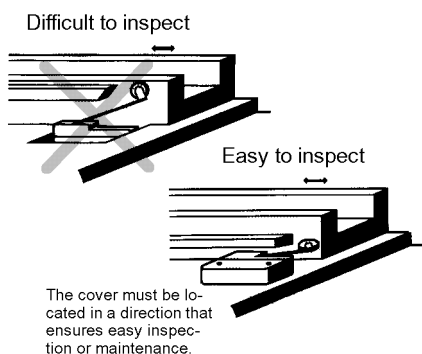
## Mounting Location

Be sure not to mount the Switch in locations where the Switch may be actuated by mistake.



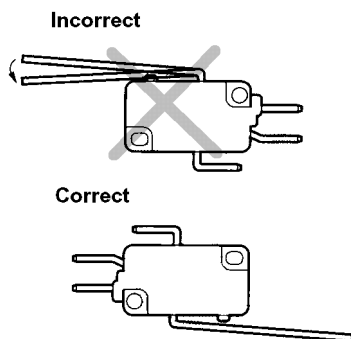
## Maintenance and Inspection

Make sure that the Switch is mounted in locations that allow easy inspection or replacement of the Switch.



## Mounting Direction

When using a Switch of low operating force attached with a long lever or long rod lever, make sure that the lever is in the downward direction as shown below, otherwise the Switch may not reset properly.



## Terminal Connections

### Solder Terminals

When soldering lead wires to a switch, make sure that the temperature of the iron tip is 380°C maximum. Improper soldering may cause abnormal heat radiation from the switch and the switch may burn.

Complete soldering within 5 seconds at 350°C or within 3 seconds at 380°C. If heat is applied for longer period of time, switch characteristics will be deteriorated, e.g., the case will melt and lead wire insulation will scorch.

Soldering conditions are even more strict for ultra subminiature switches. Refer to the *Precautions* for individual models for details.

### Quick-Connect Terminals

Use the specified receptacles to connect to quick-connect terminals. Do not apply excessive force horizontally or vertically to the terminals, otherwise the terminal may be deformed or the housing may be damaged.

### Wiring Work

When wiring a switch, check the insulation distance between the switch and the mounting plate. If the insulation distance is insufficient, use an insulation guard or separator. Be particularly careful when mounting a switch to metal.

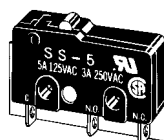
Use wire sizes suitable for the applied voltage and carrying current.

Do not wire a switch while power is being supplied.

### Using Separators

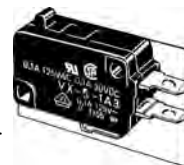
If providing sufficient insulation distance is a problem or there are metal components or copper wire near a switch, use a switch with an insulation guard or use a separator (order separately) to provide sufficient insulation distance.

#### Separator for SS□



Separator

#### Separator for V□



Separator

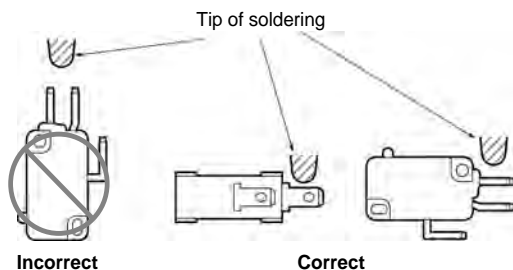
#### Separator for Z□



Separator

## Soldering Precautions

When soldering by hand, place the terminal horizontal to the ground, use a soldering iron with a suitable heat capacity and a suitable amount of solder, and complete soldering quickly. Prevent flux from entering a switch by exhausting flux gas with an exhaust fan and by avoiding the contact of the tip of the soldering iron and the switch body. Flux gas inside a switch may cause contact failure. Do not apply any force to the terminal or wire immediately after soldering.

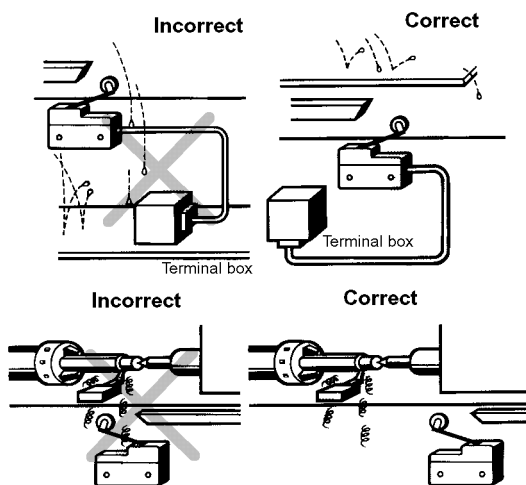


When soldering automatically, adjust the amount of solder so that flux does not float onto the top of PCB. If flux enters the switch, it can cause contact failure.

## Operation and Storage

### Oil and Water Resistance

The standard Switch is not water-resistant. Protect the Switch appropriately when using the Switch in places with water or oil spray. If the Switch is exposed to water drops, use a sealed Switch.



### Operating Environment

Do not install the Switch in any location or direction where the Switch resonates or continuous vibration or shock is imposed on the Switch. If continuous vibration or shock is imposed on the Switch, a contact failure, malfunction, or a decrease in life expectancy may be caused by abrasive powder generated from the internal parts. If excessive vibration or shock is imposed on the Switch, the contacts may malfunction or become damaged.

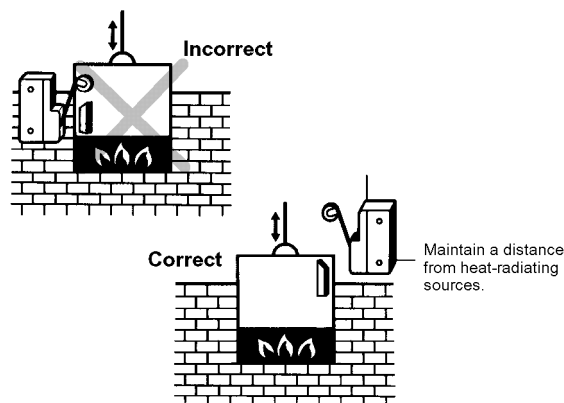
A general switch is not water-resistant. Protect the switch appropriately when using the switch in places with water or oil spray.

Do not use the Switch in locations with corrosive gas, such as sulfuric gas ( $\text{H}_2\text{S}$  or  $\text{SO}_2$ ), ammonium gas ( $\text{NH}_3$ ), nitric gas ( $\text{HNO}_3$ ), or chlorine gas ( $\text{Cl}_2$ ), or in locations with high temperature and humidity. Otherwise, contact failure or corrosion damage may result.

If the Switch is used in places with silicone gas, arc energy may attract silicon dioxide ( $\text{SiO}_2$ ) to the contacts and a contact failure may result. If there is silicone oil, silicone sealant, a wire covered with silicone, or any other silicone-based product near the Switch, attach a

contact protective circuit to suppress the arcing of the Switch or eliminate the source of silicone gas generation. Even for a sealed switch, it may not be possible to prevent all of the gas from penetrating the seal rubber, and contact failure may result.

Be sure to use the Switch at temperature and humidity within the specified ranges. If the Switch is exposed to radical temperature changes or intense heat, the performance characteristics of the Switch may change.



### Storage Environment

When storing the Switch, consider countermeasures (e.g., storing in a plastic bag) to prevent discoloration resulting from sulfidization of terminals (silver-plated). Make sure that the location is free of corrosive gas or dust with no high temperature or humidity. It is recommended that the Switch be inspected before use if it is stored for three months or more.

## Other Issues

### Handling

Do not modify the switch in any way, for example, by expanding the mounting holes. Do not drop the Switch, otherwise the Switch may break or deform. Do not apply oil, grease, or other lubricants to the sliding parts of the Switch, otherwise the actuator may not operate smoothly. Furthermore, the intrusion of oil, grease, or other lubricants into the internal part may cause the Switch to fail.





# Switch Trouble and Corrective Action

Type	Location of failure	Failure	Possible cause	Remedy
Failures related to electrical characteristics	Contacts	Contact failure	Dust and dirt collect on the contacts	Clean the environment, place the contact Switch in a box, or use a sealed Switch.
			Oil, water or other liquid has penetrated into the Switch.	
			Chemical substances have been generated on the contact surfaces because the atmosphere contains chemical gas.	Use a Switch having contacts with high environmental resistivity (such as gold or alloy contacts).
			Chemical substances have been generated on the contact surface when the Switch breaks a very low load.	
			Solder flux has penetrated into the Switch.	Review the soldering method or use a sealed or flux-tight Switch.
			Silicon gas exists near the switch	Remove the material generating gas, or adjust contact capacity to prevent formation of silicon compounds on the contacts.
		Malfunction	The contacts are separated from each other by vibration or shock.	Use a Switch having a high contact force (generally a heavy OF).
		Contact weld	The load connected to the Switch is too large.	Use a Switch having higher switching capacity, insert a relay to switch the heavy load or insert a contact protection circuit.
		Insulation degradation	Contacts have been melted and scattered by arc.	Insert a contact protection circuit or switch the load with a high-capacity relay or magnetic relay.
			Water has penetrated into the Switch because the Switch is placed in extremely humid environment.	Change the environment, place the Switch in a sealed box, or use a sealed Switch.
			Oil or liquid has penetrated into the Switch and been carbonized by arc heat.	
Failures related to mechanical characteristics	Actuator	Operating failure	The sliding part of the actuator has been damaged because an excessive force was applied on the actuator.	Make sure that no excessive force is applied to the actuator, or use an auxiliary actuator mechanically strong.
			Foreign material, such as dust, dirt or oil, have penetrated into the switch,	Clean the environment or place the Switch in a sealed box.
			The actuator does not release because the operating body is too heavy.	Use a Switch having a larger OF.
			The Switch is loosely installed and thus does not operate even when the actuator is at the rated OP.	Secure the Switch.
		Service life is too short	The shape of the dog or cam is improper.	Change the design of the dog or cam.
			The operating method is improper.	Review the operating stroke and operating speed.
		Damage	A shock has been applied to the actuator.	Change the environment or use a Switch mechanically strong.
			The clamping part has not been tightened enough or the Switch has been loosely mounted.	Replace the Switch with a new one.
			Deformation or drop-out. (Actuator was subjected to an excessive force or force from an inappropriate direction.	Relocate the Switch so that improper force will not be imposed on the actuator or in the wrong direction. Review the operating method.
	Mounting section	Damage	Screws have not been inserted straight.	Check and correct screw insertion methods.
			The mounting screws were tightened with too much torque.	Tighten the screws to an appropriate torque.
			The mounting pitch is wrong.	Correct the pitch.
			The Switch is not installed on a flat surface.	Install the Switch on a flat surface.
	Terminal	Damage	An excessive force was applied to the terminal while being wired.	Do not apply an excessive force.
			The plastic part has been deformed by solder heat	Use a soldering iron rated at a lower wattage.

# Snap Action Switch

# Selection Guide

## Unsealed Basic

	 Page 147	 Page 19	 Page 141	 Page 89
<b>General Attributes</b>	<b>Z</b>	<b>A</b>	<b>X</b>	<b>DZ</b>
<b>Dimensions mm (in)</b>	24.2 H x 17.45 D x 49.2 W (0.95 x 0.69 x 1.93)	24.2 H x 17.45 D x 49.2 W (0.95 x 0.69 x 1.93)	24.2 H x 17.45 D x 49.2 W (0.95 x 0.69 x 1.93)	22.7 H x 17.45 D x 49.2 W (0.89 x 0.69 x 1.93)
<b>Features</b>	<ul style="list-style-type: none"> <li>General Purpose Snap Action Switch</li> <li>High precision 15 A switch available in a variety of styles</li> </ul>	<ul style="list-style-type: none"> <li>General Purpose Snap Action Switch</li> <li>High capacity switch handles loads with large inrush currents</li> </ul>	<ul style="list-style-type: none"> <li>DC switch</li> <li>Magnetic blowout to extinguish arc</li> </ul>	<ul style="list-style-type: none"> <li>DPDT basic switch</li> <li>Incorporates two completely independent built-in switches</li> <li>Can switch two independent circuits operating on different voltages</li> </ul>
<b>Contact Rating(s) Resistive load</b>	15A @ 250VAC (Z-15) 10A @ 250VAC (Z-10F) 0.1A @ 125VAC (Z-01H)	20A @ 250VAC	10A @ 125VDC 3 A @ 250VDC	10A @ 250VAC
<b>Contact form</b>	SPDT	SPDT	SPDT	DPDT
<b>Operating force (OF)*</b>	250gf to 350gf	400gf to 625gf	510gf	570gf
<b>Mechanical service life</b>	Refer to "SPECIFICATIONS" section of data sheet for detailed service life information	1,000,000 ops. min. (at rated OT load)	1,000,000 operations min.	1,000,000 operations min.
<b>Electrical service life</b>	Refer to "SPECIFICATIONS" section of data sheet for detailed service life information	500,000 ops. min. (at rated OT load)	100,000 operations min.	500,000 operations min.
<b>Mounting pitch (mm)</b>	25.4	25.4	25.4	25.4
<b>Actuator type</b>	Pin plunger, slim spring plunger, short spring plunger, panel mount plunger, panel mount roller plunger, panel mount cross roller plunger, hinge lever, low force hinge lever, short hinge roller lever, hinge roller lever, Leaf spring, unidirectional short hinge roller lever, spring plunger, flexible rod	Pin plunger, short spring plunger, panel mount plunger, panel mount roller plunger, panel mount cross roller, short hinge lever, hinge lever, short hinge roller lever, hinge roller lever	Pin plunger, short spring plunger, slim spring plunger, panel mount plunger, panel mount cross-roller plunger, panel mount roller plunger, leaf spring, hinge lever, hinge roller lever, short hinge lever, short hinge roller lever	Pin plunger, hinge lever, short hinge roller lever, hinge roller lever
<b>Terminal choices</b>	Solder, Screw	Solder, Screw	Solder, Screw	Solder, Screw
<b>Approved standards</b>	UL, CSA, EN	UL, CSA, EN	UL, CSA	UL, CSA





\* Values are for pin plunger versions only

\*\* None of the snap action switches contained in this catalog are water-washable. Be sure to read the precautions and information common to all snap action and detection switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

\*\*\* Accessories for the Z, A, X and DZ switches can be found on page 177 in the "Z/A/X/DZ Common Accessories" datasheet



# Unsealed Basic






	 Page 117	 Page 73	 Page 121	 Page 135
<b>General Attributes</b>	<b>TZ</b>	<b>D3V</b>	<b>V</b>	<b>VX</b>
<b>Dimensions mm (in)</b>	32 H x 17.45 D x 49.2 W (1.26 x 0.69 x 1.93)	15.9 H x 10.3 D x 27.8 W (0.63 x 0.41 x 1.09)	15.9 H x 10.3 D x 27.8 W (0.63 x 0.41 x 1.09)	18.8 H x 10.3 D x 27.8 W (0.74 x 0.41 x 1.09)
<b>Features</b>	<ul style="list-style-type: none"> <li>Stable operation at 400°C ambient temperature</li> <li>High contact reliability</li> <li>Smooth operation</li> </ul>	<ul style="list-style-type: none"> <li>Miniature Snap Action Switch</li> <li>Environmentally friendly: free of beryllium copper &amp; lead</li> <li>Maximum operating temperature of 105°C (standard versions)</li> <li>Internally or externally fitted levers</li> <li>200°C versions available (D3V-6, D3V-01: "T" models)</li> </ul>	<ul style="list-style-type: none"> <li>Miniature Snap Action Switch</li> <li>Industry standard design with 21A, 16A, 15A, 11A, and 10A versions</li> <li>Cadmium-free contacts</li> <li>Internal lever options</li> <li>Heat resistant versions available (V-15 and V-10)</li> </ul>	<ul style="list-style-type: none"> <li>Miniature Snap Action</li> <li>Low operating force</li> <li>High contact reliability</li> <li>0.1 A to 5 A</li> </ul>
<b>Contact Rating(s) Resistive load</b>	1A @ 250VAC	21/16/11/6A @ 125/250VAC 0.1A @ 125VAC	21A @ 250VAC (V-21) 16A @ 250 VAC (V-16) 15A @ 250VAC (V-15G) 11A @ 250VAC (V-11) 10A @ 250VAC (V-10G)	5A @ 250VAC (VX-5) 0.1A @ 125VAC (VX-01)
<b>Contact form</b>	SPDT	SPDT, SPST-NC, SPST-NO	SPDT, SPST-NC, SPST-NO	SPDT, SPST-NO, SPST-NC
<b>Operating force (OF)*</b>	500gf	25gf, 50gf, 100gf, 125gf or 200gf (depends upon model)	100gf (V-11, V-10G) 200gf (V-11, V-15G, V-16) 400gf (V-21)	25gf, 50gf
<b>Mechanical service life</b>	100,000 operations min	10,000,000 operations min.	50,000,000 operations min.	50,000,000 (VX-5) 10,000,000 (VX-01)
<b>Electrical service life</b>	50,000 operations min	100,000 operations min. (D3V-16) 200,000 operations min. (D3V-11) 500,000 operations min. (D3V-6 / D3V-01)	100,000 operations min. (V-15G) 300,000 operations min. (V-10G)	500,000 (VX-5) 1,000,000 (VX-01)
<b>Mounting pitch (mm)</b>	25.4	10.3 x 22.2	10.3 x 22.2	10.3 x 22.2
<b>Actuator type</b>	Pin plunger, hinge lever, short hinge roller lever, hinge roller lever	Pin plunger, short hinge lever, hinge lever, long hinge lever, simulated roller lever, short hinge roller lever, hinge roller lever	Pin plunger, short hinge lever, hinge lever, long hinge lever, simulated roller lever, short hinge roller lever, hinge roller lever	Pin plunger, short hinge lever, hinge lever, long hinge lever, simulated roller lever, short hinge roller lever, hinge roller lever
<b>Terminal choices</b>	Bolt	Solder Quick connect (#187) Quick connect (#250) RAST5 (#250)	Solder Quick connect (#187) Quick connect (#250)	Solder Quick connect (#187)
<b>Approved standards</b>	–	UL, CSA, EN	UL, CSA, EN	UL, CSA, EN

\* Values are for pin plunger versions only

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\*\*\* Accessories for the V, VX and D3V switches can be found on page 173 in the "V/VX/D3V Common Accessories" datasheet






# Unsealed Basic

	 Page 95	 Page 103	 Page 109	 Page 57	 Page 31
General Attributes	SS	SS-P	SSG	D3M	D2F
<b>Dimensions mm (in)</b>	10.2 H x 6.4 D x 19.8 W (0.40 x 0.25 x 0.78)	10.2 H x 6.4 D x 19.8 W (0.40 x 0.25 x 0.78)	10.2 H x 6.4 D x 19.8 W (0.40 x 0.25 x 0.78)	10 H x 7 D x 31.6 W (0.39 x 0.28 x 1.24)	6.5 H x 5.8 D x 12.8 W (0.26 x 0.23 x 0.50)
<b>Features</b>	<ul style="list-style-type: none"> <li>Subminiature Snap Action Switch</li> <li>SS-01: Switches microcurrent/ microvoltage load with crossbar contacts</li> <li>SS-5: Split double spring mechanism for a long life of up to 30 million operations</li> <li>SS-10: Split double spring mechanism for a long life of up to 10 million operations</li> <li>Internal lever options</li> </ul>	<ul style="list-style-type: none"> <li>SS-01P: Switches microcurrent/ microvoltage load with crossbar contacts</li> <li>SS-3P: Single-leaf moveable spring</li> </ul>	<ul style="list-style-type: none"> <li>Subminiature Snap Action Switch with even pitch terminals</li> <li>Available in two versions SSG-01 and SSG-5</li> <li>Wide operating temperature range of -25 to + 125°C</li> <li>Internal lever options</li> <li>Global switch conforming to EN, UL &amp; CSA</li> </ul>	<ul style="list-style-type: none"> <li>External actuators with possible mounting positions</li> <li>Easy wiring through connector terminals</li> <li>Same mounting pitch as the subminiature SS style</li> </ul>	<ul style="list-style-type: none"> <li>Subminiature Snap Action Switch</li> <li>Switches microvoltage/ microcurrent loads</li> <li>Long lifespan assured by high-precision dual spring reverse-action mechanism</li> </ul>
<b>Contact Rating(s) Resistive load</b>	0.1A @ 125VAC (SS-01) 5A @ 125VAC (SS-5) 10.1A @ 125/250VAC (SS-10)	0.1A @ 125VAC (SS-01) 3A @ 125VAC (SS-3)	0.1A @ 125VAC (SSG-01) 5A @ 125VAC (SSG-5)	0.1A @ 30VDC	0.1A @ 30VDC (D2F-01) 1A @ 125VAC (D2F-F) 0.5A @ 30 VDC (D2F-F) 3A @ 125VAC (D2F) 2A @ 30 VDC (D2F)
<b>Contact form</b>	SPDT (SPST-NC, SPST-NO per request)	SPDT	SPDT (SPST-NC, SPST-NO per request)	SPST-NO or SPST-NC	SPDT
<b>Operating force (OF)*</b>	25gf, 50gf, or 150gf (SS-01) 50gf or 150gf (SS-5) 150gf (SS-10)	153gf	51gf, or 153gf	153gf	75gf or 150gf
<b>Mechanical service life</b>	30,000,000 ops. min. (SS-01, SS-5) 10,000,000 ops. min. (SS-10)*	1,000,000 ops. min. (SS-01P, SS-3P)	10,000,000 ops. min.	500,000 ops. min.	1,000,000 ops. min.
<b>Electrical service life</b>	200,000 operations min. (SS-01, SS-5) 50,000 operations min. (SS-10)**	200,000 operations min. (SS-01P) 70,000 operations min. (SS-3P)	200,000 operations min.	200,000 operations min.	30,000 operations min.
<b>Mounting pitch (mm)</b>	9.5	9.5	9.5	9.5	6.5
<b>Actuator type</b>	Pin plunger, hinge lever, simulated roller lever, hinge roller lever	Pin plunger, hinge lever, simulated roller lever	Pin plunger, hinge lever, simulated roller lever, hinge roller lever	Pin plunger, hinge lever, simulated roller lever, hinge roller lever	Pin plunger, hinge lever, simulated roller lever, roller lever
<b>Terminal choices</b>	SS-01, SS-3, SS-5: Through-hole PCB (straight, parallel left, parallel right), Solder, Quick connect (#110) SS-10: PCB (straight), Solder, Quick connect (#110)	SS-01P, SS-3P: Through-hole PCB (straight), Solder, Quick connect (#110)	SSG-01, SSG-5: Through-hole PCB (straight), Solder, Quick connect (#110)	Dipole XA Connector (J.S.T. Manufacturing, not sold by Omron)	Through-hole PCB (straight, self-supporting, right-angle, left angle), Solder, Compact Solder
<b>Approved standards</b>	UL, CSA, EN	UL, CSA, EN	UL, CSA, EN	UL, CSA, EN	UL, CSA

\* Values are for pin plunger versions only

\*\* None of the snap action switches contained in this catalog are water-washable. Be sure to read the precautions and information common to all snap action and detection switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.



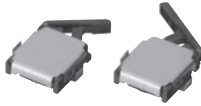

# Sealed Basic

	 Page 207	 Page 195	 Page 201	 Page 181	 Page 189
<b>General Attributes</b>	<b>D2VW</b>	<b>D2SW</b>	<b>D2SW-P</b>	<b>D2HW</b>	<b>D2JW</b>
<b>Dimensions mm (in)</b>	15.9 H x 10.3 D x 33 W (0.63 x 0.41 x 1.29)	10.1 H x 6.4 D x 19.8 W (0.40 x 0.25 x 0.78)	7.7 H x 6.4 D x 19.8 W (0.30 x 0.25 x 0.78)	7 H x 5.3 D x 13.3/18.5 W (0.28 x 0.21 x 0.52/0.73)	9.4 H x 5.3 D x 12.7 W (0.37 x 0.21 x 0.50)
<b>Features</b>	<ul style="list-style-type: none"> <li>• Miniature Snap Action Switch</li> <li>• Sealed water-tight switch conforms to IP67</li> <li>• Same mounting pitch as D3V, V, VX</li> </ul>	<ul style="list-style-type: none"> <li>• Subminiature snap action switch</li> <li>• Small sealed switch conforms to IP67</li> <li>• Same mounting pitch as SS style</li> </ul>	<ul style="list-style-type: none"> <li>• Sealed basic switch conforms to IP67</li> <li>• Single leaf movable spring construction</li> <li>• Microload versions available</li> <li>• Same mounting pitch as SS Style</li> </ul>	<ul style="list-style-type: none"> <li>• Subminiature Snap Action Switch</li> <li>• Small sealed switch with long stroke for reliable ON/OFF action</li> <li>• Conforms to IP67</li> </ul>	<ul style="list-style-type: none"> <li>• Small size</li> <li>• Gold crossbar contact and coil spring for long life</li> <li>• IP67 rating for molded lead wire versions</li> </ul>
<b>Contact Rating(s) Resistive load</b>	0.1A @ 125VAC (D2VW-01) 5A @ 125/250VAC (D2VW-5)	0.1A @ 125VAC (D2SW-01) 3A @ 125VAC (D2SW-3)	0.1A @ 125VAC (D2SW-P01) 2A @ 250VAC (D2SW-P2)	2A @ 12VDC 1A @ 24VDC/ 0.5A @ 42VDC	0.1A @ 30VDC
<b>Contact form</b>	SPDT (SPST-NC, SPST-NO Lead Wire versions)	SPDT (SPST-NC, SPST-NO Lead Wire versions)	SPDT (SPST-NC, SPST-NO Lead Wire versions)	SPDT (SPST-NC, SPST-NO Lead Wire versions)	SPDT
<b>Operating force (OF)*</b>	200gf	180gf	183gf	76gf	250gf
<b>Mechanical service life</b>	10,000,000 ops min.	5,000,000 ops min.	1,000,000 ops min.	1,000,000 ops min.	1,000,000 ops min.
<b>Electrical service life</b>	1,000,000 ops min. (0.1A, 125VAC) 100,000 ops min. (5A, 125/250VAC)	200,000 ops min. (0.1 or 3A, 125VAC) 100,000 ops min. (2A, 250VAC)	200,000 ops min. (0.1, 125VAC) 50,000 ops min. (2A, 250VAC)	100,000 ops min.	100,000 ops min.
<b>Mounting pitch (mm)</b>	10.3 x 22.2	9.5	9.5	8 (posts), 13 (screw)	4.8
<b>Actuator type</b>	Pin plunger, short hinge lever, hinge lever, long hinge lever, simulated roller lever, short hinge roller lever, hinge roller lever	Pin plunger, hinge lever, simulated roller lever, hinge roller lever	Pin plunger, hinge lever, hinge roller lever, simulated roller lever	Pin plunger, hinge lever, long hinge lever, simulated roller lever, leaf lever, simulated leaf lever, long leaf lever	Pin plunger, short hinge lever, hinge lever, simulated roller lever, hinge roller lever
<b>Terminal choices</b>	Solder/Quick connect (#187 tab terminals) Lead wires	Solder, Quick connect (#110), Through-hole PCB, Lead wires	Solder, Quick connect (#110), Through-hole PCB (even & uneven pitch), Molded lead wire	PCB (straight, angled), Solder, Lead wire (bottom, right side, left side)	Solder, Molded lead wire
<b>Approved standards</b>	UL, CSA, EN (refer to "Approved Standards" section of data sheet)	UL, CSA, EN	UL, CSA	UL, CSA	—

\* Values are for pin plunger versions only

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## Detection

	 Page 41	 Page 45	 Page 63	 Page 69
<b>General Attributes</b>	<b>D2X</b>	<b>D3C</b>	<b>D3SH</b>	<b>D3SK</b>
<b>Dimensions mm (in)</b>	28.1 H x 8.4 D x 5.3 W (1.11 x 0.33 x 0.21)	6 H x 4.2 D x 8 W (0.24 x 0.17 x 0.31)	0.9 H x 3.5 D x 3.0 W (0.035 x 0.138 x 0.118)	0.9 H x 3.5 D x 3.0 W (0.035 x 0.138 x 0.118)
<b>Features</b>	<ul style="list-style-type: none"> <li>• Bi-directional paddle allows actuation from left or right</li> <li>• Low contact force</li> <li>• Wiping action for greater contact reliability</li> <li>• Easy wiring through connector terminals</li> </ul>	<ul style="list-style-type: none"> <li>• Compact detection switch</li> <li>• Low torque built-in slide mechanism</li> <li>• Shorting or non-shortng timing (Break/Make or Make-before Break versions)</li> </ul>	<ul style="list-style-type: none"> <li>• The smallest detection switch available. (as of April 2008)</li> <li>• Unique switching mechanism enables high contact reliability, high precision operation and low OF</li> <li>• Long and short lever versions available, mounted left or right, provides horizontal 2-way detection and long stroke</li> <li>• Available with or without PCB positioning boss</li> </ul>	<ul style="list-style-type: none"> <li>• The smallest detection switch available. (as of April 2008)</li> <li>• Unique switching mechanism enables high contact reliability, high precision operation and low OF</li> <li>• Lever options (straight/ left, straight, right actuation) provides horizontal 2-way detection and long stroke</li> <li>• Available with or without PCB positioning boss</li> </ul>
<b>Contact Rating(s) Resistive load</b>	0.1A @ 30VDC	0.1A @ 30VDC	15 $\mu$ A @ 3 VDC	15 $\mu$ A @ 3 VDC
<b>Contact form</b>	SPST-NC	SPDT	SPST-NO, SPST-NC	SPST-NO, SPST-NC
<b>Operating force (OF)*</b>	50gf	40gf, 130gf	31gf	4gf
<b>Mechanical service life</b>	1,000,000 operations min.	50,000 operations min.	150,000 operations min.	150,000 operations min.
<b>Electrical service life</b>	50,000 operations min.	50,000 operations min.	100,000 operations min.	100,000 operations min.
<b>Mounting pitch (mm)</b>	12.2 (Snap-in panel mount tabs)	5.7	—	—
<b>Actuator type</b>	Bi-directional paddle	Rotary lever	Lever (short or long, with hinge fulcrum positioned left or right)	Lever (curved, allowing actuation perpendicular to the switch with left or right positioning.)
<b>Terminal choices</b>	Crimp connector	Through-hole PCB	Surface Mount PCB	
<b>Approved standards</b>	—	—	—	—

\* Values are for pin plunger versions only

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## Door / Interlock

	 Page 25	 Page 37	 Page 49	 Page 53
<b>General Attributes</b>	<b>D2D</b>	<b>D2T</b>	<b>D3D</b>	<b>D3DC</b>
<b>Dimensions mm (in)</b>	Varies with model	24.65 H x 11.5 D x 28.8 W (0.97 x 0.45 x 1.13)	30.7 H x 15 D x 36.4 W (1.21 x 0.59 x 1.43)	18.8 H x 11 D x 26.3 W (0.74 x 0.43 x 1.04)
<b>Features</b>	<ul style="list-style-type: none"> <li>Minimum contact gap of 3 mm (standard versions)</li> <li>Mechanism with double return spring and direct drive positive contact</li> <li>Pull-on lock versions available</li> <li>Conforms to Class II of VDE Insulation Grade</li> </ul>	<ul style="list-style-type: none"> <li>Compact door switch</li> <li>Incorporates two circuits for power loads &amp; micro loads</li> </ul>	<ul style="list-style-type: none"> <li>Miniature door switch</li> <li>Low-noise</li> <li>Disconnectable crimp connector</li> <li>Gold crossbar contacts</li> </ul>	<ul style="list-style-type: none"> <li>DC Switching in package size that's smaller than the D3D</li> <li>Long stroke of 7 mm</li> <li>Simple leaf switch structure</li> <li>Disconnectable crimp connector</li> </ul>
<b>Contact Rating(s) Resistive load</b>	16A @ 250VAC (standard versions) 10A @ 250VAC (pull-on lock versions)	6A @ 30VDC 5A @ 250VAC (Main terminals) 0.1A @ 125VAC (Auxiliary terminals)	1A @ 125VAC 0.5A @ 250VAC	0.1A @ 30VDC
<b>Contact form</b>	SPDB-NO/NC (SPDT) SPDB-NO (SPST-NO) SPDB-NC (SPST-NC) SPDB-NO+SPDB-NO/CNC (SPST-NO+SPDT) DPDB-NO (DPST-NO) (Note: "DB" = double break)	DPST-NO	SPDT, SPST-NC, SPST-NO	SPST-NO, SPST-NC
<b>Operating force (OF)*</b>	300 - 600gf (standard versions) 200 - 300gf (pull-on lock versions)	330gf	204gf	102gf
<b>Mechanical service life</b>	10,000,000 operations min.	100,000 operations min.	300,000 operations min.	100,000 operations min.
<b>Electrical service life</b>	100,000 operations min.	100,000 operations min.	100,000 operations min.	100,000 operations min.
<b>Mounting pitch (mm)</b>	25.2 (screw terminal) 13.5 x 36.7 (panel cutout, with 1.0 mm panel thickness)	26.4 (screw terminals) 11.9 x 31.0 (panel cutout)	11.2 x 22.9 (panel cutout)	8.7 x 16.9 (panel cutout)
<b>Actuator type</b>	Plunger, Pull-on plunger	Pin plunger, hinge lever	Plunger, Integral lever	Plunger
<b>Terminal choices</b>	Quick Connect (#250)	Solder (straight or right-angle)	HL Connector (J.S.T. Manufacturing, not sold by Omron)	XA Connector (J.S.T. Manufacturing, not sold by Omron)
<b>Approved standards</b>	UL, CSA, EN	UL, CSA, EN	UL, CSA, EN	UL, CSA

\* Values are for pin plunger versions only

\*\* None of the snap action switches contained in this catalog are water-washable. Be sure to read the precautions and information common to all snap action and detection switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.



# Snap Action Switch












# A

## General-purpose Snap Action Switch

- High-capacity switch capable of handling 20 A loads with large inrush currents
- Directly switches such loads as motors, halogen lamps and solenoids
- Same shape as OMRON snap action switch model Z except in pin plunger position, yet endures inrush currents as large as 75 A.



## Ordering Information

		Terminal	Solder terminal 	Screw terminal (-B) 
Actuator			Model	Model
Pin plunger			A-20G	A-20G-B
Short spring plunger			A-20GD	A-20GD-B
Panel mount plunger			A-20GQ	A-20GQ-B
Panel mount roller plunger			A-20GQ22	A-20GQ22-B
Panel mount cross roller plunger			—	A-20GQ21-B
Short hinge lever			A-20GV21	A-20GV21-B
Hinge lever			A-20GV	A-20GV-B
Short hinge roller lever			A-20GV22	A-20GV22-B
Hinge roller lever			A-20GV2	A-20GV2-B

## Model Number Legend

A - 20 G □ - □  
1 2 3 4

### 1. Ratings

20: 20 A (250 VAC)

### 2. Contact Gap

G: 0.5 mm

### 3. Actuator

None: Pin plunger  
D: Short spring plunger  
Q: Panel mount plunger  
Q21: Panel mount cross roller plunger  
Q22: Panel mount roller plunger  
V: Hinge lever  
V2: Hinge roller lever  
V21: Short hinge lever  
V22: Short hinge roller lever

### 4. Terminals

None: Solder terminal  
B: Screw terminal  
(with toothed washer)

# Specifications

## ■ Characteristics

Operating speed		0.01 mm to 1m/s (see note 1)
Operating frequency	Mechanical	240 operations/min
	Electrical	20 operations/min
Contact resistance		15 mΩ max. (initial value)
Insulation resistance		100 MΩ min. (at 500 VDC)
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min between terminals of the same polarity 2,000 VAC, 50/60 Hz for 1 min between the current-carrying metal parts and the ground, and between each terminal and non-current-carrying metal parts
Vibration resistance	Malfunction	10 to 55 Hz, 1.5-mm double amplitude (See note 2)
Shock resistance	Destruction	1,000 m/s <sup>2</sup> max.
	Malfunction	300 m/s <sup>2</sup> max. (See notes 1 and 2)
Degree of protection		IP00
Degree of protection against electric shock		Class I
Proof tracking index (PTI)		175
Ambient operating temperature		–25°C to 80°C (with no icing)
Ambient operating humidity		35% to 85%RH
Service life	Mechanical	1,000,000 operations min.
	Electrical	500,000 operations min.
Weight		Approx. 22 to 58 g

Note: 1. The value is for the pin plunger.

2. Malfunction: 1 ms max.

## ■ Operating Characteristics

Characteristics	A-20G-B	A-20GD-B	A-20GQ-B	A-20GQ22-B	A-20GQ21-B	A-20GV21-B	A-20GV-B	A-20GV22-B	A-20GV2-B
OF	400 to 625 g			630 g max.		160 g	70 g	160 g	90 g
RF min.	285 g			280g		42 g	14 g	42 g	14 g
PT max.	1.3 mm					6.5 mm	15.9 mm	6.3 mm	12 mm
OT min.	0.25 mm	3 mm	5.6 mm	3.58 mm		1.2 mm	4 mm	1.2 mm	2.4 mm
MD max.	0.2 mm			0.35 mm		1.2 mm	2.4 mm	1.2 mm	2.2 mm
OP	16.3±0.4 mm	26.2±0.5 mm	21.8±0.8 mm	33.4±1.2 mm		19±0.8 mm	19±0.8 mm	29.8±0.8 mm	30.2±0.8 mm

## ■ Ratings

Rated voltage (V)	Non-inductive load (A)				Inductive load (A)			
	Resistive load		Lamp load		Inductive load		Motor load	
	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	20		7.5		20		12.5	
250 VAC	20		7.5		20		8.3	
500 VAC	15		4		10		2	
8 VDC	20		3	1.5	20		12.5	
14 VDC	20		3	1.5	15		12.5	
30 VDC	6		3	1.5	5		5	
125 VDC	0.5		0.5	0.5	0.05		0.05	
250 VDC	0.25		0.25	0.25	0.03		0.03	

Note: 1. The above values are for steady-state current.

2. Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).

3. Lamp load has an inrush current of 10 times the steady-state current.

4. Motor load has an inrush current of 6 times the steady-state current.

5. The ratings values apply under the following test conditions:

(1) Ambient temperature: 20±2°C

(2) Ambient humidity: 65±5%RH

(3) Operating frequency: 20 operations/min

## ■ Contact Specification

Contacts	Shape	Rivet
	Material	Silver alloy
	Gap (standard value)	0.5 mm
Inrush current	NC	75 A max.
	NO	75 A max.

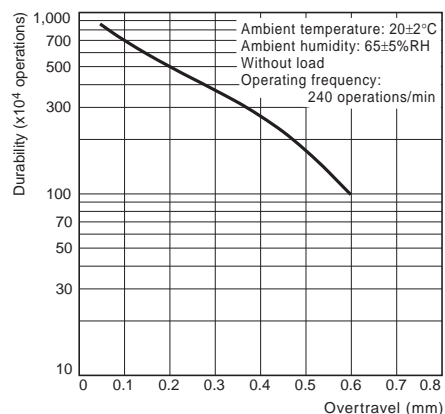
## ■ Safety Standards Ratings

UL/CSA (General ratings only)

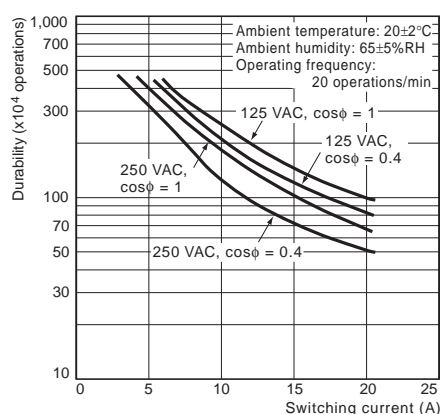
Rated voltage	A-20G
125 VAC	1 HP and 10 A "L" (Tungsten)
250 VAC	2 HP
480 VAC	20 A
125 VDC	0.5 A
250 VDC	0.25 A

# Engineering Data

## Mechanical Durability (A-20G)

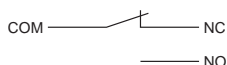


## Electrical Durability (A-20G)



## Structure

### Contact Form (SPDT)

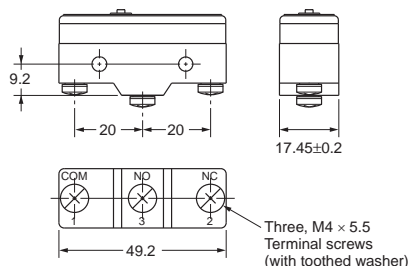


## Dimensions

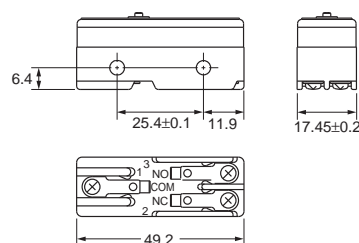
**Note:** Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## Terminals

### Screw Terminals (-B)



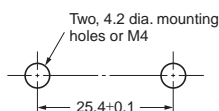
### Solder Terminal (Blank)



**Note:** Appropriate terminal screw tightening torque: 0.78 to 1.18 N-m.

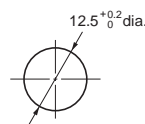
## Mounting Holes

All switches can be mounted using M4 mounting screws with plane washers or spring washers to securely mount the Switch. Tighten the screws to a torque of 1.18 to 1.47 N-m.

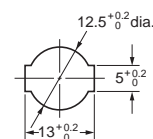


Versions with panel mount plungers can be panel mounted via the plunger, provided that the hexagonal nut of the actuator is tightened to a torque of 2.94 to 4.9 N-m.

### Panel Mount Plunger



### Panel Mount Roller Plunger



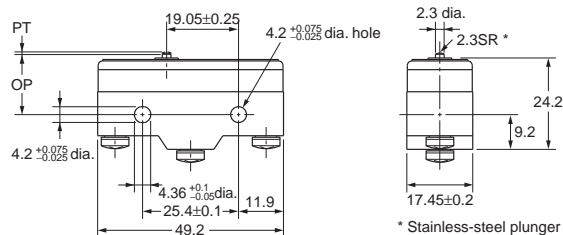
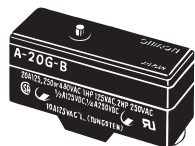
**Note:** Mount using either the side mounting holes or the panel mount plunger, not both. If using the side mounting holes, then remove the hexagonal nut(s) from the panel mount plunger.

**Accessories (Terminal Covers, and Separators): Refer to 'Z/A/X/DZ Common Accessories' datasheet**

**Note:** 1. All drawings show the switches with screw terminals. For solder terminals, remove the “-B” from the end of the part number  
2. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

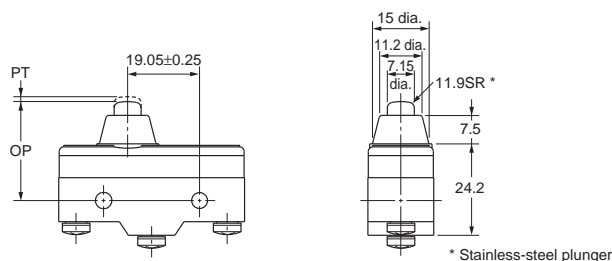
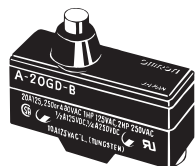
## Pin Plunger

### A-20G-B



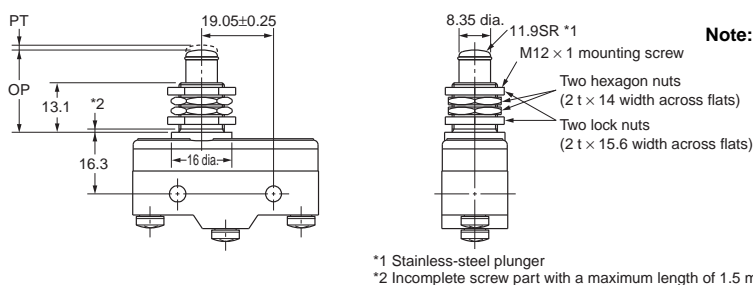
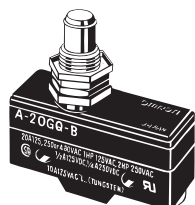
## Short Spring Plunger

### A-20GD-B



## Panel Mount Plunger

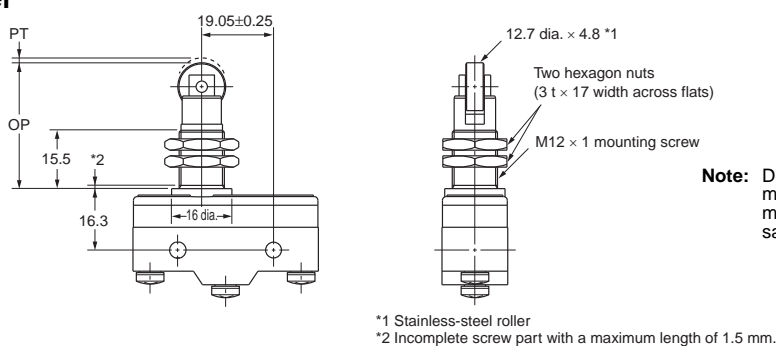
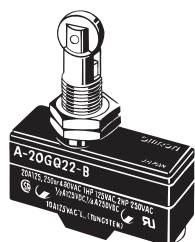
### A-20GQ-B



**Note:** Do not use both M12 mounting screw and mounting holes at the same time.

## Panel Mount Roller Plunger

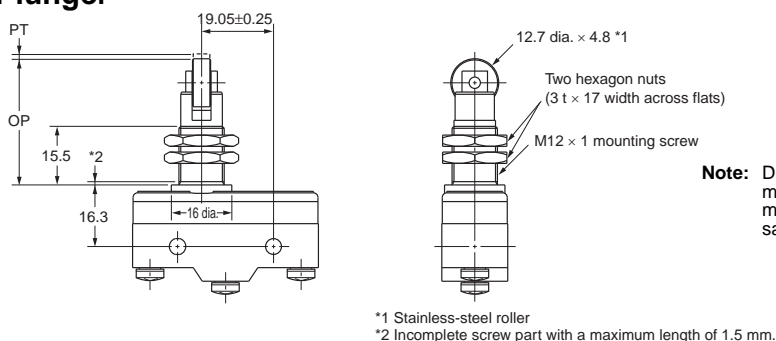
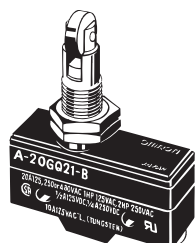
### A-20GQ22-B



**Note:** Do not use both M12 mounting screw and mounting holes at the same time.

## Panel Mount Cross Roller Plunger

### A-20GQ21-B

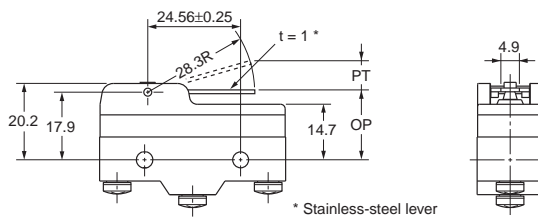


**Note:** Do not use both M12 mounting screw and mounting holes at the same time.

- Note:** 1. All drawings show the switches with screw terminals. For solder terminals, remove the “-B” from the end of the part number  
2. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

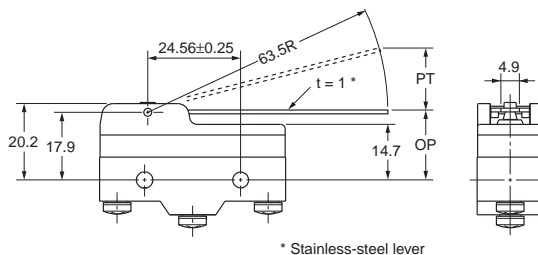
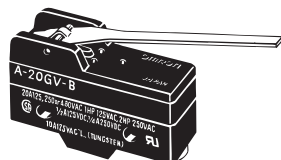
## Short Hinge Lever

A-20GV21-B



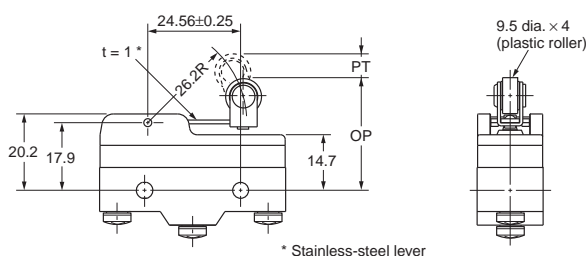
## Hinge Lever

A-20GV-B



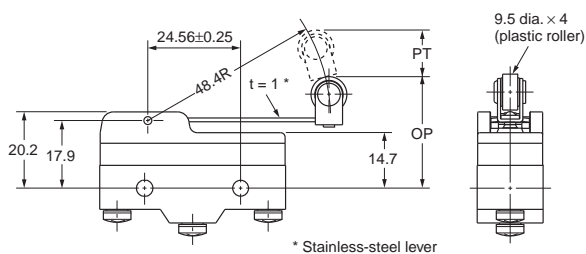
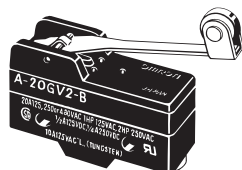
## Short Hinge Roller Lever

A-20GV22-B



## Hinge Roller Lever

A-20GV2-B





# Safety Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## Precautions for Safe Use

### Terminal Connection

When soldering lead wires to the Switch, make sure that the capacity of the soldering iron is 60 W maximum. Do not take more than 5 s to solder any part of the Switch. The characteristics of the Switch will deteriorate if a soldering iron with a capacity of more than 60 W is applied to any part of the Switch for 5 s or more.

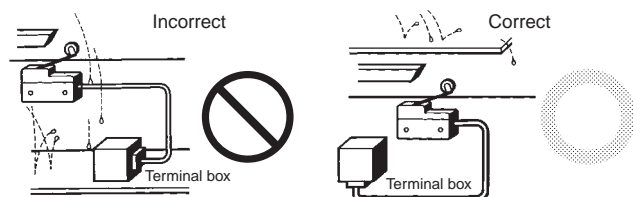
### Operation

- Make sure that the switching frequency or speed is within the specified range.
1. If the switching speed is extremely slow, the contact may not be switched smoothly, which may result in a contact failure or contact welding.
  2. If the switching speed is extremely fast, switching shock may damage the Switch soon. If the switching frequency is too high, the contact may not catch up with the speed.
- The rated permissible switching speed and frequency indicate the switching reliability of the Switch.
- The life of a Switch is determined at the specified switching speed. The life varies with the switching speed and frequency even when they are within the permissible ranges. In order to determine the life of a Switch model to be applied to a particular use, it is best to conduct an appropriate durability test on some samples of the model under actual conditions.
- Make sure that the actuator travel does not exceed the permissible OT position. The operating stroke must be set to 70% to 100% of the rated OT.

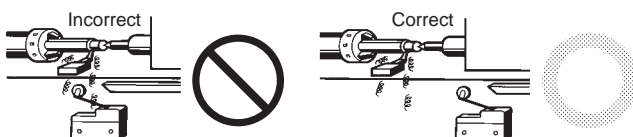
## Precautions for Correct Use

### Mounting Location

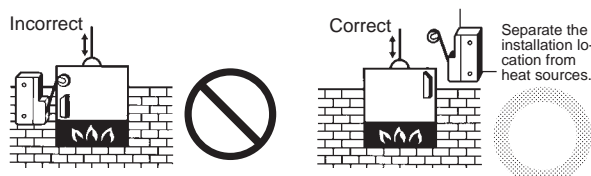
- Do not use the switch alone in atmospheres such as flammable or explosive gases. Arcing and heat generation associated with switching may cause fires or explosions.
- Switches are generally not constructed with resistance against water. Use a protective cover to prevent direct spraying if the switch is used in locations subject to splashing or spurting oil or water, dust adhering.



- Install the switch in a location that is not directly subject to debris and dust from cutting. The actuator and the switch body must be protected from accumulated cutting debris and dirt.



- Do not use the switch in locations subject to hot water (greater than 60°C) or in water vapor.
- Do not use the switch outside the specified temperature and atmospheric conditions. The permissible ambient temperature depends on the model. (Refer to the specifications in this catalog.) Sudden thermal changes may cause thermal shock to distort the switch and result in faults.



- Mount a cover if the switch is to be installed in a location where worker inattention could result in incorrect operation or accidents.



- Subjecting the switch to continuous vibration or shock may result in contact failure or faulty operation due to abrasion powder and in reduced durability. Excessive vibration or shock will cause the contacts to operate malfunction or become damaged. Mount the switch in a location that is not subject to vibration or shock and in a direction that does not subject the switch to resonance.
- If silver contacts are used with relatively low frequency for a long time or are used with microloads, the sulfide coating produced on the contact surface will not be broken down and contact faults will result. Use a microload switch that uses gold contacts.
- Do not use the switch in atmospheres with high humidity or heat or in harmful gases, such as sulfide gas ( $\text{H}_2\text{S}$ ,  $\text{SO}_2$ ), ammonia gas ( $\text{NH}_3$ ), nitric acid gas ( $\text{HNO}_3$ ), or chlorine gas ( $\text{Cl}_2$ ). Doing so may impair functionality, such as with damage due to contacting faults or corrosion.
- The switch includes contacts. If the switch is used in an atmosphere with silicon gas, arc energy may cause silicon oxide ( $\text{SiO}_2$ ) to accumulate on the contacts and result in contact failure. If there is silicon oil, silicon filling, silicon wiring, or other silicon products in the vicinity of the switch, use a contact protection circuit to limit arcing and remove the source of the silicon gas.

### Panel-mounting model (A-20G□)

- If a Switch is side-mounted with screws, remove the hexagonal nut of the actuator.
- If a Switch is side-mounted and secured with screws, make sure that the angle or speed of the actuating object is not excessively large or too high, otherwise the Switch may be damaged.
- If a Switch is panel-mounted, pay utmost attention to make sure that the actuating speed or OT distance is not excessively high or large. Not doing so may damage the Switch.

# Door Interlock Switch D2D

## Power Switch with Minimum Contact Gap up to 3 mm.

- Minimum contact gap of 3 mm (standard models), needed in general power switches, is provided.
- Mechanism with double return spring and direct drive positive contact opening features
- Pull-on lock type for easy maintenance is also available.
- Conforms to Class II of VDE Insulation Grade.
- RoHS Compliant



## Ordering Information

Type	Contact Gap	Contact Form	Part Number	
			Screw mount type	Panel mount type
Standard	3 mm min.	SPDB-NO/NC	D2D-1000	D2D-1100
		SPDB-NO	D2D-1001	D2D-1101
		SPDB-NC	D2D-1002	D2D-1102
		SPDB-NO + SPDB-NO/NC	- - -	D2D-3103
		DPDB-NO	- - -	D2D-3104
Pull-on lock	1 mm	SPDB-NO/NC	D2D-2000	D2D-2100

**Note:** “DB” in the contact form = “Double Break”.

### Model Number Legend

D2D -              
          1   2   3

**1. Construction**

- 1: Single pole, 3-mm contact gap
- 2: Pull-on-lock type, 1-mm contact gap
- 3: Double-pole, 3-mm contact gap

**2. Mounting**

- 0: Screw mount
- 1: Panel snap-fit mount

**3. Contact Form**

- 0: SPDB-NO/NC
- 1: SPDB-NO
- 2: SPDB-NC
- 3: SPDB-NO + SPDB-NO/NC
- 4: DPDB-NO

# Specifications

## ■ Characteristics

Item		D2D-1000 models	D2D-2000 models	D2D-3000 models
Operating speed		10 mm/s to 1 m/s		
Operating frequency		Mechanical: 300 operations per minute max. Electrical: 30 operations per minute max.		
Contact resistance		50 mΩ max.		
Insulation resistance		100 MΩ min. (at 500 VDC)		
Dielectric strength 50/60 Hz, 1mm (See note 2)	Between terminals of same polarity	2,000 VAC	1,000 VAC	2,000 VAC
	Between terminals and ground	2,000 VAC	1,500 VAC	2,000 VAC
	Between terminals and non-current carrying metal parts	2,500 VAC	1,500 VAC	---
	Between terminals and actuator	4,000 VAC	---	4,000 VAC
Vibration resistance		Malfunction: 10 to 55 Hz, 1.5 mm double amplitude		
Shock resistance	Destruction	1,000 m/s <sup>2</sup> (approx 100G) max.		
	Malfunction	500 m/s <sup>2</sup> (approx. 50G) max.	300 m/s <sup>2</sup> (approx. 30G) max.	500 m/s <sup>2</sup> (approx. 50G) max.
Degree of protection		IEC IP40		
Degree of protection vs. electric shock		Class II		
Proof tracking index (PTI)		175		
Ambient operating temperature		-25° to 85°C (at 60% RH max.) with no icing		
Ambient operating humidity		85% max (for 5°C to 35°C)		
Life expectancy		Mechanical: 10,000,000 operations min. at 60 operations/minute Electrical: 100,000 operations min. at 30 operations/minute		
Weight		Approx. 14 g (D2D-1000)		

Note: 1. Data shown are of initial value

2. The dielectric strength shown is measured using a separator between the switch and metal mounting plate

## ■ Ratings (Reference values)

Type	Voltage	Resistive load		Motor load	
		NC	NO	NC	NO
Standard	125 VAC 250 VAC	16 A		4 A	
Pull-on lock	125 VAC 250 VAC	10 A		---	

Note: 1. The above values are for steady-state current and the motor load has an inrush current of 6 times the steady-state current.

2. The ratings apply under the following test conditions: Ambient Temperature = 20±2°C, Ambient Humidity = 65±5%, Operating frequency = 30 operations/min.

## ■ Approved Standards

UL Recognized (File No. E41515)  
CSA Certified (File No. LR21642)

Rated voltage	D2D-1000	D2D-2000	D2D-3000
125 VAC	---	---	3/4 hp
250 VAC	16 A	10 A	16A, 1.5 hp

EN61058-1 (File No. 136005 VDE approval)

Rated voltage	D2D-1000	D2D-2000	D2D-3000
250 VAC	16(4) A	10 A	16(4) A

Testing conditions: 1E4 (10,000 operations), T85 (0°C to 85°C)

Note: The value in parentheses indicate motor load ratings.

EN61058-1 (File No. R9551934, TÜV Rheinland approval)

Rated voltage	D2D-3104
24 VDC	4 A

Testing conditions: 5E4 (50,000 operations), T85 (0°C to 85°C)

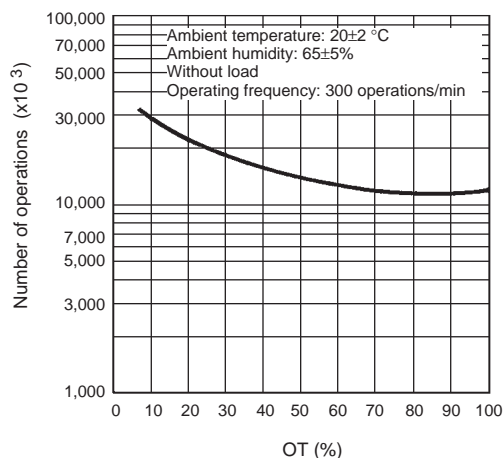
## ■ Contact Specifications

Item	Standard model	Pull-on lock model
Specification	Rivet	
Material	Silver	
Gap (standard value)	3 mm min.	1 mm
Inrush current	30 A max.	24 A max.
Minimum applicable load (see note)	160 mA at 5 VDC	

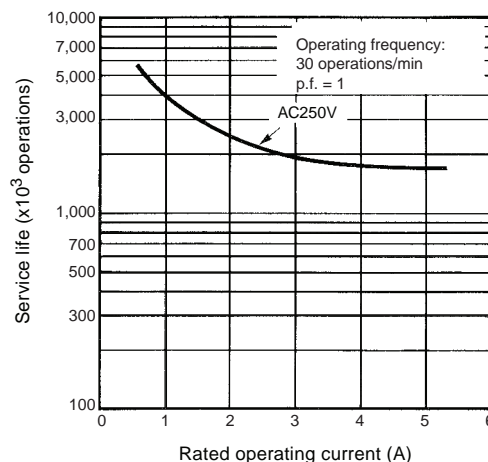
Note: Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003).  
The equation  $\lambda_{60}=0.5 \times 10^{-6}$  / operations indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%

# Engineering Data

## Mechanical Service Life

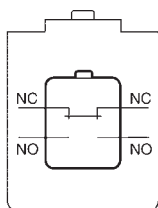


## Electrical Service Life



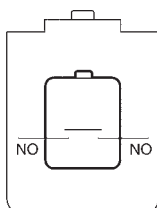
## Contact Form

SPDB-NO/NC



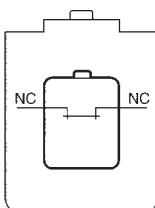
D2D-1000 D2D-2000  
D2D-1100 D2D-2100

SPDB-NO



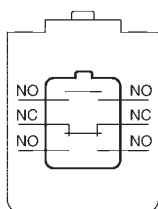
D2D-1001 D2D-1101

SPDB-NC



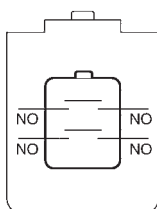
D2D-1002 D2D-1102

SPDB-NO +  
SPDB-NO/NC



D2D-3103

DPDB-NO

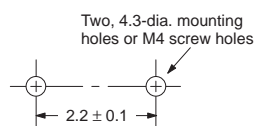


D2D-3104

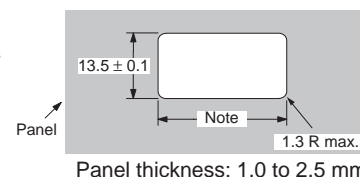
## Mounting Holes

Screw mount switches may be panel mounted using M4 mounting screws with plane washers or spring washers to securely mount the switch. Tighten the screws to a torque of 0.49 to 0.69 N·m

Panel Mount Holes



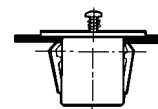
Panel Cutout Dimensions



**Note:** Dimension is  $36.7 \pm 0.1$  with a panel thickness of 1.0 mm and  $37.0 \pm 0.1$  with a panel thickness of 2.5 mm



Screw mount type panel



Panel mount type panel

Snap-fit panel mount switches use the panel cutout hole illustrated above. When mounting on a metal surface, be sure to provide a separator between the switch and mounting plate.

## Pull-on Lock Function

When opening or closing the door, the power ON state of the switch can be checked with the door left open. By closing the door after maintenance inspection, the switch will resume the normal momentary action. (this feature is ideal for conducting the electrical continuity test, inspection, repair, etc. of the switch after its assembly.)

Example		To turn ON the power when the door is closed	To turn OFF the power when the door is open	To turn ON the power with the door left open
State	NO-NO	ON	OFF	ON
	NC-NC	OFF	ON	OFF


## Safety Features

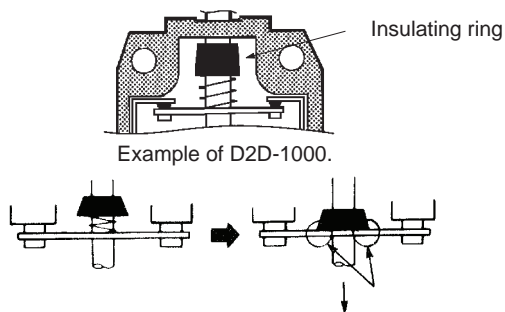
### Double Spring Mechanism

Two return springs are provided for the pin plunger. Thus, if either of the springs are broken, this feature will prevent the switch from malfunctioning or short-circuiting.


(Applicable to D2D-1000 and D2D-3000 models. The D2D-2000 models with pull-on lock is not provided with this feature.)

### Direct Contact Opening Mechanism

The insulating ring, identified by , will positively break the circuit if a contact weld occurs in the switch. (D2D-1000 models).

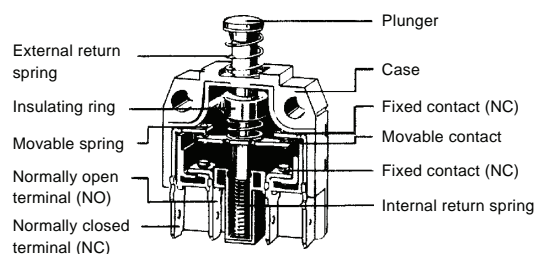


Example of D2D-1000.

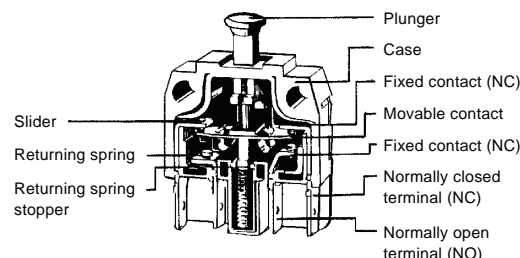
The section marked  pushes the movable contact to apply force in the direction which separates the movable contact forcibly from the fixed contact.

## Structure


### Standard Types



### Pull-on Lock Types



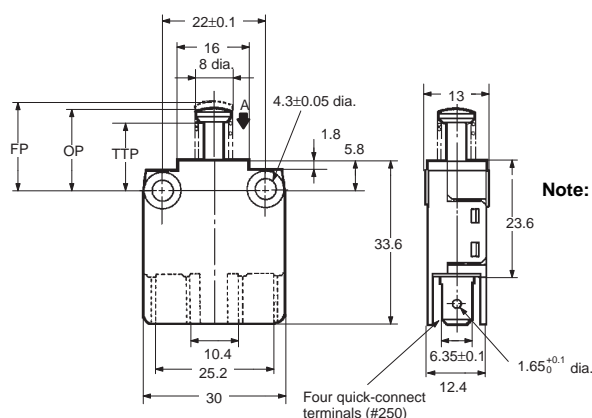
## Dimensions and Operating Characteristics

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
2. The operating characteristics are for operation in the A direction()

## Standard Models

### Screw Mounting

D2D-1000  
D2D-1001  
D2D-1002



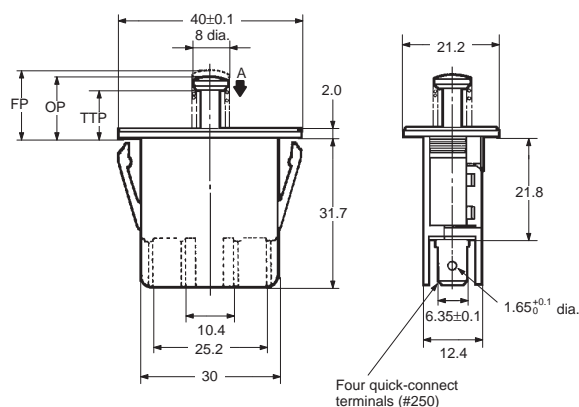
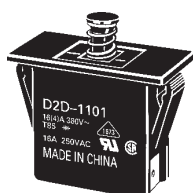
- Note:** 1. NC-OFF: The force applied to the actuator to cause it to move from the free position to the position at which the NC contact opens.  
2. NO-ON: The force applied to the actuator to cause it to move from the free position to the position at which the NO contact closes

Model	D2D-1000	D2D-1001	D2D-1002
OF max.	300 gf	---	300 gf
NC-OFF	600 gf	600 gf	---
NO-ON		750 gf	
TTF max.	2.3 mm		
OT min.	5.5 mm		
FP max.	16.4 mm	17 mm	16.4 mm
OP	15.9 ± 0.4 mm	---	15.9 ± 0.4 mm
NC-OFF	12.7 ± 0.4 mm	12.7 ± 0.4 mm	---
NO-ON			
TTP max.	10 mm		

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
 2. The operating characteristics are for operation in the A direction(▼)

### Panel Mounting

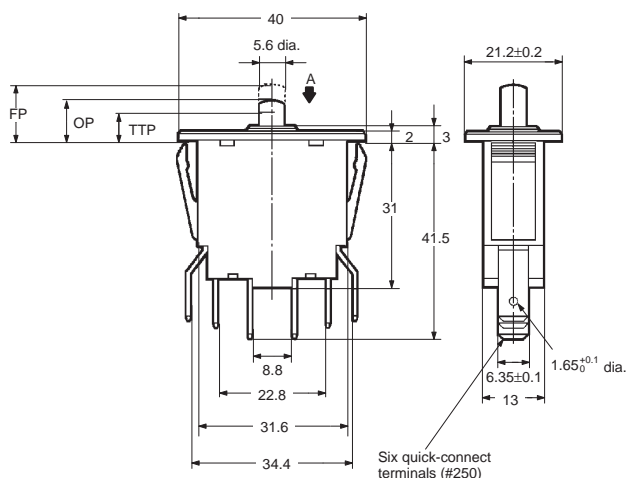
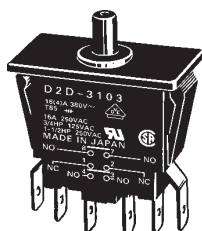
D2D-1100  
 D2D-1101  
 D2D-1102



Model	D2D-1100	D2D-1101	D2D-1102
OF max.	NC-OFF NO-ON	300 gf 600 gf	---
TTF max.	750 gf		
OT min.	2.3 mm		
FP max.	12.4 mm	13 mm	12.4 mm
OP	NC-OFF NO-ON	11.9 ± 0.4 mm 8.7 ± 0.4 mm	---
TTP max.	6 mm		

### Panel Mounting

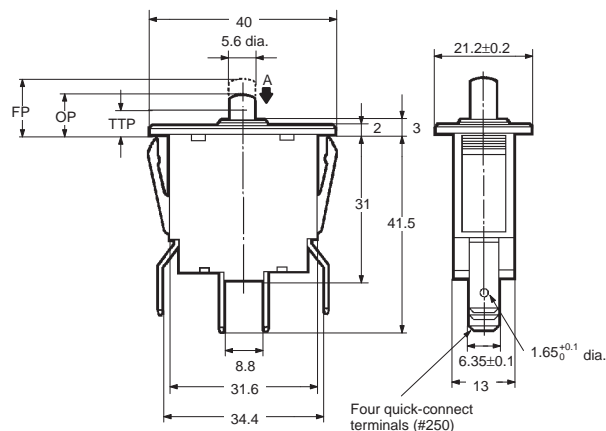
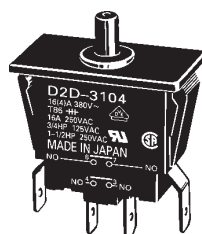
D2D-3103



Model	D2D-3103
OF max.	NC-OFF NO-ON
TTF max.	300 gf 600 gf
OT min.	1,000 gf
FP max.	2.3 mm
OP	NC-OFF NO-ON
TTP max.	11.9 ± 0.8 mm 8.7 ± 0.8 mm
	6.4 mm

### Panel Mounting

D2D-3104



Model	D2D-3104
OF max.	NC-OFF NO-ON
TTF max.	---
OT min.	600 gf
FP max.	1,000 gf
OP	NC-OFF NO-ON
TTP max.	2.3 mm
	13.4 mm
	---
	8.7 ± 0.8 mm
	6.4 mm

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
2. The operating characteristics are for operation in the A direction(▼)

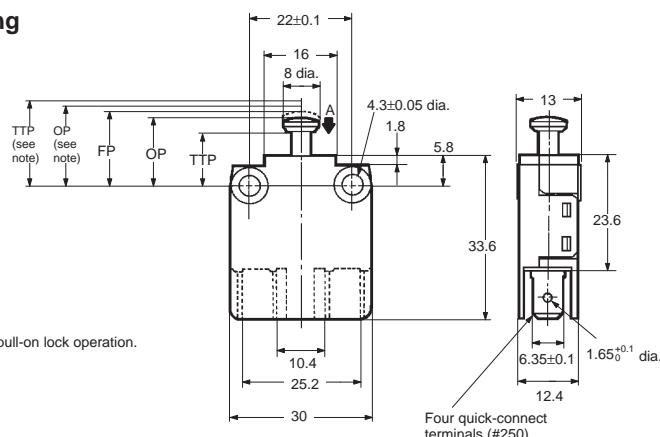
## Pull-on Lock Models

### Screw Mounting

D2D-2000



**Note:** At pull-on lock operation.

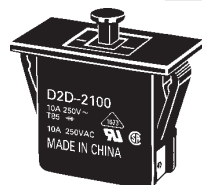


### Momentary Operation (Normal Operation)

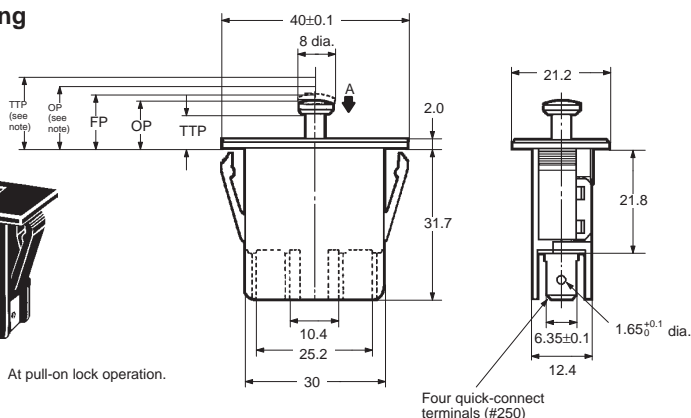
Model	D2D-2000	D2D-2100
OF max.	NC-OFF NO-ON	200 gf 300 gf
TTF max.		600 gf
OT min.		4.5 mm
FP max.	14.3 mm	10.3 mm
OP	NC-OFF NO-ON	13.5 ± 0.6 mm 12.7 ± 0.6 mm
TTP max.	8.3 mm	4.3 mm

### Panel Mounting

D2D-2100



**Note:** At pull-on lock operation.



### Pull-on Lock Operation

Model	D2D-2000	D2D-2100
OF max.	2,000 gf	
PT max.	2 mm	
OT min.	0.4 mm	
MD max.	1.5 mm	
FP max.	14.3 mm	10.3 mm
OP	15.1 ± 0.6 mm	11.1 ± 0.6 mm
TTP max.	16.5 mm	12.5 mm

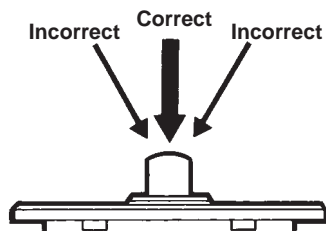
## Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

### Correct Use

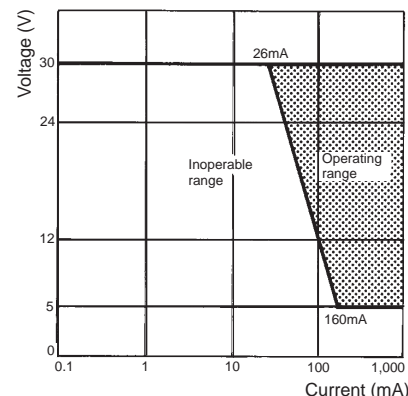
#### Actuation

Apply operation force to the pin plunger in the direction it operates. Applying forces laterally or from an oblique direction may damage the pin plunger.



#### Using Microloads

Using a model for ordinary loads to switch microloads may result in faulty operation. Instead, use the models that are designed for microloads and that operate in the following range;



However, even when using microload models within the operating range shown above, if inrush current or inductive voltage spikes occur when the contact is opened or closed, then contact wear may increase and so decrease the service life. Therefore, insert a contact protection circuit where necessary.

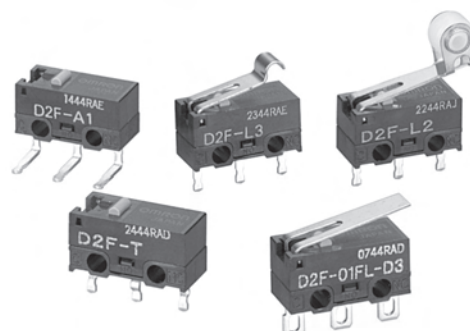


# Snap Action Switch

## D2F

### Subminiature Snap Action Switch

- Switches 3 A loads (general-purpose), 1 A loads (low force general-purpose) and 0.1 A loads (microvoltage/microcurrent)
- Long life span assured by high-precision dual spring reverse-action mechanism
- Flux penetration prevented by using an insert terminal and allowing a height difference at the case bottom
- Ideal for a wide range of applications including appliances, office equipment, audio and communications equipment
- RoHS Compliant



### Ordering Information

Actuator	Contact type	Model	Contact OF	Model					
				Terminal type					
				PCB	Self-supporting	Solder	Compact Solder	Right-angle	Left-angle
	Microvoltage/current	Low force	75 g	D2F-01F	D2F-01F-T	D2F-01F-D3	D2F-01F-D	D2F-01F-A	D2F-01F-A1
		Standard	150 g	D2F-01	D2F-01-T	D2F-01-D3	D2F-01-D	D2F-01-A	D2F-01-A1
	General-purpose	Low force	75 g	D2F-F	D2F-F-T	D2F-F-D3	D2F-F-D	D2F-F-A	D2F-F-A1
		Standard	150 g	D2F	D2F-T	D2F-D3	D2F-D	D2F-A	D2F-A1
	Microvoltage/current	Low force	25 g	D2F-01FL	D2F-01FL-T	D2F-01FL-D3	D2F-01FL-D	D2F-01FL-A	D2F-01FL-A1
		Standard	80 g	D2F-01L	D2F-01L-T	D2F-01L-D3	D2F-01L-D	D2F-01L-A	D2F-01L-A1
	General-purpose	Low force	25 g	D2F-FL	D2F-FL-T	D2F-FL-D3	D2F-FL-D	D2F-FL-A	D2F-FL-A1
		Standard	80 g	D2F-L	D2F-L-T	D2F-L-D3	D2F-L-D	D2F-L-A	D2F-L-A1
	Microvoltage/current	Low force	40 g	D2F-01FL3	D2F-01FL3-T	D2F-01FL3-D3	D2F-01FL3-D	D2F-01FL3-A	D2F-01FL3-A1
		Standard	80 g	D2F-01L3	D2F-01L3-T	D2F-01L3-D3	D2F-01L3-D	D2F-01L3-A	D2F-01L3-A1
	General-purpose	Low force	40 g	D2F-FL3	D2F-FL3-T	D2F-FL3-D3	D2F-FL3-D	D2F-FL3-A	D2F-FL3-A1
		Standard	80 g	D2F-L3	D2F-L3-T	D2F-L3-D3	D2F-L3-D	D2F-L3-A	D2F-L3-A1
	Microvoltage/current	Low force	40 g	D2F-01FL2	D2F-01FL2-T	D2F-01FL2-D3	D2F-01FL2-D	D2F-01FL2-A	D2F-01FL2-A1
		Standard	80 g	D2F-01L2	D2F-01L2-T	D2F-01L2-D3	D2F-01L2-D	D2F-01L2-A	D2F-01L2-A1
	General-purpose	Low force	40 g	D2F-FL2	D2F-FL2-T	D2F-FL2-D3	D2F-FL2-D	D2F-FL2-A	D2F-FL2-A1
		Standard	80 g	D2F-L2	D2F-L2-T	D2F-L2-D3	D2F-L2-D	D2F-L2-A	D2F-L2-A1

### Model Number Legend

D2F-□ □ □ □  
1 2 3 4

#### 1. Ratings

None: General loads  
01: Micro loads (0.1 A at 30 VDC)

#### 2. Maximum Operating Force

None: 1.47 N {150 gf}  
F: 0.74 N {75 gf}

**Note:** These OF values are for the pin plunger models.

#### 3. Actuator

None: Pin plunger  
L: Hinge lever  
L2: Hinge roller lever  
L3: Simulated roller lever

#### 4. Terminals

None: PCB terminals/straight terminals  
-T: Self-clinching PCB terminals  
-A: Right-angled PCB terminals  
-A1: Left-angled PCB terminals  
-D3: Solder terminals  
-D: Compact solder terminals

# Specifications

## ■ Characteristics

Operating speed	1 to 500 mm/second (pin plunger models)
Operating frequency	Mechanical: 200 operations per minute max. Electrical: 30 operations per minute max.
Contact resistance	General Purpose: 30 mΩ max. (Standard force versions) 50 mΩ max. (Low force versions) Microload: 100 mΩ max.
Insulation resistance	100 MΩ min. at 500 VDC
Dielectric strength (See note 2)	600 VAC, 50/60 Hz for 1 minute between terminals of same polarity 1,500 VAC, 50/60 Hz for 1 minute between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts
Vibration resistance (See note 3)	Malfunction: 10 to 55 Hz, 1.5 mm double amplitude
Shock resistance (See note 3)	Destruction: 1,000 m/s <sup>2</sup> (approx. 100G) max. Malfunction: 300 m/s <sup>2</sup> (approx. 30 g min.) max.
Degree of protection	IEC IP40
Degree of protection against electric shock	Class I
Proof tracking index (PTI)	175
Ambient operating temperature	-25° to 65°C (at 60% RH) with no icing
Ambient operating Humidity	85% max. (for 5° to 35°C)
Service life (Consult Omron for test conditions)	Mechanical: 1 million operations min. at 60 operations/minute. Electrical: 30,000 operations min. at 30 operations/minute.
Weight	Approx. 0.5 g (pin plunger models)

**Note:** 1. Data shown are of initial value.

2. The dielectric strength shown in the table indicates a value for models with a separator.

3. For pin plunger models, the values are measured at the free position and total travel position. For the lever models, they are measured at the total travel position.

## ■ Ratings

Rated Voltage	Resistive load			
	Microvoltage/current (D2F-01 models)		General-purpose (D2F models)	
	Low force	Standard	Low force	Standard
125 VAC	—	—	1 A	3 A
30 VDC	0.1 A	0.1 A	0.5 A	2 A

**Note:** 1. When using an inductive load or motor load, consult OMRON.

2. The ratings apply under the following test conditions: Ambient Temperature = 20±2°C, Ambient Humidity = 65±5%, Operating frequency = 30 operations/min.

## ■ Approvals

### UL Recognized, CSA Certified

Rated voltage	D2F		D2F-01
	Standard Force	Low Force	
125 VAC	3 A	1 A	—
30 VDC	2 A	0.5 A	0.1 A

**Note:** The rated values approved by each of the safety standards (e.g. UL, CSA) may be different from the performance characteristics individually defined in this catalog.

## ■ Contact Specifications

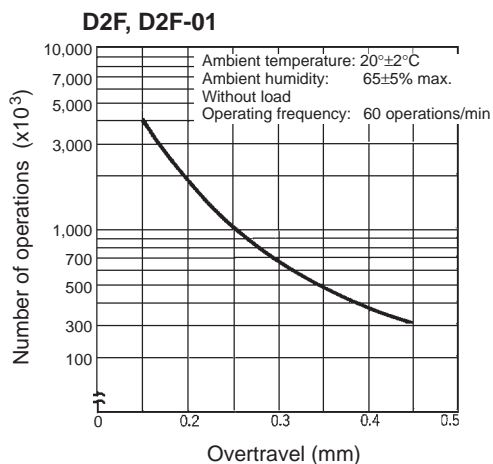
Item	D2F	D2F-01
Specification	Crossbar	
Material	Silver alloy	Gold alloy
Gap (Standard value)	0.25 mm	
Minimum Applicable Load (See note)	100 mA at 5 VDC	1 mA at 5VDC

**Note:** Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003).

The equation  $\lambda_{60}=0.5 \times 10^{-6}$ /operations indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%.

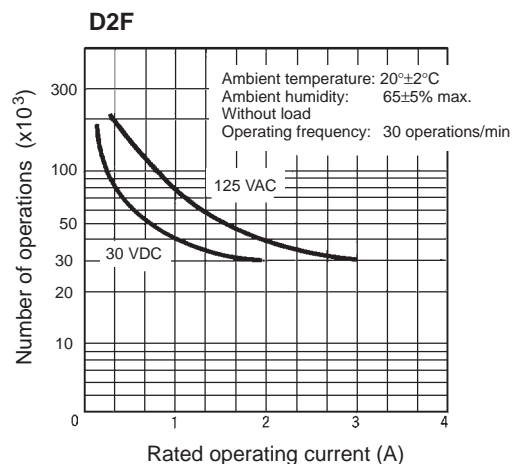
# Engineering Data

## Mechanical Service Life



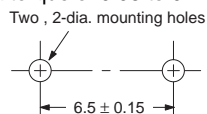
**Note:** Values are for pin plunger actuator type.

## Electrical Service Life

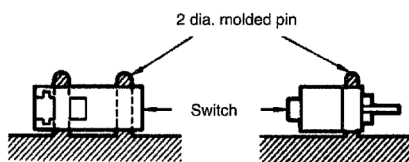


## Mounting

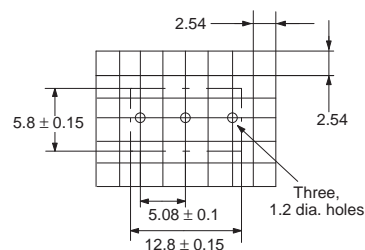
All switches may be panel mounted using M2 mounting screws with plane washers or spring washers to securely mount the switch. Tighten the screws to a torque of 0.08 to 0.1 N·m.



Use of molded components is recommended for mounting purposes

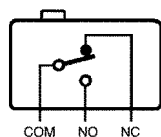


## PCB Layout (reference)



## Structure

### Contact Form (SPDT)

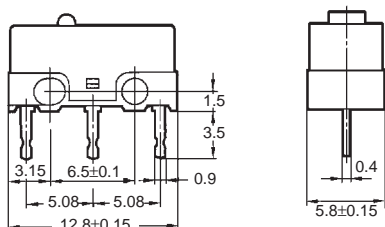


# Dimensions

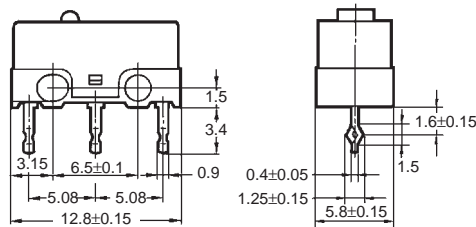
## ■ Terminals

**Note:** Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions

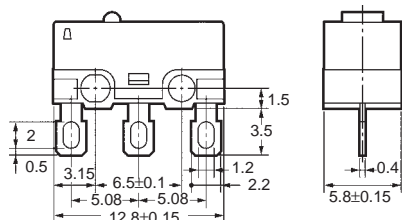
### PCB terminals D2F



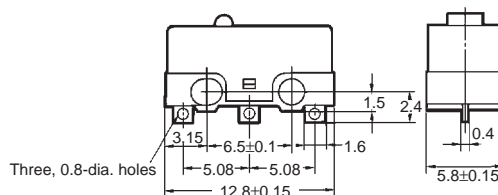
### Self-supporting terminals D2F-T



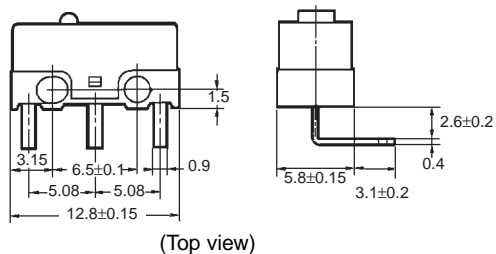
### Solder terminals D2F-D3



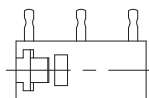
### Compact solder terminals D2F-D



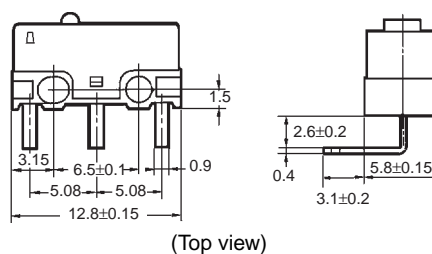
### Right-angle PCB terminals D2F-A



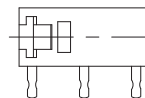
(Top view)



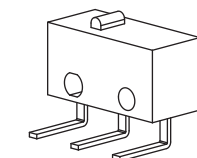
### Left-angle PCB terminals D2F-A1



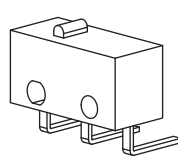
(Top view)



**Note:** Angled terminal directions are shown below.



Left-angled terminal



Right-angled terminal

# Dimensions and Operating Characteristics

**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions

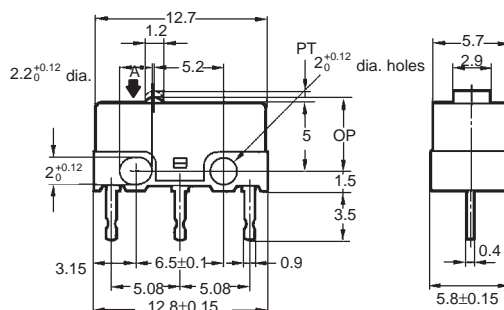
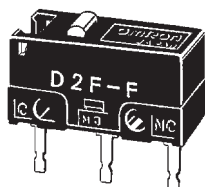
2. Omitted dimensions are the same as pin plunger type.

3. The following illustrations and dimensions are for models with PCB terminals. Refer to "Terminals" for models with self-supporting, solder and right / left angle terminal specifics.

4. The operating characteristics are for operation in the A direction(▼)

## Pin Plunger Models

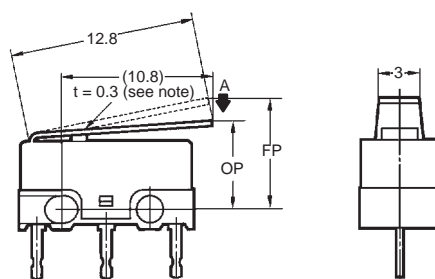
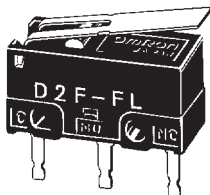
D2F-□  
D2F-01-□  
D2F-F-□  
D2F-01F-□



Characteristics	D2F-□ D2F-01-□	D2F-F-□ D2F-01F-□
OF max.	150 g	75 g
RF min.	20 g	5 g
PT max.	0.5 mm	0.5 mm
OT min.	0.25 mm	0.25 mm
MD max.	0.12 mm	0.12 mm
OP	5.5 ± 0.3 mm	5.5 ± 0.3 mm
FP max.	—	—

## Hinge Lever Models

D2F-L-□  
D2F-01L-□  
D2F-FL-□  
D2F-01FL-□

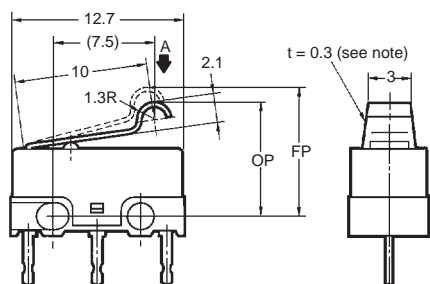
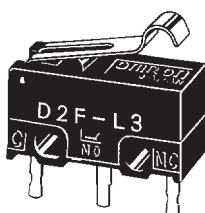


**Note:** Stainless-steel lever

Characteristics	D2F-L-□ D2F-01L-□	D2F-FL-□ D2F-01FL-□
OF max.	80 g	25 g
RF min.	5 g	2 g
PT max.	—	—
OT min.	0.55 mm	0.55 mm
MD max.	0.5 mm	0.5 mm
OP	6.8 ± 1.5 mm	6.8 ± 1.5 mm
FP max.	10 mm	10 mm

## Simulated Roller Lever Models

D2F-L3-□  
D2F-01L3-□  
D2F-FL3-□  
D2F-01FL3-□

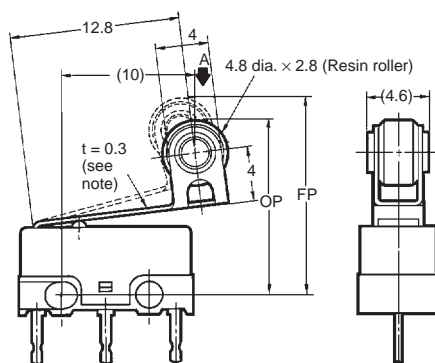
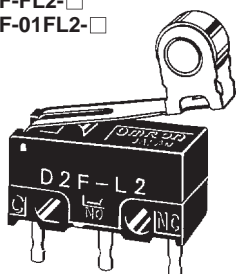


**Note:** Stainless-steel lever

Characteristics	D2F-L3-□ D2F-01L3-□	D2F-FL3-□ D2F-01FL3-□
OF max.	80 g	40 g
RF min.	5 g	2 g
PT max.	—	—
OT min.	0.5 mm	0.5 mm
MD max.	0.45 mm	0.45 mm
OP	8.5 ± 1.2 mm	8.5 ± 1.2 mm
FP max.	13 mm	13 mm

## Hinge Roller Lever Models

D2F-L2-□  
D2F-01L2-□  
D2F-FL2-□  
D2F-01FL2-□



**Note:** Stainless-steel lever

Characteristics	D2F-L2-□ D2F-01L2-□	D2F-FL2-□ D2F-01FL2-□
OF max.	80 g	40 g
RF min.	5 g	2 g
PT max.	—	—
OT min.	0.55 mm	0.55 mm
MD max.	0.5 mm	0.5 mm
OP	13 ± 2.0 mm	13 ± 2.0 mm
FP max.	16.5 mm	16.5 mm

# Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## ■ Correct Use

### Mounting

Turn OFF the power supply before mounting or removing the switch, wiring the switch, or performing maintenance or inspection. Failure to do so may result in electric shock or burning.

Mount the switch onto a flat surface. Mounting on an uneven surface may cause deformation of the switch, resulting in faulty operation or breakage of the housing.

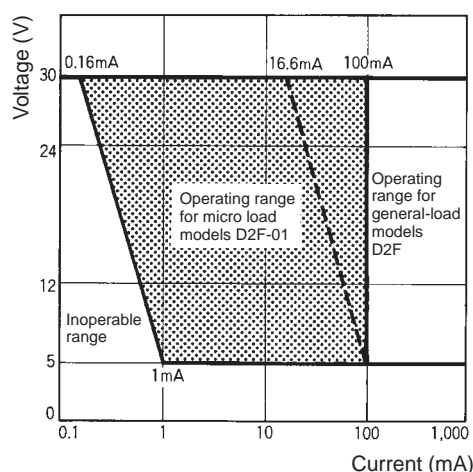
Allow sufficient insulation distance between terminals, terminal traces and between terminals and ground.

### Operating Stroke Setting

Take particular care in setting the operating stroke for the pin plunger models. Make sure that the operating stroke is 70% to 100% of the rated OT distance. Do not operate the actuator exceeding the OT distance, otherwise the service life of the switch maybe decreased.

### Using Microloads

Using a model for ordinary loads to switch microloads may result in faulty operation. Instead, use the models that are designed for microloads and that operate in the following range;



However, even when using microload models within the operating range shown above, if inrush current or inductive voltage spikes occur when the contact is opened or closed, it may increase contact wear and so decrease the service life. Therefore, insert a contact protection circuit where necessary.

## ■ Cautions

### Terminal Connection

When soldering a lead wire to the terminal, first insert the lead wire conductor into the terminal hole and then perform soldering.

Make sure that the capacity of the soldering iron is 30 W maximum and that the temperature of the soldering tip is approximately 300 °C. (350 °C maximum.) Complete soldering within 3 s. After soldering, do not apply external force to the soldered area for about 1 minute.

Using a switch with improper soldering may result in abnormal heating, possibly resulting in a burn.

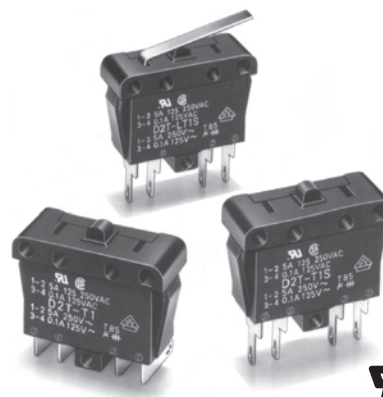
Applying the soldering iron for more than 3 s or using an iron that is rated for more than 30 W may deteriorate the switch characteristics.

When soldering the lead wire to the PCB terminal, pay careful attention so that the flux and solder liquid level does not exceed the PCB level.



# Door Interlock Switch D2T

## Compact DPST-NO Snap Action Switch

- Incorporates circuits for power and low-level loads
- Approved by safety standards, such as UL, CSA, and VDE
- As compact as OMRON's V-series snap action switches
- Contact gap of 0.7 mm min.
- Panel or screw-mounted with ease
- Straight and angled terminals are available
- RoHS Compliant



## Ordering Information

Actuator	Right-angled solder terminal	Straight solder terminal
Pin plunger 	D2T-T1	D2T-T1S
Hinge lever 	D2T-LT1	D2T-LT1S

**Note:** The actuator of the D2T is identical to that used for OMRON's V-series Snap-action Switches. The actuator can be replaced with other types of actuators. Contact your OMRON representative for details.

## Model Number Legend

D2T- T1   
1      2

1. **Actuator**  
None: Pin plunger  
L: Hinge lever

2. **Terminals**  
None: Right-angled solder terminals  
S: Straight solder terminals

## Specifications

### ■ Characteristics (Initial)

Operating speed	10 to 500 mm/second
Operating frequency	Mechanical: 120 operations per minute max. Electrical: 30 operations per minute max.
Contact resistance	50 mΩ max. between terminals 1 and 2 100 mΩ max. between terminals 3 and 4
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength (See note 1)	1,000 VAC for 1 minute 50/60 Hz between terminals of same polarity 1,500 VAC for 1 minute 50/60 Hz between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal part, and between terminals of different polarity
Vibration resistance (See note 2)	Malfunction: 10 to 55 Hz, 1.5 mm double amplitude
Shock resistance (See note 2)	Destruction: 1,000 m/s <sup>2</sup> (approx 100G) max. Malfunction: 300 m/s <sup>2</sup> (approx. 30G) max.
Degree of protection	IEC IP40
Degree of protection vs. electric shock	Class I
Proof tracking index (PTI)	175
Ambient operating temperature	-25° to 85°C (at 60% RH max.) with no icing
Ambient operating humidity	85% max (for 5°C to 35°C)
Life expectancy	Mechanical: 100,000 operations min. at 60 operations/minute Electrical: 100,000 operations min. at 30 operations/minute
Weight	Approx. 10 g (for pin plunger models)

**Note:** 1. The dielectric strength shown is measured using a separator between the switch and metal mounting plate

2. For the pin plunger models, the above values apply for use at the free position and total travel position.  
For lever models, they apply at the total travel position. Contact opening or closing time is within 1ms.



## ■ Ratings (Reference values)

Voltage	Resistive Load	
	Between terminals 1 and 2	Between terminals 3 and 4
250 VAC	5A	---
125 VAC	5A	0.1A
30 VDC	6A	0.1A

**Note:** The ratings apply under the following test conditions: Ambient Temperature = 20±2°C, Ambient Humidity = 65±5%, Operating frequency = 30 operations/min.

## ■ Approved Standards

UL Recognized  
CSA Certified

Rated voltage	Between terminals 1 and 2	Between terminals 3 and 4
125 VAC	5A	0.1A (for 100,000 operations)
250 VAC	5A	---

EN61058-1 (VDE approval)

Rated voltage	Between terminals 1 and 2	Between terminals 3 and 4
125 VAC	---	0.1A
250 VAC	5A	---

Testing conditions: 5E4 (50,000 operations), T85 (0°C to 85°C)

## ■ Contact Specifications

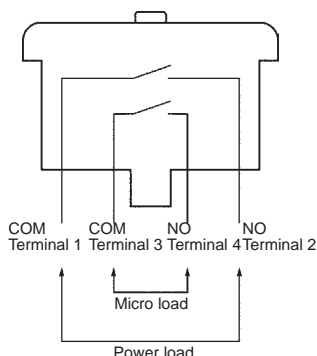
Item	Terminals 1 and 2	Terminals 3 and 4
Specification	Rivet	Plated
Material	Silver	
Gap (standard value)	1 mm	1.4 mm
Inrush current	60 A max.	---
Minimum applicable load (see note)	160 mA at 5 VDC	1 mA at 5 VDC

**Note:** Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003).  
The equation  $\lambda_{60}=0.5 \times 10^{-6}$  / operations indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%

## Engineering Data

### ■ Contact Form

DPST-NO

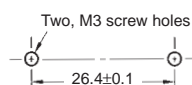


**Note:** The circuit switching power load has a snap-action mechanism. The circuit switching low-level load has a slow-action mechanism.

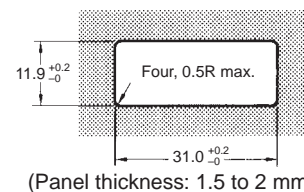
### ■ Mounting Holes

All switches may be panel mounted using M3 mounting screws with plane washers or spring washers to securely mount the switch. Tighten the screws to a torque of 0.4 to 0.6 N·m

Panel Mount Holes



Panel Cutout Dimensions



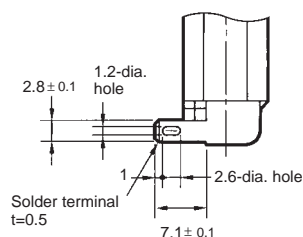
When mounting on a metal surface, be sure to provide a separator between the switch and mounting plate.

# Dimensions

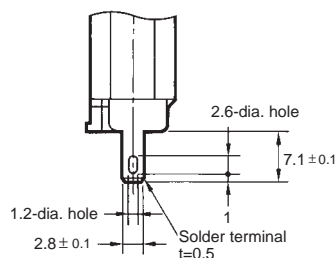
## ■ Terminals

**Note:** Unless otherwise specified, all units are in millimeters

### Angled Terminals



### Straight Terminals



## ■ Dimensions and Operating Characteristics

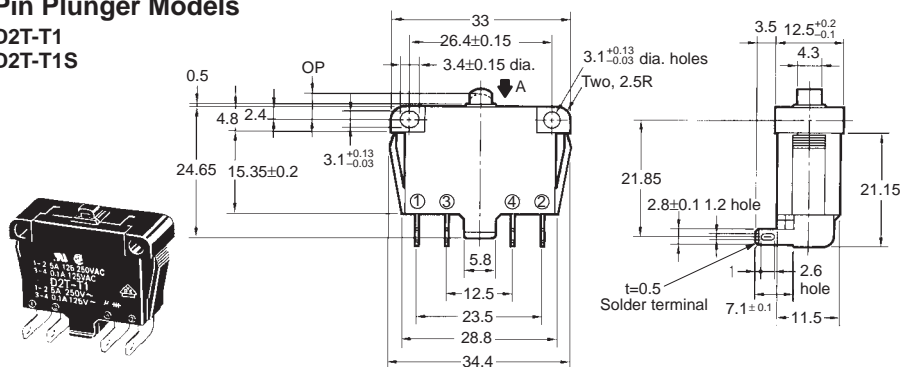
**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions

2. The following illustrations and dimensions are for D2T models with angled terminals. Refer to the dimensions in "Terminals" for the straight terminal versions of D2T.

3. The operating characteristics are for operation in the A direction (↓)

### Pin Plunger Models

D2T-T1  
D2T-T1S

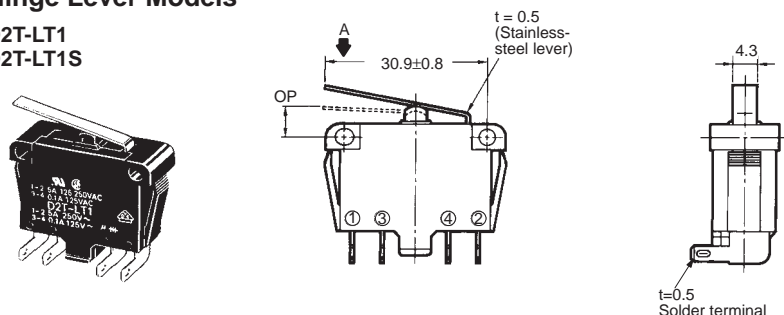


OF max.	330 gf
RF min.	50 gf
TTF max.	650 gf
OT min.	0.8 mm
OP	4.4 ± 0.6 mm (see note)

**Note:** Operating sequence of the circuit between terminals 1 and 2 and the circuit between terminals 3 and 4 is not specified.

### Hinge Lever Models

D2T-LT1  
D2T-LT1S



OF max.	150 gf
RF min.	20 gf
TTF max.	250 gf
OT min.	1.6 mm
OP	6.9 ± 1.3 mm (see note)

**Note:** Operating sequence of the circuit between terminals 1 and 2 and the circuit between terminals 3 and 4 is not specified.

## Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

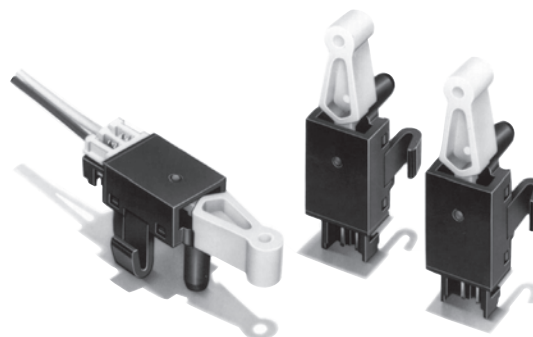
# MEMO

# Detection Switch

## D2X

### Switch with Crimp Connector

- Reduced wiring time with AMP crimp-type connectors
- Snap-fit attachment for easy installation
- Actuator operates from either side, allowing mounting in either direction
- High contact force and wiping action for greater contact reliability
- Rated load 0.1 A at 30 VDC
- RoHS Compliant



### Ordering Information

Actuator	Terminal	Contact OF	Model
			Standard Model
Center mounted rotary lever	Crimp-type connector	50 g	D2X-C

### Specifications

#### ■ Characteristics

Electrical ratings	0.1 A, 30 VDC (resistive load)
Operating speed	0.1 mm to 100 mm/second
Operating frequency	Mechanical: 60 operations per minute Electrical: 30 operations per minute
Contact resistance	200 mΩ max.
Insulation resistance	100 MΩ min. at 250 VDC
Dielectric strength	250 VAC, 50/60 Hz for 1 minute between terminals of same polarity 250 VAC, 50/60 Hz for 1 minute between current-carrying metal parts and ground
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5 mm double amplitude
Shock resistance	Destruction: 500 m/s <sup>2</sup> (approx. 50G) max. Malfunction: 300 m/s <sup>2</sup> (approx. 30G) max.
Degree of protection	IEC IP00
Degree of protection against electric shock	Class I
Proof tracking index (PTI)	175
Ambient operating temperature	-10° to 70°C (at 60% RH max.) with no icing
Ambient operating humidity	45% to 85% (for 5°C to 35°C)
Service life	Mechanical: 1,000,000 operations min. Electrical: 50,000 operations min.
Weight	Approx. 1 g

**Note:** 1. Data shown are of initial value.

2. The ratings apply under the following test conditions: Ambient Temperature = 20±2°C, Ambient Humidity = 65±5%, Operating frequency = 30 operations/min.

# Engineering Data

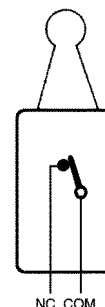
## Contact Specifications

Item	Specification
Specification	Slide
Material	Gold plated
Minimum applicable load (see note)	1 mA at 5 VDC

**Note:** Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003).

The equation  $\lambda_{60}=0.5 \times 10^{-6}/\text{operations}$  indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%.

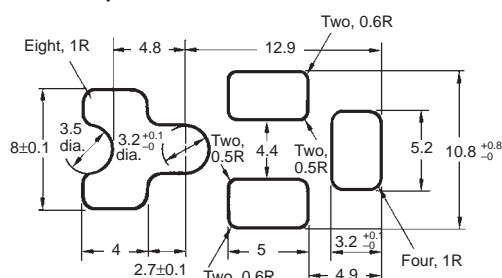
## Contact Form



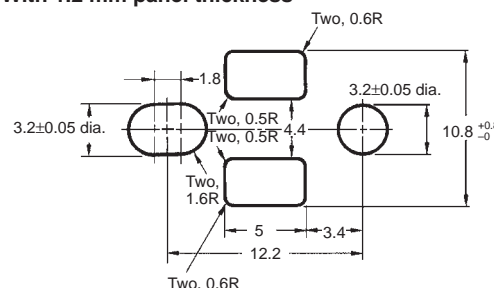
## Panel Mounting Holes

- Note:**
1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.1$  mm applies to all dimensions
  2. The tolerance from the center of each hole is  $\pm 0.07$
  3. Make sure that any burrs are located on the backside of the mounting plate

With 1.6 mm panel thickness



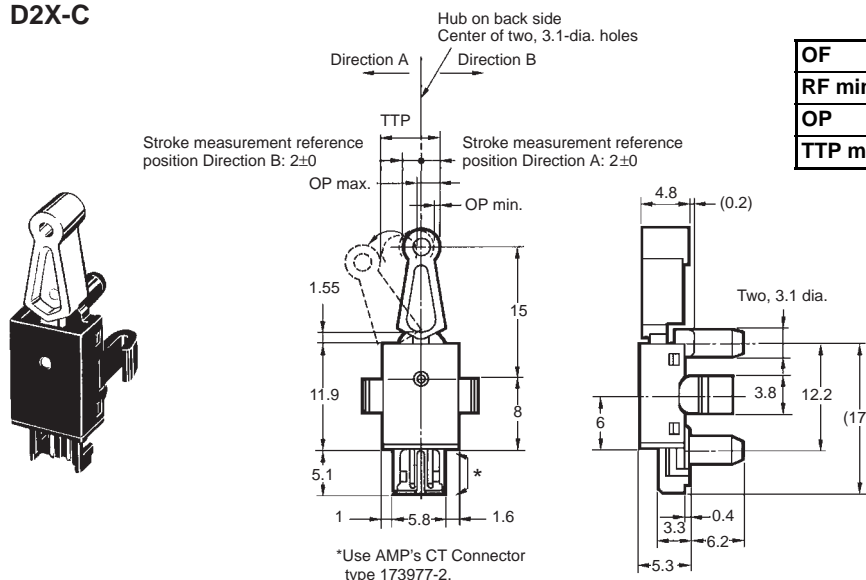
With 1.2 mm panel thickness



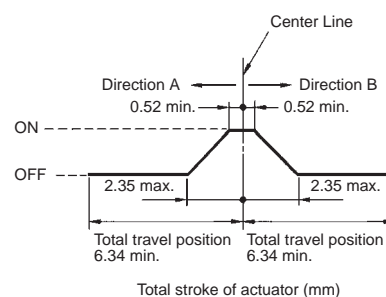
## Dimensions

- Note:**
1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.
  2. The operating characteristics are for cases where the actuator operates in the A ( $\leftarrow$ ) direction or B ( $\rightarrow$ ) direction.

### D2X-C



OF	50 g
RF min.	2 g
OP	2° to 9° max. or 0.52 to 2.35 mm
TTP max.	25° or 6.34 mm



# Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## ■ Correct Use

### Operating Object

For proper operation, follow these guidelines:

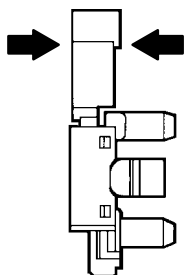
Set the dog or cam stroke so the actuator does not receive excessive force when the switch is actuated. When the actuator is released, the dog or cam must not be touching the actuator head.

Set the dog or cam so that it will press the head of the lever in the traveling direction of the lever.

Do not allow the lever to be pressed beyond the TTP, otherwise the D2X may be damaged.

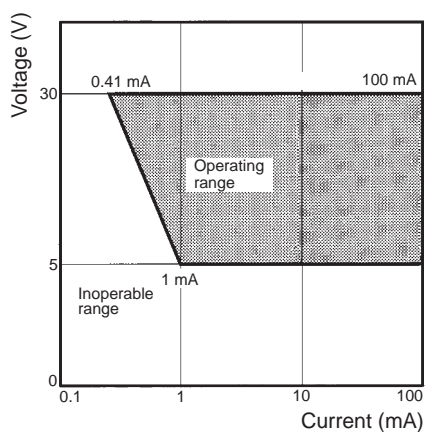
### Lever Load

Do not impose loads in the following directions on the lever, otherwise the Switch may be damaged or malfunction.



### Microload

Be sure that the load is within the following range:



## ■ Wiring Connector

Use the following type CT connectors of AMP for wiring.

Press-fit connector: 173997-2

Crimp-style connector housing: 179228-2

Crimp-style connector contact: 179227-1

The above connectors are not sold by Omron.

Contact Tyco Electronic's AMP offices for these connectors

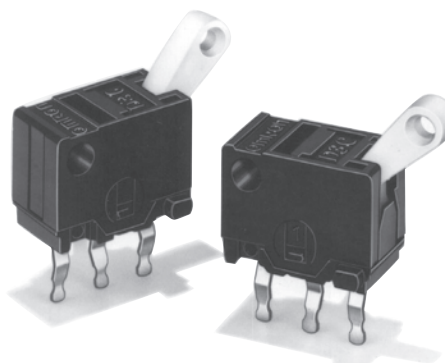
# MEMO

# Detection Switch

## D3C

### Subminiature Detection Switch

- Built-in slide mechanism provides reliable contact
- Choose from shorting or non-shorting switch timing models
- PCB mount switch with 100 milliamp capacity
- Ideal for household appliances, sound equipment, office equipment, communications equipment, etc.
- Compact size
- RoHS Compliant



## Ordering Information

Actuator	General Purpose		Low Operating Force	
	Non-shorting Model	Shorting Model	Non-shorting Model	Shorting Model
Pivoting Hinge lever	D3C-1210	D3C-2210	D3C-1220	D3C-2220

### Model Number Legend

D3C- 2 0  
           1    2

#### 1. Switching Timing

- 1: Non-shorting  
(Break-before-make)
- 2: Shorting  
(Make-before-break)

#### 2. Maximum Operating Force

- 1: 130 gf
- 2: 40 gf

## Specifications

### ■ Characteristics

Electrical rating	100 mA, 30 VDC (resistive load)
Operating speed	1 to 500 mm/s
Operating frequency	Mechanical: 200 operations per minute, max. Electrical: 30 operations per minute, max.
Contact resistance	50 mΩ max.
Insulation resistance	100 MΩ min. at 250 VDC
Dielectric strength	250 VAC, 50/60 Hz for 1 minute between terminals of same polarity 250 VAC, 50/60 Hz for 1 minute between current-carrying metal parts and ground
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5 mm double amplitude
Shock resistance	Destruction: 1,000 m/s <sup>2</sup> (approx 100G) max. Malfunction: 300 m/s <sup>2</sup> (approx. 30G) max.
Degree of protection	IEC IP00
Degree of protection against electric shock	Class III
Proof tracking index (PTI)	175
Ambient operating temperature	-20° to 80°C (at 60% RH max) with no icing
Ambient operating humidity	85% max. (for 5° to 35°C)
Service life	50,000 operations min. at 30 operations per minute
Weight	Approx. 0.3 g

**Note:** 1. Data shown are of initial value.

2. The electrical rating applies under the following test conditions:  
 Ambient Temperature = 20±2°C, Ambient Humidity = 65±5%, Operating frequency = 30 operations/min.



# Engineering Data

## Contact Specifications

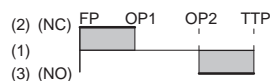
Item	Specification
Specification	Slide
Material	Silver plated
Minimum applicable load (see note)	1 mA at 5 VDC

**Note:** Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003).

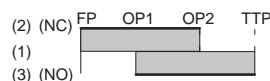
The equation  $\lambda_{60}=0.5 \times 10^{-6}/\text{operations}$  indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%.

## Switching Timing

### Non-shorting Model

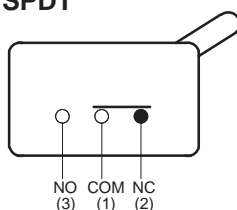


### Shorting Model



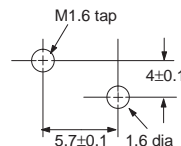
## Contact Form

### SPDT

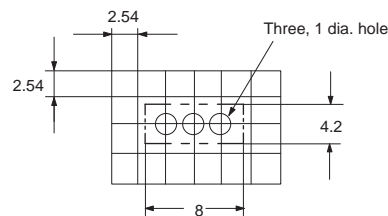


## Mounting

All D3C switches may be panel mounted using M1.6 mounting screws with plane washers or spring washers to securely mount the switch. Tighten the screws to a torque of 4.9 to 9.8 x 10<sup>-2</sup> N·m.



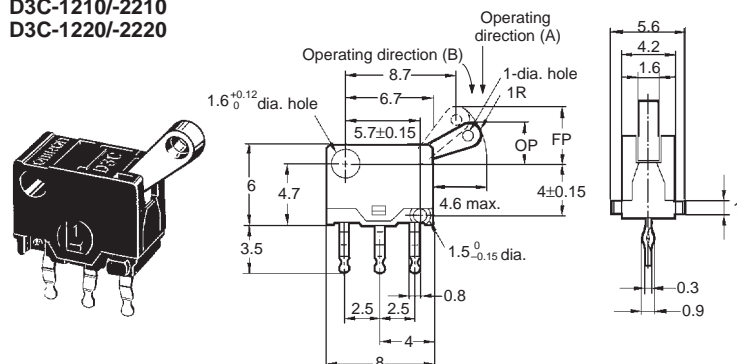
## PCB Layout (reference)



## Dimensions

**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of ±0.4 mm applies to all dimensions.

D3C-1210/-2210  
D3C-1220/-2220



Model	Non-shorting Model		Shorting Model	
	D3C-1210	D3C-1220	D3C-2210	D3C-2220
OF max.	130 gf (100 gf)	40 gf (30 gf)	130 gf (100 gf)	40 gf (30 gf)
RF min.	10 gf (15 gf)	3 gf (5 gf)	10 gf (15 gf)	3 gf (5 gf)
FP max.	4.8 mm		4.8 mm	
OP1	3.5 ± 0.3 mm		3.4 ± 0.3 mm	
OP2	2.5 ± 0.3 mm		2.6 ± 0.3 mm	
TTP	1.3 ± 0.4 mm		1.3 ± 0.4 mm	

**Note:** The values for operating characteristics apply for operation in the A direction (↗). The values in parentheses indicate those for operation in the B direction (↘).

# Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## Correct Use

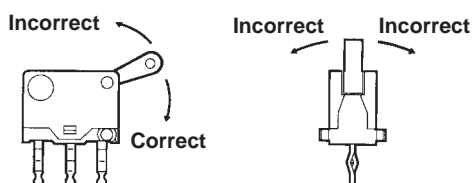
### Mounting

Turn off the power supply before mounting or removing the switch, wiring or performing maintenance or inspection. Failure to do so may result in electric shock or burning.

Mount the switch onto a flat surface. Mounting on an uneven surface may cause deformation of the switch, resulting in faulty operation or breakage in the housing.

### Application of Operation Force to the Lever

Apply operation forces to the lever in its operating direction. Applying operating force to the lever in any other directions will damage the switch or cause malfunction.

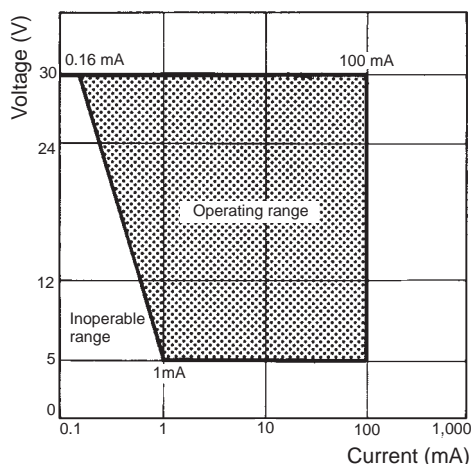


### Mounting Plate

Use materials other than ABS or polycarbonate for the mounting plate. Since grease is used within the switch, cracks may be caused if grease from the switch comes in contact with such materials.

### Using Microloads

Using a model for ordinary loads to switch microloads may result in faulty operation. Instead, use the models that are designed for microloads and that operate in the following range;



However, even when using microload models within the operating range shown above, if inrush current or inductive voltage spikes occur when the contact is opened or closed, then contact wear may increase and so decrease the service life. Therefore, insert a contact protection circuit where necessary.

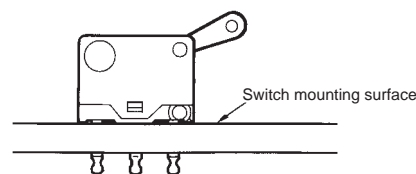
## Cautions

### Terminal Connection

When soldering the lead wire to the terminals, first bind the lead wire to the terminal and then apply the 60(Sn):40(Pb) solder to the terminals. Complete soldering within 5s at a soldering iron temperature of 260°C. Soldering at a temperature exceeding 260°C, soldering for more than 5 s, or repeated soldering will degrade the switch characteristics.

When soldering the lead wire to the PCB terminal, pay careful attention so that the flux and solder liquid level does not exceed the PCB level.

It is also recommended that you apply flux guard to the mounting surface of the switch.



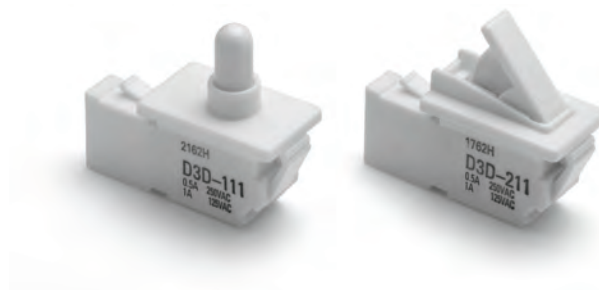
# MEMO

# Miniature Door Switch



## D3D

### Unique Mechanism Allows Switching of Micro Loads

- Choose from plunger or lever actuators.
- The internal structure of plunger models provides temporary sealing at the free position.
- Low operating force of 204 g max.
- Disconnectable crimp connector for easier wiring.
- High contact reliability ensured with gold crossbar contacts.
- Low noise operation.
- RoHS Compliant.



## Ordering Information

Actuator	Contact form		
	SPDT	SPST-NC	SPST-NO
Plunger 	D3D-111	D3D-121	D3D-131
Lever 	D3D-211	D3D-221	D3D-231

### Model Number Legend

D3D -     1  
           1 2

#### 1. Actuator

- 1: Plunger  
2: Lever

#### 2. Contact Form

- 1: SPDT  
2: SPST-NC  
3: SPST-NO

## Specifications

### ■ Characteristics

Operating speed	7.5 to 500 mm/s
Operating frequency	Mechanical: 120 operations/minute, max. Electrical: 20 operations/minute, max.
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	100 mΩ max.
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between terminals of the same polarity 1,500 VAC, 50/60 Hz for 1 min between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts
Vibration resistance (See note 2)	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance (See note 2)	Destruction: 490 m/s <sup>2</sup> max. Malfunction: 300 m/s <sup>2</sup> max.
Degree of protection	IP00 (IP40 for pin plunger models, when at the free position)
Degree of protection against electric shock	D3D-1 models (plunger models): Class II D3D-2 models (lever models): Class 0
Proof tracking index (PTI)	600
Ambient operating temperature	-30°C to 60°C (with no icing)
Ambient operating humidity	85% max.
Life expectancy	Mechanical: 300,000 operations min. (60 operations per minute) Electrical: 100,000 operations min. (20 operations per minute)
Weight	Approx. 4 g

Note: 1. Data shown are of initial value.

2. The contacts do not open or close for more than 1 ms.

## Ratings

Rated voltage	Resistive load
125 VAC	1 A
250 VAC	0.5 A

**Note:** The electrical rating applies under the following test conditions:

Ambient Temperature = 20±2°C, Ambient Humidity = 65±5%, Operating frequency = 30 operations/min.

## Approved Standards

### UL Recognized/CSA Certified

Rated voltage	D3D
125 VAC	1 A
250 VAC	0.5 A

### EN61058-1 (VDE approval)

Rated voltage	D3D
125 VAC	1 A
250 VAC	0.5 A

Testing conditions: 5E4 (50,000 operations), T55 (0°C to 55°C)

## Contact Specifications

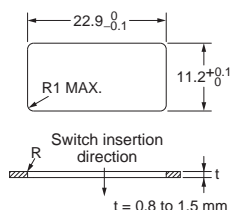
Item	Specification
Specification	Crossbar
Material	Gold alloy
Minimum applicable load (see note)	1 mA at 5 VDC

**Note:** Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003).

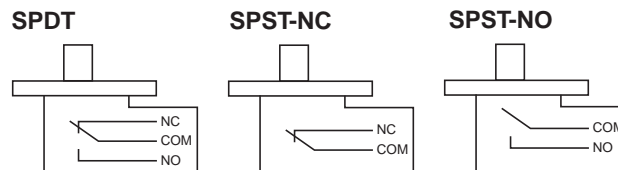
The equation  $\lambda_{60}=0.5 \times 10^{-6}$  / operations indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%

## Engineering Data

### Panel Cutout Dimensions



### Contact Form



## Dimensions

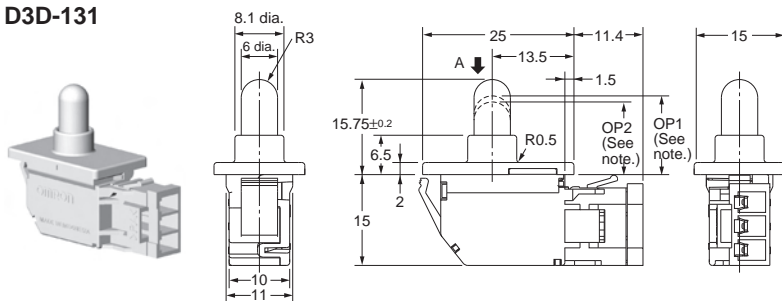
### Dimensions and Operating Characteristics

**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of ±0.4 mm applies to all dimensions

2. The operating characteristics are for operation in the A direction (indicated by the arrow)

#### Plunger Models

D3D-111  
D3D-121  
D3D-131



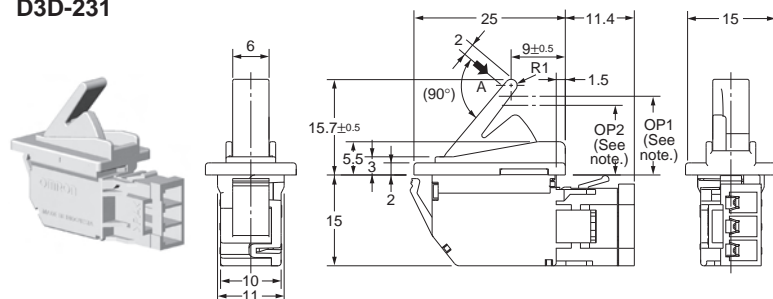
**Note:** The dimensions OP1 and OP2 apply to the D3D-111 only. The D3D-121 and D3D-131 are SPST-NC and SPST-NO respectively and so therefore have only one corresponding dimension here (OP).

Type	Plunger model		
	D3D-111	D3D-121	D3D-131
OF max.	204 gf		
TTF max.	357 gf		
TT	9.0 mm (reference value)		
OP min.	OP1 (NC-OFF) 13 mm	13 mm	12 mm
	OP2 (NO-ON) 12 mm		

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
2. The operating characteristics are for operation in the A direction (indicated by the arrow)

## Lever Models

D3D-211  
D3D-221  
D3D-231



**Note:** The dimensions OP1 and OP2 apply to the D3D-211 only. The D3D-221 and D3D-231 are SPST-NC and SPST-NO respectively and so therefore have only one corresponding dimension here (OP).

Type Model	Lever model		
	D3D-211	D3D-221	D3D-231
OF max.	204 gf		
TTF max.	357 gf		
TT	9.7 mm (reference value)		
OP min.	OP1 (NC-OFF) 13 mm	13 mm	11.5 mm
	OP2 (NO-ON) 11.5 mm		

## Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

### Correct Use

#### Mounting

This product does not have waterproof or drip-proof construction. Ensure that water does not enter the switch interior. In particular, do not use the switch in locations where water may be spilled or flow over the switch. Doing so may result in deterioration of the insulation.

#### Wiring

Do not use the switch with a large force applied to the connector or lead wire. Doing so may result in rattling or contact failure.

#### Storage Environment

Storing the switch in a plastic bag will help prevent discoloration due to sulfuration of the (silver-plated) terminals.

Do not use the switch in locations subject to harmful gases or to high temperatures or humidity levels. Depending on the location, it is recommended that switches be inspected between 3 and 6 months after the date of manufacture.

#### Micro Loads

Even when using the switch within the operating range, if there are inrush currents or surges, it may decrease the durability of the switch. If necessary, insert a contact protection circuit.

#### Connectors

The terminals connect to JST's HL Connector.

The HL Connector consists of the following components.

Contact: SSF-21T-P1.4

Housing: HLP-03V

Omron does not sell the HL Connector.

Contact J.S.T. Manufacturing Co. for these connectors.

### Cautions

#### Handling

Do not expose the switch to shocks, such as by dropping it. Doing so may damage or deform the switch.

Do not apply lubrication to the sliding parts, such as pushbuttons or actuators. Doing so may result in faulty operation or contact failure.

In order to ensure stable contact force for NO contacts, use an operating stroke of at least 5 mm.

# MEMO

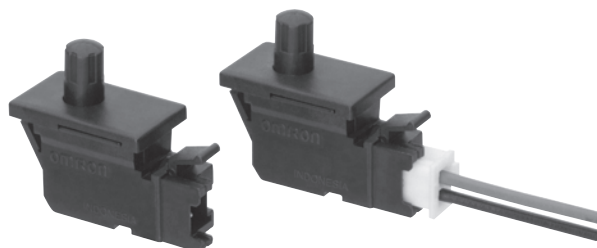
A large grid of small, faint, repeating geometric patterns, likely a decorative background or a placeholder for a complex image. The patterns are arranged in a regular, repeating fashion across the entire page, creating a textured, grid-like appearance. The patterns themselves are small, intricate, and appear to be composed of various geometric shapes and lines, possibly representing a complex mathematical or architectural design. The overall effect is a dense, uniform field of these small, repeating motifs.

# Miniature Door Switch

## D3DC

### Long Stroke Actuator with Operating Position Marks

- Long stroke (7 mm) in a small package.
- Easy assembly with panel mount design.
- Quick-connection terminals facilitate wiring.
- Simple leaf switch structure
- RoHS Compliant.

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## Ordering Information

### List of Models

Contact Form	Model Name
SPST-NC	D3DC-2
SPST-NO	D3DC-3

### Model Number Legend

D3DC -   
1

1. Contact Form  
2: SPST-NC  
3: SPST-NO

## Specifications

### ■ Characteristics

Operating speed	0.5 to 1 mm/s
Operating frequency	Mechanical: 30 operations/minute, max. Electrical: 20 operations/minute, max.
Insulation resistance	100 M $\Omega$ min. (at 500 VDC)
Contact resistance	300 m $\Omega$ max.
Dielectric strength	600 VAC, 50/60 Hz for 1 min between terminals of the same polarity 1,500 VAC, 50/60 Hz for 1 min between current-carrying metal parts and ground
Vibration resistance (See note 2)	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance (See note 2)	Destruction: 500 m/s <sup>2</sup> max. Malfunction: 100 m/s <sup>2</sup> max.
Degree of protection	IEC IP00
Proof tracking index (PTI)	600
Ambient operating temperature	-25°C to 85°C (at 60% RH max.) with no icing
Ambient operating humidity	85% max. (for 5°C to 35°C)
Life expectancy	Mechanical: 100,000 operations min. (30 operations per minute) Electrical: 100,000 operations min. (20 operations per minute)
Weight	Approx. 2 g

Note: 1. Data shown are of initial value.

2. The contacts do not open or close for more than 1 ms.

### ■ Ratings

Rated voltage	Resistive load
30 VDC	0.1 A

Note: The electrical rating applies under the following test conditions:

Ambient Temperature = 20 $\pm$ 2°C, Ambient Humidity = 65 $\pm$ 5%, Operating frequency = 20 operations/min.



## Contact Specifications

Item	Specification
Specification	Rivet
Material	Silver
Gap (standard value)	0.3 mm
Minimum applicable load (see note)	1 mA at 5 VDC

**Note:** Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003).  
The equation  $\lambda_{60}=0.5 \times 10^{-6}$  / operations indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%

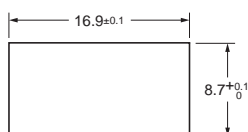
## Approved Standards

UL Recognized  
CSA Certified (UL approval)

Rated voltage	Rated Load
30 VDC	0.1 A

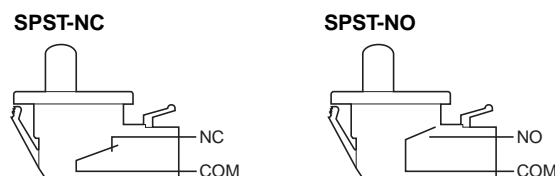
## Engineering Data

### Panel Cutout Dimensions



**Note:** Mounting plate thickness: 0.75 mm to 1.50 mm.

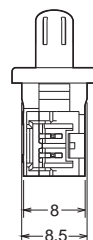
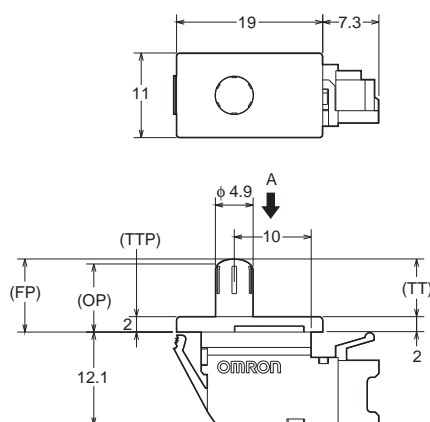
### Contact Form



## Dimensions and Operating Characteristics

**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
2. The operating characteristics are for operation in the A direction (indicated by the arrow)

D3DC-2  
D3DC-3



Model	D3DC-2	D3DC-3
OF max.	102 gf	
TT	7.0 mm (reference value)	
FP	9.5 (reference value)	
OP min.	6.7 mm	
TTP	2.0 mm (reference value)	

# Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## ■ Correct Use

### Mounting

This product does not have waterproof or drip-proof construction. Ensure that water does not enter the switch interior. In particular, do not use the switch in locations where water may be spilled or flow over the switch. Doing so may result in deterioration of the insulation.

### Wiring

Do not use the switch with a large force applied to the connector or lead wire. Doing so may result in rattling or contact failure.

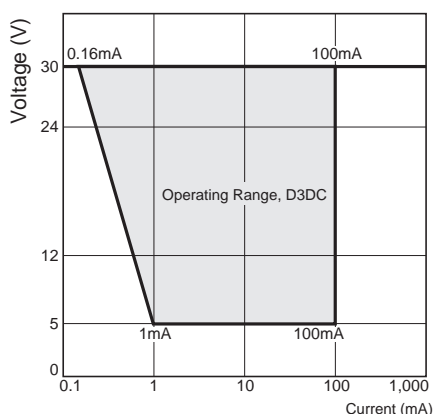
### Storage Environment

Storing the switch in a plastic bag will help prevent discoloration due to sulfuration of the (silver-plated) terminals.

Do not use the switch in locations subject to harmful gases or to high temperatures or humidity levels. Depending on the location, it is recommended that switches be inspected between 3 and 6 months after the date of manufacture.

### Micro Loads

Using a model for ordinary loads to switch microloads may result in faulty operation. Instead, use the models that are designed for microloads and that operate in the following range;



However, even when using microload models within the operating range shown above, if inrush current or inductive voltage spikes occur when the contact is opened or closed, then contact wear may increase and so decrease the service life. Therefore, insert a contact protection circuit where necessary.

### Connectors

The terminals connect to JST's XA Connector.

The XA Connector consists of the following components.

Contact: SXA-001T-P0.6

Housing: XAP-02V-1

Omron does not sell the XA Connector.

Contact J.S.T. Manufacturing Co. for these connectors.

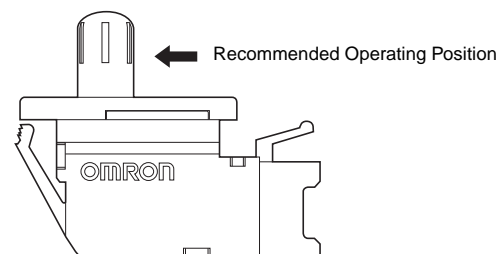
## ■ Cautions

### Handling

Do not expose the switch to shocks, such as by dropping it. Doing so may damage or deform the switch.

Do not apply lubrication to the sliding parts, such as pushbuttons or actuators. Doing so may result in faulty operation or contact failure.

In order to ensure stable contact force for contacts, actuate beyond the recommended operating point and release to free position.



# MEMO

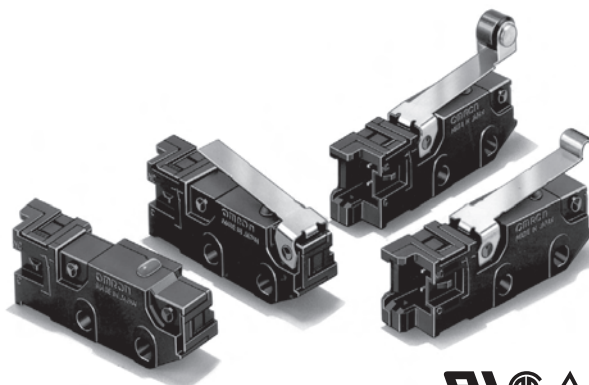
The image displays a large grid of 1000 small squares, arranged in 10 rows and 100 columns. Each square contains a unique combination of symbols, including dots, lines, and crosses, arranged in a 10x10 pattern. The symbols are black on a white background, forming a complex, abstract pattern that resembles a barcode or a data matrix. The pattern is highly structured and repetitive, suggesting a systematic arrangement of the symbols.

# Subminiature Snap Action Switch








## D3M

### Saves Wiring Effort, Production Steps, and Time

- Easy wiring ensured through the Quick-Connect Terminals
- External actuator mounts in either of two directions
- Horizontal layout of terminals saves mounting space
- Same mounting pitch and internal mechanism as the OMRON SS Subminiature Snap Action Switch
- RoHS Compliant



### Ordering Information

Actuator	Actuator mounting position	Contact type	Model
Pin plunger 	—	SPST-NC	D3M-01
		SPST-NO	D3M-01-3
Hinge lever  	High ratio operating position ("K" actuator position)	SPST-NC	D3M-01K1
		SPST-NO	D3M-01K1-3
	Standard operating position ("L" actuator position)	SPST-NC	D3M-01L1
		SPST-NO	D3M-01L1-3
Hinge roller lever  	High ratio operating position ("K" actuator position)	SPST-NC	D3M-01K2
		SPST-NO	D3M-01K2-3
	Standard operating position ("L" actuator position)	SPST-NC	D3M-01L2
		SPST-NO	D3M-01L2-3
Simulated roller lever  	High ratio operating position ("K" actuator position)	SPST-NC	D3M-01K3
		SPST-NO	D3M-01K3-3
	Standard operating position ("L" actuator position)	SPST-NC	D3M-01L3
		SPST-NO	D3M-01L3-3

### Model Number Legend

D3M-01□□□  
1 2 3

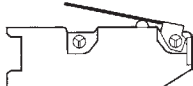
#### 1. Actuator Mounting Position

None: No actuator

K: Pushbutton close to actuator fulcrum

L: Pushbutton far from actuator fulcrum

"K" Actuator Position



"L" Actuator Position



#### 2. Actuator

None: Pin plunger

1: Hinge lever

2: Hinge roller lever

3: Simulated roller lever

#### 3. Contact Form

None: SPST-NC (with red pushbutton)

-3: SPST-NO (with black pushbutton)

# Specifications

## ■ Characteristics

Electrical Rating (See note 4)	0.1 A at 30 VDC, resistive
Operating speed	0.1 mm/s to 1 m/s (pin plunger models)
Operating frequency	Mechanical: 400 operations/minute max. Electrical: 30 operations/minute max.
Insulation resistance	100 MΩ min. at 500 VDC
Contact resistance	100 mΩ max. including connector and 50-mm AWG28 lead wire resistance
Dielectric strength (See note 2)	1,000 VAC at 50/60 Hz for 1 minute between terminals of the same polarity 1,500 VAC at 50/60 Hz for 1 minute between charged metal part and ground 1,500 VAC at 50/60 Hz for 1 minute between non-charged metal part and each terminal
Vibration resistance (See note 3)	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance (See note 3)	Destruction: 1,000 m/s <sup>2</sup> (approx. 100G) max. Malfunction: 300 m/s <sup>2</sup> (approx. 30G) max.
Degree of protection	IEC IP40
Degree of protection against electric shock	Class I
Proof tracking index (PTI)	175
Ambient operating temperature	-25°C to 85°C (at 60% RH max) with no icing
Ambient operating humidity	85% max. (for 5°C to 35°C)
Life expectancy	Mechanical: 500,000 operations at 60 operations/minute Electrical: 200,000 operations at 30 operations/minute
Weight	Approx. 2 g (pin plunger model)

Note: 1. Data shown are of initial value.

2. The dielectric strength shown is measured using a separator between the switch and metal mounting plate.

3. For the pin plunger models, the above values apply for use at the free position and total travel position. For the lever models, they apply at the total travel position. Contact opening or closing time is within 1 ms.

4. The electrical ratings apply under the following test conditions: Ambient Temperature = 20±2°C, Ambient Humidity = 65±5%, Operating frequency = 30 operations/min.

## ■ Approved Standards

### UL Recognized/CSA Certified

Rated voltage	D3M
30 VDC	0.1 A

### EN61058-1 (TÜV Rheinland approval)

Rated voltage	D3M
30 VDC	0.1 A

Testing conditions: 1E5 (100,000 operations), T85 (0°C to 85°C)

## ■ Contact Specifications

Item	Specification
Specification	Crossbar
Material	Gold alloy
Contact gap	0.5 mm
Inrush current	1 A max.
Minimum applicable load (see note)	1 mA at 5 VDC

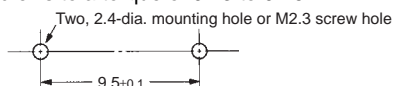
Note: Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003).

The equation  $\lambda_{60}=0.5 \times 10^{-6}$  / operations indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%

# Engineering Data

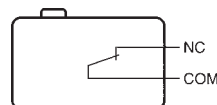
## ■ Mounting Holes

All switches may be panel mounted using M2.3 mounting screws with plane washers or spring washers to securely mount the switch. Tighten the screws to a torque of 0.23 to 0.26 N·m.

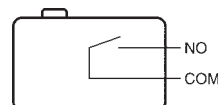


## ■ Contact Form

SPST-NC



SPST-NO



## Dimensions

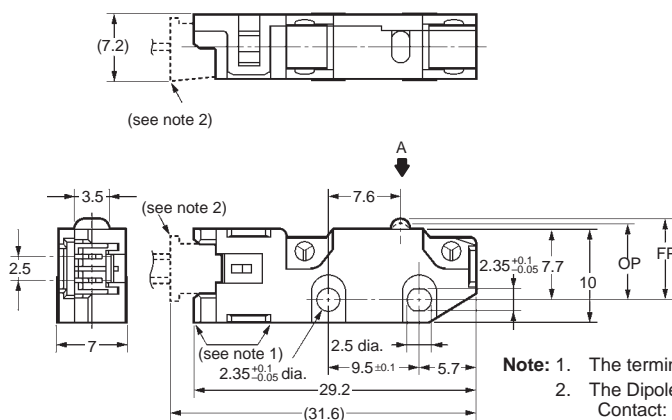
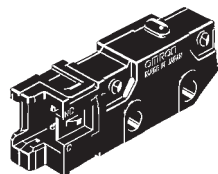
**Note: 1.** Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions

**2. The operating characteristics are for operation in the A direction(↓)**

## Pin Plunger Models

**D3M-01**

**D3M-01-3**



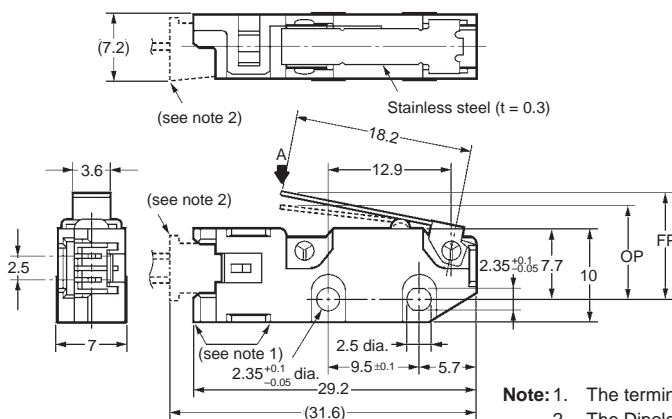
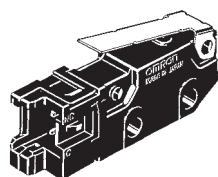
- Note:**
1. The terminals connect to JST's Dipole XA Connector.
  2. The Dipole XA Connector consists of the following components.  
Contact: SXA-001T-P0.6  
Housing: XAP-02V-1

OF max	153 gf
RF min.	25 gf
PT max.	0.6 mm
OT min.	0.4 mm
MD max.	0.1 mm
OP	$8.4 \pm 0.3$ mm

### Hinge Lever Models (K)

D3M-01K1

D3M-01K1-3



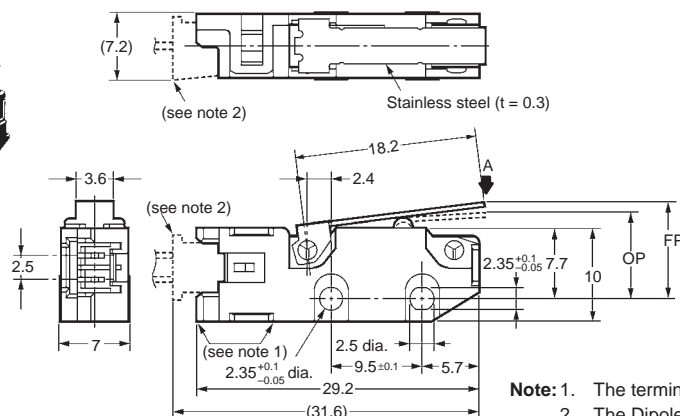
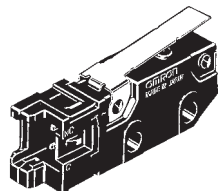
- Note:**
1. The terminals connect to JST's Dipole XA Connector.
  2. The Dipole XA Connector consists of the following components.  
Contact: SXA-001T-P0.6  
Housing: XAP-02V-1

<b>OF max</b>	51 gf
<b>RF min.</b>	6 gf
<b>OT min.</b>	1.2 mm
<b>MD max.</b>	0.8 mm
<b>FP max.</b>	14.0 mm
<b>OP</b>	10.0 ± 0.8 mm

## Hinge Lever Models (L)

**D3M-01L1**

D3M-01L1-3



- Note:** 1. The terminals connect to JST's Dipole XA Connector.  
2. The Dipole XA Connector consists of the following components.  
Contact: SXA-001T-P0.6  
Housing: XAP-02V-1

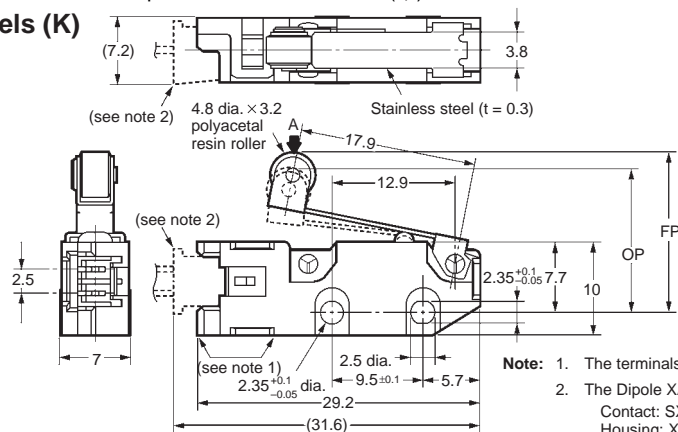
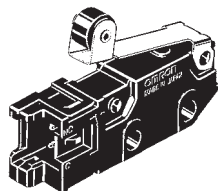
<b>OF max</b>	102 gf
<b>RF min.</b>	10 gf
<b>OT min.</b>	0.7 mm
<b>MD max.</b>	0.6 mm
<b>FP max.</b>	11.5 mm
<b>OP</b>	9.2 ± 0.6 mm

**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions

2. The operating characteristics are for operation in the A direction(▼)

### Hinge Roller Lever Models (K)

D3M-01K2  
D3M-01K2-3

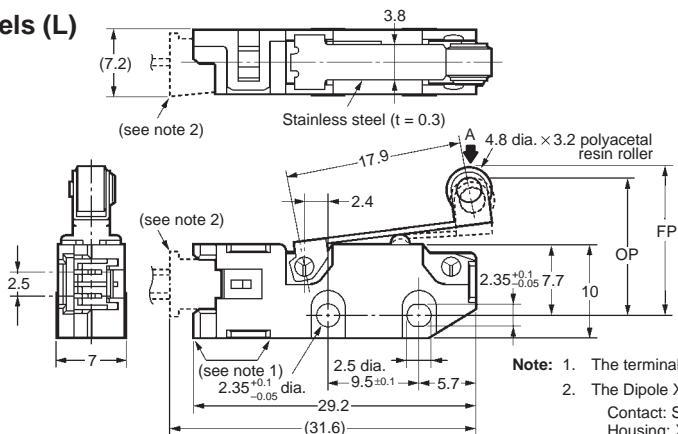
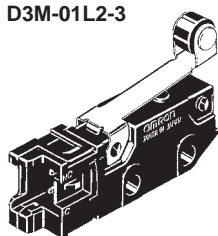


OF max	51 gf
RF min.	6 gf
OT min.	1.2 mm
MD max.	0.8 mm
FP max.	19.7 mm
OP	15.7 ± 0.8 mm

- Note:** 1. The terminals connect to JST's Dipole XA Connector.  
2. The Dipole XA Connector consists of the following components.  
Contact: SXA-001T-P0.6  
Housing: XAP-02V-1

### Hinge Roller Lever Models (L)

D3M-01L2  
D3M-01L2-3

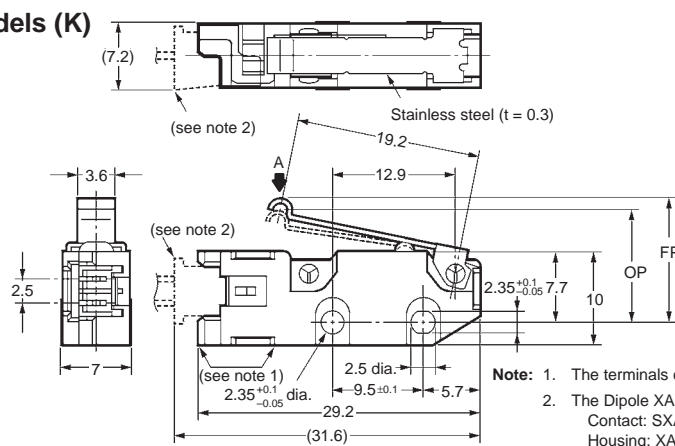
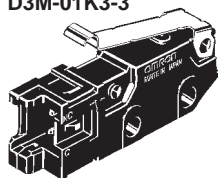


OF max	102 gf
RF min.	10 gf
OT min.	0.7 mm
MD max.	0.6 mm
FP max.	17.2 mm
OP	14.9 ± 0.6 mm

- Note:** 1. The terminals connect to JST's Dipole XA Connector.  
2. The Dipole XA Connector consists of the following components.  
Contact: SXA-001T-P0.6  
Housing: XAP-02V-1

### Simulated Roller Lever Models (K)

D3M-01K3  
D3M-01K3-3

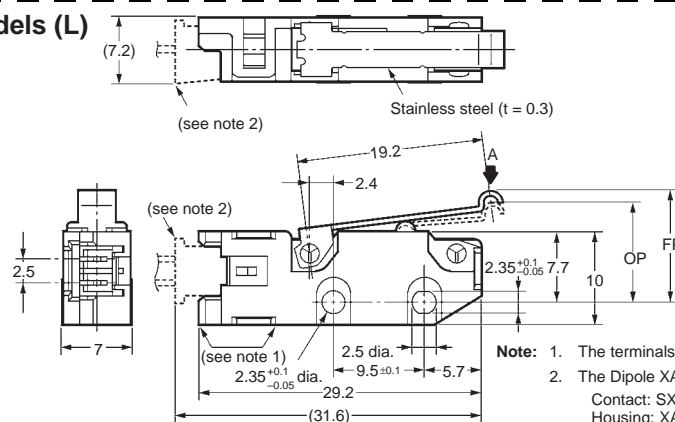
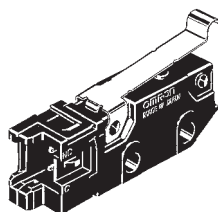


OF max	51 gf
RF min.	6 gf
OT min.	1.2 mm
MD max.	0.8 mm
FP max.	16.2 mm
OP	12.2 ± 0.8 mm

- Note:** 1. The terminals connect to JST's Dipole XA Connector.  
2. The Dipole XA Connector consists of the following components.  
Contact: SXA-001T-P0.6  
Housing: XAP-02V-1

### Simulated Roller Lever Models (L)

D3M-01L3  
D3M-01L3-3



OF max	102 gf
RF min.	10 gf
OT min.	0.7 mm
MD max.	0.6 mm
FP max.	13.6 mm
OP	11.3 ± 0.6 mm

- Note:** 1. The terminals connect to JST's Dipole XA Connector.  
2. The Dipole XA Connector consists of the following components.  
Contact: SXA-001T-P0.6  
Housing: XAP-02V-1

# Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## ■ Correct Use

### Mounting

Make sure that the surface to which the D3M is mounted is flat. If the surface is not flat, the housing may distort, and the D3M may malfunction, or the housing may crack.

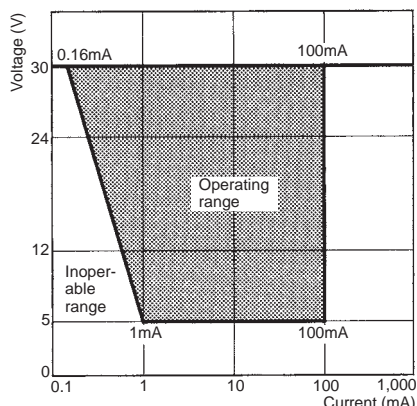
### Operating Stroke

Make sure that the dog is separated from the actuator when the actuator is in the free position and that the actuator is pressed appropriately when the D3M is actuated. The actuator must not be pressed excessively to reach the maximum overtravel position, or the D3M may be damaged.

Make sure the actuator is pressed in the direction where the D3M is actuated.

### Using Microloads

Using a model for ordinary loads to switch microloads may result in faulty operation. Instead, use the models that are designed for microloads and that operate in the following range;



However, even when using microload models within the operating range shown above, if inrush current or inductive voltage spikes occur when the contact is opened or closed, then contact wear may increase and so decrease the service life. Therefore, insert a contact protection circuit where necessary.

### Wiring

The terminals connect to JST's Dipole XA Connector.

The Dipole XA Connector consists of the following components.

Contact: SAX-001T-P0.6

Housing: XAP-02V-1

OMRON does not sell the Dipole XA Connector.

Contact J.S.T. Manufacturing Co. for these connectors.

## ■ Cautions

### Handling

To avoid an electric shock or a fire, be sure to turn OFF the D3M before mounting, removing, wiring, or servicing.

### ⚠ CAUTION

The voltage and current applied to the D3M must be within the rated ranges when it is turned ON, turned OFF, and in operation, or the service life of the D3M may be shortened. Also note that if inappropriate voltage and current are applied, the D3M may radiate heat and burn.

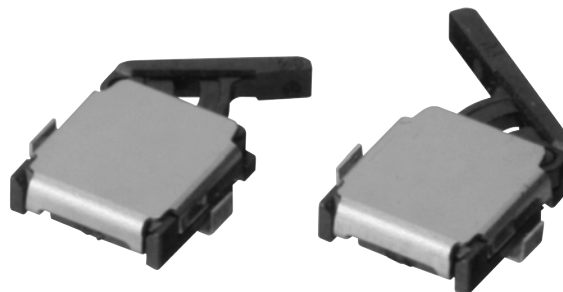


# MEMO

# Surface Mount Detection Switch D3SH

**The smallest detection switch in the world. (OMRON's data as of June 2006.)**

- Ultra small size and ultra low profile contributing to down-sizing of sets devices. (3.0 x 3.4 x 0.9 mm (W x D x H))
- A unique mechanism enables high contact reliability and high precision operation.
- Horizontal 2-way detection and long stroke for easy installation are available.
- Meet a variety of applications by contact and lever variations.



**NEW**

## Ordering Information

### Standard Lever Models

Contact form	Direction of Operation	Positioning Boss	Model	Packing form
SPST-NO	Right	With Boss	D3SH-A1R	Embossed tape packing (see note)
		Without Boss	D3SH-A0R	
	Left	With Boss	D3SH-A1L	
		Without Boss	D3SH-A0L	
SPST-NC	Right	With Boss	D3SH-B1R	Embossed tape packing (see note)
		Without Boss	D3SH-B0R	
	Left	With Boss	D3SH-B1L	
		Without Boss	D3SH-B0L	

**Note:** Minimum packing unit is 1,000 pcs./reel.

### Long Lever Models

Contact form	Direction of Operation	Positioning Boss	Model	Packing form
SPST-NO	Right	With Boss	D3SH-A1R1	Embossed tape packing (see note)
		Without Boss	D3SH-A0R1	
	Left	With Boss	D3SH-A1L1	
		Without Boss	D3SH-A0L1	
SPST-NC	Right	With Boss	D3SH-B1R1	Embossed tape packing (see note)
		Without Boss	D3SH-B0R1	
	Left	With Boss	D3SH-B1L1	
		Without Boss	D3SH-B0L1	

**Note:** Minimum packing unit is 1,000 pcs./reel.

### Model Number Legend

D3SH -      
          1 2 3

1. **Contact Form**  
A: SPST-NO  
B: SPST-NC

2. **Boss for PCB Positioning**  
0: without Boss  
1: with Boss

3. **Lever Length and Direction of Operation**  
R: Right Operating with standard lever  
L: Left Operating with standard lever  
R1: Right Operating with long lever  
L1: Left Operating with long lever

# Specifications

## ■ Characteristics

Electrical Rating (see note 3)	1 mA at 30 VDC (resistive)
Operating speed	1 mm to 300 mm/s
Operating frequency	Mechanical: 20 operations/minute max. Electrical: 20 operations/minute max.
Insulation resistance	100 M $\Omega$ min. (at 100 VDC)
Contact resistance	3 $\Omega$ max.
Dielectric strength	100 VAC for 1 min between terminals of same polarity
Vibration resistance (see note 2)	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance (see note 2)	Destruction: 1000 m/s <sup>2</sup> (approx. 100 G) max. Malfunction: 300 m/s <sup>2</sup> (approx. 30 G) max.
Life expectancy	Mechanical: 150,000 operations min. (20 operations/minute) Electrical: 100,000 operations min. (20 operations/minute)
Ambient operating temperature	-25°C to 85°C (at 60% RH max.) with no icing or condensation
Ambient operating humidity	85% max. (for 5°C to 35°C)
Weight	Approx. 0.02 g

**Note:** 1. The data given above are initial values.

2. The values apply at the total travel position. Contact opening or closing time is within 1ms.

3. The electrical rating applies under the following test conditions:

Ambient Temperature = 20 $\pm$ 2°C, Ambient Humidity = 65 $\pm$ 5%, Operating frequency = 30 operations/minute

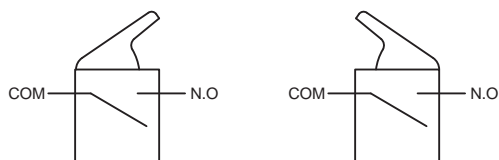
## ■ Contact Specifications

Contact Specification	Slide
Minimum applicable load	15 $\mu$ A at 3 VDC

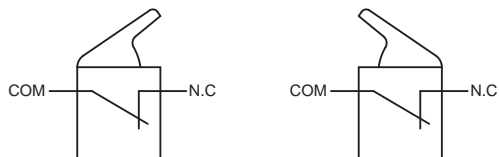
# Engineering Data

## ■ Contact form

### SPST-NO

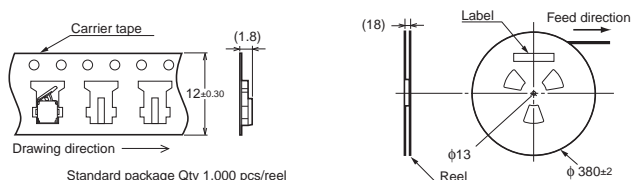


### SPST-NC



**Note:** The cover connects with COM terminal inside.

## ■ Packaging Specifications



Standards	Conforms to JEITA
Package	Qty 1,000 pcs/reel

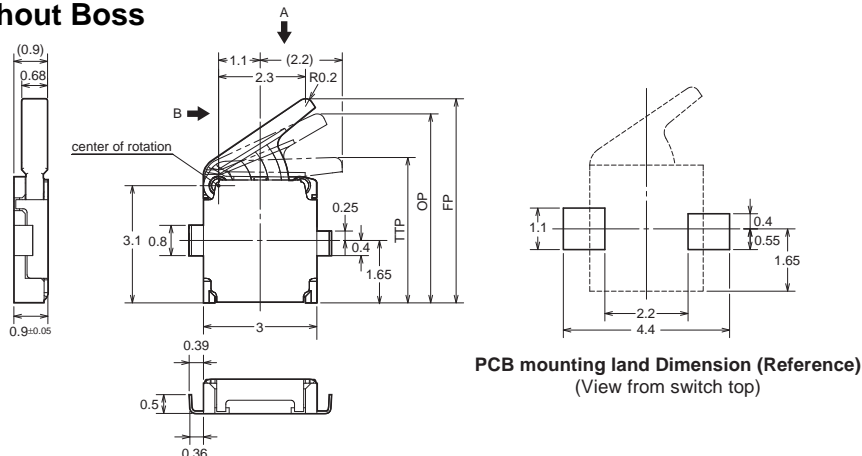
# Dimensions and Operating Characteristics

**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.15$  mm applies to all dimensions  
 2. The operating characteristics are for operation in the A direction ( $\downarrow$ ) and B direction ( $\rightarrow$ ,  $\leftarrow$ ).

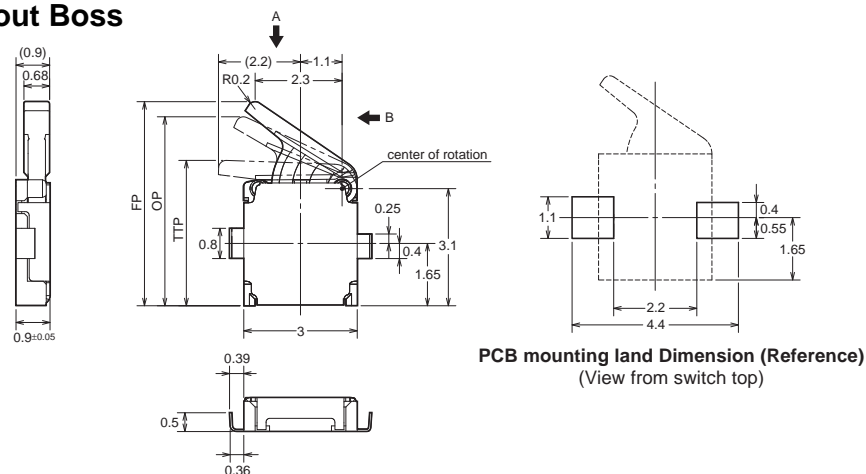
## Standard Lever Models

Model	D3SH-□□R D3SH-□□L
Operating force (OF) max.	31 gf
Free position (FP)	$5.4 \pm 0.2$ mm
Operating position (OP)	$5.0 \pm 0.2$ mm
Total travel position (TTP)	$3.8 \pm 0.15$ mm

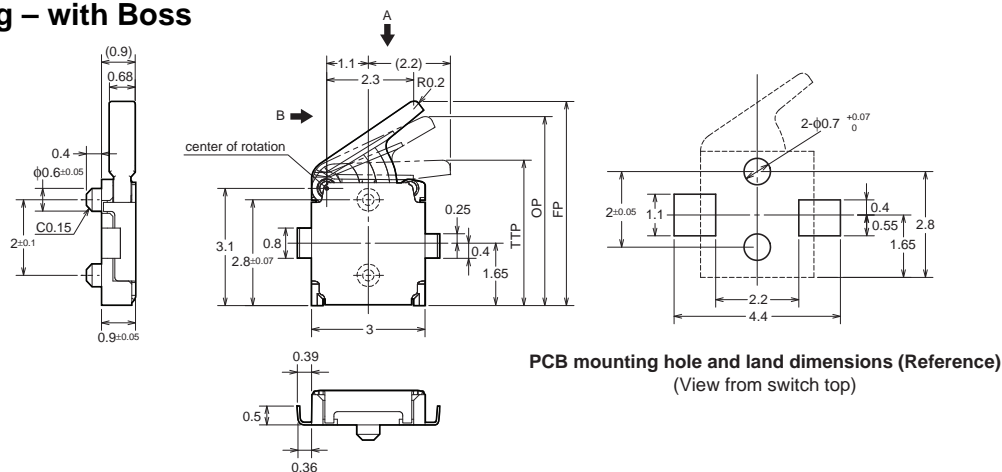
### Right operating – without Boss D3SH-□0R



### Left operating – without Boss D3SH-□0L



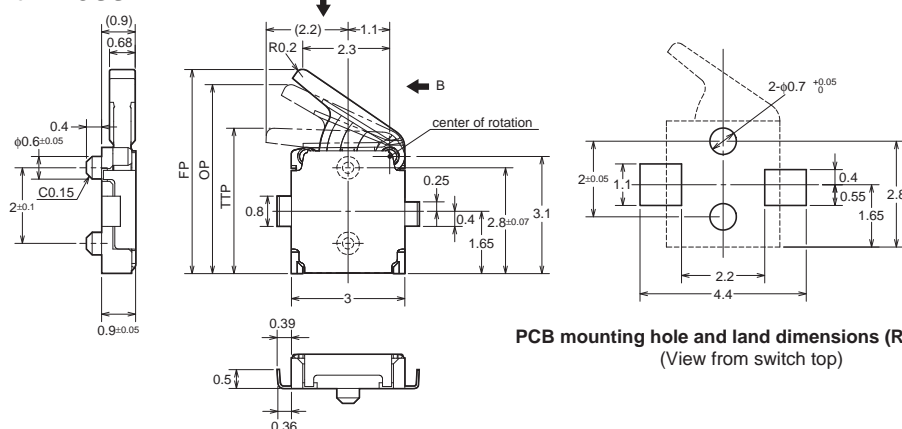
### Right operating – with Boss D3SH-□1R



**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.15$  mm applies to all dimensions  
 2. The operating characteristics are for operation in the A direction ( $\downarrow$ ) and B direction ( $\rightarrow$ ,  $\leftarrow$ ).

## Left operating – with Boss

D3SH-□1L



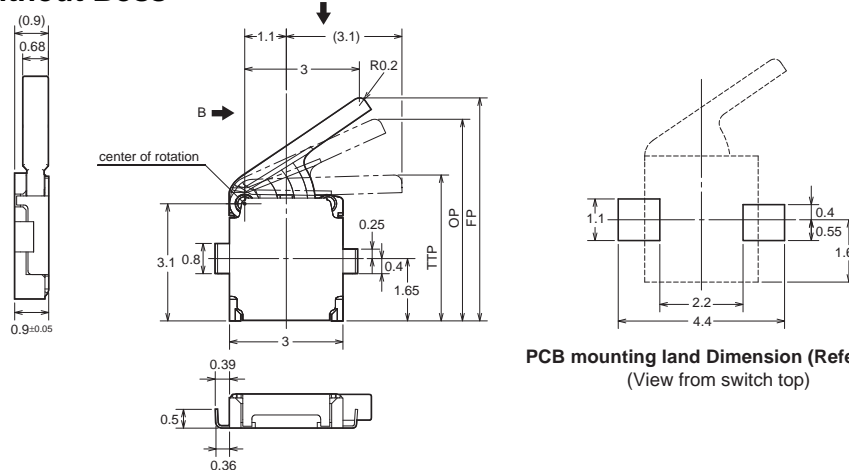
PCB mounting hole and land dimensions (Reference)  
 (View from switch top)

## Long Lever Models

Model	D3SH-□□R1 D3SH-□□L1
Operating force (OF) max.	24 gf
Free position (FP)	$5.9 \pm 0.3$ mm
Operating position (OP)	$5.4 \pm 0.3$ mm
Total travel position (TTP)	$3.8 \pm 0.2$ mm

## Right operating – without Boss

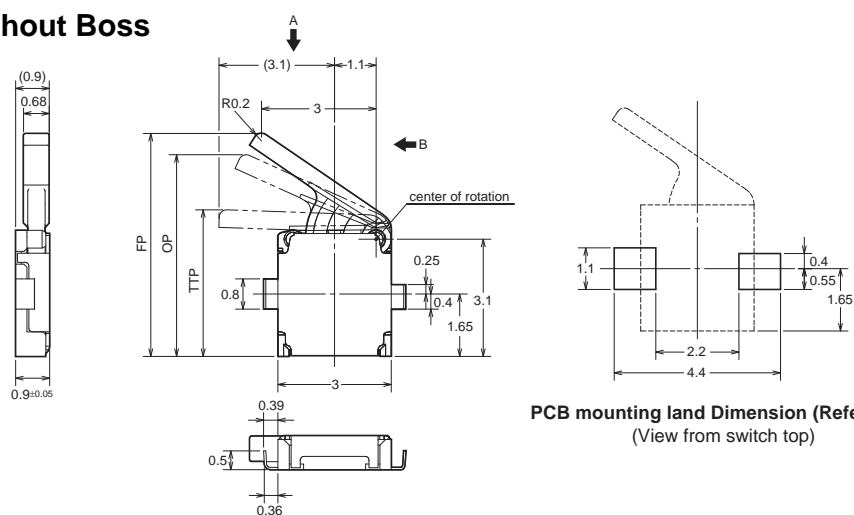
D3SH-□0R1



PCB mounting land Dimension (Reference)  
 (View from switch top)

## Left operating – without Boss

D3SH-□0L1

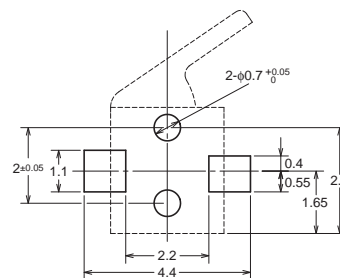
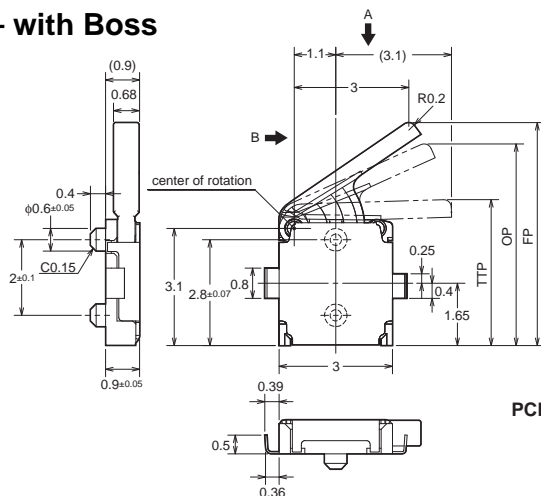


PCB mounting land Dimension (Reference)  
 (View from switch top)

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.15$  mm applies to all dimensions  
 2. The operating characteristics are for operation in the A direction ( $\downarrow$ ) and B direction ( $\rightarrow$ ,  $\leftarrow$ ).

### Right operating – with Boss

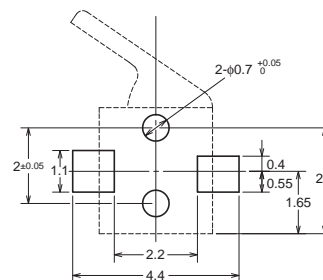
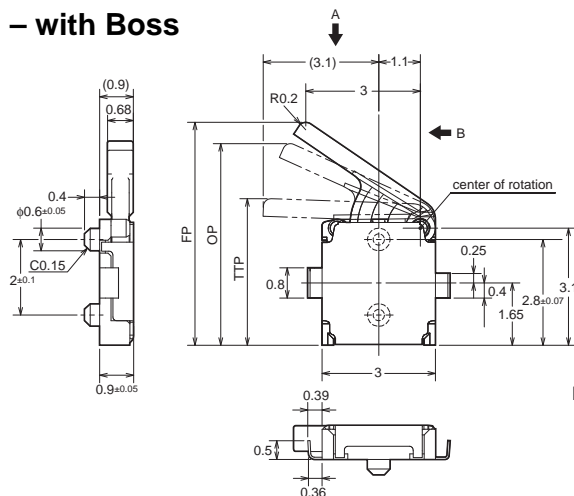
D3SH-□1R1



PCB mounting hole and land dimensions (Reference)  
 (View from switch top)

### Left operating – with Boss

D3SH-□1L1



PCB mounting hole and land dimensions (Reference)  
 (View from switch top)

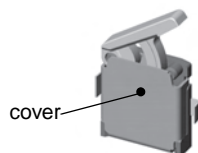
# Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## ■ Correct Use

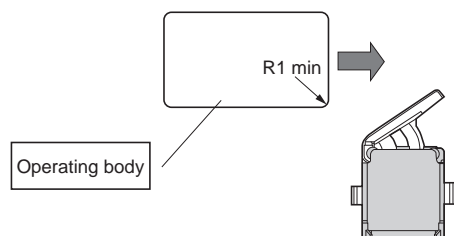
### Mounting

The cover has the same electrical potential as the COM terminal. Do not short-circuit the cover with a NO or NC terminal when mounting the cover.



Be careful of the following points. Incorrect handling may lead to insufficient actuator return, Switch damage, or reduced durability.

- Set the operating body in line with the direction of the actuator movement, and make sure that the operating body is completely separate from the actuator when the Switch is in the free position (FP). When the actuator is operated from the crosswise direction of the Switch, make sure that the corner of the operating body has a minimum radius of R1.



- Set the Switch stroke to 70% to 100% of the overtravel (the difference between the operating position and the total travel position).
- Do not subject the Switch to operations that involve strong impact.
- Do not use the Switch as a stopper.
- Do not apply excessive loads to the cover or operate the actuator from a direction other than a specified operating direction.
- Do not use an adhesive to secure the Switch.

A lubricant is used in the Switch. Some of the lubricant may seep out because the Switch does not have an airtight construction. Consider this possibility with respect to the usage conditions when designing or using the Switch.

### Application Environment

Do not use the Switch in locations that are subject to toxic gas, silicon, excessive dust, excessive dirt, high temperatures, high humidity, sudden temperature changes, water splashes, or oil splashes. Otherwise, damage resulting by faulty contact of the Switch contacts, corrosion, or other causes, or other functional faults may occur.

### Insulation and Wiring

Be sure that the installation conditions provide a sufficient insulation distance between Switch terminals and other metal parts, lands, etc.

### Cleaning

The Switch does not have an airtight construction, and it must not be cleaned with cleaning fluids. Malfunctions may occur if the cleaning fluid penetrates the interior of the Switch together with flux or foreign matter from the surface of the PCB.

### Confirmation with Actual Equipment

Be sure to confirm the quality of the product under the load and environmental conditions that will be used during actual applications.

## ■ Caution

### Electrical Ratings

Confirm the contact load in order to select an appropriate switch rating.

Do not apply an excessive electrical load to the contacts, otherwise the contacts may weld, resulting in a short circuit or burning.

### Terminal Connection

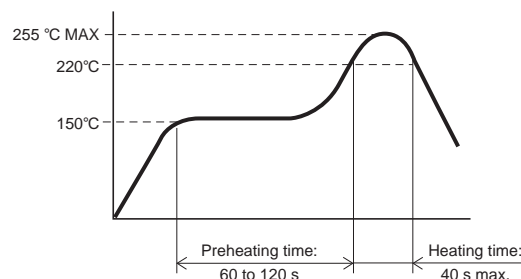
Do not use flow soldering or hand soldering to solder terminals.

Conduct reflow soldering within the range shown in the terminal temperature profile below. Some reflow soldering devices have extremely high peak values. Do a test in advance to confirm proper soldering conditions.

Do not conduct reflow soldering more than twice. Also provide a time interval of at least five minutes between the first and second reflow soldering processes to allow the Switch to return to room temperature. Heating the Switch continuously (without an interval) may cause the edges of the Switch to melt and degrade the characteristics.

When printing for a screen solder process, a 0.13-mm screen thickness is recommended.

Be sure to provide local ventilation.



### Printed Circuit Boards

Special attention must be paid to the handling of printed circuit boards after a Switch has been mounted onto them. Airborne PCB particles may penetrate the interior of the Switch when printed circuit boards are separated by cutting. Also, do not stack printed circuit boards that have Switches mounted on them.

### Product Specification Details

This document provides only a partial list of specifications. It is recommended that you request complete drawings and specifications prior to purchasing or using the product.

## ■ RoHS Directive Compliance

Models that are indicated as being RoHS compliant are free of the following six substances.

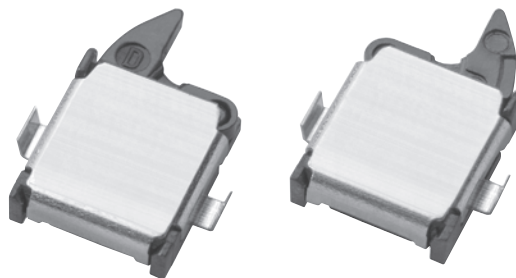
Lead:	1,000 ppm max.
Mercury:	1,000 ppm max.
Cadmium:	100 ppm max.
Hexavalent chromium:	1,000 ppm max.
PBB:	1,000 ppm max.
PBDE:	1,000 ppm max.

# Surface Mount Detection Switch

## D3SK

**The smallest detection switch in the industry (OMRON's data as of April 2008.)**

- Ultra small size and ultra low profile contributing to down-sizing of sets devices. (3.0 x 3.5 x 0.9 mm (W x D x H))
- A unique mechanism enables high contact reliability and high precision operation.
- Long stroke for easy installation is available.
- Meet a variety of applications by contact and lever variations.



***NEW***

## Ordering Information

Contact form	Direction of Operation		Positioning Boss	Model	Packing form
SPST-NO	Right		With Boss	D3SK-A1R	Embossed tape packing (see note)
			Without Boss	D3SK-A0R	
	Left		With Boss	D3SK-A1L	
			Without Boss	D3SK-A0L	
SPST-NC	Right		With Boss	D3SK-B1R	
			Without Boss	D3SK-B0R	
	Left		With Boss	D3SK-B1L	
			Without Boss	D3SK-B0L	

**Note:** The minimum packaging unit of the above models is 1,000 pieces per reel. Add "-6" to the end of the part number to obtain packaging quantities of 6,000 pieces per reel. eg: D3SK-B1R-6.

## Model Number Legend

D3SK -    

1 2 3

**1. Contact Form**

- A: SPST-NO  
B: SPST-NC

**2. Boss for PCB Positioning**

- 0: without Boss  
1: with Boss

**3. Lever and Detection Operation**

- R: Right Operating with lever  
L: Left Operating with lever



# Specifications

## ■ Characteristics

Electrical Rating (see note 3)	1 mA at 5 VDC (resistive)
Operating speed	1 mm to 300 mm/s
Operating frequency	Mechanical: 20 operations/minute max. Electrical: 20 operations/minute max.
Insulation resistance	100 M $\Omega$ min. (at 100 VDC)
Contact resistance	3 $\Omega$ max.
Dielectric strength	100 VAC for 1 min between terminals of same polarity
Vibration resistance (see note 2)	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance (see note 2)	Destruction: 1000 m/s <sup>2</sup> (approx. 100 G) max. Malfunction: 300 m/s <sup>2</sup> (approx. 30 G) max.
Life expectancy	Mechanical: 150,000 operations min. (20 operations/minute) Electrical: 100,000 operations min. (20 operations/minute)
Ambient operating temperature	-25°C to 85°C (at 60% RH max.) with no icing or condensation
Ambient operating humidity	85% max. (for 5°C to 35°C)
Weight	Approx. 0.02 g

**Note:** 1. The data given above are initial values.

2. The values apply at the total travel position. Contact opening or closing time is within 1ms.

3. The electrical rating applies under the following test conditions:

Ambient Temperature = 20 $\pm$ 2°C, Ambient Humidity = 65 $\pm$ 5%, Operating frequency = 30 operations/minute

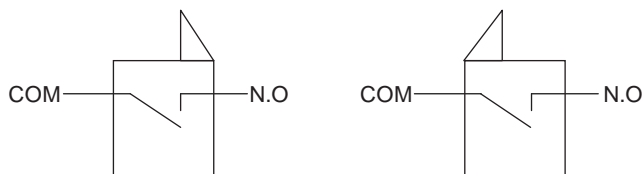
## ■ Contact Specifications

Contact Specification	Slide
Minimum applicable load	15 $\mu$ A at 3 VDC

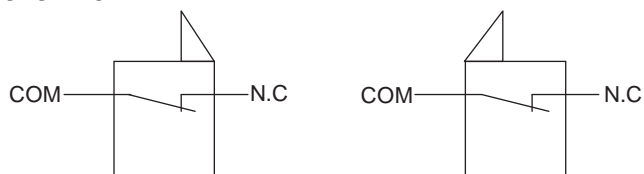
# Engineering Data

## ■ Contact form

### SPST-NO

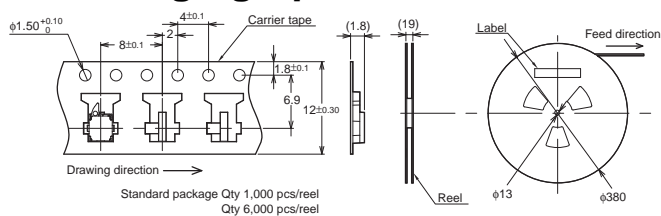


### SPST-NC



**Note:** The cover connects with COM terminal inside.

## ■ Packaging Specifications



Standards	Conforms to JEITA
Package	Qty 1,000 pcs/reel Qty 6,000 pcs/reel

# Dimensions and Operating Characteristics

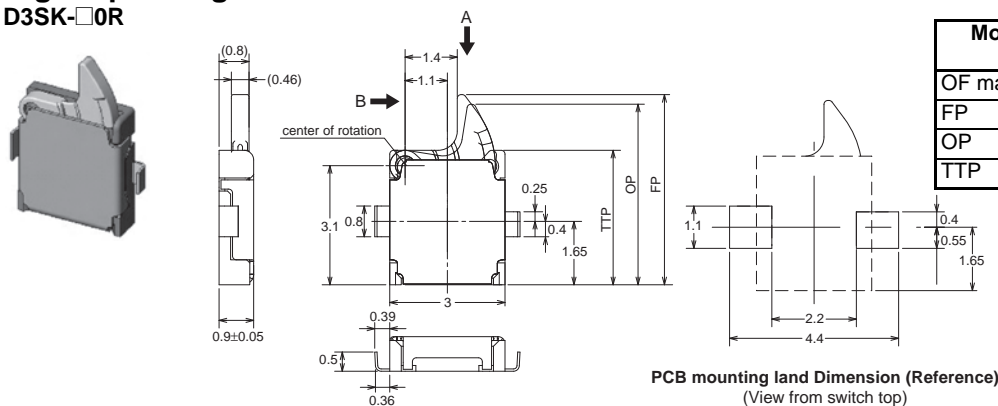
**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.15$  mm applies to all dimensions  
 2. The operating characteristics are for operation in the A direction ( $\downarrow$ ) and B direction ( $\rightarrow$ ,  $\leftarrow$ ).

## Right operating - without Boss

D3SK-□0R

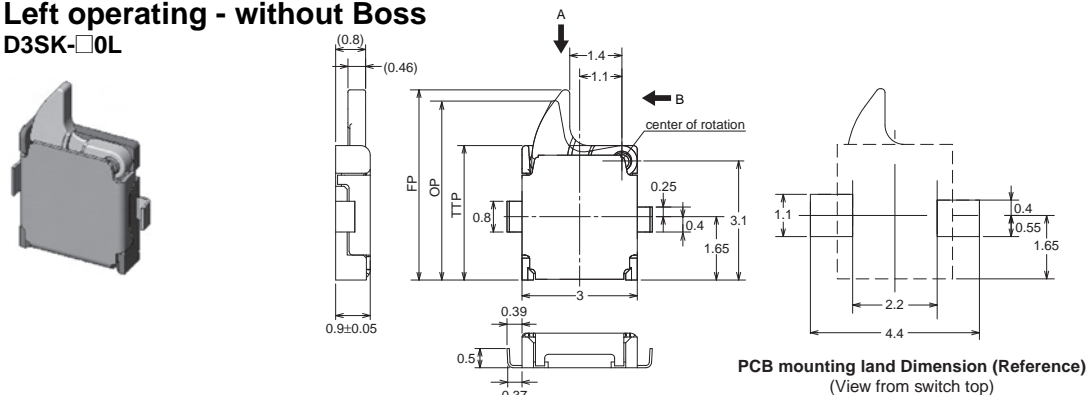
## All Standard Models

Model	D3SK-□□R D3SK-□□L
OF max.	41 gf
FP	$4.95 \pm 0.15$ mm
OP	$4.7 \pm 0.2$ mm
TTP	$3.5 \pm 0.2$ mm



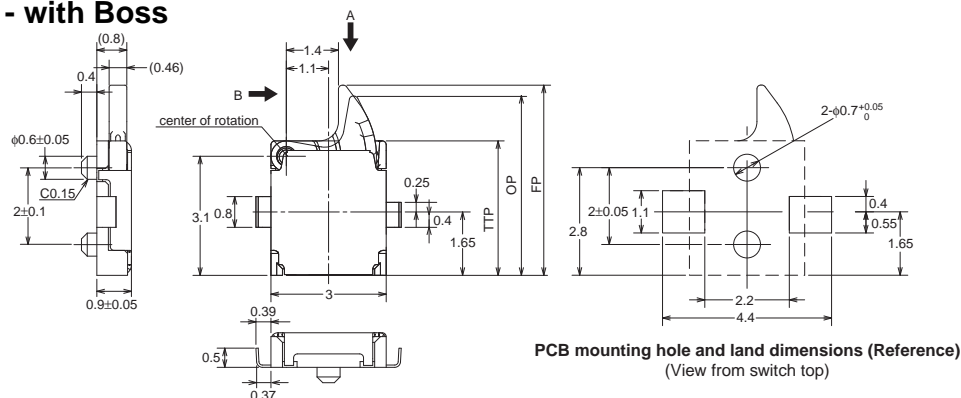
## Left operating - without Boss

D3SK-□0L



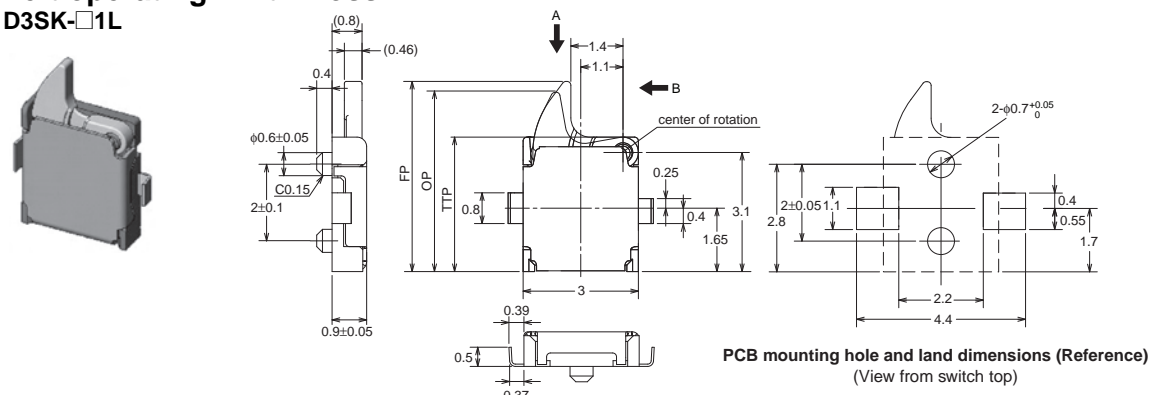
## Right operating - with Boss

D3SK-□1R



## Left operating - with Boss

D3SK-□1L



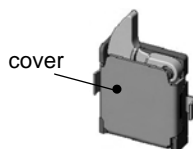
# Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## ■ Correct Use

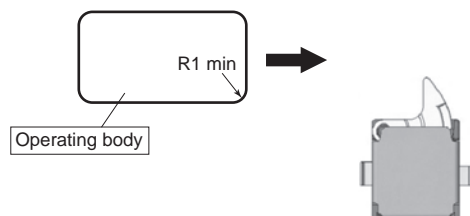
### Mounting

The cover has the same electrical potential as the COM terminal. Do not short-circuit the cover with a NO or NC terminal when mounting the cover.



Be careful of the following points. Incorrect handling may lead to insufficient actuator return, Switch damage, or reduced durability.

- Set the operating body in line with the direction of the actuator movement, and make sure that the operating body is completely separate from the actuator when the Switch is in the free position (FP). When the actuator is operated from the crosswise direction of the Switch, make sure that the corner of the operating body has a minimum radius of R1.



- Set the Switch stroke to 70% to 100% of the overtravel (the difference between the operating position and the total travel position).
- Do not subject the Switch to operations that involve strong impact.
- Do not use the Switch as a stopper.
- Do not apply excessive loads to the cover or operate the actuator from a direction other than a specified operating direction.
- Do not use an adhesive to secure the Switch.

A lubricant is used in the Switch. Some of the lubricant may seep out because the Switch does not have an airtight construction. Consider this possibility with respect to the usage conditions when designing or using the Switch.

### Application Environment

Do not use the Switch in locations that are subject to toxic gas, silicon, excessive dust, excessive dirt, high temperatures, high humidity, sudden temperature changes, water splashes, or oil splashes. Otherwise, damage resulting by faulty contact of the Switch contacts, corrosion, or other causes, or other functional faults may occur.

### Insulation and Wiring

Be sure that the installation conditions provide a sufficient insulation distance between Switch terminals and other metal parts, lands, etc.

### Cleaning

The Switch does not have an airtight construction, and it must not be cleaned with cleaning fluids. Malfunctions may occur if the cleaning fluid penetrates the interior of the Switch together with flux or foreign matter from the surface of the PCB.

### Confirmation with Actual Equipment

Be sure to confirm the quality of the product under the load and environmental conditions that will be used during actual applications.

## ■ Caution

### Electrical Ratings

Confirm the contact load in order to select an appropriate switch rating.

Do not apply an excessive electrical load to the contacts, otherwise the contacts may weld, resulting in a short circuit or burning.

### Terminal Connection

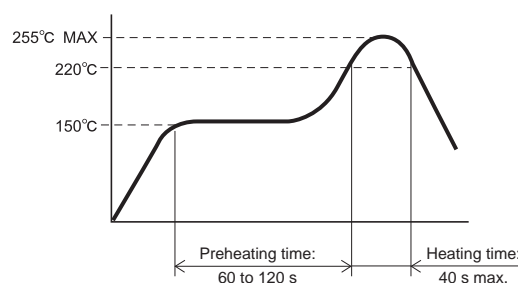
Do not use flow soldering or hand soldering to solder terminals.

Conduct reflow soldering within the range shown in the terminal temperature profile below. Some reflow soldering devices have extremely high peak values. Do a test in advance to confirm proper soldering conditions.

Do not conduct reflow soldering more than twice. Also provide a time interval of at least five minutes between the first and second reflow soldering processes to allow the Switch to return to room temperature. Heating the Switch continuously (without an interval) may cause the edges of the Switch to melt and degrade the characteristics.

When printing for a cream solder process, a 0.13-mm screen thickness is recommended.

Be sure to provide local ventilation.



### Printed Circuit Boards

Special attention must be paid to the handling of printed circuit boards after a Switch has been mounted onto them. Airborne PCB particles may penetrate the interior of the Switch when printed circuit boards are separated by cutting. Also, do not stack printed circuit boards that have Switches mounted on them.

### Product Specification Details

This document provides only a partial list of specifications. It is recommended that you request complete drawings and specifications prior to purchasing or using the product.

## ■ RoHS Directive Compliance

Models that are indicated as being RoHS compliant are free of the following six substances.

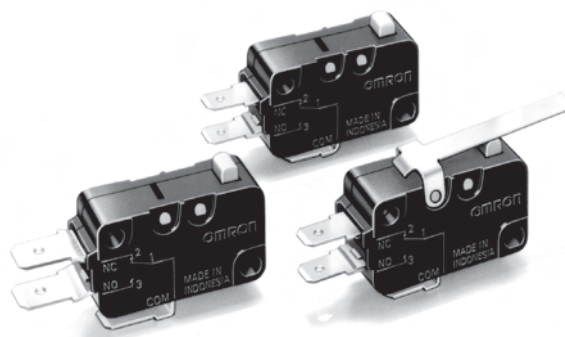
Lead:	1,000 ppm max.
Mercury:	1,000 ppm max.
Cadmium:	100 ppm max.
Hexavalent chromium:	1,000 ppm max.
PBB:	1,000 ppm max.
PBDE:	1,000 ppm max.

# Miniature Basic Switch

## D3V

### Reliable Basic Switch with External Lever

- Available by 0.1 A, 6 A, 11 A, 16 A and 21 A models, all with self-cleaning contacts. 0.1 A utilizes gold alloy crossbar contacts for high reliability at low loads.
- Available with internally or externally fitted levers, and 2 fixing positions for external levers.
- Conforms to EN61058-1 UL1054.
- High Temperature models rated up to 200°C (D3V-6, D3V-01) and 155°C (D3V-11) are available.
- RoHS Compliant.



## Ordering Information

### Model Number Legend

D3V -             -          -       -      

1   2   3   4   5   6   7   8   9   10

#### 1. Ratings

21: 20 (4) A at 250 VAC  
 16: 16 (3) A at 250 VAC  
 11: 11 (3) A at 250 VAC  
 6: 6 (2) A at 250 VAC  
 01: 0.1 A at 125 VAC

#### 2. Contact Gap

None: 1 mm (F gap)  
 G: 0.5 mm (G gap)

#### 3. Actuator

None: Pin plunger  
 1: Short hinge lever  
 2: Hinge lever  
 3: Long hinge lever  
 4: Simulated roller lever  
 5: Short hinge roller lever  
 6: Hinge roller lever

#### 4. Hinge Position

None: Internal / Far from Plunger  
 M: External / Far from Plunger  
 K: External / Near Plunger

#### 5. Contact Form

1: SPDT  
 2: SPST-NC  
 3: SPST-NO

#### 6. Terminals

A: Solder terminals  
 C2: Quick-connect terminal (#187)  
 C: Quick-connect terminal (#250)  
 C6: RAST5 terminal (#250)

#### 7. Maximum Operating Force

5: 200 gf  
 4A: 125 gf  
 4: 100 gf  
 3: 50 gf  
 2: 25 gf  
**Note:** These OF values are for the pin plunger models.

#### 8. Enclosure Material

None: Standard  
 T: High Temperature  
     200°C for D3V-6, D3V-01  
     155°C for D3V-11

W2: EN60695-2-11/-12 Approved  
 (Glow wire flammability test method with PTI = 250)

#### 9. Mounting Hole Size

None: 3.1 mm  
 K: 2.9 mm

#### 10. Special Code

None: Standard  
 H: High Temperature (125°C)  
 E: Special Rating: 21 (8) A  
     (D3V-21, only)

## Available Combinations








Model		D3V-21	D3V-16		D3V-11					D3V-6				D3V-01		
		Rated current	21 A	16 A		11 A					6 A			0.1 A		
		OF	125 gf	200 gf	100 gf	200 gf		100 gf		50 gf	200 gf	100 gf		50 gf	50 gf	25 gf
		Contact gap	G 0.5 mm	F/G 1 mm or 0.5 mm	F/G 1 mm or 0.5 mm	F 1 mm	G 0.5 mm	F 1 mm	G 0.5 mm	G 0.5 mm	F/G 1 mm or 0.5 mm	F 1 mm	G 0.5 mm	G 0.5 mm	F/G 1 mm or 0.5 mm	
Heat resistance	Terminals															
Standard (85°C)	#187														○	○
	#250	○													○	○
	RAST5														○	○
Standard (105°C)	#187		○	○	○	○	○	○	○	○	○	○	○			
	#250		○	○	○	○	○	○	○	○	○	○	○			
	RAST5								○				○			
EN60695-2-11 approved W2: 85°C	#187														○	○
	#250														○	○
															○	○
EN60695-2-11 approved W2: 105°C	#187		○													
	#250		○		○		○					○		○		
	RAST5								○							
High temperature H: 125°C	#187		○	○	○	○	○	○	○	○	○	○	○			
	#250		○	○	○	○	○	○	○	○	○	○	○			
	RAST5															
High temperature T: 155°C	#187				○	○	○	○	○							
	#250				○	○	○	○	○							
	RAST5								○							
High temperature T: 200°C	#187										○	○	○	○	○	○
	#250										○	○	○	○	○	○
	RAST5													○	○	

Note: 1. ○: Available model.








2. Consult OMRON for specific models with standard approval.

## List of Models








### 21 A (OF: 125 gf)

Actuator	Hinge position (far from plunger)	Contact form		
		SPDT	SPST-NC	SPST-NO
Pin plunger 	---	D3V-21G-1□4A-Δ-▽	D3V-21G-2□4A-Δ-▽	D3V-21G-3□4A-Δ-▽
Short hinge lever 	Internal	D3V-21G1-1□4A-Δ-▽	D3V-21G1-2□4A-Δ-▽	D3V-21G1-3□4A-Δ-▽
	External (M)	D3V-21G1M-1□4A-Δ-▽	D3V-21G1M-2□4A-Δ-▽	D3V-21G1M-3□4A-Δ-▽
Hinge lever 	Internal	D3V-21G2-1□4A-Δ-▽	D3V-21G2-2□4A-Δ-▽	D3V-21G2-3□4A-Δ-▽
	External (M)	D3V-21G2M-1□4A-Δ-▽	D3V-21G2M-2□4A-Δ-▽	D3V-21G2M-3□4A-Δ-▽
Long hinge lever 	Internal	D3V-21G3-1□4A-Δ-▽	D3V-21G3-2□4A-Δ-▽	D3V-21G3-3□4A-Δ-▽
	External (M)	D3V-21G3M-1□4A-Δ-▽	D3V-21G3M-2□4A-Δ-▽	D3V-21G3M-3□4A-Δ-▽
Simulated roller lever 	Internal	D3V-21G4-1□4A-Δ-▽	D3V-21G4-2□4A-Δ-▽	D3V-21G4-3□4A-Δ-▽
	External (M)	D3V-21G4M-1□4A-Δ-▽	D3V-21G4M-2□4A-Δ-▽	D3V-21G4M-3□4A-Δ-▽
Short hinge roller lever 	Internal	D3V-21G5-1□4A-Δ-▽	D3V-21G5-2□4A-Δ-▽	D3V-21G5-3□4A-Δ-▽
	External (M)	D3V-21G5M-1□4A-Δ-▽	D3V-21G5M-2□4A-Δ-▽	D3V-21G5M-3□4A-Δ-▽
Hinge roller lever 	Internal	D3V-21G6-1□4A-Δ-▽	D3V-21G6-2□4A-Δ-▽	D3V-21G6-3□4A-Δ-▽
	External (M)	D3V-21G6M-1□4A-Δ-▽	D3V-21G6M-2□4A-Δ-▽	D3V-21G6M-3□4A-Δ-▽








## 16 A (OF: 200 gf)

Actuator	Hinge position (far from plunger)	Contact form		
		SPDT	SPST-NC	SPST-NO
Pin plunger 	---	D3V-16-1□5-●-△-▽	D3V-16-2□5-●-△-▽	D3V-16-3□5-●-△-▽
Short hinge lever 	Internal	D3V-161-1□5-●-△-▽	D3V-161-2□5-●-△-▽	D3V-161-3□5-●-△-▽
	External (M)	D3V-161M-1□5-●-△-▽	D3V-161M-2□5-●-△-▽	D3V-161M-3□5-●-△-▽
Hinge lever 	Internal	D3V-162-1□5-●-△-▽	D3V-162-2□5-●-△-▽	D3V-162-3□5-●-△-▽
	External (M)	D3V-162M-1□5-●-△-▽	D3V-162M-2□5-●-△-▽	D3V-162M-3□5-●-△-▽
Long hinge lever 	Internal	D3V-163-1□5-●-△-▽	D3V-163-2□5-●-△-▽	D3V-163-3□5-●-△-▽
	External (M)	D3V-163M-1□5-●-△-▽	D3V-163M-2□5-●-△-▽	D3V-163M-3□5-●-△-▽
Simulated roller lever 	Internal	D3V-164-1□5-●-△-▽	D3V-164-2□5-●-△-▽	D3V-164-3□5-●-△-▽
	External (M)	D3V-164M-1□5-●-△-▽	D3V-164M-2□5-●-△-▽	D3V-164M-3□5-●-△-▽
Short hinge roller lever 	Internal	D3V-165-1□5-●-△-▽	D3V-165-2□5-●-△-▽	D3V-165-3□5-●-△-▽
	External (M)	D3V-165M-1□5-●-△-▽	D3V-165M-2□5-●-△-▽	D3V-165M-3□5-●-△-▽
Hinge roller lever 	Internal	D3V-166-1□5-●-△-▽	D3V-166-2□5-●-△-▽	D3V-166-3□5-●-△-▽
	External (M)	D3V-166M-1□5-●-△-▽	D3V-166M-2□5-●-△-▽	D3V-166M-3□5-●-△-▽

## 16 A (OF: 100 gf)

Actuator	Hinge position (far from plunger)	Contact form		
		SPDT	SPST-NC	SPST-NO
Pin plunger 	---	D3V-16-1□4-●-△-▽	D3V-16-2□4-●-△-▽	D3V-16-3□4-●-△-▽
Short hinge lever 	Internal	D3V-161-1□4-●-△-▽	D3V-161-2□4-●-△-▽	D3V-161-3□4-●-△-▽
	External (M)	D3V-161M-1□4-●-△-▽	D3V-161M-2□4-●-△-▽	D3V-161M-3□4-●-△-▽
Hinge lever 	Internal	D3V-162-1□4-●-△-▽	D3V-162-2□4-●-△-▽	D3V-162-3□4-●-△-▽
	External (M)	D3V-162M-1□4-●-△-▽	D3V-162M-2□4-●-△-▽	D3V-162M-3□4-●-△-▽
Long hinge lever 	Internal	D3V-163-1□4-●-△-▽	D3V-163-2□4-●-△-▽	D3V-163-3□4-●-△-▽
	External (M)	D3V-163M-1□4-●-△-▽	D3V-163M-2□4-●-△-▽	D3V-163M-3□4-●-△-▽
Simulated roller lever 	Internal	D3V-164-1□4-●-△-▽	D3V-164-2□4-●-△-▽	D3V-164-3□4-●-△-▽
	External (M)	D3V-164M-1□4-●-△-▽	D3V-164M-2□4-●-△-▽	D3V-164M-3□4-●-△-▽
Short hinge roller lever 	Internal	D3V-165-1□4-●-△-▽	D3V-165-2□4-●-△-▽	D3V-165-3□4-●-△-▽
	External (M)	D3V-165M-1□4-●-△-▽	D3V-165M-2□4-●-△-▽	D3V-165M-3□4-●-△-▽
Hinge roller lever 	Internal	D3V-166-1□4-●-△-▽	D3V-166-2□4-●-△-▽	D3V-166-3□4-●-△-▽
	External (M)	D3V-166M-1□4-●-△-▽	D3V-166M-2□4-●-△-▽	D3V-166M-3□4-●-△-▽

## 11 A (OF: 200 gf)

Actuator	Hinge position (far from plunger)	Contact form		
		SPDT	SPST-NC	SPST-NO
Pin plunger 	---	D3V-11-1□5-●-△-▽	D3V-11-2□5-●-△-▽	D3V-11-3□5-●-△-▽
Short hinge lever 	Internal	D3V-111-1□5-●-△-▽	D3V-111-2□5-●-△-▽	D3V-111-3□5-●-△-▽
	External (M)	D3V-111M-1□5-●-△-▽	D3V-111M-2□5-●-△-▽	D3V-111M-3□5-●-△-▽
Hinge lever 	Internal	D3V-112-1□5-●-△-▽	D3V-112-2□5-●-△-▽	D3V-112-3□5-●-△-▽
	External (M)	D3V-112M-1□5-●-△-▽	D3V-112M-2□5-●-△-▽	D3V-112M-3□5-●-△-▽
Long hinge lever 	Internal	D3V-113-1□5-●-△-▽	D3V-113-2□5-●-△-▽	D3V-113-3□5-●-△-▽
	External (M)	D3V-113M-1□5-●-△-▽	D3V-113M-2□5-●-△-▽	D3V-113M-3□5-●-△-▽
Simulated roller lever 	Internal	D3V-114-1□5-●-△-▽	D3V-114-2□5-●-△-▽	D3V-114-3□5-●-△-▽
	External (M)	D3V-114M-1□5-●-△-▽	D3V-114M-2□5-●-△-▽	D3V-114M-3□5-●-△-▽
Short hinge roller lever 	Internal	D3V-115-1□5-●-△-▽	D3V-115-2□5-●-△-▽	D3V-115-3□5-●-△-▽
	External (M)	D3V-115M-1□5-●-△-▽	D3V-115M-2□5-●-△-▽	D3V-115M-3□5-●-△-▽
Hinge roller lever 	Internal	D3V-116-1□5-●-△-▽	D3V-116-2□5-●-△-▽	D3V-116-3□5-●-△-▽
	External (M)	D3V-116M-1□5-●-△-▽	D3V-116M-2□5-●-△-▽	D3V-116M-3□5-●-△-▽

- The □ in the model number is for the terminal code.

A: Solder/quick-connect terminals (#187)

C2: Quick-connect terminals (#187)

C: Quick-connect terminals (#250)

C6 RAST5 terminals (#250)

- The ● in the model number is for the enclosure material

None: Standard

T: High Temperature (200°C for D3V-6/-01, 155°C for D3V-11)

W2: EN60695-2-11/-12 conformity with PTI=250

- The △ in the model number is for the mounting hole size.

None: 3.1 mm

K: 2.9 mm








- The ▽ in the model number is for the special code

None: Standard




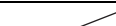



H: High Temperature (125°C)

E: Special rating of 21A (8)A (for D3V-21 only)








# 11 A (OF: 100 gf)

Actuator	Hinge position (far from plunger)	Contact form		
		SPDT	SPST-NC	SPST-NO
Pin plunger 	---	D3V-11-1□4-●-△-▽	D3V-11-2□4-●-△-▽	D3V-11-3□4-●-△-▽
Short hinge lever 	Internal	D3V-111-1□4-●-△-▽	D3V-111-2□4-●-△-▽	D3V-111-3□4-●-△-▽
	External (M)	D3V-111M-1□4-●-△-▽	D3V-111M-2□4-●-△-▽	D3V-111M-3□4-●-△-▽
Hinge lever 	Internal	D3V-112-1□4-●-△-▽	D3V-112-2□4-●-△-▽	D3V-112-3□4-●-△-▽
	External (M)	D3V-112M-1□4-●-△-▽	D3V-112M-2□4-●-△-▽	D3V-112M-3□4-●-△-▽
Long hinge lever 	Internal	D3V-113-1□4-●-△-▽	D3V-113-2□4-●-△-▽	D3V-113-3□4-●-△-▽
	External (M)	D3V-113M-1□4-●-△-▽	D3V-113M-2□4-●-△-▽	D3V-113M-3□4-●-△-▽
Simulated roller lever 	Internal	D3V-114-1□4-●-△-▽	D3V-114-2□4-●-△-▽	D3V-114-3□4-●-△-▽
	External (M)	D3V-114M-1□4-●-△-▽	D3V-114M-2□4-●-△-▽	D3V-114M-3□4-●-△-▽
Short hinge roller lever 	Internal	D3V-115-1□4-●-△-▽	D3V-115-2□4-●-△-▽	D3V-115-3□4-●-△-▽
	External (M)	D3V-115M-1□4-●-△-▽	D3V-115M-2□4-●-△-▽	D3V-115M-3□4-●-△-▽
Hinge roller lever 	Internal	D3V-116-1□4-●-△-▽	D3V-116-2□4-●-△-▽	D3V-116-3□4-●-△-▽
	External (M)	D3V-116M-1□4-●-△-▽	D3V-116M-2□4-●-△-▽	D3V-116M-3□4-●-△-▽

# 11 A (OF: 50 gf)

Actuator	Hinge position (far from plunger)	Contact form		
		SPDT	SPST-NC	SPST-NO
Pin plunger 	---	D3V-11G-1□3-●-△-▽	D3V-11G-2□3-●-△-▽	D3V-11G-3□3-●-△-▽
Short hinge lever 	Internal	D3V-11G1-1□3-●-△-▽	D3V-11G1-2□3-●-△-▽	D3V-11G1-3□3-●-△-▽
	External (M)	D3V-11G1M-1□3-●-△-▽	D3V-11G1M-2□3-●-△-▽	D3V-11G1M-3□3-●-△-▽
Hinge lever 	Internal	D3V-11G2-1□3-●-△-▽	D3V-11G2-2□3-●-△-▽	D3V-11G2-3□3-●-△-▽
	External (M)	D3V-11G2M-1□3-●-△-▽	D3V-11G2M-2□3-●-△-▽	D3V-11G2M-3□3-●-△-▽
Long hinge lever 	Internal	D3V-11G3-1□3-●-△-▽	D3V-11G3-2□3-●-△-▽	D3V-11G3-3□3-●-△-▽
	External (M)	D3V-11G3M-1□3-●-△-▽	D3V-11G3M-2□3-●-△-▽	D3V-11G3M-3□3-●-△-▽
Simulated roller lever 	Internal	D3V-11G4-1□3-●-△-▽	D3V-11G4-2□3-●-△-▽	D3V-11G4-3□3-●-△-▽
	External (M)	D3V-11G4M-1□3-●-△-▽	D3V-11G4M-2□3-●-△-▽	D3V-11G4M-3□3-●-△-▽
Short hinge roller lever 	Internal	D3V-11G5-1□3-●-△-▽	D3V-11G5-2□3-●-△-▽	D3V-11G5-3□3-●-△-▽
	External (M)	D3V-11G5M-1□3-●-△-▽	D3V-11G5M-2□3-●-△-▽	D3V-11G5M-3□3-●-△-▽
Hinge roller lever 	Internal	D3V-11G6-1□3-●-△-▽	D3V-11G6-2□3-●-△-▽	D3V-11G6-3□3-●-△-▽
	External (M)	D3V-11G6M-1□3-●-△-▽	D3V-11G6M-2□3-●-△-▽	D3V-11G6M-3□3-●-△-▽

# 6 A (OF: 100 gf)

Actuator	Hinge position (far from plunger)	Contact form		
		SPDT	SPST-NC	SPST-NO
Pin plunger 	---	D3V-6-1□4-●-△-▽	D3V-6-2□4-●-△-▽	D3V-6-3□4-●-△-▽
Short hinge lever 	Internal	D3V-61-1□4-●-△-▽	D3V-61-2□4-●-△-▽	D3V-61-3□4-●-△-▽
	External (M)	D3V-61M-1□4-●-△-▽	D3V-61M-2□4-●-△-▽	D3V-61M-3□4-●-△-▽
Hinge lever 	Internal	D3V-62-1□4-●-△-▽	D3V-62-2□4-●-△-▽	D3V-62-3□4-●-△-▽
	External (M)	D3V-62M-1□4-●-△-▽	D3V-62M-2□4-●-△-▽	D3V-62M-3□4-●-△-▽
Long hinge lever 	Internal	D3V-63-1□4-●-△-▽	D3V-63-2□4-●-△-▽	D3V-63-3□4-●-△-▽
	External (M)	D3V-63M-1□4-●-△-▽	D3V-63M-2□4-●-△-▽	D3V-63M-3□4-●-△-▽
Simulated roller lever 	Internal	D3V-64-1□4-●-△-▽	D3V-64-2□4-●-△-▽	D3V-64-3□4-●-△-▽
	External (M)	D3V-64M-1□4-●-△-▽	D3V-64M-2□4-●-△-▽	D3V-64M-3□4-●-△-▽
Short hinge roller lever 	Internal	D3V-65-1□4-●-△-▽	D3V-65-2□4-●-△-▽	D3V-65-3□4-●-△-▽
	External (M)	D3V-65M-1□4-●-△-▽	D3V-65M-2□4-●-△-▽	D3V-65M-3□4-●-△-▽
Hinge roller lever 	Internal	D3V-66-1□4-●-△-▽	D3V-66-2□4-●-△-▽	D3V-66-3□4-●-△-▽
	External (M)	D3V-66M-1□4-●-△-▽	D3V-66M-2□4-●-△-▽	D3V-66M-3□4-●-△-▽

• The □ in the model number is for the terminal code.

A: Solder/quick-connect terminals (#187)  
C2: Quick-connect terminals (#187)  
C: Quick-connect terminals (#250)  
C6: RAST5 terminals (#250)

• The ● in the model number is for the enclosure material

None: Standard  
T: High Temperature (200°C for D3V-6/-01, 155°C for D3V-11)  
W2: EN60695-2-11/-12 conformity with PTI=250

• The △ in the model number is for the mounting hole size.








None: 3.1 mm  
K: 2.9 mm

• The ▽ in the model number is for the special code








None: Standard  
H: High Temperature (125°C)  
E: Special rating of 21A (8)A (for D3V-21 only)




## 6 A (OF: 50 gf)

Actuator	Hinge position (far from plunger)	Contact form		
		SPDT	SPST-NC	SPST-NO
Pin plunger 	---	D3V-6G-1□3-●-△-▽	D3V-6G-2□3-●-△-▽	D3V-6G-3□3-●-△-▽
Short hinge lever 	Internal	D3V-6G1-1□3-●-△-▽	D3V-6G1-2□3-●-△-▽	D3V-6G1-3□3-●-△-▽
	External (M)	D3V-6G1M-1□3-●-△-▽	D3V-6G1M-2□3-●-△-▽	D3V-6G1M-3□3-●-△-▽
Hinge lever 	Internal	D3V-6G2-1□3-●-△-▽	D3V-6G2-2□3-●-△-▽	D3V-6G2-3□3-●-△-▽
	External (M)	D3V-6G2M-1□3-●-△-▽	D3V-6G2M-2□3-●-△-▽	D3V-6G2M-3□3-●-△-▽
Long hinge lever 	Internal	D3V-6G3-1□3-●-△-▽	D3V-6G3-2□3-●-△-▽	D3V-6G3-3□3-●-△-▽
	External (M)	D3V-6G3M-1□3-●-△-▽	D3V-6G3M-2□3-●-△-▽	D3V-6G3M-3□3-●-△-▽
Simulated roller lever 	Internal	D3V-6G4-1□3-●-△-▽	D3V-6G4-2□3-●-△-▽	D3V-6G4-3□3-●-△-▽
	External (M)	D3V-6G4M-1□3-●-△-▽	D3V-6G4M-2□3-●-△-▽	D3V-6G4M-3□3-●-△-▽
Short hinge roller lever 	Internal	D3V-6G5-1□3-●-△-▽	D3V-6G5-2□3-●-△-▽	D3V-6G5-3□3-●-△-▽
	External (M)	D3V-6G5M-1□3-●-△-▽	D3V-6G5M-2□3-●-△-▽	D3V-6G5M-3□3-●-△-▽
Hinge roller lever 	Internal	D3V-6G6-1□3-●-△-▽	D3V-6G6-2□3-●-△-▽	D3V-6G6-3□3-●-△-▽
	External (M)	D3V-6G6M-1□3-●-△-▽	D3V-6G6M-2□3-●-△-▽	D3V-6G6M-3□3-●-△-▽

## 01 A (OF: 50 gf)

Actuator	Hinge position (far from plunger)	Contact form		
		SPDT	SPST-NC	SPST-NO
Pin plunger 	---	D3V-01-1□3-●-△-▽	D3V-01-2□3-●-△-▽	D3V-01-3□3-●-△-▽
Short hinge lever 	Internal	D3V-011-1□3-●-△-▽	D3V-011-2□3-●-△-▽	D3V-011-3□3-●-△-▽
	External (M)	D3V-011M-1□3-●-△-▽	D3V-011M-2□3-●-△-▽	D3V-011M-3□3-●-△-▽
Hinge lever 	Internal	D3V-012-1□3-●-△-▽	D3V-012-2□3-●-△-▽	D3V-012-3□3-●-△-▽
	External (M)	D3V-012M-1□3-●-△-▽	D3V-012M-2□3-●-△-▽	D3V-012M-3□3-●-△-▽
Long hinge lever 	Internal	D3V-013-1□3-●-△-▽	D3V-013-2□3-●-△-▽	D3V-013-3□3-●-△-▽
	External (M)	D3V-013M-1□3-●-△-▽	D3V-013M-2□3-●-△-▽	D3V-013M-3□3-●-△-▽
Simulated roller lever 	Internal	D3V-014-1□3-●-△-▽	D3V-014-2□3-●-△-▽	D3V-014-3□3-●-△-▽
	External (M)	D3V-014M-1□3-●-△-▽	D3V-014M-2□3-●-△-▽	D3V-014M-3□3-●-△-▽
Short hinge roller lever 	Internal	D3V-015-1□3-●-△-▽	D3V-015-2□3-●-△-▽	D3V-015-3□3-●-△-▽
	External (M)	D3V-015M-1□3-●-△-▽	D3V-015M-2□3-●-△-▽	D3V-015M-3□3-●-△-▽
Hinge roller lever 	Internal	D3V-016-1□3-●-△-▽	D3V-016-2□3-●-△-▽	D3V-016-3□3-●-△-▽
	External (M)	D3V-016M-1□3-●-△-▽	D3V-016M-2□3-●-△-▽	D3V-016M-3□3-●-△-▽

## 01 A (OF: 25 gf)

Actuator	Hinge position (far from plunger)	Contact form		
		SPDT	SPST-NC	SPST-NO
Pin plunger 	---	D3V-01-1□2-●-△-▽	D3V-01-2□2-●-△-▽	D3V-01-3□2-●-△-▽

- The □ in the model number is for the terminal code.

A: Solder/quick-connect terminals (#187)

C2: Quick-connect terminals (#187)

C: Quick-connect terminals (#250)

C6: RAST5 terminals (#250)

- The ● in the model number is for the enclosure material

None: Standard

T: High Temperature (200°C for D3V-6/-01, 155°C for D3V-11)

W2: EN60695-2-11/-12 conformity with PTI=250

- The △ in the model number is for the mounting hole size.

None: 3.1 mm

K: 2.9 mm

- The ▽ in the model number is for the special code

None: Standard

H: High Temperature (125°C)

E: Special rating of 21A (8)A (for D3V-21 only)



# Specifications

## ■ Ratings

Type	Rated voltage	Non-inductive load				Inductive load			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
D3V-21	250 VAC	21 A		3 A		12 A		4 A	
	8 VDC	21 A		5 A		12 A		7 A	
	30 VDC	14 A		5 A		12 A		5 A	
	125 VDC	0.6 A		0.1 A		0.6 A		0.1 A	
	250 VDC	0.3 A		0.05 A		0.3 A		0.05 A	
D3V-16	250 VAC	16 A		2 A		10 A		3 A	
	8 VDC	16 A		4 A		10 A		6 A	
	30 VDC	10 A		4 A		10 A		4 A	
	125 VDC	0.6 A		0.1 A		0.6 A		0.1 A	
	250 VDC	0.3 A		0.05 A		0.3 A		0.05 A	
D3V-11	250 VAC	11 A		1.5 A		6 A		2 A	
	8 VDC	11 A		3 A		6 A		3 A	
	30 VDC	6 A		3 A		6 A		3 A	
	125 VDC	0.6 A		0.1 A		0.6 A		0.1 A	
	250 VDC	0.3 A		0.05 A		0.3 A		0.05 A	
D3V-6	250 VAC	6 A		3 A		4 A		---	
	8 VDC	6 A		3 A		4 A		---	
	30 VDC	6 A		3 A		4 A		---	
	125 VDC	0.4 A		0.1 A		0.4 A		---	
	250 VDC	0.3 A		0.05 A		0.2 A		---	
D3V-01	125 VAC	0.1 A		---		---		---	
	8 VDC	0.1 A		---		---		---	
	30 VDC	0.1 A		---		---		---	

**Note:** 1. The above current values are the normal current values of models with a contact gap of 1 mm (gap F), which vary with the normal current values of models with a contact gap of 0.5 mm (gap G).

2. Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).

3. Lamp load has an inrush current of 10 times the steady-state current.

4. Motor load has an inrush current of 6 times the steady-state current.

5. The ratings values apply under the following test conditions: Ambient temperature: 20±2°C, Ambient humidity: 65±5%, Operating frequency: 30 operations/min

## ■ Approved Standards

UL1054 (File No. E41515)

CSA C22.2 No.55 (File No. LR21642)

(Only standard ratings are listed.)

Rated voltage	D3V-21G	D3V-16	D3V-16G	D3V-11	D3V-11G	D3V-6	D3V-6G	D3V-01
125 VAC	3/4 HP	16 A, 1/2 HP	16 A, 1/2 HP	11 A, 1/2 HP	11 A, 1/2 HP	6 A, 1/4 HP	6 A, 1/4 HP	0.1 A
250 VAC	20.1 A, 3/4 HP	16 A, 1/2 HP	16 A, 1/2 HP	11 A, 1/2 HP	11 A, 1/2 HP	6 A, 1/4 HP	6 A, 1/4 HP	---
125 VDC	---	0.6 A	0.1 A	0.6 A	0.1 A	---	---	---
250 VDC	---	0.3 A	---	0.3 A	---	---	---	---

EN 61058-1: 1992+A1: 1993 (License No. 119151L)

Rated voltage	D3V-21G	D3V-16	D3V-11	D3V-6	D3V-01
125 VAC	---	---	---	---	0.1 A
250 VAC	20 (4) A	16 (3) A	11 (3) A	6 (2) A	---
250 VAC	21 (8) A**				

Testing conditions: 50,000 operations, T85 (0°C to 85°C) for D3V-21/D3V-01, T105 (0°C to 105°C) for D3V-16/D3V-11/D3V-6 and T200 (0 to 200°C) for D3V-6/-01 with suffix "T", T155 (0 to 155°C) for D3V-11 with suffix "T".

\*\*Testing conditions: 10,000 operations, T85 (0°C to 85°C)

EN 60695-2-11 Ed.2, EN 60695-2-12 Ed.2 - - Glow-wire flammability test methods

Rated voltage	D3V-16	D3V-11	D3V-6	D3V-01
125 VAC	---	---	---	0.1 A
250 VAC	16 (3) A	11 (3) A	6 (2) A	---

## ■ Characteristics

Operating speed	0.1 mm to 1 m/s (plunger models)
Operating frequency	Mechanical: 600 operations/min Electrical: 60 operations/min
Insulation resistance	100 M $\Omega$ min. (at 500 VDC)
Contact resistance	D3V-21: 50 m $\Omega$ max. D3V-16, D3V-11, D3V-6: 30 m $\Omega$ max. D3V-01, 50 gf versions: 50 m $\Omega$ max. 25 gf versions: 100 m $\Omega$ max.
Dielectric strength (see note 2)	1,000 VAC, 50/60 Hz for 1 min between terminals of the same polarity 2,000 VAC, 50/60 Hz for 1 min between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts
Vibration resistance (see note 3)	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance (see note 3)	Destruction: 400 m/s <sup>2</sup> (approx. 40G) max. Malfunction: 100 m/s <sup>2</sup> (approx. 10G) max.
Life expectancy	Mechanical: 10,000,000 operations min. Electrical: D3V-21: 50,000 operations min. D3V-16: 100,000 operations min. D3V-11: 200,000 operations min. D3V-6, D3V-01: 500,000 operations min.
Degree of protection	IEC IP40
Degree of protection against electric shock	Class I
Proof tracking index (PTI)	250 (High Temperature type with suffix "-T": 175)
Ambient operating temperature	D3V-21: -25°C to 85°C with no icing D3V-16: -25°C to 105°C (High Temperature type "H": -25°C to 125°C) with no icing D3V-11: -25°C to 105°C (High Temperature types "H": -25°C to 125°C, "T": -25°C to 155°C) with no icing D3V-6: -25°C to 105°C (High Temperature types "H": -25°C to 125°C, "T": -25°C to 200°C) with no icing D3V-01: -25°C to 85°C (High Temperature type "T": -25°C to 200°C) with no icing
Ambient operating humidity	85% max. (for 5°C to 35°C)
Weight	Approx. 6.2 g (plunger models)

**Note:** 1. Data shown are of initial value.

2. The dielectric strength values shown in the table are for models with a Separator.

3. For plunger models, the above values apply for use at both the free position and total travel position. For lever models, they apply at the total travel position.

4. For testing conditions, contact your OMRON sales representative.

## ■ Contact Specifications

Item		D3V-21	D3V-16	D3V-11	D3V-6	D3V-01
Contact	Specification	Rivet				Crossbar
	Material	Silver alloy				Gold alloy
	Gap (standard value)	0.5 mm	1 mm (F gap type) or 0.5 mm (G gap type)			1.0 mm
Inrush current	NC	50 A max.	40 A max.	24 A max.	15 A max.	---
	NO					
Minimum applicable load		160 mA at 5 VDC				1 mA at 5 VDC

**Note:** Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003). The equation  $\lambda_{60}=0.5 \times 10^{-6}$  / operations indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%.

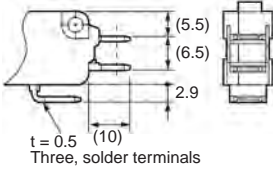
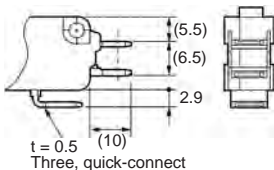
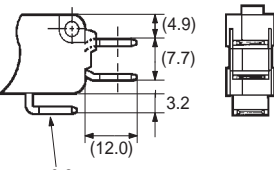
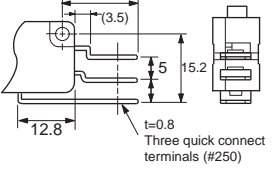
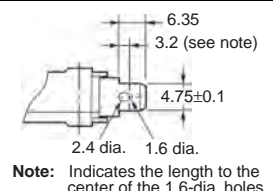
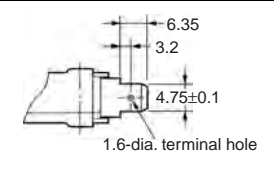
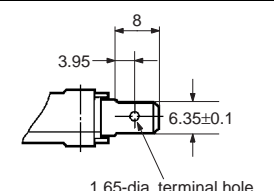
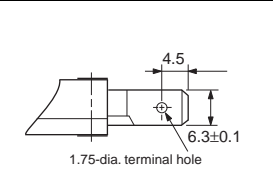
## ■ Contact Form

SPDT	SPST-NC	SPST-NO

# Dimensions

## ■ Terminals

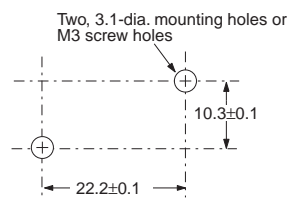
**Note:** Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions

Terminal type	Solder Terminal (A)	Quick-connect Terminal (#187) (C2)	Quick-connect Terminal (#250) (C)	Quick-connect RAST5 Terminals (#250)(C6)
COM				
Terminal dimensions				

**Note:** The table above is for the SPDT contact specifications. Two terminals will be available for SPST-NO or SPST-NC contact specifications. For terminal positions, refer to the above *Contact Form*.

## ■ Mounting Holes

All switches may be panel mounted using M3 mounting screws with plane washers or spring washers to securely mount the switch. Tighten the screws to a torque of 0.39 to 0.59 N·m.



## ■ Dimensions and Operating Characteristics

**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions

- The following illustrations and drawings are for quick-connect terminals (#187) (terminals C2). D3V models also incorporate terminals A, C, and C6, which are omitted from the following drawings. Refer to *Terminals* section for the dimensions of these terminals.
- The □ in the model number is for the terminal code.
- The Δ in the model number is for combinations of the enclosure material, the mounting hole size and the special code as indicated in the *Model Number Legend* and *Available Combinations* tables. The hole size in the following illustrations of models with a suffix "K" in the Δ is 2.9 mm.
- The operating characteristics are for operation in the A direction ( ↓ ).

### Plunger Models

D3V-21G-1□4A-Δ

D3V-16-1□5-Δ

D3V-11-1□5-Δ

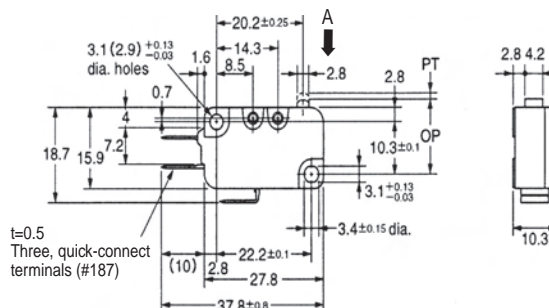
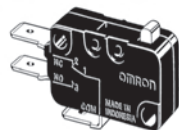
D3V-11-1□4-Δ

D3V-6-1□4-Δ

D3V-6G-1□3-Δ

D3V-01-1□2-Δ

D3V-01-1□3-Δ



Model	D3V-21G-1□4A-Δ	D3V-16-1□5-Δ D3V-11-1□5-Δ	D3V-11-1□4-Δ D3V-6-1□4-Δ	D3V-6G-1□3-Δ	D3V-01-1□3-Δ	D3V-01-1□2-Δ
OF max. RF min.	125 gf 20 gf	200 gf 50 gf	100 gf 15 gf	50 gf 5 gf	50 gf 5 gf	25 gf 3 gf
PT max. OT min. MD max.	1.2 mm 1.0 mm 0.3 mm	1.2 mm 1.0 mm 0.4 mm (F gap type) or 0.3 mm (G gap type)			1.2 mm 1.0 mm 0.4 mm	
OP	14.7±0.4 mm					

# Short Hinge Lever Models

D3V-21G1-1□4A-Δ

D3V-161-1□5-Δ

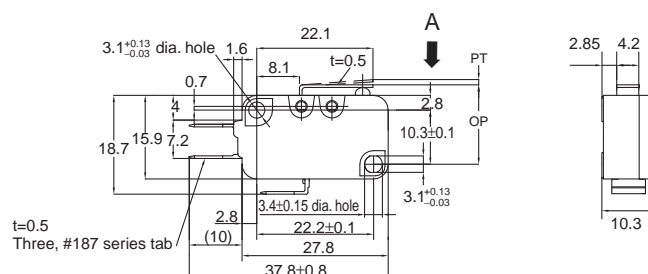
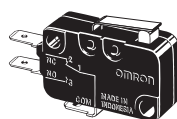
D3V-111-1□5-Δ

D3V-111-1□4-Δ

D3V-61-1□4-Δ

D3V-6G1-1□3-Δ

D3V-011-1□3-Δ



D3V-21G1M-1□4A-Δ

D3V-161M-1□5-Δ

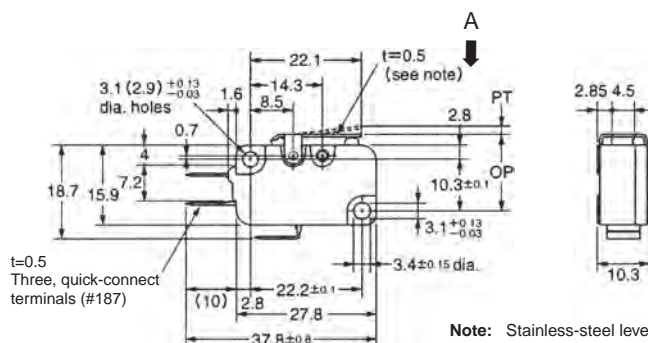
D3V-111M-1□5-Δ

D3V-111M-1□4-Δ

D3V-61M-1□4-Δ

D3V-6G1M-1□3-Δ

D3V-011M-1□3-Δ



Model	D3V-21G1(M)-1□4A-Δ	D3V-161(M)-1□5-Δ D3V-111(M)-1□5-Δ	D3V-111(M)-1□4-Δ D3V-61(M)-1□4-Δ	D3V-6G1(M)-1□3-Δ	D3V-011(M)-1□3-Δ
OF max. RF min.	125 gf 20 gf	200 gf 50 gf	100 gf 15 gf	50 gf 5 gf	
PT max. OT min. MD max.	1.6 mm 0.8 mm 0.5 mm	1.6 mm 0.8 mm 0.6 mm (F gap type) or 0.5 mm (G gap type)			1.6 mm 0.8 mm 0.6 mm
OP	15.2 ± 0.5 mm				

D3V-21G1K-1□4A-Δ

D3V-161K-1□5-Δ

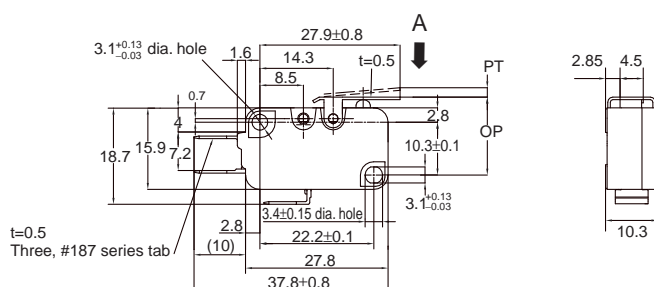
D3V-111K-1□5-Δ

D3V-111K-1□4-Δ

D3V-61K-1□4-Δ

D3V-6G1K-1□3-Δ

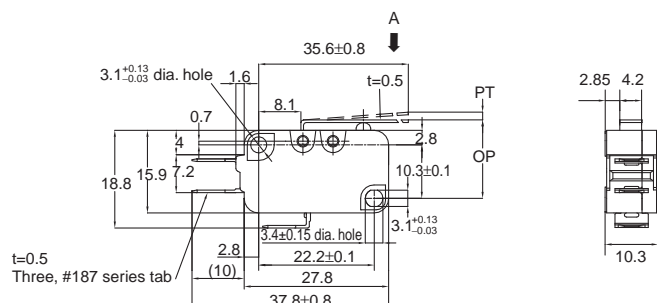
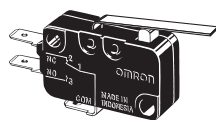
D3V-011K-1□3-Δ



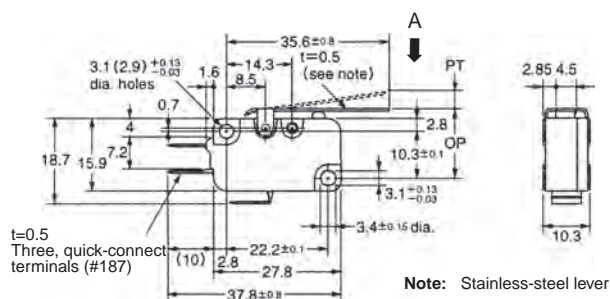
Model	D3V-21G1K-1□4A-Δ	D3V-161K-1□5-Δ D3V-111K-1□5-Δ	D3V-111K-1□4-Δ D3V-61K-1□4-Δ	D3V-6G1K-1□3-Δ	D3V-011K-1□3-Δ
OF max. RF min.	85 gf 8 gf	130 gf 16 gf	65 gf 8 gf	35 gf 4 gf	
PT max. OT min. MD max.	3.5 mm 1.1 mm 1.1 mm	3.5 mm 1.1 mm 1.2 mm (F gap type) or 1.1 mm (G gap type)			3.5 mm 1.1 mm 1.2 mm
OP	15.2 ± 1.2 mm				

## Hinge Lever Models

D3V-21G2-1□4A-Δ  
D3V-162-1□5-Δ  
D3V-112-1□5-Δ  
D3V-112-1□4-Δ  
D3V-62-1□4-Δ  
D3V-6G2-1□3-Δ  
D3V-012-1□3-Δ



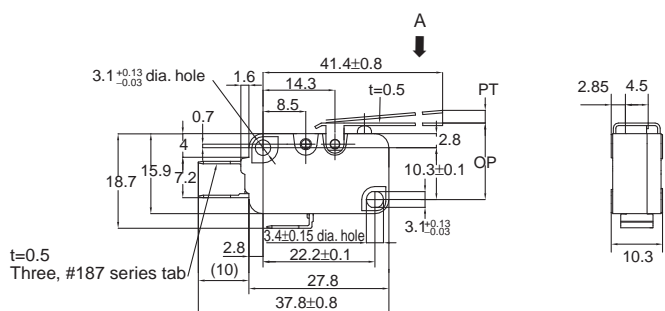
D3V-21G2M-1□4A-Δ  
D3V-162M-1□5-Δ  
D3V-112M-1□5-Δ  
D3V-112M-1□4-Δ  
D3V-62M-1□4-Δ  
D3V-6G2M-1□3-Δ  
D3V-012M-1□3-Δ



Note: Stainless-steel lever

Model	D3V-21G2(M)-1□4A-Δ	D3V-162(M)-1□5-Δ D3V-112(M)-1□5-Δ	D3V-112(M)-1□4-Δ D3V-62(M)-1□4-Δ	D3V-6G2(M)-1□3-Δ	D3V-012(M)-1□3-Δ
OF max. RF min.	80 gf 6 gf	125 gf 14 gf	60 gf 6 gf		30 gf - - -
PT max. OT min. MD max.	4.0 mm 1.6 mm 0.8 mm	4.0 mm 1.6 mm 1.5 mm (F gap type) or 0.8 mm (G gap type)			4.0 mm 1.6 mm 1.5 mm
OP	15.2 ± 1.2 mm				

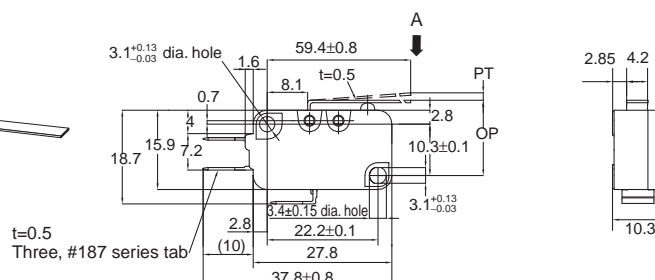
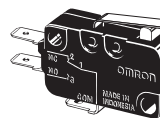
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D3V-162K-1□5-Δ  
D3V-112K-1□5-Δ  
D3V-112K-1□4-Δ  
D3V-62K-1□4-Δ  
D3V-6G2K-1□3-Δ  
D3V-012K-1□3-Δ



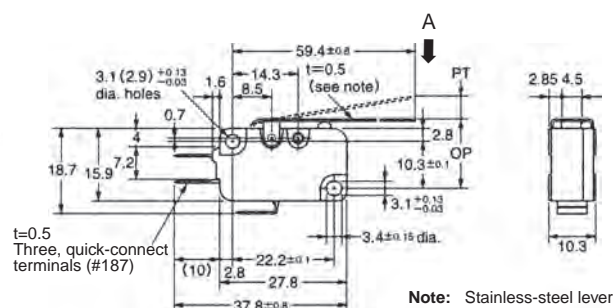
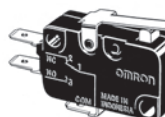
Model	D3V-21G2K-1□4A-Δ	D3V-162K-1□5-Δ D3V-112K-1□5-Δ	D3V-112K-1□4-Δ D3V-62K-1□4-Δ	D3V-6G2K-1□3-Δ	D3V-012K-1□3-Δ
OF max. RF min.	45 gf 4 gf	70 gf 8 gf	35 gf 4 gf	20 gf - - -	
PT max. OT min. MD max.	6.0 mm 2.5 mm 1.3 mm	6.0 mm 2.5 mm 2.0 mm (F gap type) or 1.3 mm (G gap type)			6.0 mm 2.5 mm 2.0 mm
OP	15.2 ± 2.0 mm				

## Long Hinge Lever Models

D3V-21G3-1□4A-Δ  
D3V-163-1□5-Δ  
D3V-113-1□5-Δ  
D3V-113-1□4-Δ  
D3V-63-1□4-Δ  
D3V-6G3-1□3-Δ  
D3V-013-1□3-Δ

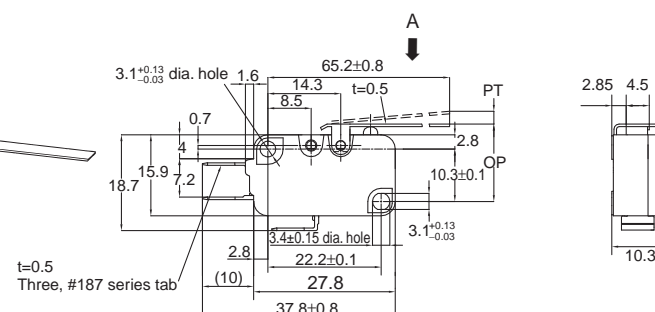
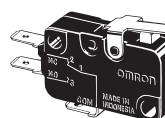


D3V-21G3M-1□4A-Δ  
D3V-163M-1□5-Δ  
D3V-113M-1□5-Δ  
D3V-113M-1□4-Δ  
D3V-63M-1□4-Δ  
D3V-6G3M-1□3-Δ  
D3V-013M-1□3-Δ



Model	D3V-21G3(M)-1□4A-Δ	D3V-163(M)-1□5-Δ D3V-113(M)-1□5-Δ	D3V-113(M)-1□4-Δ D3V-63(M)-1□4-Δ	D3V-6G3(M)-1□3-Δ	D3V-013(M)-1□3-Δ
OF max. RF min.	45 gf 3 gf	70 gf 6 gf	35 gf ---	20 gf ---	
PT max. OT min. MD max.	9.0 mm 2.0 mm 2.0 mm	9.0 mm 2.0 mm 2.8 mm (F gap type) or 2.0 mm (G gap type)	9.0 mm 3.2 mm 2.8 mm (F gap type) or 2.0 mm (G gap type)		9.0 mm 3.2 mm 2.8 mm
OP	15.2 <sup>+2.6</sup> <sub>-3.2</sub> mm		15.2 ± 2.6 mm		

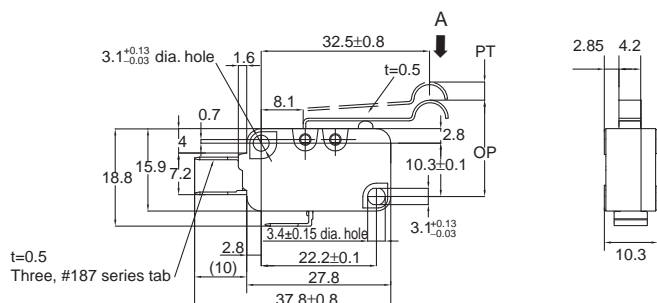
D3V-21G3K-1□4A-Δ  
D3V-163K-1□5-Δ  
D3V-113K-1□5-Δ  
D3V-113K-1□4-Δ  
D3V-63K-1□4-Δ  
D3V-6G3K-1□3-Δ  
D3V-013K-1□3-Δ



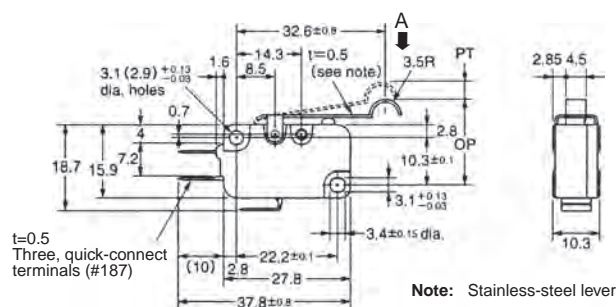
Model	D3V-21G3K-1□4A-Δ	D3V-163K-1□5-Δ D3V-113K-1□5-Δ	D3V-113K-1□4-Δ D3V-63K-1□4-Δ	D3V-6G3K-1□3-Δ	D3V-013K-1□3-Δ
OF max. RF min.	20 gf - - -	35 gf 4 gf	20 gf ---	10 gf ---	
PT max. OT min. MD max.	15.0 mm 4.0 mm 3.0 mm	15.0 mm 4.0 mm 3.8 mm (F gap type) or 3.0 mm (G gap type)			15.0 mm 4.0 mm 3.8 mm
OP	15.2 ± 3.0 mm				

# Simulated Roller Lever Models

D3V-21G4-1□4A-Δ  
D3V-164-1□5-Δ  
D3V-114-1□5-Δ  
D3V-114-1□4-Δ  
D3V-64-1□4-Δ  
D3V-6G4-1□3-Δ  
D3V-014-1□3-Δ

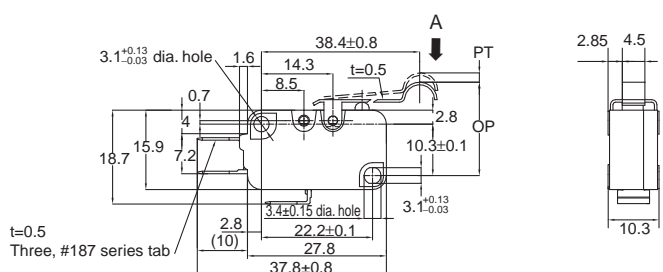


D3V-21G4M-1□4A-Δ  
D3V-164M-1□5-Δ  
D3V-114M-1□5-Δ  
D3V-114M-1□4-Δ  
D3V-64M-1□4-Δ  
D3V-6G4M-1□3-Δ  
D3V-014M-1□3-Δ



Model	D3V-21G4(M)-1□4A-Δ	D3V-164(M)-1□5-Δ D3V-114(M)-1□5-Δ	D3V-114(M)-1□4-Δ D3V-64(M)-1□4-Δ	D3V-6G4(M)-1□3-Δ	D3V-014(M)-1□3-Δ
OF max. RF min.	85 gf 7 gf	125 gf 14 gf	60 gf 6 gf	30 gf ---	
PT max. OT min. MD max.	4.0 mm 1.6 mm 1.4 mm	4.0 mm 1.6 mm 1.5 mm (F gap type) or 0.8 mm (G gap type)			4.0 mm 1.6 mm 1.5 mm
OP	18.7 ± 1.2 mm				

D3V-21G4K-1□4A-Δ  
D3V-164K-1□5-Δ  
D3V-114K-1□5-Δ  
D3V-114K-1□4-Δ  
D3V-64K-1□4-Δ  
D3V-6G4K-1□3-Δ  
D3V-014K-1□3-Δ

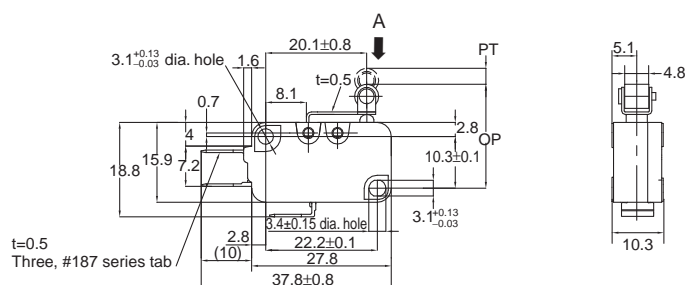
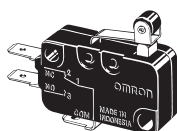


Model	D3V-21G4K-1□4A-Δ	D3V-164K-1□5-Δ D3V-114K-1□5-Δ	D3V-114K-1□4-Δ D3V-64K-1□4-Δ	D3V-6G4K-1□3-Δ	D3V-014K-1□3-Δ
OF max. RF min.	55 gf 3 gf	75 gf 10 gf	40 gf 3 gf	20 gf ---	
PT max. OT min. MD max.	8.0 mm 1.5 mm 3.0 mm	8.0 mm 1.5 mm 3.5 mm (F gap type) or 3.0 mm (G gap type)			8.0 mm 1.5 mm 3.5 mm
OP	18.7 ± 1.2 mm				

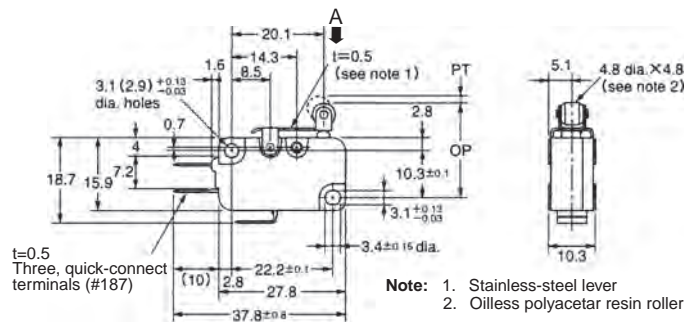
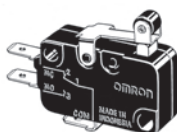


# Short Hinge Roller Lever Models

**D3V-21G5-1□4A-Δ**  
**D3V-165-1□5-Δ**  
**D3V-115-1□5-Δ**  
**D3V-115-1□4-Δ**  
**D3V-65-1□4-Δ**  
**D3V-6G5-1□3-Δ**  
**D3V-015-1□3-Δ**

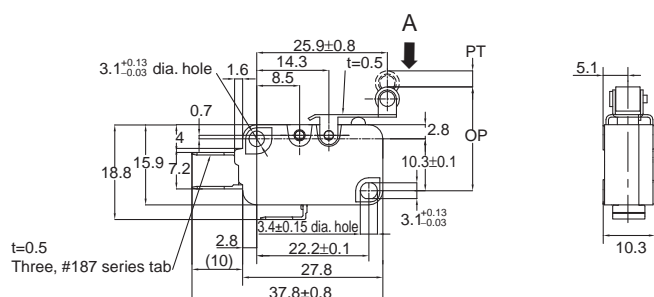
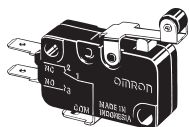


**D3V-21G5M-1□4A-Δ**  
**D3V-165M-1□5-Δ**  
**D3V-115M-1□5-Δ**  
**D3V-115M-1□4-Δ**  
**D3V-65M-1□4-Δ**  
**D3V-6G5M-1□3-Δ**  
**D3V-015M-1□3-Δ**



Model	D3V-21G5(M)-1□4A-Δ	D3V-165(M)-1□5-Δ D3V-115(M)-1□5-Δ	D3V-115(M)-1□4-Δ D3V-65(M)-1□4-Δ	D3V-6G5(M)-1□3-Δ	D3V-015(M)-1□3-Δ
OF max. RF min.	145 gf 20 gf	240 gf 50 gf	120 gf 15 gf	60 gf 6 gf	
PT max. OT min. MD max.	1.6 mm 0.8 mm 0.5 mm	1.6 mm 0.8 mm 0.6 mm (F gap type) or 0.5 mm (G gap type)			1.6 mm 0.8 mm 0.6 mm
OP	20.7±0.6 mm				

**D3V-21G5K-1□4A-Δ**  
**D3V-165K-1□5-Δ**  
**D3V-115K-1□5-Δ**  
**D3V-115K-1□4-Δ**  
**D3V-65K-1□4-Δ**  
**D3V-6G5K-1□3-Δ**  
**D3V-015K-1□3-Δ**

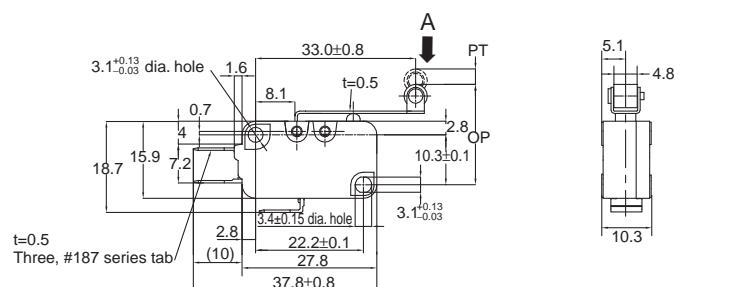


Model	D3V-21G5K-1□4A-Δ	D3V-165K-1□5-Δ D3V-115K-1□5-Δ	D3V-115K-1□4-Δ D3V-65K-1□4-Δ	D3V-6G5K-1□3-Δ	D3V-015K-1□3-Δ
OF max. RF min.	100 gf 8 gf	160 gf 15 gf	80 gf 8 gf	40 gf 4 gf	
PT max. OT min. MD max.	2.6 mm 1.0 mm 8.0 mm	2.6 mm 1.0 mm 0.9 mm (F gap type) or 0.8 mm (G gap type)			2.6 mm 1.0 mm 0.9 mm
OP	20.7 ± 1.0 mm				

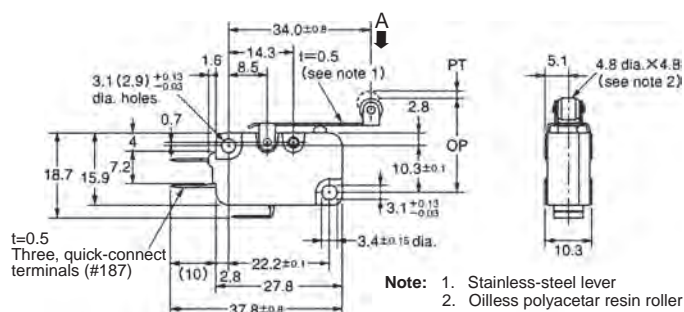


# Hinge Roller Lever Models

D3V-21G6-1□4A-Δ  
D3V-166-1□5-Δ  
D3V-116-1□5-Δ  
D3V-116-1□4-Δ  
D3V-66-1□4-Δ  
D3V-6G6-1□3-Δ  
D3V-016-1□3-Δ

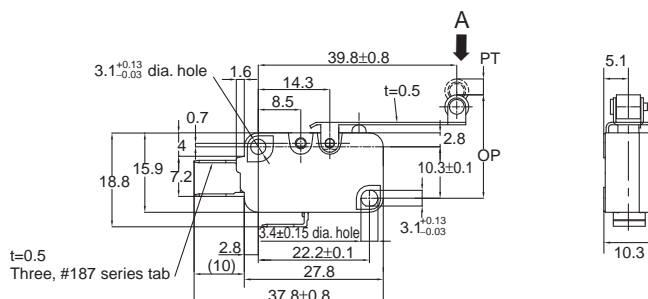
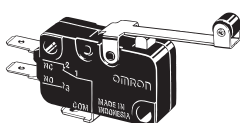


D3V-21G6M-1□4A-Δ  
D3V-166M-1□5-Δ  
D3V-116M-1□5-Δ  
D3V-116M-1□4-Δ  
D3V-66M-1□4-Δ  
D3V-6G6M-1□3-Δ  
D3V-016M-1□3-Δ



Model	D3V-21G6(M)-1□4A-Δ	D3V-166(M)-1□5-Δ D3V-116(M)-1□5-Δ	D3V-116(M)-1□4-Δ D3V-66(M)-1□4-Δ	D3V-6G6(M)-1□3-Δ	D3V-016(M)-1□3-Δ
OF max. RF min.	80 gf 5 gf	125 gf 14 gf	60 gf 6 gf	30 gf ---	
PT max. OT min. MD max.	4.0 mm 1.6 mm 0.8 mm	4.0 mm 1.6 mm 1.5 mm (F gap type) or 0.8 mm (G gap type)			4.0 mm 1.6 mm 1.5 mm
OP	20.7±1.2 mm				

D3V-21G6K-1□4A-Δ  
D3V-166K-1□5-Δ  
D3V-116K-1□5-Δ  
D3V-116K-1□4-Δ  
D3V-66K-1□4-Δ  
D3V-6G6K-1□3-Δ  
D3V-016K-1□3-Δ



Model	D3V-21G6K-1□4A-Δ	D3V-166K-1□5-Δ D3V-116K-1□5-Δ	D3V-116K-1□4-Δ D3V-66K-1□4-Δ	D3V-6G6K-1□3-Δ	D3V-016K-1□3-Δ
OF max. RF min.	50 gf 3 gf	75 gf 10 gf	40 gf 3 gf	20 gf - - -	
PT max. OT min. MD max.	7.2 mm 2.0 mm 2.0 mm	7.2 mm 2.0 mm 2.7 mm (F gap type) or 2.0 mm (G gap type)			7.2 mm 2.0 mm 2.7 mm
OP	20.7 ± 2.2 mm				

# Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## ■ Correct Use

### Mounting Direction

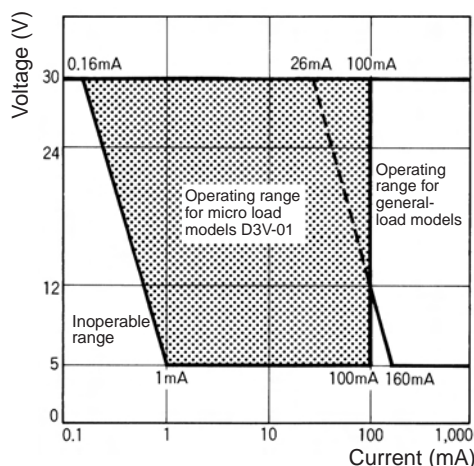
Mount lever-operated switches with a maximum operating force of 0.49 N in a direction where the actuator weight will not be applied to the switch. Since the switch is designed for a small load, its resetting force is small. Therefore, resetting failure may occur if unnecessary load is applied to the switch.

### Insulation Distance

According to EN61058-1, the minimum insulation thickness for this switch should be 1.1 mm and minimum clearance distance between the terminal and mounting plate should be 1.9 mm. If the insulation distance cannot be provided in the product incorporating the switch, either use a switch with insulation barrier or use a Separator to ensure sufficient insulation distance.

### Using Microloads

Using a model for ordinary loads to switch microloads may result in faulty operation. Instead, use the models that are designed for microloads and that operate in the following range;



However, even when using microload models within the operating range shown above, if inrush current or inductive voltage spikes occur when the contact is opened or closed, then contact wear may increase and so decrease the service life. Therefore, insert a contact protection circuit where necessary.

### Solder Terminal Approval Conditions

Use of soldering iron for normal soldering is acceptable.
Soldering hook holes version available.
Soldering terminal types 1 and 2 are met.

## ■ Cautions

### Handling

Be careful not to drop the switch. Doing so may cause damage to the switch's internal components because it is designed for a small load.

# MEMO

# Special-purpose Basic Switch

## DZ

### DPDT Basic Switch for Two Independent Circuit Control

- Incorporates two completely independent built-in switches.
- Ideal for switching the circuits operating on two different voltages, and for controlling two independent circuits.
- Interchangeable with OMRON Z Basic Switches, as both switches are identical in mounting hole dimensions, mounting pitch and pin plunger position.



## Ordering Information

		Terminal	Solder terminal (-1A)	Screw terminal (-B)
Actuator		OT (min.)	Model	Model
Pin plunger		0.13 mm	DZ-10G-1A	DZ-10G-1B
Hinge lever		1.6 mm	DZ-10GW-1A	DZ-10GW-1B
		0.4 mm	DZ-10GV-1A	DZ-10GV-1B
Short hinge roller lever		0.9 mm	DZ-10GW22-1A	DZ-10GW22-1B
		0.13 mm	DZ-10GV22-1A	DZ-10GV22-1B
Hinge roller lever		1.2 mm	DZ-10GW2-1A	DZ-10GW2-1B
		0.26 mm	DZ-10GV2-1A	DZ-10GV2-1B

### Model Number Legend

DZ-10 G ☐ - 1 ☐  
 1 2 3 4 5

#### 1. Ratings

10: 10 A (250 VAC)

#### 2. Contact Gap

G: 0.5 mm

#### 3. Actuator

None: Pin plunger

Low OT Levers:

V: Hinge lever

V22: Short hinge roller lever

V2: Hinge roller lever

High OT Levers:

W: Hinge lever

W22: Short hinge roller lever

W2: Hinge roller lever

#### 4. Contact Form

1: DPDT

#### 5. Terminals

A: Solder terminal

B: Screw terminal

# Specifications

## ■ Characteristics

Operating speed		0.1 mm to 1 m/s (See note 1)
Operating frequency	Mechanical	240 operations/min
	Electrical	20 operations/min
Contact resistance		15 mΩ max. (initial value)
Insulation resistance		100 MΩ min. (at 500 VDC)
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min between non-continuous terminals 1,500 VAC, 50/60 Hz for 1 min between current-carrying metal parts and non-current-carrying metal part, and between current-carrying metal part and ground and between switches
Vibration resistance	Malfunction	10 to 55 Hz, 1.5-mm double amplitude (See note 2)
Shock resistance	Destruction	1,000 m/s <sup>2</sup> max.
	Malfunction	300 m/s <sup>2</sup> max. (See notes 1 and 2)
Degree of protection		IP00
Degree of protection against electric shock		Class I
Proof tracking index (PTI)		175
Ambient operating temperature		–25°C to 80°C (with no icing)
Ambient operating humidity		35% to 85%RH
Service life	Mechanical	1,000,000 operations min.
	Electrical	500,000 operations min.
Weight		Approx. 30 to 50 g

**Note:** 1. The values are for pin plunger models.  
2. Malfunction: 1 ms max.

## ■ Ratings

Rated voltage (V)	Non-inductive load (A)				Inductive load (A)			
	Resistive load		Lamp load		Inductive load		Motor load	
	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	10		2	1	6		3	1.5
250 VAC	10		1.5	0.7	4		2	1
8 VDC	10		3	1.5	6		5	2.5
14 VDC	10		3	1.5	6		5	2.5
30 VDC	10		3	1.5	4		3	1.5
125 VDC	0.5		0.5		0.05		0.05	
250 VDC	0.25		0.25		0.03		0.03	

**Note:** 1. The above values are for steady-state current.  
2. Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).  
3. Lamp load has an inrush current of 10 times the steady-state current.  
4. Motor load has an inrush current of 6 times the steady-state current.  
5. The ratings values apply under the following test conditions:  
(1) Ambient temperature: 20±2°C  
(2) Ambient humidity: 65±5%RH  
(3) Operating frequency: 20 operations/min

## ■ Contact Specifications

Contacts	Material	Silver alloy
	Gap (standard value)	0.5 mm
Inrush current	NC	30 A max.
	NO	15 A max.

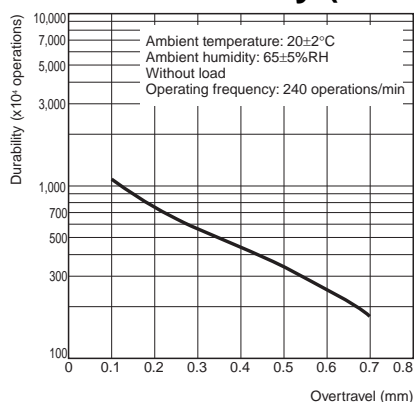
## ■ Safety Standard Ratings

### UL/CSA

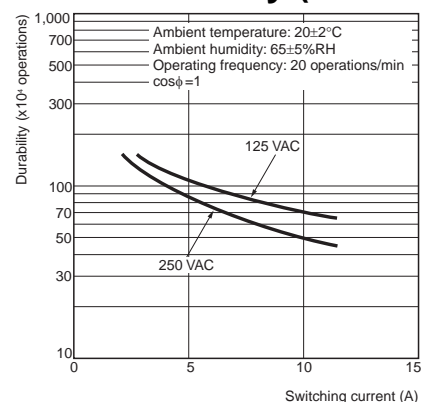
Rated voltage	DZ-10G
125 VAC	10 A and 1/8 HP
250 VAC	10 A and 1/4 HP
480 VAC	2 A
125 VDC	0.5 A
250 VDC	0.25 A

# Engineering Data

## Mechanical Durability (DZ-10G-1B)

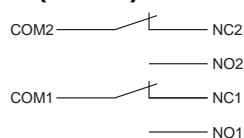


## Electrical Durability (DZ-10G-1B)



## Structure

### Contact Form (DPDT)

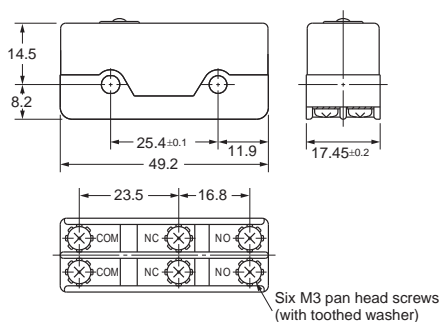


## Dimensions

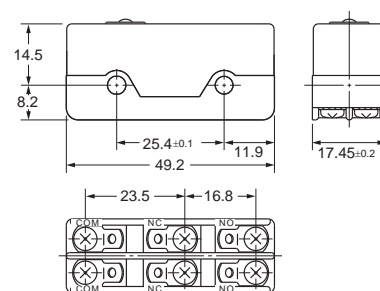
**Note:** Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## Terminals

### Screw Terminals (-1B)

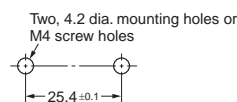


### Solder Terminals (-1A)



## Mounting

All switches can be mounted using M4 mounting screws with plane washers or spring washers to securely mount the Switch. Tighten the screws to a torque of 1.18 to 1.47 N·m.



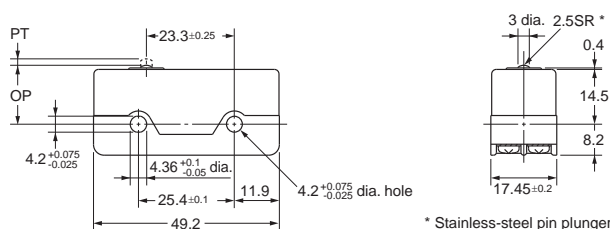
**Accessories (Terminal Covers, and Separators):** Refer to 'Z/A/X/DZ Common Accessories' datasheet

**Note:** 1. The solder terminal model has a suffix "-1A" in its model number and its omitted dimensions are the same as the corresponding dimensions of the pin plunger model.

2. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## Pin Plunger

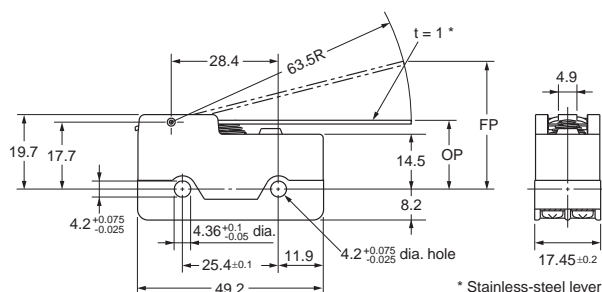
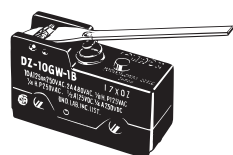
### DZ-10G-1B



Operating force	OF max.	570 gf
Release force	RF min.	57 gf
Pretravel	PT max.	1.7 mm
Overtravel	OT min.	0.13 mm
Movement Differential	MD max.	0.4 mm
Operating Position	OP	15.6±0.4 mm

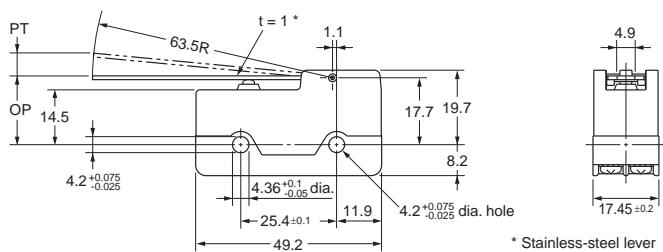
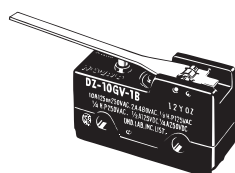
## Hinge Lever

### DZ-10GW-1B



OF max.	170 gf
RF min.	28 gf
OT min.	1.6 mm
MD max.	4 mm
FP max.	46.3 mm
OP	21.8±1 mm

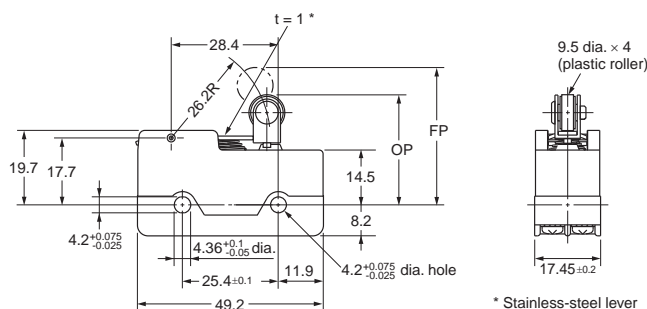
### DZ-10GV-1B



OF max.	200 gf
RF min.	13 gf
PT max.	6 mm
OT min.	0.4 mm
MD max.	1.7 mm
OP	18.3±1 mm

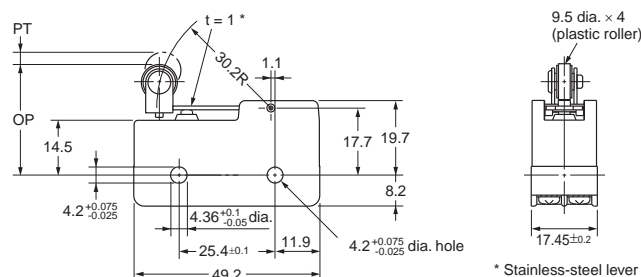
## Short Hinge Roller Lever

### DZ-10GW22-1B



OF max.	400 gf
RF min.	85 gf
OT min.	0.9 mm
MD max.	2.4 mm
FP max.	39.7 mm
OP	30.2±0.8 mm

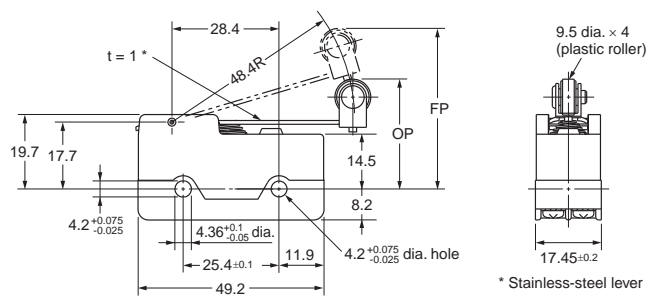
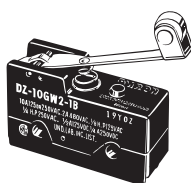
### DZ-10GV22-1B



OF max.	430 gf
RF min.	42 gf
PT max.	3 mm
OT min.	0.13 mm
MD max.	0.6 mm
OP	29.4±0.8 mm

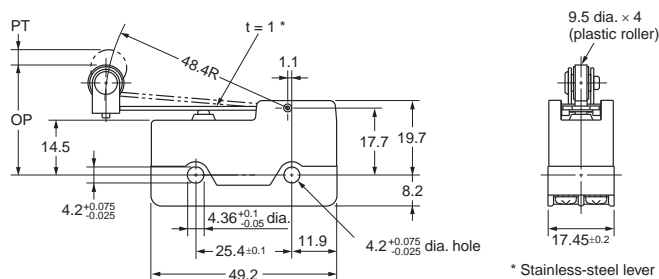
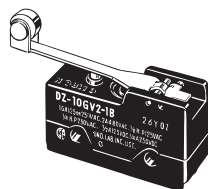
- Note:** 1. The solder terminal model has a suffix "-1A" in its model number and its omitted dimensions are the same as the corresponding dimensions of the pin plunger model.
2. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## Hinge Roller Lever DZ-10GW2-1B



OF max.	213 gf
RF min.	42 gf
OT min.	1.2 mm
MD max.	3.3 mm
FP max.	47.6 mm
OP	31.8 $\pm$ 0.8 mm

## DZ-10GV2-1B



OF max.	270 gf
RF min.	34 gf
PT max.	4 mm
OT min.	0.26 mm
MD max.	1.1 mm
OP	29.4 $\pm$ 0.8 mm



# Safety Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## Precautions for Safe Use

### Terminal Connection

When soldering lead wires to the Switch, make sure that the capacity of the soldering iron is 60 W maximum. Do not take more than 5 s to solder any part of the Switch. The characteristics of the Switch will deteriorate if a soldering iron with a capacity of more than 60 W is applied to any part of the Switch for 5 s or more.

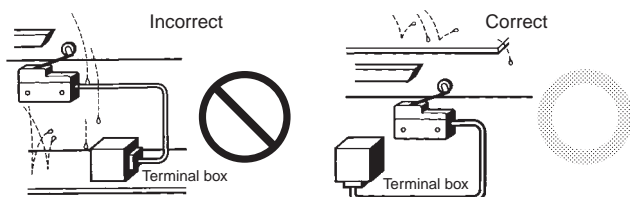
### Operation

- Make sure that the switching frequency or speed is within the specified range.
1. If the switching speed is extremely slow, the contact may not be switched smoothly, which may result in a contact failure or contact welding.
  2. If the switching speed is extremely fast, switching shock may damage the Switch soon. If the switching frequency is too high, the contact may not catch up with the speed.
- The rated permissible switching speed and frequency indicate the switching reliability of the Switch.
- The life of a Switch is determined at the specified switching speed. The life varies with the switching speed and frequency even when they are within the permissible ranges. In order to determine the life of a Switch model to be applied to a particular use, it is best to conduct an appropriate durability test on some samples of the model under actual conditions.
- Make sure that the actuator travel does not exceed the permissible OT position. The operating stroke must be set to 70% to 100% of the rated OT.

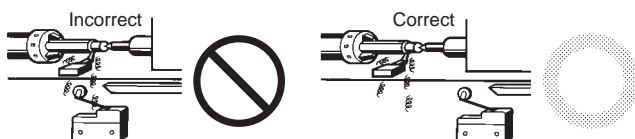
## Precautions for Correct Use

### Mounting Location

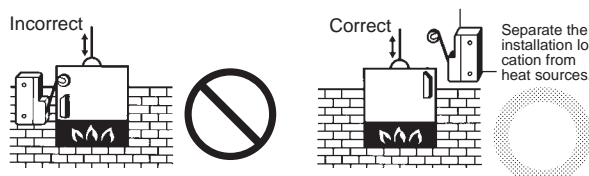
- Do not use the switch alone in atmospheres such as flammable or explosive gases. Arcing and heat generation associated with switching may cause fires or explosions.
- Switches are generally not constructed with resistance against water. Use a protective cover to prevent direct spraying if the switch is used in locations subject to splashing or spurring oil or water, dust adhering.



- Install the switch in a location that is not directly subject to debris and dust from cutting. The actuator and the switch body must be protected from accumulated cutting debris and dirt.



- Do not use the switch in locations subject to hot water (greater than 60°C) or in water vapor.
- Do not use the switch outside the specified temperature and atmospheric conditions. The permissible ambient temperature depends on the model. (Refer to the specifications in this catalog.) Sudden thermal changes may cause thermal shock to distort the switch and result in faults.



- Mount a cover if the switch is to be installed in a location where worker inattention could result in incorrect operation or accidents.



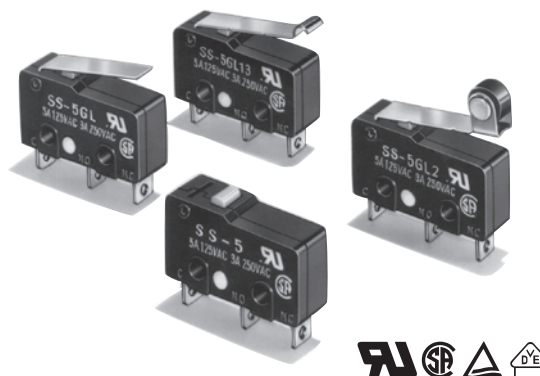
- Subjecting the switch to continuous vibration or shock may result in contact failure or faulty operation due to abrasion powder and in reduced durability. Excessive vibration or shock will cause the contacts to operate malfunction or become damaged. Mount the switch in a location that is not subject to vibration or shock and in a direction that does not subject the switch to resonance.
- If silver contacts are used with relatively low frequency for a long time or are used with microloads, the sulfide coating produced on the contact surface will not be broken down and contact faults will result. Use a microload switch that uses gold contacts.
- Do not use the switch in atmospheres with high humidity or heat or in harmful gases, such as sulfide gas ( $\text{H}_2\text{S}$ ,  $\text{SO}_2$ ), ammonia gas ( $\text{NH}_3$ ), nitric acid gas ( $\text{HNO}_3$ ), or chlorine gas ( $\text{Cl}_2$ ). Doing so may impair functionality, such as with damage due to contacting faults or corrosion.
- The switch includes contacts. If the switch is used in an atmosphere with silicon gas, arc energy may cause silicon oxide ( $\text{SiO}_2$ ) to accumulate on the contacts and result in contact failure. If there is silicon oil, silicon filling, silicon wiring, or other silicon products in the vicinity of the switch, use a contact protection circuit to limit arcing and remove the source of the silicon gas.

# Snap Action Switch













# SS

## Subminiature Snap Action Switch

- Economical, subminiature snap action switch offers long service life (30 million operations minimum)
- All models are free from overtravel restrictions, permit easy setting
- Wide switching capacity range from microvoltage/current loads (1 mA at 5 VDC to high-capacity loads 10.1 A at 250 VAC)
- Standard operating force, low force or super-low force models available
- RoHS Compliant



## Ordering Information

Rating	Actuator	Contact OF	PCB terminal			Soldered terminal	Tab (#110) terminal
			Straight	Left-angled	Right-angled		
0.1 A	Pin plunger 	25 g	SS-01-ED	—	—	SS-01-E	SS-01-ET
		50 g	SS-01-FD	—	—	SS-01-F	SS-01-FT
		150 g	SS-01D	SS-01D1	SS-01D2	SS-01	SS-01T
	Hinge lever 	8 g	SS-01GL-ED	—	—	SS-01GL-E	SS-01GL-ET
		16 g	SS-01GL-FD	—	—	SS-01GL-F	SS-01GL-FT
		50 g	SS-01GLD	SS-01GLD1	SS-01GLD2	SS-01GL	SS-01GLT
	Simulated roller lever 	8 g	SS-01GL13-ED	—	—	SS-01GL13-E	SS-01GL13-ET
		16 g	SS-01GL13-FD	—	—	SS-01GL13-F	SS-01GL13-FT
		50 g	SS-01GL13D	—	—	SS-01GL13	SS-01GL13T
	Hinged roller lever 	8 g	SS-01GL2-ED	—	—	SS-01GL2-E	SS-01GL2-ET
		16 g	SS-01GL2-FD	—	—	SS-01GL2-F	SS-01GL2-FT
		50 g	SS-01GL2D	—	—	SS-01GL2	SS-01GL2T
5 A	Pin plunger 	50 g	SS-5-FD	SS-5-FD1	SS-5-FD2	SS-5-F	SS-5-FT
		150 g	SS-5D	SS-5D1	SS-5D2	SS-5	SS-5T
	Hinge lever 	16 g	SS-5GL-FD	SS-5GL-FD1	SS-5GL-FD2	SS-5GL-F	SS-5GL-FT
		50 g	SS-5GLD	SS-5GLD1	SS-5GLD2	SS-5GL	SS-5GLT
	Simulated roller lever 	16 g	SS-5GL13-FD	—	SS-5GL13-FD2	SS-5GL13-F	SS-5GL13-FT
		50 g	SS-5GL13D	SS-5GL13D1	SS-5GL13D2	SS-5GL13	SS-5GL13T
	Hinge roller lever 	16 g	SS-5GL2-FD	SS-5GL2-FD1	SS-5GL2-FD2	SS-5GL2-F	SS-5GL2-FT
		50 g	SS-5GL2D	SS-5GL2D1	SS-5GL2D2	SS-5GL2	SS-5GL2T
10 A	Pin plunger 	150 g	SS-10D	—	—	SS-10	SS-10T
	Hinge lever 	50 g	SS-10GLD	—	—	SS-10GL	SS-10GLT
	Simulated roller lever 	50 g	SS-10GL13D	—	—	SS-10GL13	SS-10GL13T
	Hinge roller lever 	50 g	SS-10GL2D	—	—	SS-10GL2	SS-10GL2T

## Model Number Legend

SS-            
           1   2   3   4   5

### 1. Ratings

10: 10.1 A at 125 VAC  
 5: 5 A at 125 VAC  
 01: 0.1 A at 30 VDC

### 2. Actuator

None: Pin plunger  
 GL: Hinge lever  
 GL13: Simulated roller lever  
 GL2: Hinge roller lever

### 3. Maximum Operating Force (see note)

None: 150 gf  
 -F: 50 gf (0.1A and 5A versions)  
 -E: 25 gf (0.1A versions)

### 4. Contact Form

None: SPDT  
 -2: SPST-NC  
 -3: SPST-NO

### 5. Terminals

None: Solder terminals  
 T: Quick-connect terminals (#110)  
 D: Straight PCB terminals  
 D1: Left-angled PCB terminals  
 D2: Right-angled PCB terminals

**Note:** These OF values are for the pin plunger models.

Consult Omron regarding the following:

- SPST-NC and SPST-NO versions
- High temperature versions that are rated from -25°C to 120°C
- Left and Right angled PCB terminal versions

## Specifications

### ■ Characteristics

Operating speed	0.1 mm to 1 m/second (pin plunger models)
Operating frequency	Mechanical: 400 operations per minute max. Electrical: 30 operations per minute max.
Insulation resistance	100 MΩ at 500 VDC
Contact resistance	150 gf: SS-10, SS-5 models: 30 mΩ max. SS-01 models: 50 mΩ max.
	50 gf: SS-5 models: 50 mΩ max. SS-01 models: 100 mΩ max.
	25 gf: SS-01 models: 150 mΩ max.
Dielectric strength (See note 2)	1,000 VAC (600 VAC for SS-01), 50/60 Hz for 1 minute between terminals of same polarity 1,500 VAC, 50/60 Hz for 1 minute between current-carrying metal parts and ground and between each terminal and noncurrent-carrying metal parts
Vibration resistance (see note 3)	Malfunction: 10 to 55 Hz, 1.5 mm double amplitude
Shock resistance (see note 3)	150 gf: Destruction: 1,000 m/s <sup>2</sup> (approx. 100G) max. Malfunction: 300 m/s <sup>2</sup> (approx. 30G) max.
	50 gf and 25gf: Destruction: 500 m/s <sup>2</sup> (approx. 50G) max. Malfunction: 200 m/s <sup>2</sup> (approx. 20G) max.
Degree of protection	IEC IP40
Degree of protection against electric shock	Class I
Proof tracking index (PTI)	175
Ambient operating temperature	-25° to 85°C (at 60% RH max.) with no icing
Ambient operating humidity	85% max. (for 5°C to 35°C)
Service life	Mechanical: 30 million operations min. at 60 operations per minute (SS-01, SS-5) 10 million operations min. at 60 operations per minute (SS-10)
	Electrical: 200,000 operations min. at 30 operations per minute (SS-01, SS-5) 50,000 operations min. at 30 operations per minute (SS-10)
Weight	Approx. 1.6 g pin plunger type

**Note:** 1. Data shown are of initial value.

2. The dielectric strength values shown is measured using a separator between the switch and metal mounting plate.

3. For pin plunger models, the above value apply for use at the free position and total travel position. For the lever models, the values apply at the total travel position.

## ■ Ratings (reference values)

Switch series:	SS-10 and SS-5								SS-01	
	Resistive load		Lamp load		Inductive load		Motor load		Resistive Load	
	NC	NO	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	5 A (10.1A)		1.5 A	0.7 A	3 A		2.5 A	1.3 A	0.1 A	
250 VAC	3 A (10.1A)		1 A	0.5 A	2 A		1.5 A	0.8 A	---	
8 VDC	5 A (10.1A)		2 A		5 A	4 A	3 A		0.1 A	
14 VDC	5 A (10.1A)		2 A		4 A		3 A		0.1 A	
30 VDC	4 A		2 A		3 A		3 A		0.1 A	
125 VDC	0.4 A		0.05 A		0.4 A		0.05 A		---	
250 VDC	0.2 A		0.03 A		0.2 A		0.03 A		---	

**Note:** 1. Data in parentheses apply to the SS-10 models only.

2. The above current ratings are the values of the steady-state current.

3. Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC). The inductive load rating of the SS-10 is the same as that of SS-5.

4. Lamp load has an inrush current of 10 times the steady-state current

5. Motor load has an inrush current of 6 times the steady-state current.

6. If the switch is used in a DC circuit and is subjected to inrush current or surge, connect a surge suppressor across the switch.

7. The electrical rating applies under the following test conditions:

Ambient Temperature = 20±2°C, Ambient Humidity = 65±5%, Operating frequency = 30 operations/minute

## ■ Approved Standards

UL Recognized (File No. E41515)

CSA Certified (File No. LR21642)

Rated Voltage	SS-10	SS-5	SS-01
125 VAC	---	5 A	0.1 A
250 VAC	10.1 A	3 A	---
30 VDC	---	---	0.1 A

EN61058-1 - - VDE approval

(File No. 129246 for SS-5, 125256 for SS-10)

Rated Voltage	SS-10	SS-5
250 VAC	10.1 A	5 A

EN61058-1 - - TÜV Rheinland approval

(File No. J9451450)

Rated Voltage	SS-10	SS-5
250 VAC	10.1 A	5 A

Testing conditions: 5E4 (50,000 operations), T85 (0°C to 85°C)

**Note:** The rated values approved by each of the safety standards (e.g. UL, CSA) may be different from the performance characteristics individually defined in this catalog.

## ■ Contact Specifications

Item	SS-10	SS-5	SS-01
Specification	Rivet		Crossbar
Material	Silver alloy	Silver	Gold alloy
Gap (standard value)	0.5 mm		0.25 mm
Inrush current	NC: 20A max. NO: 15A max.	NC: 20A max. NO: 10A max.	1A max.
Minimum applicable load (see note)	160 mA at 5 VDC		1 mA at 5 VDC

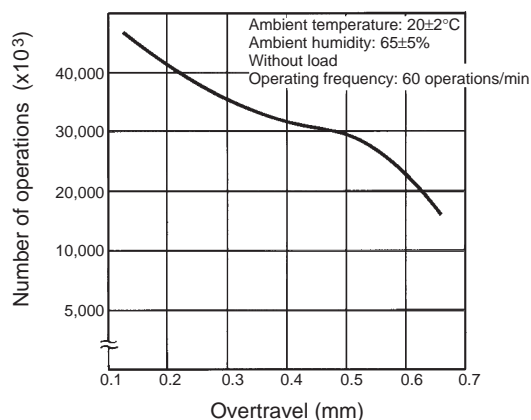
**Note:** Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003).

The equation  $\lambda_{60}=0.5 \times 10^{-6} / \text{operations}$  indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%

# Engineering Data

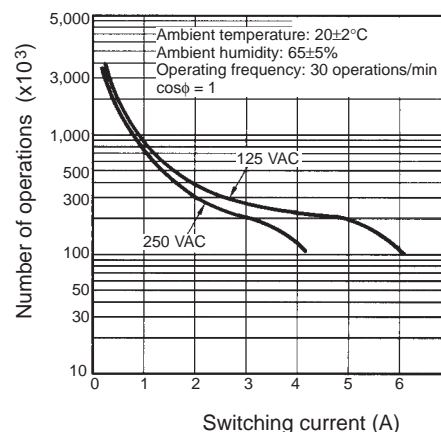
## Mechanical Service Life

SS-01, SS-5 Models  
(Pin Plunger Models)



## Electrical Service Life

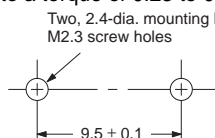
SS-5 Models  
(Pin Plunger Models)



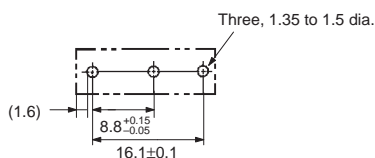
## Mounting

### Panel Mounting

All switches may be panel mounted using M2.3 mounting screws with plane washers or spring washers to securely mount the switch. Tighten the screws to a torque of 0.23 to 0.26 N·m.

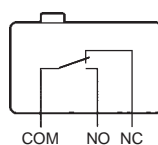


### PCB Layout

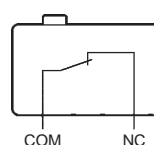


## Contact Form

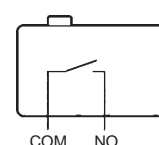
### SPDT



### SPST-NC



### SPST-NO



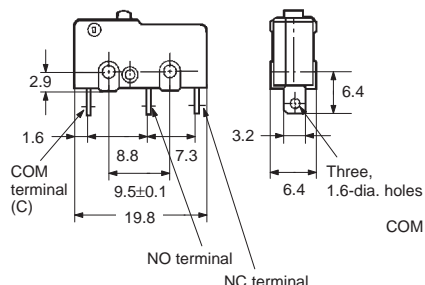
\* Consult Omron for SPST-NC and SPST-NO contact form types ordering information.

# Dimensions

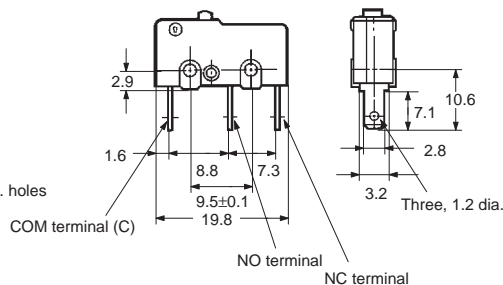
## ■ Terminals

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
2. Terminal plate thickness is 0.5 mm for all models.

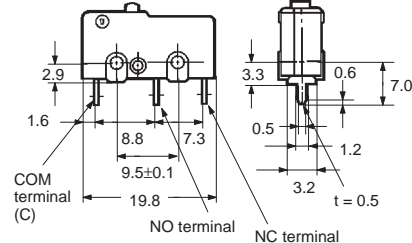
### Solder Terminals



### Quick-connect Terminals (#110)

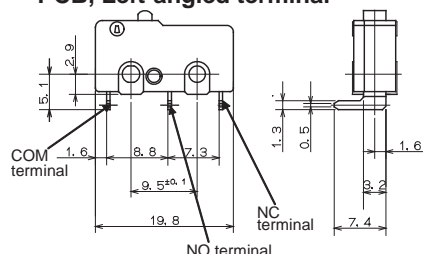


### PCB Terminals

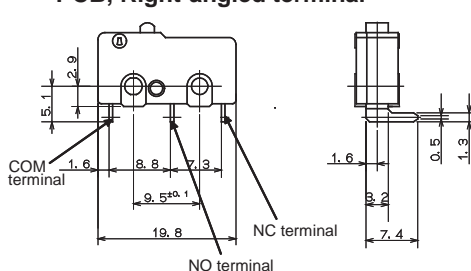


**Note:** Terminal plate thickness is 0.5 mm for all models.

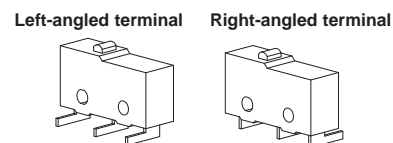
### PCB, Left-angled terminal



### PCB, Right-angled terminal



**Note:** Angled terminal directions are shown below.

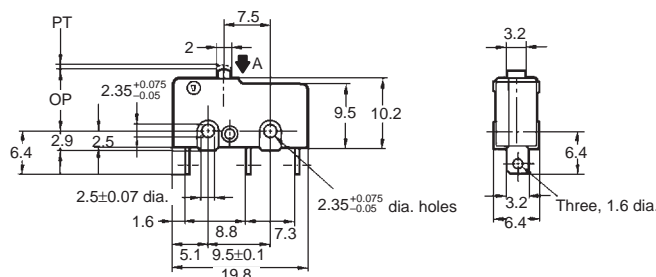
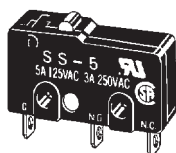


## ■ Dimensions and Operating Characteristics

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
2. The following illustrations and dimensions are for solder terminal models. Refer to "Terminals" for models with quick-connect terminals (#110) or PCB terminals.  
3. The operating characteristics are for operation in the A direction(▼)

### Pin Plunger Models

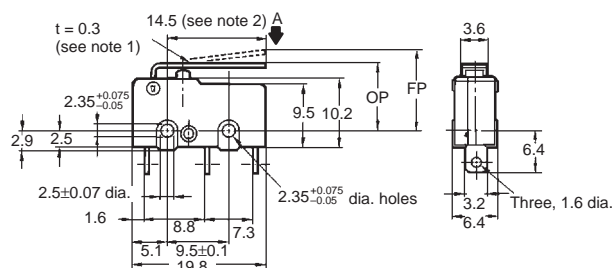
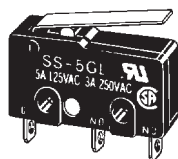
SS-01(-E, -F)  
SS-5(-F)  
SS-10



Characteristics	Part number			
	SS-01-E	SS-01-F, SS-5-F	SS-01, SS-5	SS-10
OF max.	25 g	50 g	150 g	150 g
RF min.	2 g	4 g	25 g	25 g
PT max.	0.5 mm	0.5 mm	0.5 mm	0.6 mm
OT min.	0.5 mm	0.5 mm	0.5 mm	0.4 mm
MD max.	0.1 mm	0.1 mm	0.1 mm	0.12 mm
OP	8.4 ± 0.5 mm			

## Hinge Lever Models

SS-01GL(-E, -F)  
SS-5GL(-F)  
SS-10GL

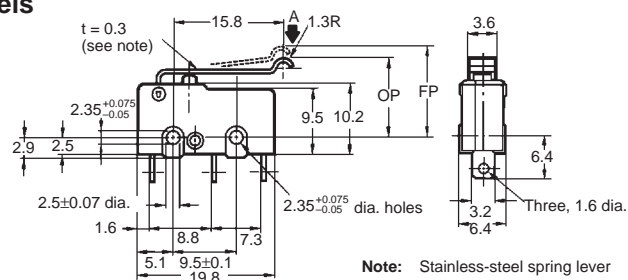
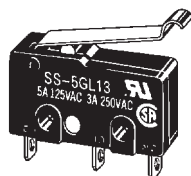


- Note:**
1. Stainless-steel lever
  2. Besides the SS-□GL models with a hinge lever length of 14.5, the SS-□GL11 models with a hinge lever length of 18.5, the SS-□GL111 models with a hinge lever length of 22.6, and the SS-□GL1111 models with a hinge lever length of 37.8 are available. Contact your OMRON representative for these models

Characteristics	SS-01GL-E	SS-01GL-F, SS-5GL-F	SS-01GL, SS-5GL	SS-10GL
OF max.	8 g	16 g	50 g	50 g
RF min.	1 g	2 g	6 g	6 g
OT min.	1.2 mm	1.2 mm	1.2 mm	1.0 mm
MD max.	0.8 mm	0.8 mm	0.8 mm	1.0 mm
FP max.	13.6 mm			
OP	8.8 ± 0.8 mm			

## Simulated Roller Lever Models

SS-01GL13(-E, -F)  
SS-5GL13(-F)  
SS-10GL13

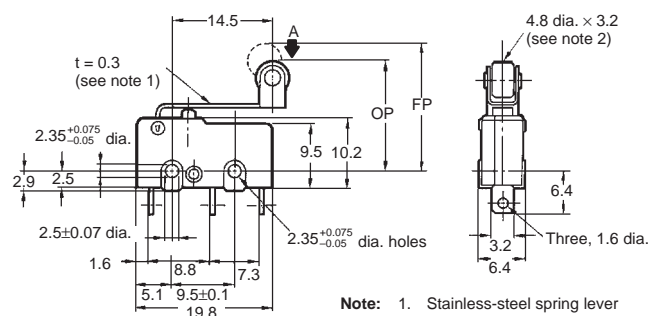
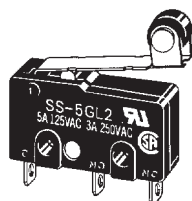


**Note:** Stainless-steel spring lever

Characteristics	SS-10GL13-E	SS-10GL13-F, SS-5GL13-F	SS-01GL13, SS-5GL13	SS-10GL13
OF max.	8 g	16 g	50 g	50 g
RF min.	1 g	2 g	6 g	6 g
OT min.	1.2 mm	1.2 mm	1.2 mm	1.0 mm
MD max.	0.8 mm	0.8 mm	0.8 mm	1.0 mm
FP max.	15.5 mm			
OP	10.7 ± 0.8 mm			

## Hinge Roller Lever Models

SS-01GL2(-E, -F)  
SS-5GL2(-F)  
SS-10GL2



- Note:**
1. Stainless-steel spring lever
  2. Polyacetal resin roller

Characteristics	SS-01GL2-E	SS-01GL2-F, SS-5GL2-F	SS-01GL2, SS-5GL2	SS-10GL2
OF max.	8 g	16 g	50 g	50 g
RF min.	1 g	2 g	6 g	6 g
OT min.	1.2 mm	1.2 mm	1.2 mm	1.0 mm
MD max.	0.8 mm	0.8 mm	0.8 mm	1.0 mm
FP max.	19.3 mm			
OP	14.5 ± 0.8 mm			

# Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## Correct Use

### Mounting

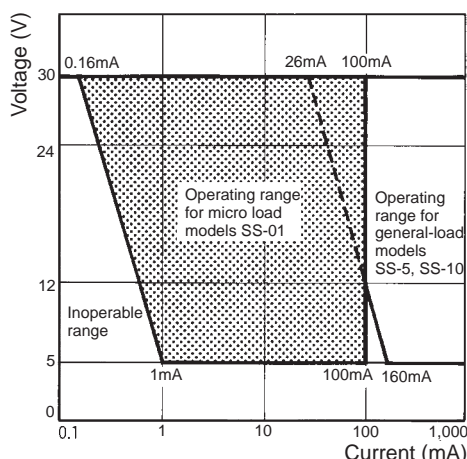
Mount the switch onto a flat surface. Mounting on an uneven surface may cause deformation of the switch, resulting in faulty operation or breakage in the housing.

### Operating Stroke

Take particular care in setting the operating stroke for the pin plunger models. Make sure that the operating stroke is 70% to 100% of the rated OT distance. Do not operate the actuator exceeding the OT distance, otherwise the life expectancy of the switch may be shortened.

### Using Microloads

Using a model for ordinary loads to switch microloads may result in faulty operation. Instead, use the models that are designed for microloads and that operate in the following range;



However, even when using microload models within the operating range shown above, if inrush current or inductive voltage spikes occur when the contact is opened or closed, then contact wear may increase and so decrease the service life. Therefore, insert a contact protection circuit where necessary.

## Cautions

### Handling

Turn OFF the power supply before mounting or removing the switch, wiring, or performing maintenance for inspection. Failure to do so may result in electric shock or burning

### Terminal Connection

When soldering the lead wire to the terminal, first insert the lead wire conductor through the terminal hole and then solder.

Make sure that the capacity of the soldering iron is 60 W maximum. Do not take more than 5 seconds to solder the switch terminal. Improper soldering involving an excessively high temperature or excessive soldering time may deteriorate the characteristics of the switch.

Be sure to apply only the minimum required amount of flux. The switch may have contact failures if flux intrudes in the interior of the switch.

Use the following lead wires to connect to the solder terminals;

Model	Conductor size
SS-5	0.5 to 0.75 mm <sup>2</sup>
SS-10	0.75 mm <sup>2</sup>

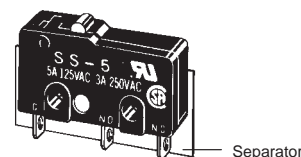
If the PCB terminal models are soldered in a solder bath, flux will permeate inside the switch and cause contact failure. Therefore, manually solder the PCB terminal.

Wire the quick-connect terminals (#110) with receptacles. Insert the terminals straight into the receptacles. Do not impose excessive force on the terminal in the horizontal direction, otherwise the terminal may be deformed or the housing may be damaged.

### Insulation Distance

Use a separator between the switch and metal mounting panels, to ensure proper dielectric characteristics are achieved.

According to EN61058-1, the minimum insulation thickness for this switch should be 1.1 mm and minimum clearance distance between the terminal and mounting plate should be 1.6 mm. If the insulation distance cannot be provided in the product incorporating the switch, either use a switch with insulation barrier or use a separator to ensure sufficient insulation distance.





# MEMO

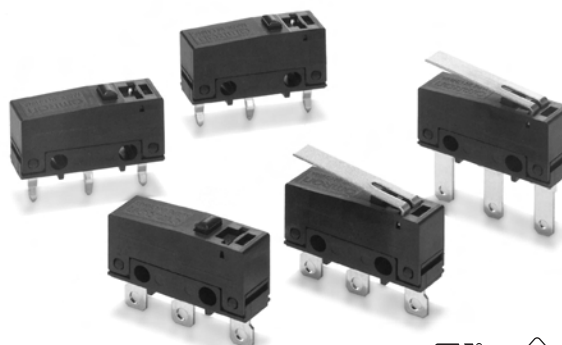
The image displays a 10x10 grid of 100 small squares. Each square contains a unique 4x4 arrangement of symbols. The symbols used are dots (.), horizontal lines (—), vertical lines (|), and crosses (x). The patterns within each square are complex and varied, with some squares featuring more symbols than others. The overall effect is a dense, textured field of geometric shapes.

# Subminiature Basic Switch

## SS-P

### SS Series Compatible Mounting with a Simple Construction and Easy-to-Use Design Concept

- Insert molded base and improved case-to-base seal provides enhanced resistance to flux.
- Switch rating of 3 A at 125 VAC possible with a single-leaf movable spring. Models for micro loads with gold crossbar contact are also available.
- Solder, quick-connect terminals (#110), and PCB terminals are available, including even-pitched PCB terminals.
- RoHS Compliant.



## Ordering Information

Rating	Actuator	Terminals	Solder terminals	Quick-connect terminals (#110)	PCB terminals	
					Uneven pitch	Even pitch
3 A	Pin plunger		SS-3GP	SS-3GPT	SS-3GPD	SS-3GPB
	Hinge lever		SS-3GLP	SS-3GLPT	SS-3GLPD	SS-3GLPB
	Simulated roller lever		SS-3GL13P	SS-3GL13PT	SS-3GL13PD	SS-3GL13PB
0.1 A	Pin plunger		SS-01GP	SS-01GPT	SS-01GPD	SS-01GPB
	Hinge lever		SS-01GLP	SS-01GLPT	SS-01GLPD	SS-01GLPB
	Simulated roller lever		SS-01GL13P	SS-01GL13PT	SS-01GL13PD	SS-01GL13PB

### Model Number Legend

SS-□ □ □ P □  
1 2 3 4

#### 1. Ratings

3: 3 A at 125 VAC  
01: 0.1 A at 30 VDC

#### 2. Contact Gap

G: 0.5 mm

#### 3. Actuator

None: Pin plunger  
L: Hinge lever  
L13: Simulated roller lever

#### 4. Terminals

None: Solder terminals  
T: Quick-connect terminals (#110)  
D: PCB terminals (Uneven pitch)  
B: PCB terminals (Even pitch)

# Specifications

## ■ Characteristics

Operating speed	0.1 mm to 1 m/s (for pin plunger models)
Operating frequency	Mechanical: 300 operations/min Electrical: 30 operations/min
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	SS-3P: 50 mΩ max. SS-01P: 100 mΩ max.
Dielectric strength (See note 2)	1,000 VAC, 50/60 Hz for 1 min between terminals of the same polarities 1,500 VAC, 50/60 Hz for 1 min between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts
Vibration resistance (See note 3)	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance (See note 3)	Destruction: 1,000 m/s <sup>2</sup> (approx. 100 G) max. Malfunction: 300 m/s <sup>2</sup> (approx. 30 G) max.
Degree of protection	IEC IP40
Degree of protection against electrical shock	Class I
Proof tracking index (PTI)	175
Ambient operating temperature	-25°C to 85°C (at 60% RH max.) with no icing
Ambient operating humidity	85% max. (for 5°C to 35°C)
Life expectancy	Mechanical: 1,000,000 operations min. (60 operations/min) Electrical: SS-3P: 70,000 operations min. (20 operations/min, 125 VAC) 100,000 operations min. (20 operations/min, 30 VDC) SS-01P: 200,000 operations min. (20 operations/min)
Weight	Approx. 1.6 g (for pin plunger models)

**Note:** 1. The data given above are initial values.

2. The dielectric strength shown in the table indicates a value for models with a Separator.

3. For the pin plunger models, the above values apply for both the free position and total travel position. For the lever models, the values apply at the total travel position. Contact opening or closing time is within 1 ms.

## ■ Ratings

Rated voltage	Model Item	SS-3P	SS-01P
		Resistive load	
125 VAC		3 A	0.1 A
30 VDC		3 A	0.1 A

**Note:** The electrical rating applies under the following test conditions:

Ambient Temperature = 20±2°C, Ambient Humidity = 65±5%, Operating frequency = 30 operations/minute

## ■ Approved Standards

UL Recognized (File No. E41515)

CSA Certified (UL approval)

Rated Voltage	SS-3P	SS-01P
125 VAC	3 A	0.1 A
30 VDC	3 A	0.1 A

EN61058-1 - - VDE approval

(File No. 40008425)

Rated Voltage	SS-3P	SS-01P
125 VAC	3 A	0.1 A
30 VDC	3 A	0.1 A

Testing conditions: 5E4 (50,000 operations), T55 (0°C to 55°C)

**Note:** The rated values approved by each of the safety standards (e.g. UL, CSA) may be different from the performance characteristics individually defined in this catalog.

## ■ Contact Specifications

Item	SS-3P	SS-01P
Specification	Rivet	Crossbar
Material	Silver alloy	Gold alloy
Gap (standard value)	0.5 mm	
Minimum applicable load (see note)	160 mA at 5 VDC	1 mA at 5 VDC

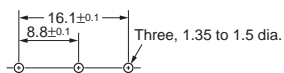
**Note:** Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003).

The equation  $\lambda_{60}=0.5 \times 10^{-6}$  / operations indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%

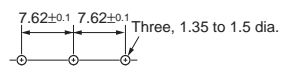
# Engineering Data

## ■ Mounting Holes

### PCB Mounting Dimensions (Reference - uneven spacing)

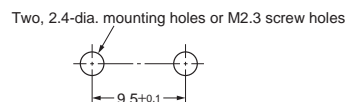


### PCB Mounting Dimensions (Reference - even spacing)



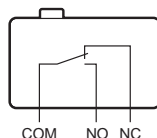
### Panel Mounting

All switches may be panel mounted using M2.3 mounting screws with plane washers or spring washers to securely mount the switch. Tighten the screws to a torque of 0.23 to 0.26 N·m



## ■ Contact Form

SPDT

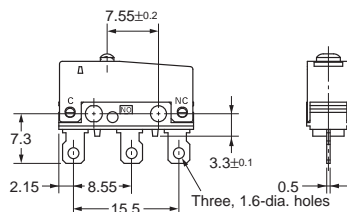


## Dimensions

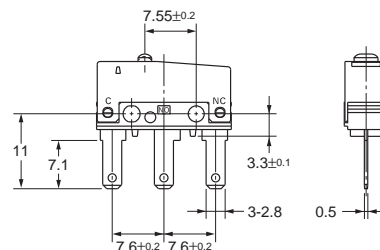
## ■ Terminals

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
2. Terminal plate thickness is 0.5 mm for all models.

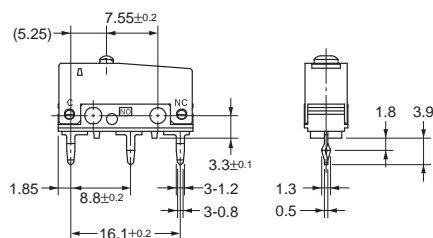
### Solder Terminals



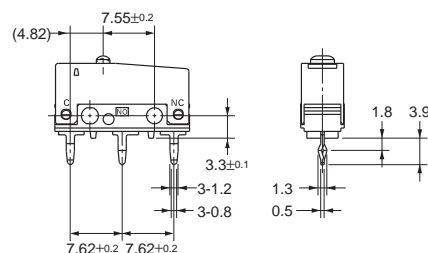
### Quick-connect Terminals (#110)



### PCB Terminals (Uneven pitch)



### PCB Terminals (Even pitch)





# Precautions

## ■ Correct Use

### Mounting

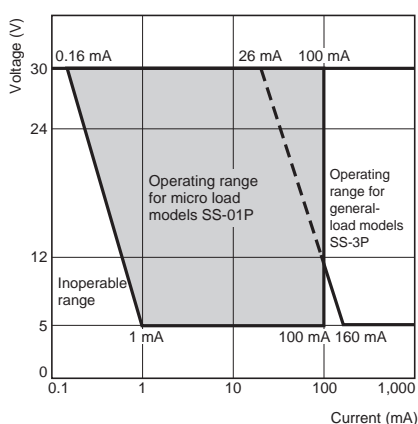
Mount the Switch onto a flat surface. Mounting on an uneven surface may cause deformation of the Switch, resulting in faulty operation or breakage in the housing.

### Operating Stroke Setting

Take particular care in setting the operating stroke for the pin plunger models. Make sure that the operating stroke is 60% to 90% of the rated OT distance. Do not operate the actuator exceeding the OT distance, otherwise the life expectancy of the Switch may be shortened.

### Using Microloads

Using a model for ordinary loads to switch microloads may result in faulty operation. Instead, use the models that are designed for microloads and that operate in the following range;



However, even when using microload models within the operating range shown above, if inrush current or inductive voltage spikes occur when the contact is opened or closed, it may increase contact wear and so decrease the service life. Therefore, insert a contact protection circuit where necessary.

## ■ Cautions

### Handling

Turn OFF the power supply before mounting or removing the Switch, wiring, or performing maintenance or inspection. Failure to do so may result in electric shock or burning.

### Solder Terminal Connection

When soldering lead wires to solder terminals, first insert the lead wire conductor through the terminal hole and then solder.

Make sure that the temperature at the tip of the soldering iron is 350 to 400°C. Do not take more than 3 seconds to solder the switch terminal, and do not impose external force on the terminal for 1 min after soldering. Improper soldering involving an excessively high temperature or excessive soldering time may deteriorate the characteristics of the Switch.

### Quick-Connect Terminals

Wire quick-connect terminals (#110) with receptacles. Insert the terminals straight into the receptacles. Do not impose excessive force on the terminal in the horizontal direction, otherwise the terminal may be deformed or the housing may be damaged.

Use appropriate #110 QC connectors, made by Nippon Tanshi or Tyco Electronics, to mate with the quick-connect versions of the switch. These connectors are not sold by OMRON. Contact Nippon Tanshi or Tyco Electronics to purchase these connectors.

### PCB Terminal Connection

When using automatic soldering baths, we recommend soldering at  $260 \pm 5^\circ\text{C}$  within 5 seconds. Make sure that the liquid surface of the solder does not flow over the edge of the board.

When soldering by hand, as a guideline, solder with a soldering iron with a tip temperature of 350 to 400°C within 3 seconds, and do not apply any external force for at least 1 minutes after soldering. When applying solder, keep the solder away from the case of the Switch and do not allow solder or flux to enter the case.

### Insulation Distance

Use a separator between the switch and metal mounting panels, to ensure proper dielectric characteristics are achieved.

# MEMO

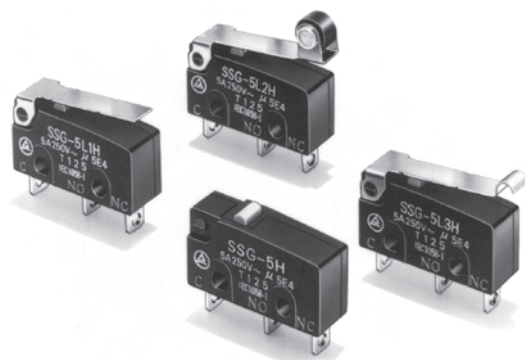
A large grid of small, faint, repeating geometric patterns, likely a decorative background or a placeholder for a complex image. The patterns are arranged in a regular, repeating fashion across the entire page, creating a textured, grid-like appearance. The patterns themselves are small, intricate, and appear to be composed of various geometric shapes and lines, possibly representing a complex mathematical or architectural design. The overall effect is a dense, uniform field of these small, repeating motifs.

# Subminiature Basic Switch

## SSG

### Global Subminiature Basic Switch Conforming to EN, UL, and CSA Standards

- A wide operating temperature range of -25°C to 125°C is available for at high-temperature use.
- PCB terminal models are resistant to flux.
- Even-pitched PCB terminals.
- RoHS Compliant.



## Ordering Information

Actuator	Rating	OF max.	Solder	Quick-connect terminal (#110)	PCB
Pin plunger 	5 A	153 gf	SSG-5H	SSG-5T	SSG-5P
		51 gf	SSG-5H-5	SSG-5T-5	SSG-5P-5
	0.1 A	153 gf	SSG-01H	SSG-01T	SSG-01P
		51 gf	SSG-01H-5	SSG-01T-5	SSG-01P-5
Hinge lever 	5 A	61 gf	SSG-5L1H	SSG-5L1T	SSG-5L1P
		20 gf	SSG-5L1H-5	SSG-5L1T-5	SSG-5L1P-5
	0.1 A	61 gf	SSG-01L1H	SSG-01L1T	SSG-01L1P
		20 gf	SSG-01L1H-5	SSG-01L1T-5	SSG-01L1P-5
Simulated roller lever 	5 A	61 gf	SSG-5L3H	SSG-5L3T	SSG-5L3P
		20 gf	SSG-5L3H-5	SSG-5L3T-5	SSG-5L3P-5
	0.1 A	61 gf	SSG-01L3H	SSG-01L3T	SSG-01L3P
		20 gf	SSG-01L3H-5	SSG-01L3T-5	SSG-01L3P-5
Hinge roller lever 	5 A	61 gf	SSG-5L2H	SSG-5L2T	SSG-5L2P
		20 gf	SSG-5L2H-5	SSG-5L2T-5	SSG-5L2P-5
	0.1 A	61 gf	SSG-01L2H	SSG-01L2T	SSG-01L2P
		20 gf	SSG-01L2H-5	SSG-01L2T-5	SSG-01L2P-5

**Note:** SPST models are also available, but not listed in the above table.

### Model Number Legend

SSG-     

1 2 3 4 5

#### 1. Ratings

5: 5 A at 125 VAC  
01: 0.1 A at 125 VAC

#### 2. Actuator

None: Pin plunger  
L1: Hinge lever  
L3: Simulated roller lever  
L2: Hinge roller lever

#### 3. Contact Form

None: SPDT  
-2: SPST-NC  
-3: SPST-NO

#### 4. Terminals

H: Solder terminals  
T: Quick-connect terminals (#110)  
P: PCB terminals

#### 5. Maximum Operating Force (see note)

None: 153 gf  
-5: 51 gf

**Note:** These OF values are for the pin plunger models.

Consult Omron regarding the following:  
- SPST-NC and SPST-NO versions  
(Solder and QC terminals, only)



# Specifications

## ■ Characteristics

Operating speed	0.1 mm to 1 m/second (pin plunger models)
Operating frequency	Mechanical: 400 operations per minute max. Electrical: 30 operations per minute max.
Insulation resistance	100 MΩ
Contact resistance	153 gf: SSG-5 models : 30 mΩ max. SSG-01 models: 50 mΩ max.
	51 gf: SSG-5 models: 50 mΩ max. SSG-01 models 100 mΩ max.
Dielectric strength (See note 2)	1,000 VAC (600 VAC for SSG-01H and SSG-01T), 50/60 Hz for 1 minute between contacts of same polarity 1,500 VAC, 50/60 Hz for 1 minute between each terminal and ground and between each terminal and non-current-carrying metal parts
Vibration resistance (see note 3)	Malfunction: 10 to 2,000 Hz, 196 m/s <sup>2</sup> (Approx. 20G)
Shock resistance (see note 3)	Malfunction: 490 m/s <sup>2</sup> (approx. 50G) max.
Degree of protection	IEC IP40
Degree of protection against electric shock	Class I
Proof tracking index (PTI)	175
Ambient operating temperature	-25° to 125°C (at 60% RH max.) with no icing
Ambient operating humidity	85% max. (for 5°C to 35°C)
Service life	Mechanical: 10 million operations min. at 60 operations per minute Electrical: 200,000 operations min. at 30 operations per minute
Weight	Approx. 1.6 g pin plunger type

**Note:** 1. Data shown are of initial value.

2. The dielectric strength values shown is measured using a separator between the switch and metal mounting plate.

3. For pin plunger models, the above values apply for use at the free position and total travel position. For the lever models, the values apply at the total travel position with contact separation = 10μs max.

## ■ Ratings

### General Ratings

Rated voltage	Resistive load		Lamp load		Inductive load		Motor load	
	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	5 A (0.1 A)		1.5 A	0.7 A	3 A		2.5 A	1.3 A
250 VAC	3 A		1 A	0.5 A	2 A		1.5 A	0.8 A
8 VDC	5 A		2 A		5 A		3 A	
14 VDC	5 A		2 A		4 A		3 A	
30 VDC	4 A(0.1 A)		2 A		3 A		3 A	
125 VDC	0.4 A		0.05 A		0.4 A		0.05 A	
250 VDC	0.2 A		0.03 A		0.2 A		0.05 A	

**Note:** 1. The values in the parentheses are for the SSG-01.

2. The above current ratings are the values of the steady-state current.

3. Inductive load has a power factor of 0.7 min. (AC) and a time constant of 7 ms max. (DC).

4. Lamp load has an inrush current of 10 times the steady-state current.

5. Motor load has an inrush current of 6 times the steady-state current.

6. If the Switch is used in a DC circuit and is subjected to a surge current, connect a surge suppressor across the switch.

7. The electrical rating applies under the following test conditions:

Ambient Temperature = 20±2°C, Ambient Humidity = 65±5%, Operating frequency = 30 operations/minute

## Approved Standards

UL Recognized (File No. E41515)

CSA Certified (File No. LR21642)

Rated Voltage	SSG-5	SSG-01
125 VAC	5 A	0.1 A
250 VAC	3 A	- - -
30 VDC	- - -	0.1 A

EN61058-1 - - TÜV Rheinland approval  
(File No. T9451449)

Rated Voltage	SSG-5	SSG-01
250 VAC	5 A	- - -
30 VDC	- - -	0.1 A

Testing conditions: 5E4 (50,000 operations), T125 (0°C to 125°C)

**Note:** The rated values approved by each of the safety standards (e.g. UL, CSA) may be different from the performance characteristics individually defined in this catalog.

## Contact Specifications

Item	SSG-5	SSG-01H(T)	SSG-01P
Specification	Rivet	Crossbar	
Material	Silver	Gold alloy	Gold alloy
Gap (standard value)	0.5 mm	0.25 mm	0.5 mm
Inrush current	NC: 20A max. NO: 10A max.	1A max.	1A max.
Minimum applicable load (see note)	160 mA at 5 VDC	1 mA at 5 VDC	

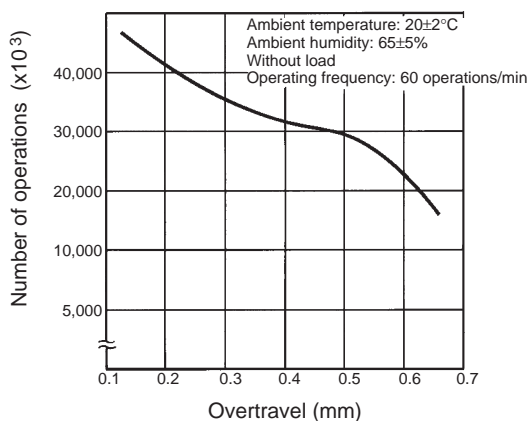
**Note:** Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003).

The equation  $\lambda_{60}=0.5 \times 10^{-6}$  / operations indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%

## Engineering Data

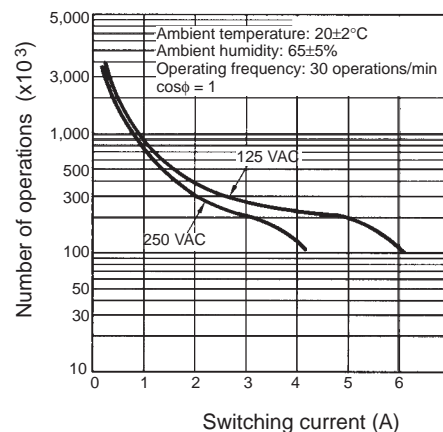
### Mechanical Service Life

SSG-5 Models



### Electrical Service Life

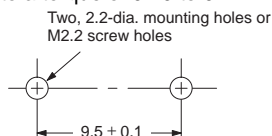
SSG-5 Models



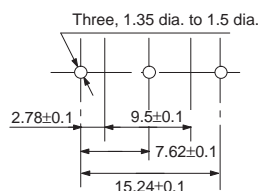
## Mounting

### Panel Mounting

All switches may be panel mounted using M2.2 mounting screws with plane washers or spring washers to securely mount the switch. Tighten the screws to a torque of 0.20 to 0.24 N·m.

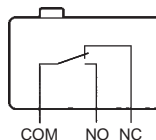


### PCB Layout

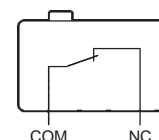


## Contact Form

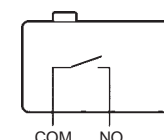
### SPDT



### SPST-NC



### SPST-NO



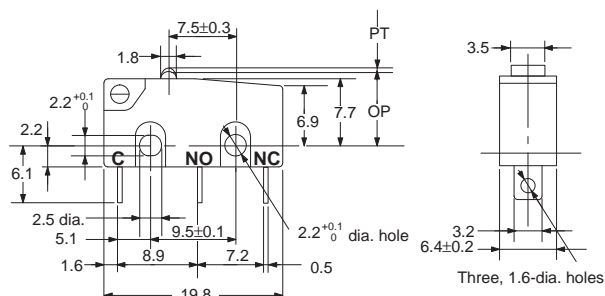
\* Consult Omron for SPST-NC and SPST-NO contact form types ordering information.

# Dimensions

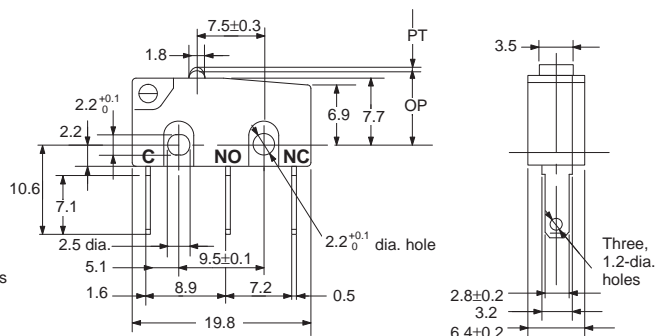
## ■ Terminals

**Note: 1.** Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions

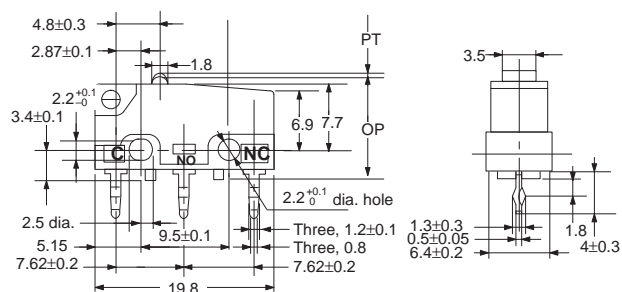
### Solder Terminals



### Quick-connect Terminals (#110)



### PCB Terminals



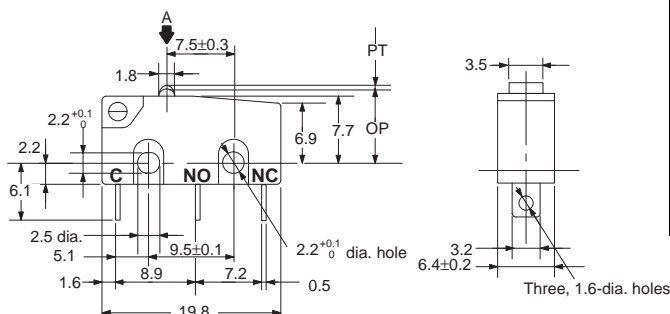
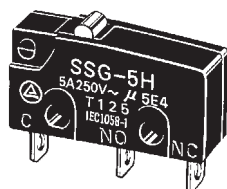
## ■ Dimensions and Operating Characteristics

- Note: 1.** Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.25$  mm applies to all dimensions  
**2.** Every actual model number includes the code instead of  $\square$  for the kind of terminals incorporated by the model.  
**3.** The operating characteristics are for operation in the A direction(▼)

### Solder/Quick-connect Terminal

#### Pin Plunger Models

SSG-01 $\square$   
SSG-5 $\square$   
SSG-01 $\square$ -5  
SSG-5 $\square$ -5

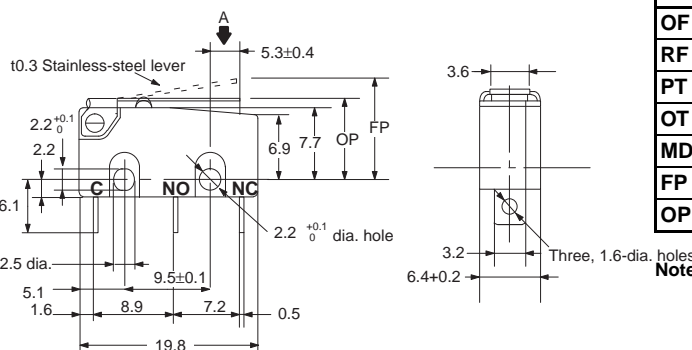
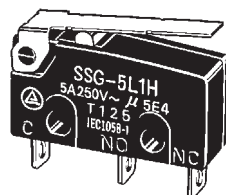


Model	SSG-01 $\square$ SSG-5 $\square$	SSG-01 $\square$ -5 SSG-5 $\square$ -5
OF max.	153 gf	51 gf
RF min.	25 gf	4 gf
PT max.	0.6 mm	
OT min.	0.4 mm	
MD max.	0.1 mm	
FP max.	---	
OP	8.4 $\pm 0.3$ mm	

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.25$  mm applies to all dimensions  
 2. Every actual model number includes the code instead of  $\square$  for the kind of terminals incorporated by the model.  
 3. The operating characteristics are for operation in the A direction( $\blacktriangledown$ )

### Hinge Lever Models

SSG-01L1 $\square$   
 SSG-5L1 $\square$   
 SSG-01L1 $\square$ -5  
 SSG-5L1 $\square$ -5

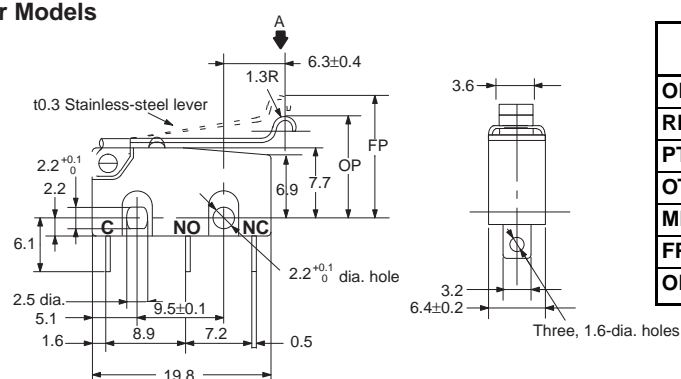
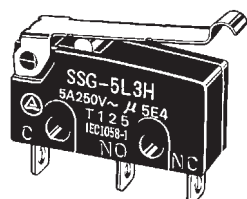


Model	SSG-01L1 $\square$ SSG-5L1 $\square$	SSG-01L1 $\square$ -5 SSG-5L1 $\square$ -5
OF max.	61 gf	20 gf
RF min.	6 gf	2 gf
PT max.	---	
OT min.	1.0 mm	
MD max.	0.8 mm	
FP max.	13.6 mm	
OP	8.8 <sup>+1.0</sup> / <sub>-0.6</sub> mm	

**Note:** Also available are models with a hinge lever length of 39 mm under the following model numbers: SSG-01L14 $\square$ , SSG-5L14 $\square$ , SSG01L14 $\square$ -5, and SSG-5L14 $\square$ -5. Contact your OMRON representative for these models.

### Simulated Roller Lever Models

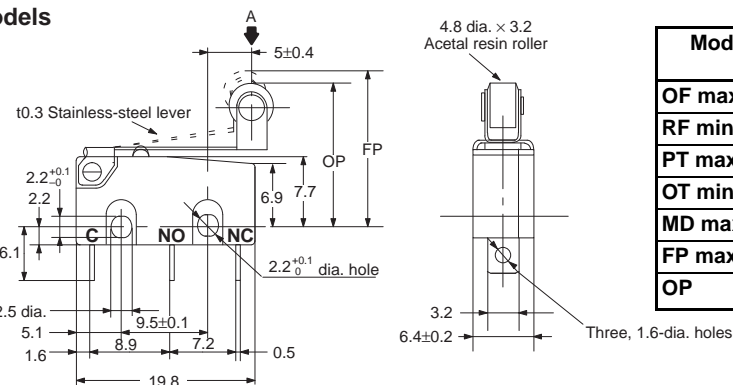
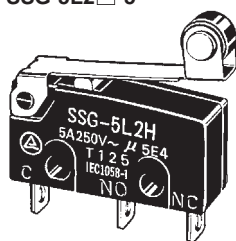
SSG-01L3 $\square$   
 SSG-5L3 $\square$   
 SSG-01L3 $\square$ -5  
 SSG-5L3 $\square$ -5



Model	SSG-01L3 $\square$ SSG-5L3 $\square$	SSG-01L3 $\square$ -5 SSG-5L3 $\square$ -5
OF max.	61 gf	20 gf
RF min.	6 gf	2 gf
PT max.	---	
OT min.	1.0 mm	
MD max.	0.8 mm	
FP max.	15.5 mm	
OP	10.7 <sup>+1.0</sup> / <sub>-0.6</sub> mm	

### Hinge Roller Lever Models

SSG-01L2 $\square$   
 SSG-5L2 $\square$   
 SSG-01L2 $\square$ -5  
 SSG-5L2 $\square$ -5

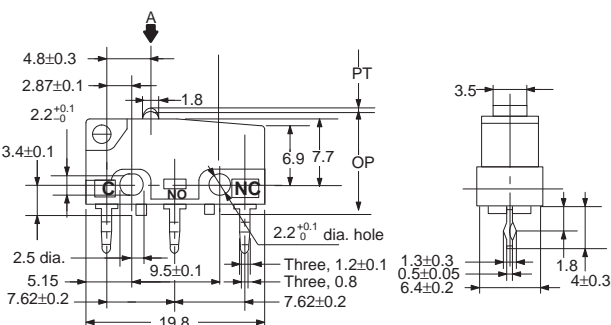
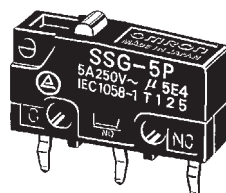


Model	SSG-01L2 $\square$ SSG-5L2 $\square$	SSG-01L2 $\square$ -5 SSG-5L2 $\square$ -5
OF max.	61 gf	20 gf
RF min.	6 gf	2 gf
PT max.	---	
OT min.	1.0 mm	
MD max.	0.8 mm	
FP max.	19.0 mm	
OP	14.5 <sup>+1.0</sup> / <sub>-0.6</sub> mm	

## PCB Terminal

### Pin Plunger

SSG-01P  
 SSG-5P  
 SSG-01P-5  
 SSG-5P-5

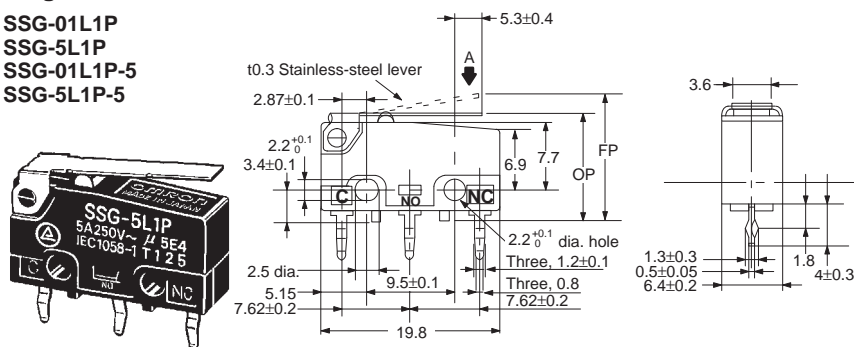


Model	SSG-01P SSG-5P	SSG-01P-5 SSG-5P-5
OF max.	153 gf	51 gf
RF min.	25 gf	4 gf
PT max.	0.6 mm	
OT min.	0.4 mm	
MD max.	0.1 mm	
FP max.	---	
OP	11.8±0.4 mm	

**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.25$  mm applies to all dimensions  
2. The operating characteristics are for operation in the A direction(▼)

### Hinge Lever Models

SSG-01L1P  
SSG-5L1P  
SSG-01L1P-5  
SSG-5L1P-5

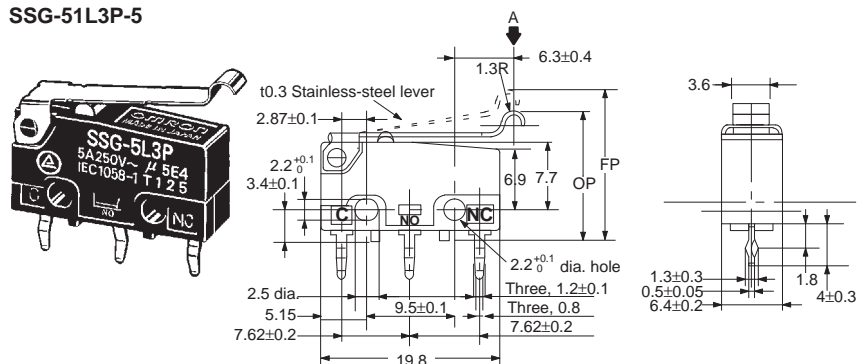


Model	SSG-01L1P SSG-5L1P	SSG-01L1P-5 SSG-5L1P-5
OF max.	61 gf	20 gf
RF min.	6 gf	2 gf
PT max.	---	
OT min.	1.0 mm	
MD max.	0.8 mm	
FP max.	17.0 mm	
OP	12.2 <sup>+1.1</sup> / <sub>-0.7</sub> mm	

**Note:** Also available are models with a hinge lever length of 39 mm under the following model numbers: SSG-01L14□, SSG-5L14□, SSG01L14□-5, and SSG-5L14□-5. Contact your OMRON representative for these models.

### Simulated Roller Lever Models

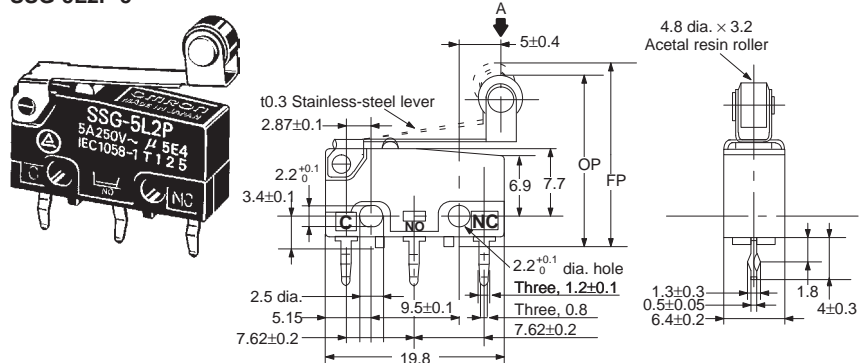
SSG-01L3P  
SSG-5L3P  
SSG-01L3P-5  
SSG-5L3P-5



Model	SSG-01L3P SSG-5L3P	SSG-01L3P-5 SSG-5L3P-5
OF max.	61 gf	20 gf
RF min.	6 gf	2 gf
PT max.	---	
OT min.	1.0 mm	
MD max.	0.8 mm	
FP max.	18.9 mm	
OP	14.4 <sup>+1.1</sup> / <sub>-0.7</sub> mm	

### Hinge Roller Lever Models

SSG-01L2P  
SSG-5L2P  
SSG-01L2P-5  
SSG-5L2P-5



Model	SSG-01L2P SSG-5L2P	SSG-01L2P-5 SSG-5L2P-5
OF max.	61 gf	20 gf
RF min.	6 gf	2 gf
PT max.	---	
OT min.	1.0 mm	
MD max.	0.8 mm	
FP max.	22.4 mm	
OP	17.9 <sup>+1.1</sup> / <sub>-0.7</sub> mm	

# Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## Correct Use

### Mounting

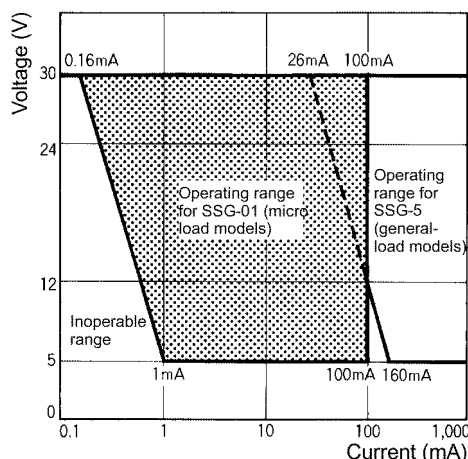
Mount the switch onto a flat surface. Mounting on an uneven surface may cause deformation of the switch, resulting in faulty operation or breakage in the housing.

### Operating Stroke

Make sure that the operating stroke is 70% to 100% of the rated OT distance. Do not operate the actuator exceeding the OT distance, otherwise the life expectancy of the switch may be shortened.

### Using Microloads

Using a model for ordinary loads to switch microloads may result in faulty operation. Instead, use the models that are designed for microloads and that operate in the following range;



However, even when using microload models within the operating range shown above, if inrush current or inductive voltage spikes occur when the contact is opened or closed, then contact wear may increase and so decrease the service life. Therefore, insert a contact protection circuit where necessary.

## Cautions

### Handling

Turn OFF the power supply before mounting or removing the switch, wiring, or performing maintenance for inspection. Failure to do so may result in electric shock or burning.

### Terminal Connection

When soldering the lead wire to the terminal, first insert the lead wire conductor through the terminal hole and then solder.

Make sure that the capacity of the soldering iron is 60 W maximum. Do not take more than 5 seconds to solder the switch terminal. Improper soldering involving an excessively high temperature or excessive soldering time may deteriorate the characteristics of the switch.

Be sure to apply only the minimum required amount of flux. The switch may have contact failures if flux intrudes in the interior of the switch.

Use the following lead wires to connect to the solder terminals;

Model	Conductor size
SSG-01	AWG 22 to 20
SSG-5	AWG 20 to 18

To automatically solder the Switch to a PCB in a soldering bath, complete soldering within 5 seconds at a flux temperature of 250°C and avoid the overflow of flux onto the surface of the PCB where the Switch or other parts are mounted.

Wire the quick-connect terminals (#110) with receptacles. Insert the terminals straight into the receptacles. Do not impose excessive force on the terminal in the horizontal direction, otherwise the terminal may be deformed or the housing may be damaged.

### Insulation Distance

Use a separator between the switch and metal mounting panels, to ensure proper dielectric characteristics are achieved.

The Switch does not have a ground terminal. The minimum distance through insulation (IEC61058-1) is 0.9 mm. If proper insulation for the end product cannot be secured, additional insulation such as a Separator or insulation cover should be attached.

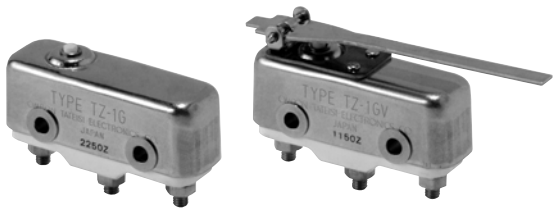
# MEMO

# High-temperature Basic Switch





# TZ

## Stable Operation at an Ambient Temperature of 400°C

- Incorporates a ceramic insulator, cobalt-alloy spring, and special-alloy contact, thus ensuring high contact reliability at high ambient temperature.
- Smoothly operates at an ambient temperature of 400°C.



## Ordering Information

Actuator		Model
Pin plunger		TZ-1G
Hinge lever		TZ-1GV
Short hinge roller lever		TZ-1GV22
Hinge roller lever		TZ-1GV2

**Note:** The levers and rollers are made of stainless steel.

## Model Number Legend

TZ - 1 G □  
1 2 3

**1. Ratings**

1: 1 A, 250 VAC

**2. Contact Gap**

G: 0.5 mm

**3. Actuator**

None: Pin plunger  
V: Hinge lever  
V2: Hinge roller lever  
V22: Short hinge roller lever



# Specifications

## ■ Characteristics

Operating speed		0.05 mm to 1 m/s (See note 1)
Operating frequency	Mechanical	60 operations/min
	Electrical	20 operations/min
Contact resistance		100 mΩ max. (initial value)
Insulation resistance		100 MΩ min. (at 500 VDC)
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min between terminals of same polarity 1,500 VAC, 50/60 Hz for 1 min between current-carrying metal parts and ground and between each terminal and non-current-carrying metal parts
Vibration resistance	Malfunction	10 to 55 Hz, 1.5-mm double amplitude (See note 2)
Shock resistance	Destruction	500 m/s <sup>2</sup> max.
	Malfunction	300 m/s <sup>2</sup> max. (See notes 1 and 2)
Degree of protection		IP00
Degree of protection against electric shock		Class I
Ambient operating temperature		–65°C to 400°C (with no icing)
Ambient operating humidity		35% to 85%RH
Service life	Mechanical	100,000 operations min.
	Electrical	50,000 operations min.
Weight		Approx. 45 to 54 g

Note: 1. The values are for pin plunger models

2. Malfunction: 1 ms max.

## ■ Ratings

Rated voltage (V)	Non-inductive load (A)				Inductive load (A)			
	Resistive load		Lamp load		Inductive load		Motor load	
	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	1		0.9	0.45	1		1.5	0.75
250 VAC	1		0.45	0.3	1		0.45	0.3
8 VDC	1		0.9	0.45	1		1.5	1.5
14 VDC	1		0.9	0.45	1		1.5	1.5
30 VDC	1		0.9	0.45	1		1.5	1.5
125 VDC	0.4		0.05	0.05	0.4		0.05	0.05

Note: 1. The above values are for steady-state current.

2. Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).

3. Lamp load has an inrush current of 10 times the steady-state current.

4. Motor load has an inrush current of 6 times the steady-state current.

5. The ratings values apply under the following test conditions:

(1) Ambient temperature: 20±2°C

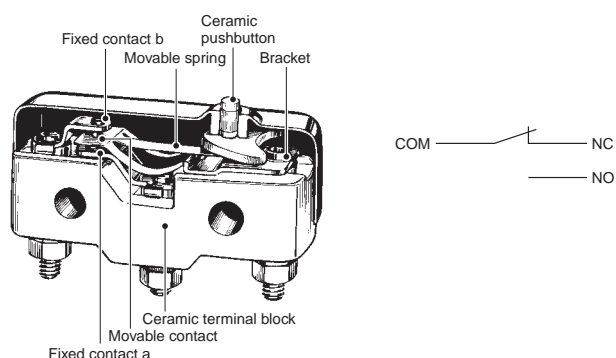
(2) Ambient humidity: 65±5%RH

(3) Operating frequency: 20 operations/min

## ■ Contact Specifications

Contact	Shape	Rivet
	Material	Platinum alloy
	Gap (standard value)	0.5 mm
Inrush current	NC	9 A max.
	NO	4.5 A max.

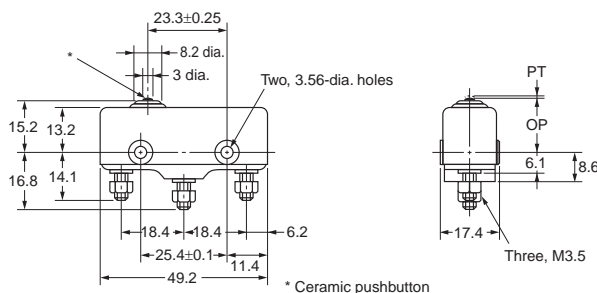
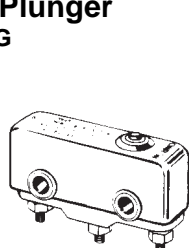
## ■ Structure/Contact Form



# Dimensions

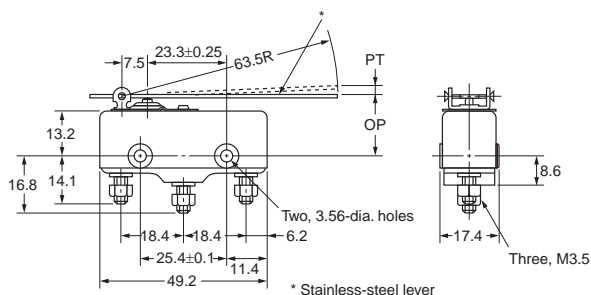
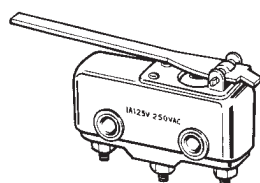
**Note:** Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## Pin Plunger TZ-1G



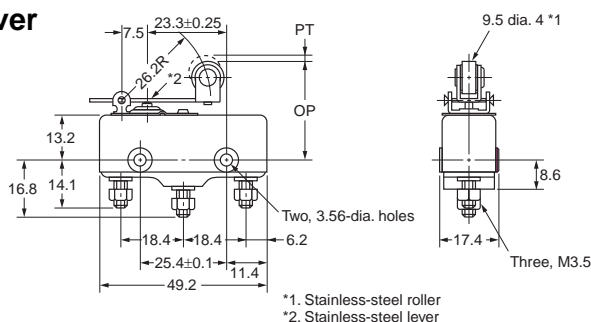
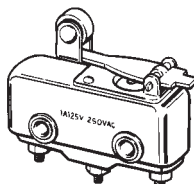
Operating force	OF max.	500 gf
Release force	RF min.	114 gf
Pretravel	PT max.	0.4 mm
Over travel	OT min.	0.13 mm
Movement Differential	MD max.	0.15 mm
Operating Position	OP	15.9±0.6 mm

## Hinge Lever TZ-1GV



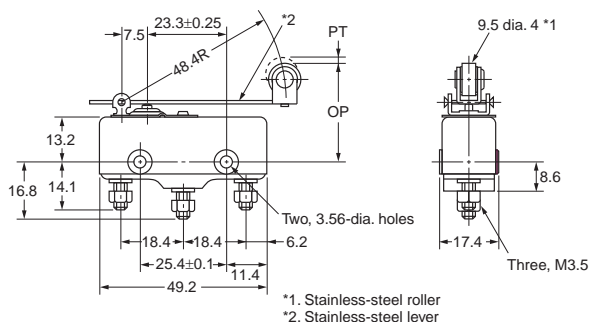
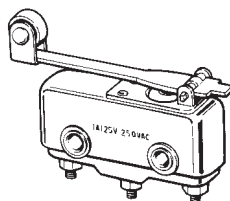
OF max.	100 gf
RF min.	14 gf
PT max.	3.5 mm
OT min.	4.6 mm
MD max.	1.3 mm
OP	18±1.2 mm

## Short Hinge Roller Lever TZ-1GV22



OF max.	240 gf
RF min.	35 gf
PT max.	1.5 mm
OT min.	1.9 mm
MD max.	0.6 mm
OP	28.6±1.2 mm

## Hinge Roller Lever TZ-1GV2



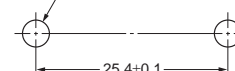
OF max.	130 gf
RF min.	20 gf
PT max.	2.6 mm
OT min.	3.5 mm
MD max.	1 mm
OP	28.6±1.2 mm

## Mounting

- Be sure to turn OFF the power supply to the Switch before mounting, dismounting, wiring, or working on the Switch for maintenance.
- Use M3.5 stainless-steel mounting screws with plane washers or spring washers to securely mount the Switch. Tighten the screws to a torque of 0.69 to 0.98 N·m.

## Mounting Holes

Two, 3.56-dia. mounting holes or M3.5 screw holes



# Safety Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## Precautions for Safe Use

### Handling

The Switch has a ceramic casing. Do not drop the Switch from a height of 30 cm or more. Doing so will break the casing.

- Connect nickel-plated solderless terminals to the TZ. Each terminal must be secured on the TZ with M3.5 nut.
- Make sure that the ceramic case is free of metal powder or other impurities.

### Operation

- Do not modify the Actuator and change the operating position.
- Make sure that the switching speed is not extremely slow or do not use the Switch so that the pushbutton will be set to a position between the FP and OP.
- Make sure that the pin plunger and the switching stroke are on the same vertical line.
- Make sure that the switching frequency or speed is within the specified range.

1. If the switching speed is extremely slow, the contact may not be switched smoothly, which may result in a contact failure or contact welding.
2. If the switching speed is extremely fast, switching shock may damage the Switch soon. If the switching frequency is too high, the contact may not catch up with the speed.

The rated permissible switching speed and frequency indicate the switching reliability of the Switch.

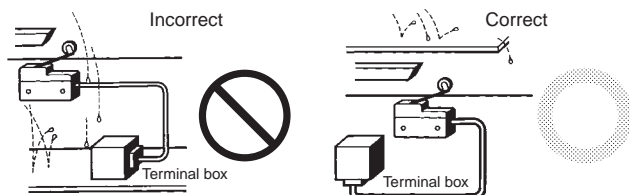
The life of a Switch is determined at the specified switching speed. The life varies with the switching speed and frequency even when they are within the permissible ranges. In order to determine the life of a Switch model to be applied to a particular use, it is best to conduct an appropriate durability test on some samples of the model under actual conditions.

- Make sure that the actuator travel does not exceed the permissible OT position. The operating stroke must be set to 70% to 100% of the rated OT.

## Precautions for Correct Use

### Mounting Location

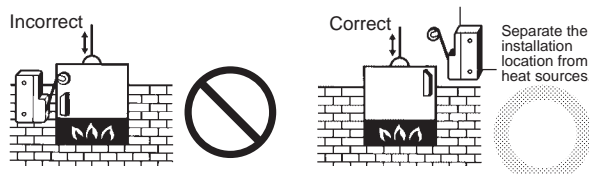
- Do not use the switch alone in atmospheres such as flammable or explosive gases. Arcing and heat generation associated with switching may cause fires or explosions.
- Switches are generally not constructed with resistance against water. Use a protective cover to prevent direct spraying if the switch is used in locations subject to splashing or spurting oil or water, dust adhering.



- Install the switch in a location that is not directly subject to debris and dust from cutting. The actuator and the switch body must be protected from accumulated cutting debris and dirt.



- Do not use the switch in locations subject to hot water (greater than 60°C) or in water vapor.
- Do not use the switch outside the specified temperature and atmospheric conditions. The permissible ambient temperature depends on the model. (Refer to the specifications in this catalog.) Sudden thermal changes may cause thermal shock to distort the switch and result in faults.



- Mount a cover if the switch is to be installed in a location where worker inattention could result in incorrect operation or accidents.



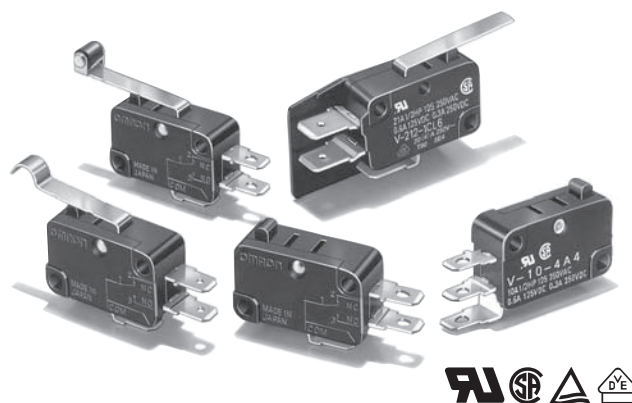
- Subjecting the switch to continuous vibration or shock may result in contact failure or faulty operation due to abrasion powder and in reduced durability. Excessive vibration or shock will cause the contacts to operate malfunction or become damaged. Mount the switch in a location that is not subject to vibration or shock and in a direction that does not subject the switch to resonance.
- If silver contacts are used with relatively low frequency for a long time or are used with microloads, the sulfide coating produced on the contact surface will not be broken down and contact faults will result. Use a microload switch that uses gold contacts.
- Do not use the switch in atmospheres with high humidity or heat or in harmful gases, such as sulfide gas ( $\text{H}_2\text{S}$ ),  $\text{SO}_2$ , ammonia gas ( $\text{NH}_3$ ), nitric acid gas ( $\text{HNO}_3$ ), or chlorine gas ( $\text{Cl}_2$ ). Doing so may impair functionality, such as with damage due to contacting faults or corrosion.
- The switch includes contacts. If the switch is used in an atmosphere with silicon gas, arc energy may cause silicon oxide ( $\text{SiO}_2$ ) to accumulate on the contacts and result in contact failure. If there is silicon oil, silicon filling, silicon wiring, or other silicon products in the vicinity of the switch, use a contact protection circuit to limit arcing and remove the source of the silicon gas.

# Snap Action Switch

# V

## General Purpose Snap Action Switch

- Industry standard design with switching currents of 10A to 21A
- Widely used for applications where long life expectancy and high reliability is required.
- Choose from a variety of levers, terminals and operating forces.
- Right and Left Barrier options are available for the V-21 and V-16 models
- Heat resistant versions of the V-15 and V-10 are available.
- RoHS Compliant



## Ordering Information

### Model Number Legend

V -          -             -         

1 2 3 4 5 6 7 8 9

#### 1. Ratings

21: 21 A at 250 VAC  
 16: 16 A at 250 VAC  
 15: 15 A at 250 VAC  
 11: 11 A at 250 VAC  
 10: 10 A at 250 VAC

#### 2. Contact Gap

None: 1 mm (F gap)  
 G: 0.5 mm (G gap)

#### 3. Actuator

None: Pin plunger  
 1: Short hinge lever  
 2: Hinge lever  
 3: Long hinge lever  
 4: Simulated roller lever  
 5: Short hinge roller lever  
 6: Hinge roller lever

#### 4. Contact Form

COM Terminal, Bottom position:

1: SPDT  
 2: SPST-NC  
 3: SPST-NO

COM Terminal, Side position:

4: SPDT  
 5: SPST-NC  
 6: SPST-NO

#### 5. Terminals

A: Solder terminals  
 C2: Quick-connect terminal (#187)  
 C: Quick-connect terminal (#250)

#### 6. Insulation Barrier

None: Without Barrier  
 R: Right-hand barrier  
 L: Left-hand barrier  
 (Barriers available for V-21 and V-16, only)

#### 7. Maximum Operating Force

6: 400 gf  
 5: 200 gf  
 4: 100 gf

**Note:** These OF values are for the pin plunger models.

#### 8. Special Purpose

None: Standard  
 T: Heat resistive  
 (V-15 and V-10, only)

#### 9. Mounting Hole Size

None: 3.1 mm  
 K: 2.9 mm

**Note:** Consult Omron regarding nomenclature combinations and part numbers not found in this datasheet.

## Available Combinations

				Thermoplastic case				Thermosetting case			
				Model	V-21	V-16		V-11	V-15		V-10
				Rated Current	21 A	16 A		11 A	15 A		10 A
COM terminal position	Insulation Barrier	Heat Resistance	OF Terminal Symbol	400 gf	400 gf	200 gf	100 gf	400 gf	200 gf	200 gf	100 gf
Bottom	No	Standard (80°C)	Solder terminals (A)	---	○	○	○	○	○	○	○
			Quick-connect terminals (#187)(C2)	---	○	○	○	○	○	○	○
			Quick-connect terminals (#250)(C)	○	○	○	○	○	○	○	○
		Heat resistant (150°C)	Solder terminals (A)	---	---	---	---	○	○	○	○
			Quick-connect terminals (#187)(C2)	---	---	---	---	○	○	○	○
			Quick-connect terminals (#250)(C)	---	---	---	---	---	---	---	---
	Yes	Standard (80°C)	Solder terminals (A)	---	○	○	---	---	---	---	---
			Quick-connect terminals (#187)(C2)	---	○	○	---	---	---	---	---
			Quick-connect terminals (#250)(C)	○	○	○	---	---	---	---	---
Side	No	Standard (80°C)	Solder terminals (A)	---	---	---	---	○	○	○	○
			Quick-connect terminals (#187)(C2)	---	---	---	---	○	○	○	○
			Quick-connect terminals (#250)(C)	○	---	---	---	---	---	---	---











**Note:** 1. ○: Available model.

Consult OMRON for specific models with standard approval.

## List of Models

### Thermoplastic Case








21 A (OF: 400 gf)

Common terminal position	Contact form	Terminal style	Actuator	Without barrier	Right-hand barrier	Left-hand barrier
Bottom	SPDT	Quick-connect (#250) (C)	Pin plunger 	V-21-1C6 	V-21-1CR6 	V-21-1CL6 
	SPST-NC			V-21-2C6	V-21-2CR6	V-21-2CL6
	SPST-NO			V-21-3C6	V-21-3CR6	V-21-3CL6
	SPDT		Short hinge lever 	V-211-1C6	V-211-1CR6	V-211-1CL6
			Hinge lever 	V-212-1C6	V-212-1CR6	V-212-1CL6
			Long hinge lever 	V-213-1C6	V-213-1CR6	V-213-1CL6
			Simulated roller lever 	V-214-1C6	V-214-1CR6	V-214-1CL6
			Short hinge roller lever 	V-215-1C6	V-215-1CR6	V-215-1CL6
			Hinge roller lever 	V-216-1C6	V-216-1CR6	V-216-1CL6








**Note:** 1. Add "G" to the part number in the appropriate location to obtain a 0.5 mm contact gap. Add "-K" to the part number in the appropriate location to obtain 2.9 mm mounting holes. Example: V-21 G2-1C6-K

2. Not all combinations are available. Consult Omron regarding nomenclature combinations and part numbers not found in this datasheet.

# 16 A (OF: 200 gf)

Common terminal position	Contact form	Terminal style	Actuator	Without barrier	Right-hand barrier	Left-hand barrier
Bottom	SPDT	A	Pin plunger 	V-16-1A5	V-16-1AR5	V-16-1AL5
		C2		V-16-1C25	V-16-1C2R5	V-16-1C2L5
		C		V-16-1C5	---	---
	SPST-NC	A		V-16-2A5	V-16-2AR5	V-16-2AL5
		C2		V-16-2C25	V-16-2C2R5	V-16-2C2L5
		C		V-16-2C5	---	---
	SPST-NO	A		V-16-3A5	V-16-3AR5	V-16-3AL5
		C2		V-16-3C25	V-16-3C2R5	V-16-3C2L5
		C		V-16-3C5	---	---
	SPDT	A	Short hinge lever 	V-161-1A5	V-161-1AR5	V-161-1AL5
		C2		V-161-1C25	V-161-1C2R5	V-161-1C2L5
		C		V-161-1C5	---	---
		A	Hinge lever 	V-162-1A5	V-162-1AR5	V-162-1AL5
		C2		V-162-1C25	V-162-1C2R5	V-162-1C2L5
		C		V-162-1C5	---	---
		A	Long hinge lever 	V-163-1A5	V-163-1AR5	V-163-1AL5
		C2		V-163-1C25	V-163-1C2R5	V-163-1C2L5
		C		V-163-1C5	---	---
		A	Simulated roller lever 	V-164-1A5	V-164-1AR5	V-164-1AL5
		C2		V-164-1C25	V-164-1C2R5	V-164-1C2L5
		C		V-164-1C5	---	---
		A	Short hinge roller lever 	V-165-1A5	V-165-1AR5	V-165-1AL5
		C2		V-165-1C25	V-165-1C2R5	V-165-1C2L5
		C		V-165-1C5	---	---
		A	Hinge roller lever 	V-166-1A5	V-166-1AR5	V-166-1AL5
		C2		V-166-1C25	V-166-1C2R5	V-166-1C2L5
		C		V-166-1C5	---	---








# 11 A (OF: 100 gf)

Common terminal position	Contact form	Terminal style	Actuator	Without barrier
Bottom	SPDT	A	Pin plunger 	V-11-1A4
		C2		V-11-1C24
		C		V-11-1C4
		A	Short hinge lever 	V-111-1A4
		C2		V-111-1C24
		C		V-111-1C4
		A	Hinge lever 	V-112-1A4
		C2		V-112-1C24
		C		V-112-1C4
		A	Long hinge lever 	V-113-1A4
		C2		V-113-1C24
		C		V-113-1C4
		A	Simulated roller lever 	V-114-1A4
		C2		V-114-1C24
		C		V-114-1C4
		A	Short hinge roller lever 	V-115-1A4
		C2		V-115-1C24
		C		V-115-1C4
		A	Hinge roller lever 	V-116-1A4
		C2		V-116-1C24
		C		V-116-1C4

- Note:** 1. Add "G" to the part number in the appropriate location to obtain a 0.5 mm contact gap. Add "-K" to the part number in the appropriate location to obtain 2.9 mm mounting holes. Examples: 1) V-16G3-1C25-K 2) V-11G-1A4-K
2. Not all combinations are available. Consult Omron regarding nomenclature combinations and part numbers not found in this datasheet.

# Thermosetting Case








## Standard models - 15 A / 10 A

Common terminal position	Contact form	Terminal style	Actuator	15 A	10 A	
				200 gf	200 gf	100 gf
Bottom	SPDT	A	<b>Pin plunger</b> 	V-15G-1A5-K	V-10G-1A5-K	V-10G-1A4-K
		C2		V-15G-1C25-K	V-10G-1C25-K	V-10G-1C24-K
		C		V-15G-1C5-K	—	—
	SPST-NC	A		V-15G-2A5-K	V-10G-2A5-K	V-10G-2A4-K
		C2		V-15G-2C25-K	V-10G-2C25-K	V-10G-2C24-K
		C		V-15G-2C5-K	—	—
	SPST-NO	A		V-15G-3A5-K	V-10G-3A5-K	V-10G-3A4-K
		C2		V-15G-3C25-K	V-10G-3C25-K	V-10G-3C24-K
		C		V-15G-3C5-K	—	—
		C		V-15G-4A5-K	V-10G-4A5-K	V-10G-4A4-K
Side	SPDT	A		V-15G-5A5-K	V-10G-5A5-K	V-10G-5A4-K
	SPST-NC	A		V-15G-6A5-K	V-10G-6A5-K	V-10G-6A4-K
	SPST-NO	A		V-15G-6A5-K	V-10G-6A5-K	V-10G-6A4-K
Bottom	SPDT	A	<b>Short hinge lever</b> 	V-15G1-1A5-K	V-10G1-1A5-K	V-10G1-1A4-K
		C2		V-15G1-1C25-K	V-10G1-1C25-K	V-10G1-1C24-K
		A	<b>Hinge lever</b> 	V-15G2-1A5-K	V-10G2-1A5-K	V-10G2-1A4-K
		C2		V-15G2-1C25-K	V-10G2-1C25-K	V-10G2-1C24-K
		A	<b>Long hinge lever</b> 	V-15G3-1A5-K	V-10G3-1A5-K	V-10G3-1A4-K
		C2		V-15G3-1C25-K	V-10G3-1C25-K	V-10G3-1C24-K
		A	<b>Simulated roller lever</b> 	V-15G4-1A5-K	V-10G4-1A5-K	V-10G4-1A4-K
		C2		V-15G4-1C25-K	V-10G4-1C25-K	V-10G4-1C24-K
		A	<b>Short hinge roller lever</b> 	V-15G5-1A5-K	V-10G5-1A5-K	V-10G5-1A4-K
		C2		V-15G5-1C25-K	V-10G5-1C25-K	V-10G5-1C24-K
		A	<b>Hinge roller lever</b> 	V-15G6-1A5-K	V-10G6-1A5-K	V-10G6-1A4-K
		C2		V-15G6-1C25-K	—	V-10G6-1C24-K

**Note:** 1. For SPST-NC and SPST-NO with levers consult Omron.

2. Not all combinations are available. Consult Omron regarding nomenclature combinations and part numbers not found in this datasheet.

## Heat Resistant Models (Up to 150°C) - 15 A / 10A

Common terminal position	Contact form	Terminal style	Actuator	15 A	10 A
				200 gf	100 gf
Bottom	SPDT	Solder Terminals (A)	<b>Pin plunger</b> 	V-15-1A5-T	V-10-1A4-T
			<b>Short hinge lever</b> 	V-151-1A5-T	V-101-1A4-T
			<b>Hinge lever</b> 	V-152-1A5-T	V-102-1A4-T
			<b>Long hinge lever</b> 	V-153-1A5-T	V-103-1A4-T
			<b>Simulated roller lever</b> 	V-154-1A5-T	V-104-1A4-T
			<b>Short hinge roller lever</b> 	V-155-1A5-T	V-105-1A4-T
			<b>Hinge roller lever</b> 	V-156-1A5-T	V-106-1A4-T

**Note:** 1. Add "G" to the part number in the appropriate location to obtain a 0.5 mm contact gap. Add "-K" to the part number in the appropriate location to obtain 2.9 mm mounting holes. Add "C2" to the part number in the appropriate location to obtain versions with #187 quick-connect terminals. Example: 1) V-15G1-1C25-T-K

2. Not all combinations are available. Consult Omron regarding nomenclature combinations and part numbers not found in this datasheet.

# Specifications

## ■ Ratings (reference values)

Type	Rated voltage	Non-inductive load				Inductive load			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
V-21	250 VAC	21 A		3 A		12 A		4 A	
	8 VDC	21 A		5 A		12 A		7 A	
	30 VDC	14 A		5 A		12 A		5 A	
	125 VDC	0.6 A		0.1 A		0.6 A		0.1 A	
	250 VDC	0.3 A		0.05 A		0.3 A		0.05 A	
V-16	250 VAC	16 A		2 A		10 A		3 A	
	8 VDC	16 A		4 A		10 A		6 A	
	30 VDC	10 A		4 A		10 A		4 A	
	125 VDC	0.6 A		0.1 A		0.6 A		0.1 A	
	250 VDC	0.3 A		0.05 A		0.3 A		0.05 A	
V-15	250 VAC	15 A		2 A		10 A		3 A	
	8 VDC	15 A		4 A		10 A		6 A	
	30 VDC	10 A		4 A		10 A		4 A	
	125 VDC	0.6 A		0.1 A		0.6 A		0.1 A	
	250 VDC	0.3 A		0.05 A		0.3 A		0.05 A	
V-11	250 VAC	11 A		1.5 A		6 A		2 A	
	8 VDC	11 A		3 A		6 A		3 A	
	30 VDC	6 A		3 A		6 A		3 A	
	125 VDC	0.6 A		0.1 A		0.6 A		0.1 A	
	250 VDC	0.3 A		0.05 A		0.3 A		0.05 A	
V-10	250 VAC	10 A		1.5 A		6 A		2 A	
	8 VDC	10 A		3 A		6 A		3 A	
	30 VDC	6 A		3 A		6 A		3 A	
	125 VDC	0.6 A		0.1 A		0.6 A		0.1 A	
	250 VDC	0.3 A		0.05 A		0.3 A		0.05 A	

- Note:** 1. The above current values are the normal current values of models with a contact gap of 1 mm (gap F), which vary with the normal current values of models with a contact gap of 0.5 mm (gap G).  
 2. Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).  
 3. Lamp load has an inrush current of 10 times the steady-state current.  
 4. Motor load has an inrush current of 6 times the steady-state current.  
 5. The ratings values apply under the following test conditions: Ambient temperature: 20±2°C, Ambient humidity: 65±5%, Operating frequency: 30 operations/min

## ■ Approved Standards

UL1054 (File No. E41515)

CSA C22.2 No.55 (File No. LR21642)

Rated voltage	V-21	V-16	V-15	V-11	V-10
125 VAC	21 A, 1/2 HP	16 A, 1/2 HP	15 A, 1/2 HP	11 A, 1/3 HP	10 A, 1/3 HP
250 VAC					
125 VDC	0.6 A				
250 VDC	0.3 A				

EN 61058-1 (File No. 129608, VDE approval)

Rated voltage	V-21	V-16	V-11
250 VAC	20 (4) A	16 (4) A	11 (3) A

Testing conditions: 5E4 (50,000 operations), T105 (0°C to 105°C)

EN 61058-1 (File No. T9451451, TÜV Rheinland approval)

Rated voltage	V-15	V-10
250 VAC	15 A	10 A
250 VDC	0.3 A	

Testing conditions: 5E4 (50,000 operations), T85 (0°C to 85°C)



## ■ Characteristics

Operating speed	0.1 mm to 1 m/s (plunger models)
Operating frequency	Mechanical: 600 operations/minute, max. Electrical: 30 operations/minute, max.
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	15 mΩ max.
Dielectric strength (see note 2)	1,000 VAC, 50/60 Hz for 1 min between terminals of the same polarity V-21, V-16 and V-11: 2,000 VAC, 50/60 Hz for 1 min between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts V-15 and V-10: 1,500 VAC, 50/60 Hz for 1 min between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts
Vibration resistance (see note 3)	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance (see note 3)	Destruction: 1,000 m/s <sup>2</sup> (approx. 100G) max. Malfunction: V-21/V-16/V-15: 300 m/s <sup>2</sup> (approx. 30G) max. V-11/V-10: 200 m/s <sup>2</sup> (approx. 20G) max.
Life expectancy	Mechanical: 50,000,000 operations min. (60 operations/minute) Electrical: V-21/V-16/V-15: 100,000 operations min. (30 operations/minute) (V-15 heat resistive: 20,000 operations min. (30 ops/minute)) V-11/V-10: 300,000 operations min. (30 operations/minute) (V-10 heat resistive: 50,000 operations min. (30 ops/minute))
Degree of protection	IEC IP40
Degree of protection against electric shock	Class I
Proof tracking index (PTI)	175
Ambient operating temperature	-25°C to 80°C (at 60% RH max.) with no icing -25°C to 150°C for heat resistive models (at 60% RH max.) with no icing.
Ambient operating humidity	85% max. (for 5°C to 35°C)
Weight	Approx. 6.2 g (plunger models)

**Note:** 1. Data shown are of initial value.

2. The dielectric strength shown is measured using a separator between the switch and metal mounting plate.

3. For pin plunger models, the above values apply for use at both the free position and total travel position. For lever models, they apply at the total travel position.

4. For testing conditions, contact your OMRON sales representative.

## ■ Contact Specifications

Item		V-21	V-16	V-15	V-11	V-10
Contact	Specification	Rivet				
	Material	Silver alloy				Silver
	Gap (standard value)	1 mm (F gap type) or 0.5 mm (G gap type)				
Inrush current	NC	50 A max.	40 A max.	36 A max.	24 A max.	
	NO					
Minimum applicable load		160 mA at 5 VDC				

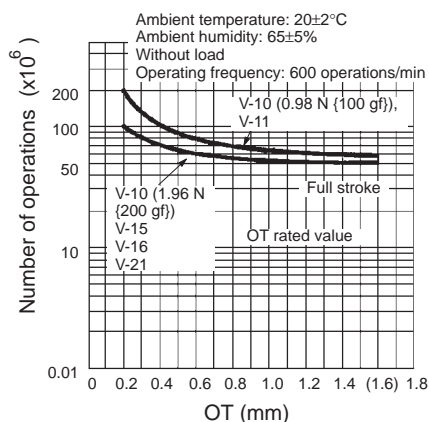
**Note:** Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003). The equation  $\lambda_{60}=0.5 \times 10^{-6}$  / operations indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%.

# Engineering Data

## Mechanical service life

(Pin plunger models)

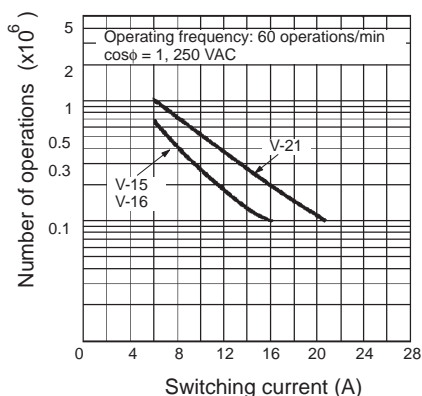
V-21/-16/-15/-10



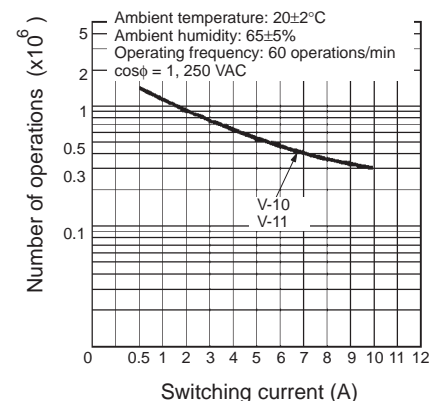
## Electrical service life

(Pin plunger models)

V-21/-16/-15



V-11/-10



## Contact Form

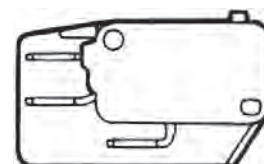
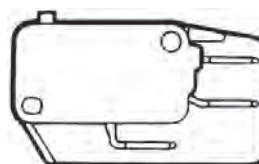
Common terminal position	Contact form		
	SPDT	SPST-NC*	SPST-NO*
Bottom type			
Side type			

\* The SPST-NC and SPST-NO contact form types listed in the ordering information tables are for Pin Plunger models only. For information concerning lever models consult Omron.

## Barrier direction (V-21 and V-16)

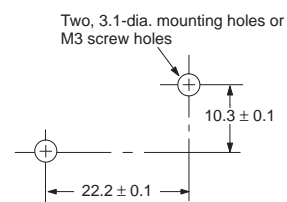
Right-hand Barrier

Left-hand Barrier



## Mounting Holes

All switches may be panel mounted using M3 mounting screws with plane washers or spring washers to securely mount the switch. Tighten the screws to a torque of 0.39 to 0.59 N·m.



# Dimensions

## ■ Terminals

**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions

2. The following table is for the SPDT contact specifications. Two terminals will be available for SPST-NO or SPST-NC contact specifications. For terminal positions, refer to the above *Contact Form*

3. Right-angle PCB terminal type is available with some models (not shown). Drawings will be provided if requested.

D5: Pins at right angles, to the right

D6: Pins at right angle, to the left

Terminal type	Solder Terminal (A)	Quick-connect Terminal (#187) (C2)	Quick-connect Terminal (#250) (C)
COM bottom position	<p>t = 0.5 Three, solder terminals</p>	<p>t = 0.5 Three, quick-connect terminals (#187)</p>	<p>t = 0.8 Three, quick-connect terminals (#250)</p>
COM side position			
Terminal dimensions	<p>Note: Indicates the length to the center of the 1.6-dia. holes</p>	<p>1.6-dia. terminal hole</p>	<p>1.65-dia. terminal hole</p>

## ■ Dimensions and Operating Characteristics

### Thermoplastic Case Models

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
 2. The following illustrations and drawings are for quick-connect terminals (#250) (terminals C). V models also incorporate terminals A and C2, which are omitted from the following drawings. Refer to *Terminals* section for the dimensions of these terminals.  
 3. The □ in the model number is for the terminal code.  
 4. The illustrations for V-21, V-16 and V-11 show a hole size of 3.1 mm. V-21, V-16 and V-11 models with a suffix "K" have a hole size of 2.9 mm.  
 5. The operating characteristics are for operation in the A direction ( ↓ ).

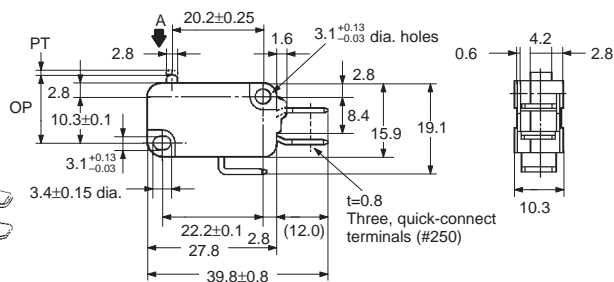
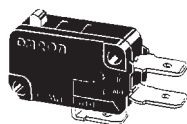
### Pin Plunger Models

(Without Barrier)

V-21-1□6

V-16-1□5

V-11-1□4

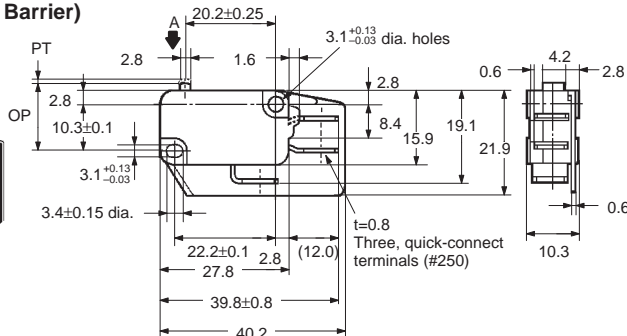
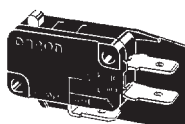


Characteristics	V-21-1□6	V-16-1□5
OF max.	400 gf	200 gf
RF min.	80 gf	50 gf
PT max.	1.2 mm	
OT min.	1.0 mm	
MD max.	0.4 mm	
OP	14.7 ± 0.4 mm	

(With Right-hand Barrier)

V-21-1□R6

V-16-1□R5

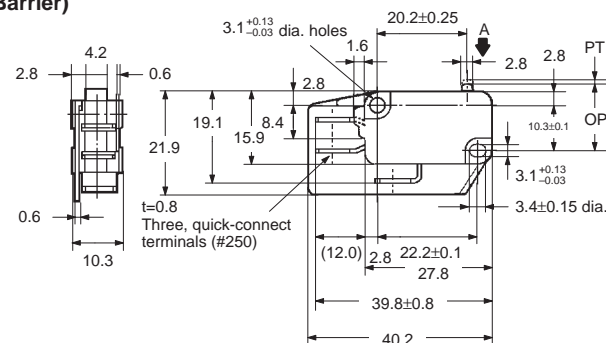
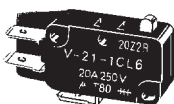


Characteristics	V-11-1□4	V-11-1□5
OF max.	100 gf	200 gf
RF min.	20 gf	50 gf
PT max.	1.2 mm	
OT min.	1.0 mm	
MD max.	0.4 mm	
OP	14.7 ± 0.4 mm	

(With Left-hand Barrier)

V-21-1□L6

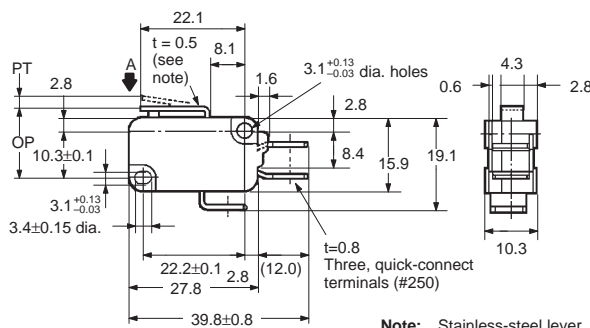
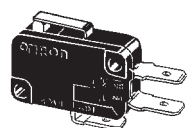
V-16-1□L5



- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions
2. The following illustrations and drawings are for quick-connect terminals (#250) (terminals C). V models also incorporate terminals A and C2, which are omitted from the following drawings. Refer to *Terminals* section for the dimensions of these terminals.
3. The □ in the model number is for the terminal code.
4. The illustrations for V-21, V-16 and V-11 show a hole size of 3.1 mm. V-21, V-16 and V-11 models with a suffix "K" have a hole size of 2.9 mm.
5. The operating characteristics are for operation in the A direction ( ↓ ).

## Short Hinge Lever Models

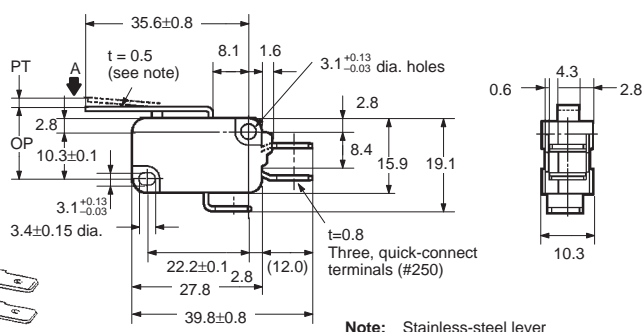
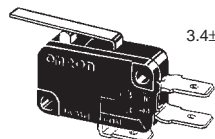
V-211-1□6  
V-161-1□5  
V-111-1□4



Characteristics	V-211-1□6	V-161-1□5	V-111-1□4
OF max.	400 gf	200 gf	100 gf
RF min.	50 gf	50 gf	15 gf
PT max.	1.6 mm		
OT min.	0.8 mm		
MD max.	0.6 mm		
OP	15.2 ± 0.5 mm		

## Hinge Lever Models

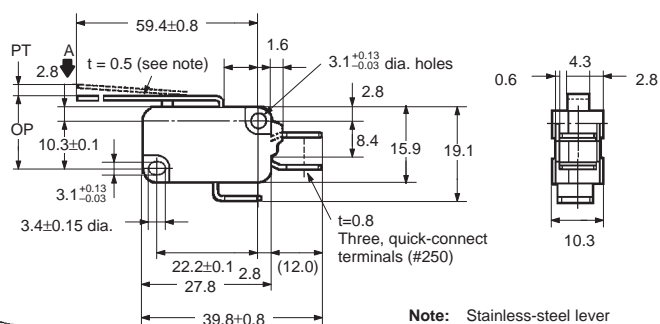
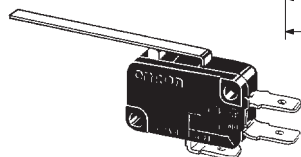
V-212-1□6  
V-162-1□5  
V-112-1□4



Characteristics	V-212-1□6	V-162-1□5	V-112-1□4
OF max.	250 gf	125 gf	60 gf
RF min.	25 gf	14 gf	6 gf
PT max.	4.0 mm		
OT min.	1.6 mm		
MD max.	1.5 mm		
OP	15.2 ± 1.2 mm		

## Long Hinge Lever Models

V-213-1□6  
V-163-1□5  
V-113-1□4

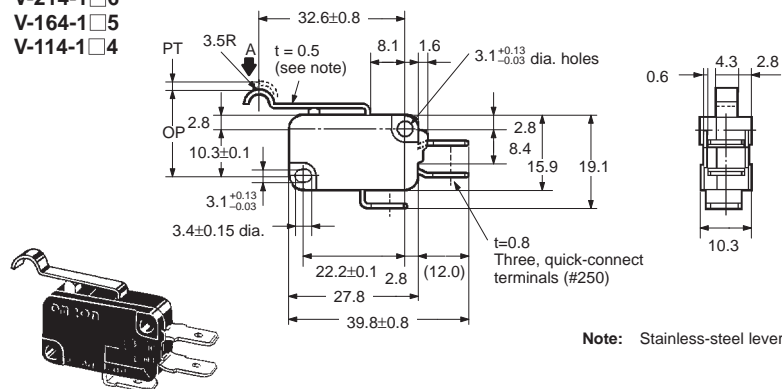


Characteristics	V-213-1□6	V-163-1□5	V-113-1□4
OF max.	130 gf	70 gf	35 gf
RF min.	12 gf	6 gf	- - -
PT max.	9.0 mm		
OT min.	2.0 mm		3.2 mm
MD max.	2.8 mm		
OP	15.2 <sup>+2.6</sup> <sub>-3.2</sub> mm		15.2 ± 2.6 mm

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
 2. The following illustrations and drawings are for quick-connect terminals (#250) (terminals C). V models also incorporate terminals A and C2, which are omitted from the following drawings. Refer to *Terminals* section for the dimensions of these terminals.  
 3. The □ in the model number is for the terminal code.  
 4. The illustrations for V-21, V-16 and V-11 show a hole size of 3.1 mm. V-21, V-16 and V-11 models with a suffix "K" have a hole size of 2.9 mm.  
 5. The operating characteristics are for operation in the A direction ( ↓ ).

## Simulated Roller Lever Models

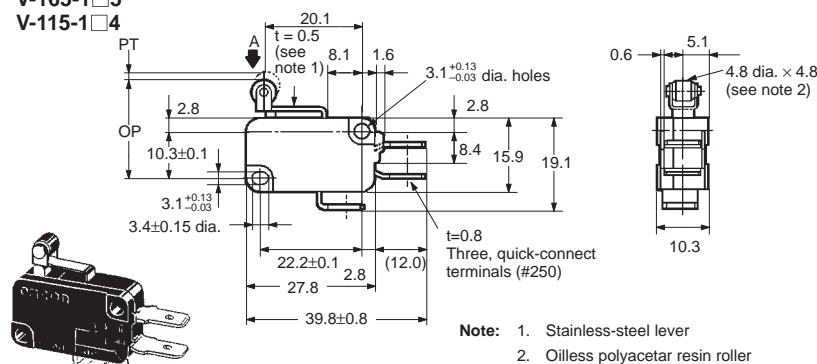
V-214-1□6  
 V-164-1□5  
 V-114-1□4



Characteristics	V-214-1□6	V-164-1□5	V-114-1□4
OF max.	250 gf	125 gf	60 gf
RF min.	25 gf	14 gf	6 gf
PT max.	4.0 mm		
OT min.	1.6 mm		
MD max.	1.5 mm		
OP	18.7 ± 1.2 mm		

## Short Hinge Roller Lever Models

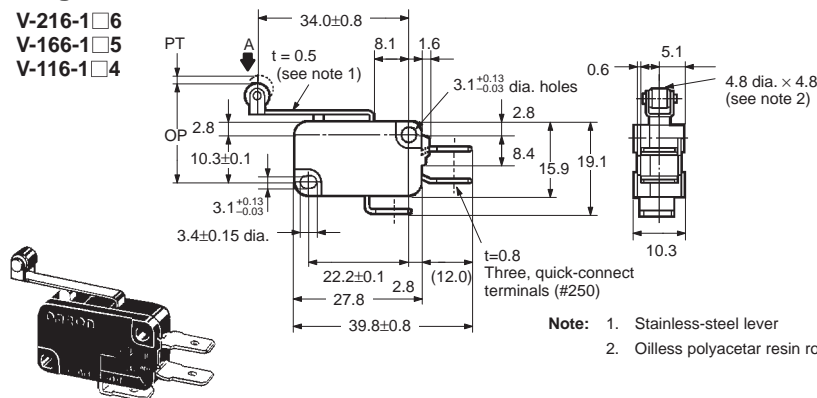
V-215-1□6  
 V-165-1□5  
 V-115-1□4



Characteristics	V-215-1□6	V-165-1□5	V-115-1□4
OF max.	480 gf	240 gf	120 gf
RF min.	50 gf	50 gf	15 gf
PT max.	1.6 mm		
OT min.	0.8 mm		
MD max.	0.6 mm		
OP	20.7 ± 0.6 mm		

## Hinge Roller Lever Models

V-216-1□6  
 V-166-1□5  
 V-116-1□4



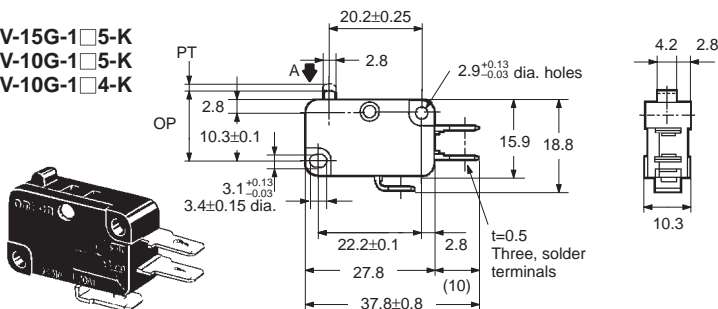
Characteristics	V-216-1□6	V-166-1□5	V-116-1□4
OF max.	250 gf	125 gf	60 gf
RF min.	25 gf	14 gf	6 gf
PT max.	4.0 mm		
OT min.	1.6 mm		
MD max.	1.5 mm		
OP	20.7 ± 1.2 mm		

## Thermosetting Case Models

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
 2. The following illustrations are for quick-connect terminals (#250) (terminals C). Refer to *Terminals* section for the dimensions of other terminals.  
 3. The □ in the model number is for the terminal code.  
 4. The illustrations show models with a suffix "K", which have a hole size of 2.9 mm. Omit the "K" to obtain models with hole size = 3.1 mm.  
 5. The operating characteristics are for operation in the A direction ( ↓ ).

### Pin Plunger Models

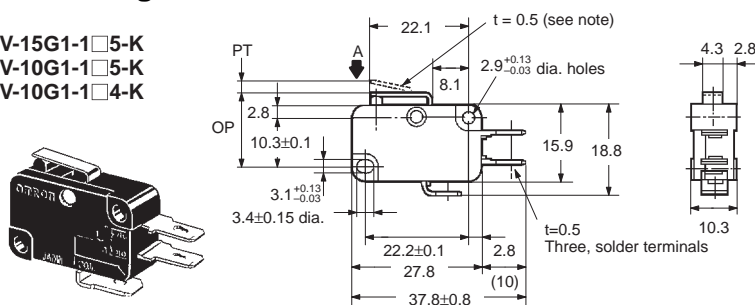
V-15G-1□5-K  
 V-10G-1□5-K  
 V-10G-1□4-K



Characteristics	V-15G-1□5-K V-10G-1□5-K	V-10G-1□4-K
OF max.	200 gf	100 gf
RF min.	50 gf	20 gf
PT max.	1.2 mm	
OT min.	1.3 mm	
MD max.	0.3 mm	
OP	14.7 ± 0.4 mm	

### Short Hinge Lever Models

V-15G1-1□5-K  
 V-10G1-1□5-K  
 V-10G1-1□4-K

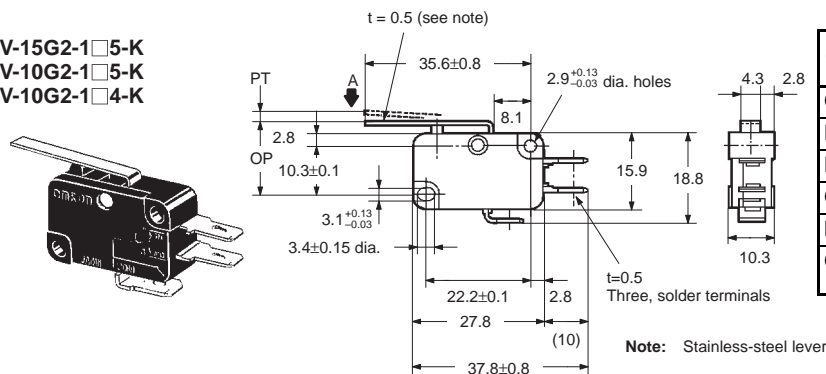


**Note:** Stainless-steel lever

Characteristics	V-15G1-1□5-K V-10G1-1□5-K	V-10G1-1□4-K
OF max.	200 gf	100 gf
RF min.	50 gf	15 gf
PT max.	1.5 mm	
OT min.	1.0 mm	
MD max.	0.5 mm	
OP	15.2 ± 0.5 mm	

### Hinge Lever Models

V-15G2-1□5-K  
 V-10G2-1□5-K  
 V-10G2-1□4-K

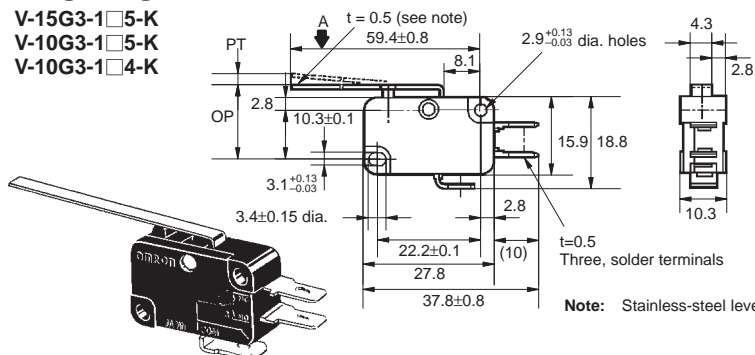


**Note:** Stainless-steel lever

Characteristics	V-15G2-1□5-K V-10G2-1□5-K	V-10G2-1□4-K
OF max.	125 gf	60 gf
RF min.	14 gf	6 gf
PT max.	3.3 mm	
OT min.	2.3 mm	
MD max.	0.8 mm	
OP	15.2 <sup>+2.6</sup> / <sub>-3.2</sub> mm	15.2 ± 1.2 mm

### Long Hinge Lever Models

V-15G3-1□5-K  
 V-10G3-1□5-K  
 V-10G3-1□4-K



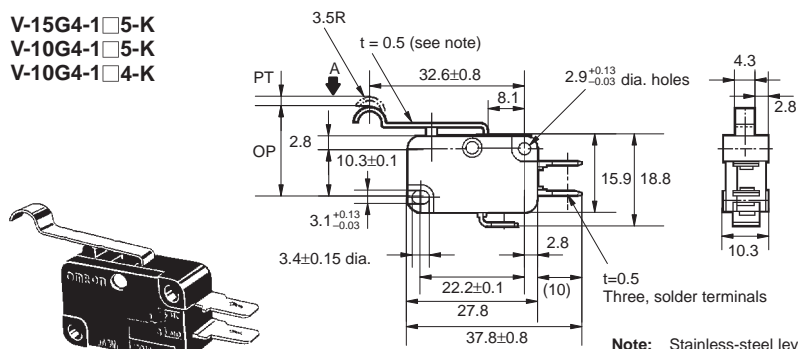
**Note:** Stainless-steel lever

Characteristics	V-15G3-1□5-K V-10G3-1□5-K	V-10G3-1□4-K
OF max.	70 gf	35 gf
RF min.	6 gf	- - - gf
PT max.	9.0 mm	7.6 mm
OT min.	3.0 mm	3.2 mm
MD max.	2.0 mm	
OP	15.2 ± 2.6 mm	

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
 2. The following illustrations are for quick-connect terminals (#250) (terminals C). Refer to *Terminals* section for the dimensions of other terminals.  
 3. The □ in the model number is for the terminal code.  
 4. The illustrations show models with a suffix "K", which have a hole size of 2.9 mm. Omit the "K" to obtain models with hole size = 3.1 mm.  
 5. The operating characteristics are for operation in the A direction ( ↓ ).

## Simulated Roller Lever Models

V-15G4-1□5-K  
 V-10G4-1□5-K  
 V-10G4-1□4-K

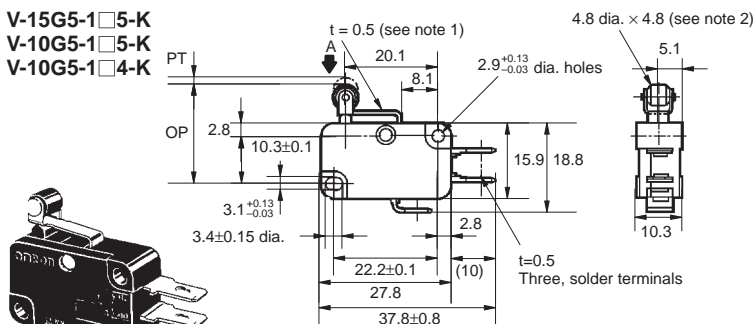


**Note:** Stainless-steel lever

Characteristics	V-15G4-1□5-K V-10G4-1□5-K	V-10G4-1□4-K
OF max.	125 gf	60 gf
RF min.	14 gf	6 gf
PT max.	3.3 mm	
OT min.	2.3 mm	
MD max.	0.8 mm	
OP	18.7 ± 1.2 mm	

## Short Hinge Roller Lever Models

V-15G5-1□5-K  
 V-10G5-1□5-K  
 V-10G5-1□4-K

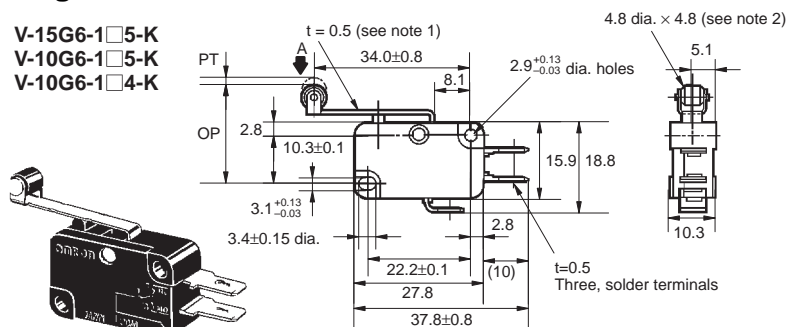


- Note:** 1. Stainless-steel lever  
 2. Oilless polyacetal resin roller

Characteristics	V-15G5-1□5-K V-10G5-1□5-K	V-10G5-1□4-K
OF max.	240 gf	120 gf
RF min.	50 gf	15 gf
PT max.	1.5 mm	
OT min.	1.0 mm	
MD max.	0.5 mm	
OP	20.7 ± 0.6 mm	

## Hinge Roller Lever Models

V-15G6-1□5-K  
 V-10G6-1□5-K  
 V-10G6-1□4-K



- Note:** 1. Stainless-steel lever  
 2. Oilless polyacetal resin roller

Characteristics	V-15G6-1□5-K V-10G6-1□5-K	V-10G6-1□4-K
OF max.	125 gf	60 gf
RF min.	14 gf	6 gf
PT max.	3.3 mm	
OT min.	2.3 mm	
MD max.	0.8 mm	
OP	20.7 ± 1.6 mm	

## Accessories

Refer to the "V/VX/D3C Common Accessories" datasheet for information regarding VAL, VAM and VAV external actuators (sold separately).



# Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## ■ Correct Use

### Terminal Connection

To solder the lead to the solder terminal, apply a soldering iron rated at 60 W max. quickly (within 5 seconds) with the actuator at the free position.

Note that applying a soldering iron for too long a time or using one that is rated at more than 60 W may degrade the switch characteristics.

Use an appropriate mating connector for #187 or #250 quick connect terminals.

### Specifications Approved by TÜV Rheinland According to EN61058-1

#### Appropriate Cable Size (mm<sup>2</sup>)

Model	Solder terminal
V-10	0.75, 1.25, 2.0
V-15	1.25, 2.0

### Operation

Make sure that the operating body pushes the switch actuator with an adequate force when the switch is to be operated, and that it does not touch the actuator when the switch is released.

Do not change the operating position by modifying the actuator.

Do not use the switch in a application where the operating speed is extremely slow or the actuator is set in the midpoint between the free position and operating position.

Install the pin plunger switch so that the operating force is applied in alignment with the stroke of the actuator. The switch should be set so that its stroke is in the range of 60 to 90% of the rated OT (minimum value) when the switch has been operated.

## ■ Cautions

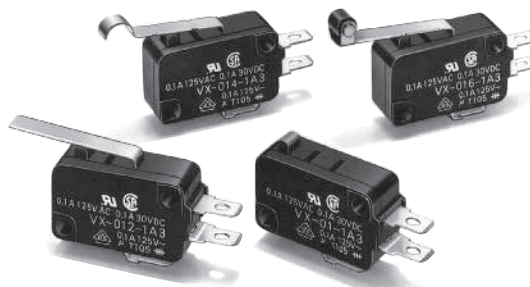
### Insulation Distance

According to EN61058-1, the minimum insulation thickness for this switch should be 1.1 mm and minimum clearance distance between the terminal and mounting plate should be 1.0 mm. If the insulation distance cannot be provided in the product incorporating the switch, either use a switch with insulation barrier or use a separator to ensure sufficient insulation distance.








# Snap Action Switch VX

## Miniature Snap Action Switch

- Compact snap action switch with low force operation
- Wide variation extends from microload to 5 A switching current, with shapes identical to those of the V-series Miniature Basic Snap Action Switch.
- Internal hinge lever mechanism assures outstanding contact reliability
- RoHS Compliant



## Ordering Information

Actuator	Terminal Style	OF max.	Rated current	
			5 A	0.1 A
Pin plunger 	A	25 gf	VX-5-1A2	VX-01-1A2
		50 gf	VX-5-1A3	VX-01-1A3
	C2	25 gf	VX-5-1C22	VX-01-1C22
		50 gf	VX-5-1C23	VX-01-1C23
Short hinge lever 	A	50 gf	VX-51-1A3	VX-011-1A3
	C2		VX-51-1C23	VX-011-1C23
Hinge lever 	A	30 gf	VX-52-1A3	VX-012-1A3
	C2		VX-52-1C23	VX-012-1C23
Long hinge lever 	A	20 gf	VX-53-1A3	VX-013-1A3
	C2		VX-53-1C23	VX-013-1C23
Simulated roller lever 	A	30 gf	VX-54-1A3	VX-014-1A3
	C2		VX-54-1C23	VX-014-1C23
Short hinge roller lever 	A	60 gf	VX-55-1A3	VX-015-1A3
	C2		VX-55-1C23	VX-015-1C23
Hinge roller lever 	A	30 gf	VX-56-1A3	VX-016-1A3
	C2		VX-56-1C23	VX-016-1C23

## Model Number Legend

VX -     -      

1   2   3   4   5

### 1. Ratings

5: 5 A at 250 VAC  
01: 0.1 A at 30 VDC

### 2. Actuator

None: Pin plunger  
1: Short hinge lever  
2: Hinge lever  
3: Long hinge lever  
4: Simulated roller lever  
5: Short hinge roller lever  
6: Hinge roller lever

### 3. Contact Form

1: SPDT  
2: SPST-NC  
3: SPST-NO

### 4. Terminals

A: Solder terminals  
C2: Quick-connect terminals (#187)

### 5. Maximum Operating Force

2: 25 gf  
3: 50 gf

**Note:** These OF values are for the pin plunger models.

# Specifications

## ■ Characteristics

Item	VX-5	VX-01
Operating speed	0.1 mm to 1 m/s (pin plunger models)	
Operating frequency	Mechanical: 600 operations per minute Electrical: 30 operations per minute	
Contact resistance	30 mΩ max.	50 mΩ max.
Insulation resistance	100 MΩ min. at 500 VDC	
Dielectric strength (see note 2)	1,000 VAC, 50/60 Hz for 1 minute between terminals of same polarity 1,500 VAC, 50/60 Hz for 1 minute between current-carrying metal parts and ground and between each terminal and non-current-carrying metal parts	
Vibration resistance (see note 3)	Malfunction: 10 to 55 Hz, 1.5 mm double amplitude	
Shock resistance (see note 3)	Destruction: 400 m/s <sup>2</sup> (approx. 40G) max. Malfunction: 100 m/s <sup>2</sup> (approx. 10G) max	
Degree of protection	IEC IP40	
Degree of protection against electric shock	Class I	
Proof tracking index	175	
Ambient operating temperature	-25°C to 80°C (at 60% RH max.) with no icing	
Ambient operating humidity	85% max (for 5°C to 35°C)	
Service life	Mechanical	50,000,000 operations min. (60 ops/minute)
	Electrical	10,000,000 operations min. (60 ops/minute)
Weight	Mechanical	500,000 operations min. (30 ops/minute)
	Electrical	1,000,000 operations min. (30 ops/minute)
Weight	Approx. 6.2 g (pin plunger models)	

**Note:** 1. Data shown are of initial value.

2. The dielectric strength shown is measured using a separator between the switch and metal mounting plate.

3. For the pin plunger models, the above values apply for use at the free position and total travel position. For lever models, they apply at the total travel position. Contact separation time is within 1 ms.

## ■ Ratings (reference values)

Type	Rated voltage	Resistive load		Lamp load		Inductive load	
		NC	NO	NC	NO	NC	NO
5 A	250 VAC	5		---		---	
	125 VAC	5		0.5		4	
	8 VDC	5		3		4	
	30 VDC	5		3		4	
	125 VDC	0.4		0.1		0.4	
	250 VDC	0.3		0.05		0.2	
0.1 A	125 VAC	0.1		---		---	
	8 VDC	0.1		---		---	
	30 VDC	0.1		---		---	

**Note:** 1. Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 milliseconds max. (DC).

2. Lamp load has an inrush current of 10 times the steady-state current

3. The electrical rating applies under the following test conditions:

Ambient Temperature = 20±2°C, Ambient Humidity = 65±5%, Operating frequency = 30 operations/minute

## ■ Approved Standards

UL Recognized (File No. E41515)

CSA Certified (File No. LR21642)

Rated Voltage	VX-5	VX-01
125 VAC	5 A	0.1 A
250 VAC	5 A	---
30 VDC	---	0.1 A

EN61058-1 - - VDE approval (File No. 124761)

Rated Voltage	VX-5	VX-01
125 VAC	5 A	0.1 A
250 VAC	5 A	---

Testing conditions: 5E4 (50,000 operations), T105 (0°C to 105°C)

## ■ Contact Specifications

Item	VX-5	VX-01
Specification	Rivet	Crossbar
Material	Silver alloy	Gold alloy
Gap (standard value)	0.5 mm	
Inrush current	NC: 15A max. NO: ---	---
Minimum applicable load (see note)	160 mA at 5 VDC	1 mA at 5 VDC

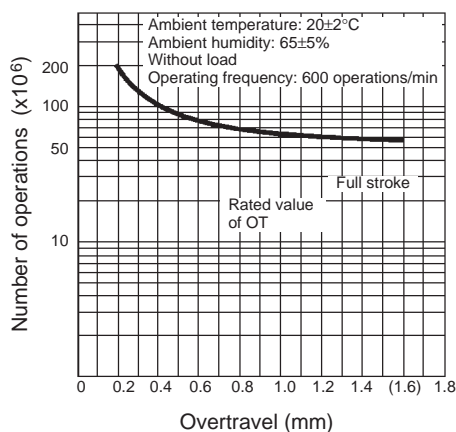
**Note:** Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003).

The equation  $\lambda_{60}=0.5 \times 10^{-6} / \text{operations}$  indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%

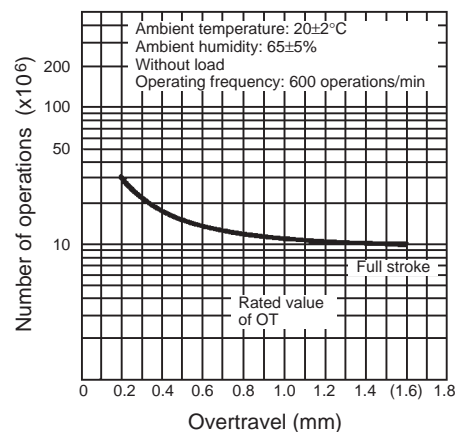
# Engineering Data

## Mechanical service life

VX-5

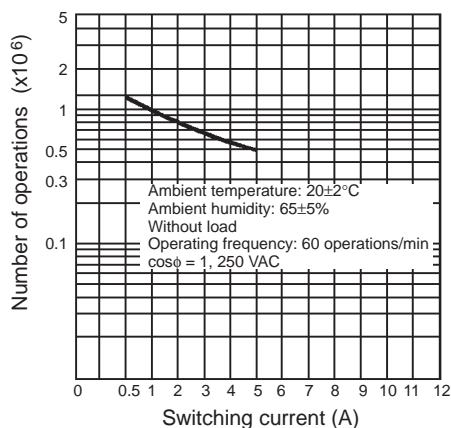


VX-01

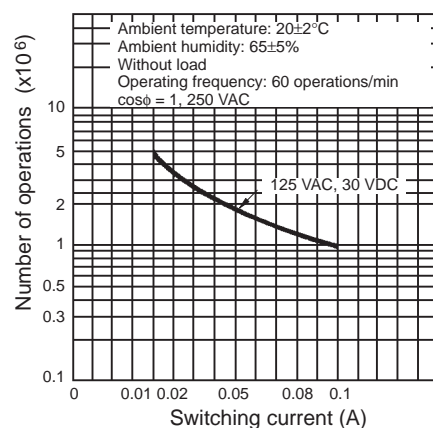


## Electrical service life

VX-5



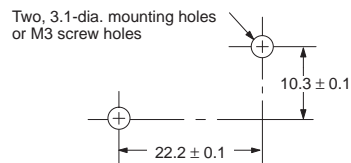
VX-01



## Mounting

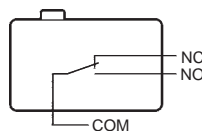
### Panel Mounting

All switches may be panel mounted using M3 mounting screws with plane washers or spring washers to securely mount the switch. Tighten the screws to a torque of 0.39 to 0.59 N·m.

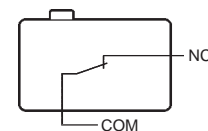


## Contact Form

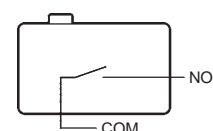
SPDT



SPST-NC



SPST-NO



# Dimensions

## ■ Terminals

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
2. The following illustrates the SPDT contact form

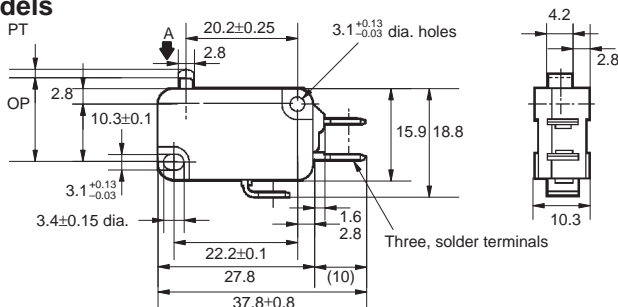
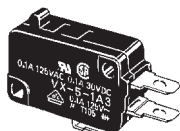
Solder terminals (A)	#187 Quick-connect terminals (C2)
<p>Three, solder terminals</p>	<p>Three, quick-connect terminals (#187)</p>
<p><b>Note:</b> The length to the center of the 1.6-dia. holes.</p>	

## ■ Dimensions and Operating Characteristics

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
2. The following illustrations and dimensions are for solder terminal models. Refer to "Terminals" for models with quick-connect terminals (#187).  
3. The □ in the model number is for the terminal code. (A = Solder Terminal, C2 = #187 quick-connect terminal)  
4. The operating characteristics are for operation in the A direction(▼)

### Pin Plunger Models

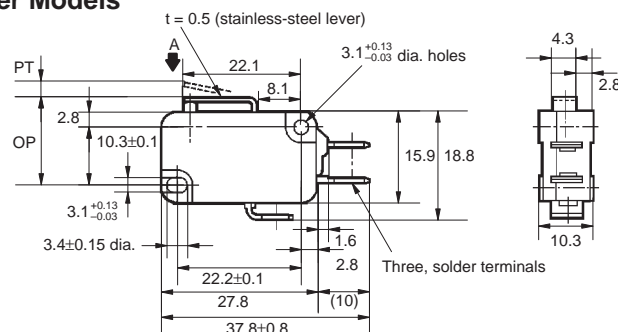
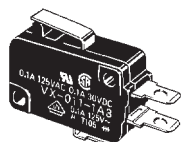
VX-5-1□2  
VX-5-1□3  
VX-01-1□2  
VX-01-1□3



Characteristics	VX-5-1□2 VX-01-1□2	VX-5-1□3 VX-01-1□3
OF max.	25 gf	50 gf
RF min.	3 gf	5 gf
PT max.	1.2 mm	
OT min.	1.0 mm	
MD max.	0.3 mm	
OP	14.7 ± 0.4 mm	

### Short Hinge Lever Models

VX-51-1□3  
VX-011-1□3

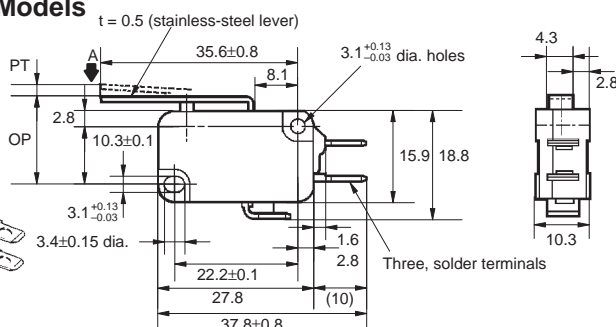
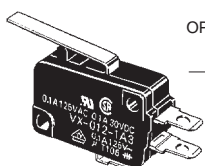


Characteristics	VX-51-1□3	VX-011-1□3
OF max.	50 gf (reference value)	
RF min.	4 gf (reference value)	
PT max.	1.6 mm	
OT min.	0.8 mm	
MD max.	0.5 mm	
OP	15.2 ± 0.5 mm	

**Note:** The reference value applies for cases when the installation direction is such that the lever weight is not applied to the plunger

### Hinge Lever Models

VX-52-1□3  
VX-012-1□3

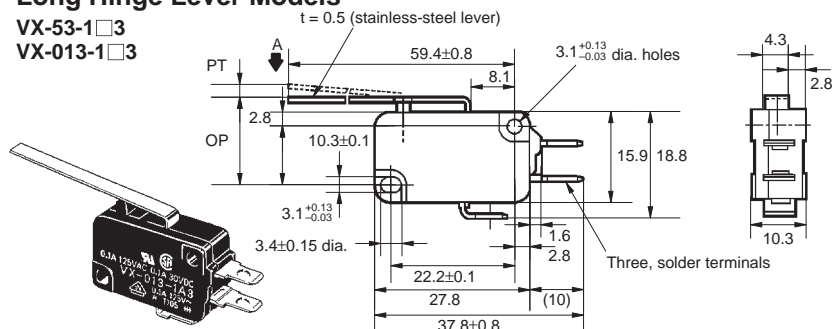


Characteristics	VX-52-1□3	VX-012-1□3
OF max.	30 gf	
RF min.	---	
PT max.	4.0 mm	
OT min.	1.6 mm	
MD max.	0.8 mm	
OP	15.2 ± 1.2 mm	

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
 2. The following illustrations and dimensions are for solder terminal models. Refer to "Terminals" for models with quick-connect terminals (#187).  
 3. The □ in the model number is for the terminal code. (A = Solder Terminal, C2 = #187 quick-connect terminal)  
 4. The operating characteristics are for operation in the A direction(↕)

### Long Hinge Lever Models

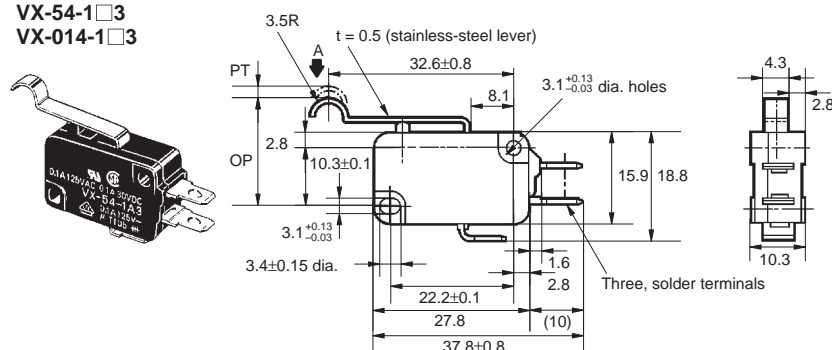
VX-53-1□3  
 VX-013-1□3



Characteristics	VX-53-1□3	VX-013-1□3
OF max.	20 gf	
RF min.	---	
PT max.	9.0 mm	
OT min.	3.2 mm	
MD max.	2.0 mm	
OP	15.2 ± 2.6 mm	

### Simulated Roller Lever Models

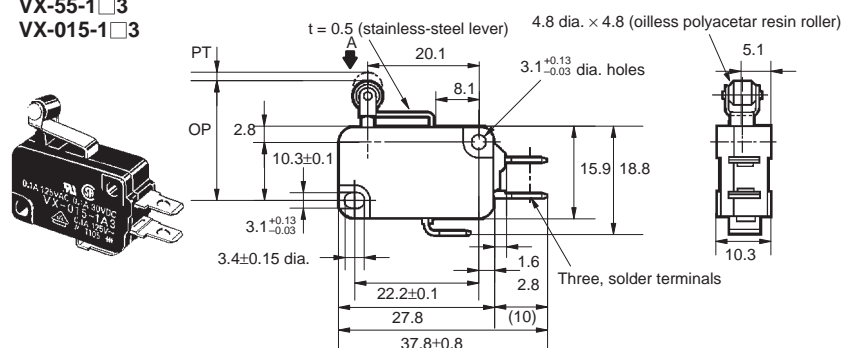
VX-54-1□3  
 VX-014-1□3



Characteristics	VX-54-1□3	VX-014-1□3
OF max.	30 gf	
RF min.	2 gf	
PT max.	4.0 mm	
OT min.	1.6 mm	
MD max.	0.8 mm	
OP	18.7 ± 1.2 mm	

### Short Hinge Roller Lever Models

VX-55-1□3  
 VX-015-1□3

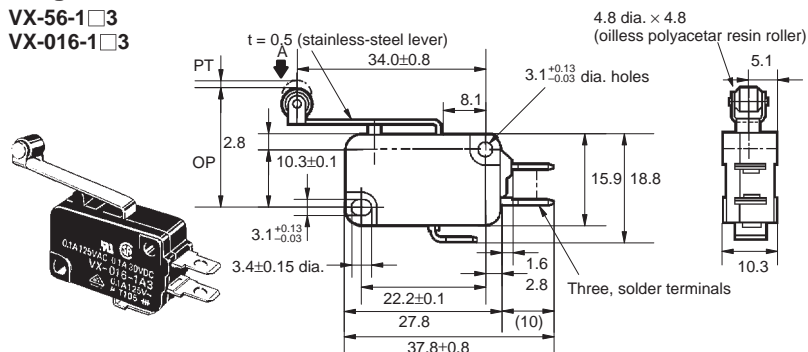


Characteristics	VX-55-1□3	VX-015-1□3
OF max.	60 gf (reference value)	
RF min.	4 gf (reference value)	
PT max.	1.6 mm	
OT min.	0.8 mm	
MD max.	0.5 mm	
OP	20.7 ± 0.6 mm	

**Note:** The reference value applies for cases when the installation direction is such that the lever weight is not applied to the plunger

### Hinge Roller Lever Models

VX-56-1□3  
 VX-016-1□3



Characteristics	VX-56-1□3	VX-016-1□3
OF max.	30 gf	
RF min.	---	
PT max.	4.0 mm	
OT min.	1.6 mm	
MD max.	0.8 mm	
OP	20.7 ± 1.2 mm	

# Precautions

## ■ Correct Use

### Mounting Direction

For a switch with an actuator, mount the switch in a direction where the actuator weight will not be applied to the switch.

Since the switch is designed for a small load, its resetting force is small. Therefore, resetting failure may occur if unnecessary load is applied to the switch.

### Operation

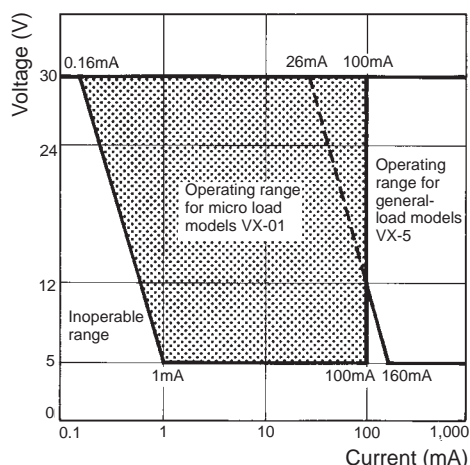
Keep the operation control completely separate from the actuator of the switch, and push it down fully when starting operation. Do not displace the operating position of the actuator when machining.

Consult OMRON in advance if the operating speed is to be extremely slow, or if the pushbutton is to be set somewhere between the free position and operating position.

Mount pin pushbutton switches so that stroke of the pushbutton and the stroke of the operating control overlap on a vertical line. The stroke of the switch, after operation, should be set to 60- 90% that of standard OT (MIN operation).

### Using Microloads

Using a model for ordinary loads to switch microloads may result in faulty operation. Instead, use the models that are designed for microloads and that operate in the following range;



However, even when using microload models within the operating range shown above, if inrush current or inductive voltage spikes occur when the contact is opened or closed, it may increase contact wear and so decrease the service life. Therefore, insert a contact protection circuit where necessary.

## ■ Cautions

### Handling

Be careful not to drop the switch. Doing so may cause damage to the switch's internal components because it is designed for a small load.

### Solder Terminal Connection

Quickly finish the soldering of the lead wire to its terminal. Use a soldering iron rated at 60W and preferably complete the soldering within 5 seconds.

Excess wattage or prolonged heating can deteriorate the characteristics of the switch.

### Insulation Distance

When mounting, make sure there is sufficient insulation distance between the switch and its mounting panel. If it is insufficient, install an insulation guard or separator. Always install an insulation guard or separator when mounting the microswitch on a metallic body. Contact your OMRON representative for information about insulation guards and separators.

### Application Environment

Do not use the Switch in locations that are subject to toxic gas, silicon, excessive dust, excessive dirt, high temperatures, high humidity, sudden temperature changes, water splashes, or oil splashes. Otherwise, damage resulting by faulty contact of the Switch contacts, corrosion, or other causes, or other functional faults may occur.

Depending on environmental conditions, the switch should be rechecked about 3 to 6 months after it has been assembled.

# General-purpose Basic Switch

# X

## Direct Current Switch with Built-in Magnetic Blowout

- Incorporates a small permanent magnet in the contact mechanism to deflect the arc to effectively extinguish it.
- Ideal for switching DC circuits
- Wide variety of actuators for a wide scope of applications
- Same shape and mounting procedures as Omron's Model Z snap action switches.



## Ordering Information

Terminal		Solder terminal	Screw terminal
Actuator		Model	Model
Pin plunger		X-10G	X-10G-B
Slim spring plunger		X-10GS	X-10GS-B
Short spring plunger		X-10GD	X-10GD-B
Panel mount plunger		X-10GQ	X-10GQ-B
Panel mount roller plunger		X-10GQ22	X-10GQ22-B
Panel mount cross roller plunger		X-10GQ21	X-10GQ21-B
Leaf spring		X-10GL	X-10GL-B
Short hinge lever		X-10GW21	X-10GW21-B

Terminal		Solder terminal	Screw terminal
Actuator		Model	Model
Hinge lever		X-10GW	X-10GW-B
Low-force hinge lever		X-10GW4	X-10GW4-B
Short hinge roller lever		X-10GW22	X-10GW22-B
Hinge roller lever		X-10GW2	X-10GW2-B
Reverse hinge lever		X-10GM	X-10GM-B
Reverse short hinge roller lever *		X-10GM22	X-10GM22-B
Reverse hinge roller lever *		X-10GM2	X-10GM2-B

\* The plungers of reverse-type models are continuously pressed by the compression coil springs and the plungers are freed by operating the levers.

## Model Number Legend

X - 10 G   -  

1 2 3 4

1. Ratings  
10: 10 A (125 VDC)

2. Contact Gap  
G: 0.9 mm

3. Actuator  
None: Pin plunger  
D: Short spring plunger  
S: Slim spring plunger  
Q: Panel mount plunger  
Q21: Panel mount cross roller plunger  
Q22: Panel mount roller plunger  
L: Leaf spring  
W: Hinge lever  
W2: Hinge roller lever  
W21: Short hinge lever  
W22: Short hinge roller lever  
W4: Low-force hinge lever  
M: Reverse hinge lever  
M2: Reverse hinge roller lever  
M22: Reverse short hinge roller lever

4. Terminals  
None: Solder terminal  
B: Screw terminal  
(with toothed washer)



# Specifications

## ■ Characteristics

Operating speed		0.1 mm to 1 m/s (See note 1)
Operating frequency	Mechanical	240 operations/min
	Electrical	20 operations/min
Contact resistance		15 mΩ max. (initial value)
Insulation resistance		100 MΩ min. (at 500 VDC)
Dielectric strength		1,500 VAC, 50/60 Hz for 1 min between terminals of the same polarity, between current-carrying metal parts and the ground, and between each terminal and non-current-carrying metal parts
Vibration resistance	Malfunction	10 to 55 Hz, 1.5-mm double amplitude (See note 2)
Shock resistance	Destruction	1,000 m/s <sup>2</sup> max.
	Malfunction	300 m/s <sup>2</sup> max. (See notes 1 and 2)
Degree of protection		IP00
Degree of protection against electric shock		Class I
Proof tracking index (PTI)		175
Ambient operating temperature		–25°C to 80°C (with no icing)
Ambient operating humidity		35% to 85%RH
Service life	Mechanical	1,000,000 operations min.
	Electrical	100,000 operations min.
Weight		Approx. 27 to 63 g

Note: 1. The values are for the pin plunger models.

2. Malfunction: 1 ms max.

## ■ Ratings

Rated voltage	Non-inductive load (A)				Inductive load (A)			
	Resistive load		Lamp load		Inductive load		Motor load	
	NC	NO	NC	NO	NC	NO	NC	NO
8 VDC	10		3	1.5	10	10	5	2.5
14 VDC	10		3	1.5	10	10	5	2.5
30 VDC	10		3	1.5	10	10	5	2.5
125 VDC	10		3	1.5	7.5	6	5	2.5
250 VDC	3		1.5	0.75	2	1.5	2	1.5

Note: 1. The above values are for the steady-state current.

- Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
- Lamp load has an inrush current of 10 times the steady-state current.
- Motor load has an inrush current of 6 times the steady-state current.

5. The above electrical ratings also apply to the AC voltage.

6. With the reverse-type models (X-10GM□), the normally closed circuits and normally open circuits are reversed.

7. The ratings values apply under the following test conditions:
- Ambient temperature: 20±2°C
  - Ambient humidity: 65±5%RH
  - Operating frequency: 20 operations/min

## ■ Contact Specification

Contacts	Material	Silver
	Gap (standard value)	0.9 mm
Inrush current	NC	30 A max.
	NO	15 A max.

## ■ Safety Standards Ratings

### UL/CSA

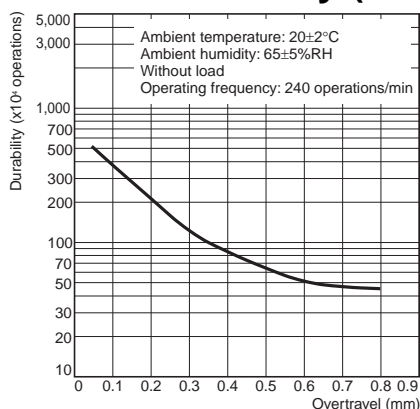
Rated voltage	X-10G
125 VDC	10 A
250 VDC	3 A

### EN (CE) (Conform to EN61058-1)

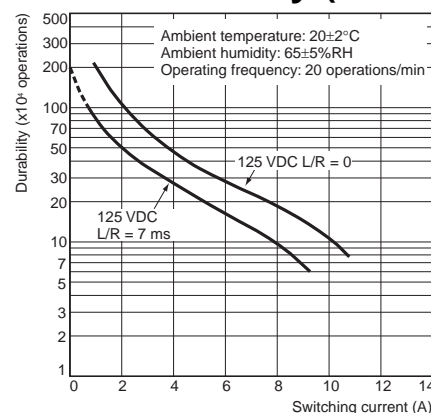
Rated voltage	X-10
50 VDC	10 A

# Engineering Data

## Mechanical Durability (X-10G)

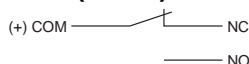


## Electrical Durability (X-10G)



## Structure

### Contact Form (SPDT)



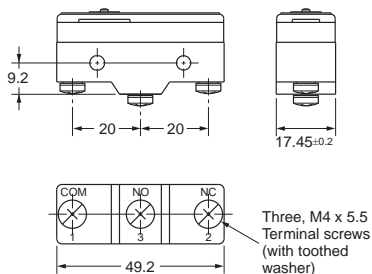
**Note:** With the reverse-type models (X-10GM□), the NC and NO terminal arrangements are reversed.

## Dimensions

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

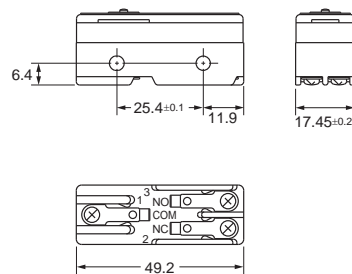
## Terminals

### Screw Terminals (-B)



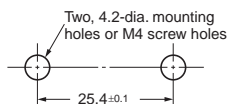
- Note:** 1. Appropriate terminal screw tightening torque: 0.78 to 1.18 N·m.  
 2. In case of DC voltage, set the COM to the positive terminal.

### Solder Terminal (Blank)



## Mounting

All switches can be mounted using M4 mounting screws with plane washers or spring washers to securely mount the Switch. Tighten the screws to a torque of 1.18 to 1.47 N·m.



Versions with panel mount plungers can be panel mounted via the plunger, provided that the hexagonal nut of the actuator is tightened to a torque of 2.94 to 4.9 N·m.

Panel Mount Plunger	Panel Mount Roller Plunger

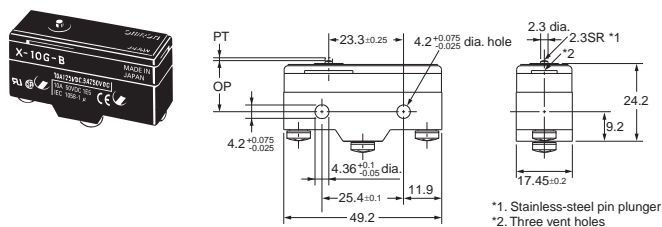
**Note:** Mount using either the side mounting holes or the panel mount plunger, not both. If using the side mounting holes, then remove the hexagonal nut(s) from the panel mount plunger.

**Accessories (Terminal Covers, Actuators, and Separators): Refer to 'Z/A/X/DZ Common Accessories' datasheet**

**Note:** 1. All drawings show the switches with screw terminals. For solder terminals, remove the “-B” from the end of the part number  
2. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

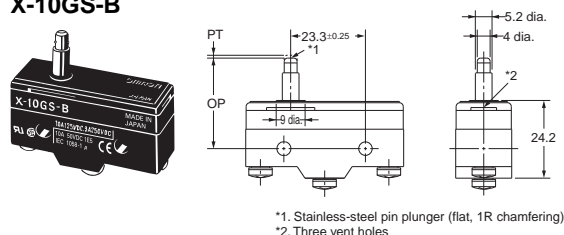
### Pin Plunger

#### X-10G-B



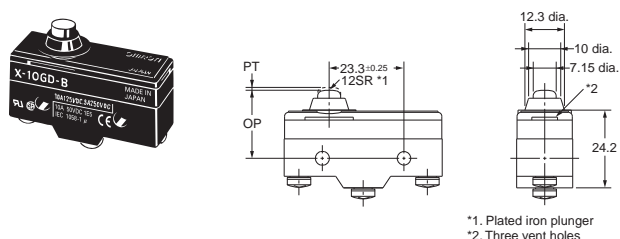
### Slim Spring Plunger

#### X-10GS-B



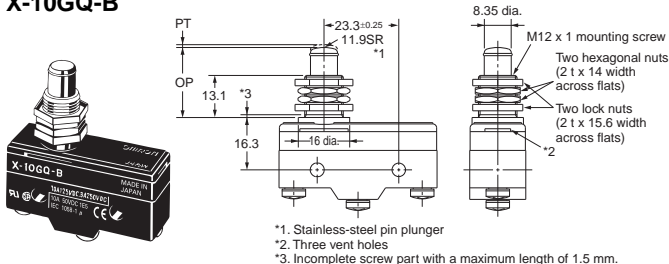
### Short Spring Plunger

#### X-10GD-B



### Panel Mount Plunger

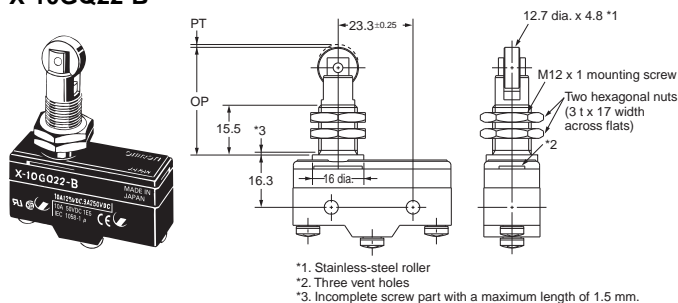
#### X-10GQ-B



**Note:** Do not use both the M12 mounting screw and the mounting holes in the case at the same time. Doing so will cause stress to be applied to the Switch, possibly damaging the case or cover.

### Panel Mount Roller Plunger

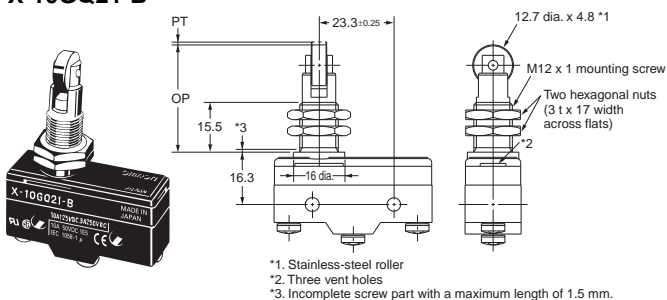
#### X-10GQ22-B



**Note:** Do not use both the M12 mounting screw and the mounting holes in the case at the same time. Doing so will cause stress to be applied to the Switch, possibly damaging the case or cover.

### Panel Mount Cross Roller Plunger

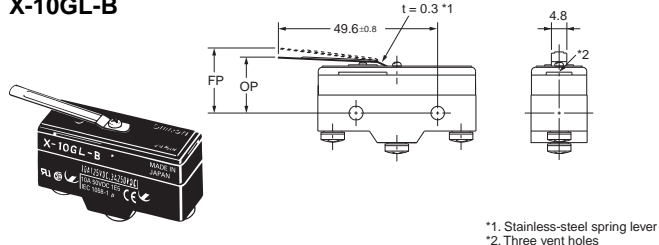
#### X-10GQ21-B



**Note:** Do not use both the M12 mounting screw and the mounting holes in the case at the same time. Doing so will cause stress to be applied to the Switch, possibly damaging the case or cover.

### Leaf Spring

#### X-10GL-B



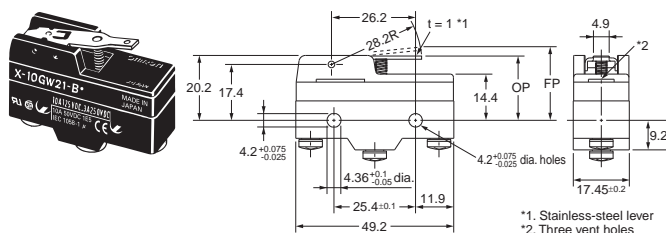
Operating Characteristics	X-10G-B	X-10GS-B	X-10GD-B	X-10GQ-B	X-10GQ22-B	X-10GQ21-B	X-10GL-B
OF max.	510 gf	510 gf	510 gf	510 gf	510 gf	510 gf	200 gf
RF min.	114 gf	114 gf	114 gf	114 gf	114 gf	114 gf	14 gf
PT max.	0.9 mm	0.9 mm	0.9 mm	0.9 mm	0.9 mm	0.9 mm	—
OT min.	0.13 mm	1.6 mm	1.6 mm	5.5 mm	3.6 mm	3.6 mm	1.6 mm *
MD max.	0.18 mm	0.18 mm	0.18 mm	0.18 mm	0.18 mm	0.18 mm	2.3 mm
FP max.	—	—	—	—	—	—	22.1 mm
OP	15.9±0.4 mm	28.2±0.5 mm	21.2±0.5 mm	21.8±0.8 mm	33.4±1.2 mm	33.4±1.2 mm	17.4±0.8 mm

\* Be sure to use the switch at the rated OT value of 1.6 mm.

- Note:** 1. All drawings show the switches with screw terminals. For solder terminals, remove the “-B” from the end of the part number  
2. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

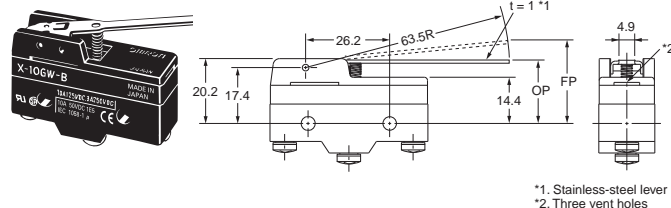
### Short Hinge Lever

#### X-10GW21-B



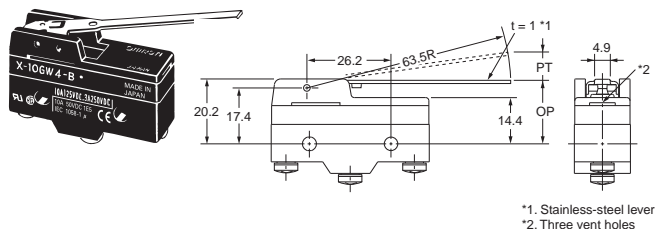
### Hinge Lever

#### X-10GW-B



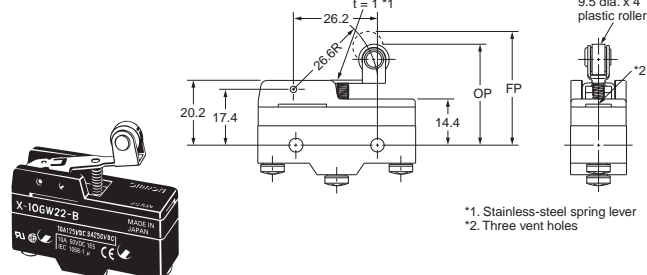
### Low-force Hinge Lever

#### X-10GW4-B



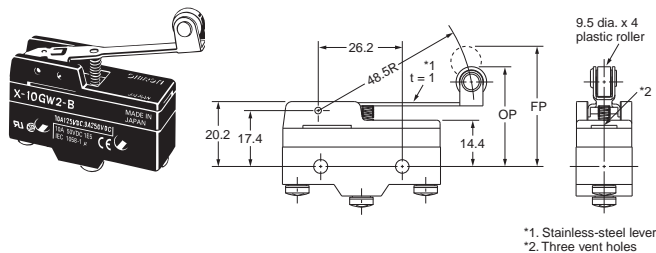
### Short Hinge Roller Lever

#### X-10GW22-B



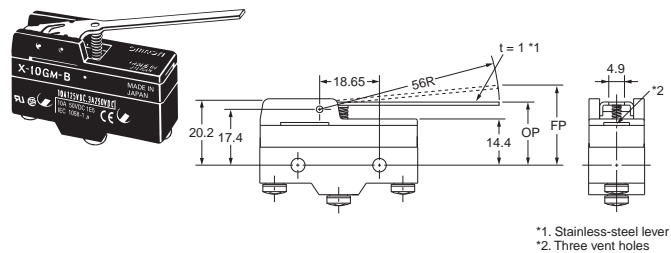
### Hinge Roller Lever

#### X-10GW2-B



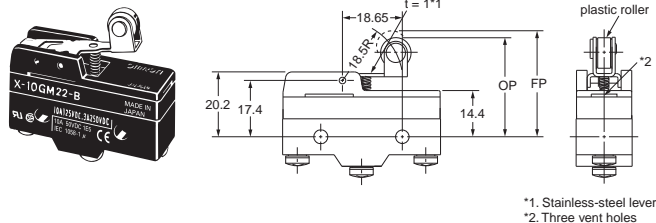
### Reverse Hinge Lever

#### X-10GM-B



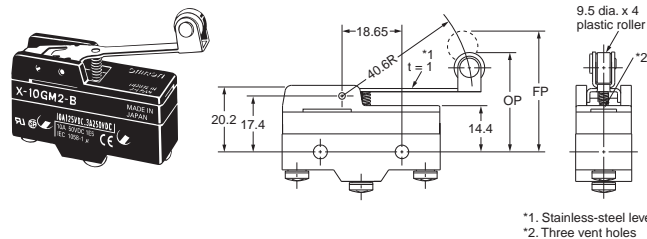
### Reverse Short Hinge Lever

#### X-10GM22-B



### Reverse Hinge Roller Lever

#### X-10GM2-B



Operating Characteristics	X-10GW21-B	X-10GW-B	X-10GW4-B	X-10GW22-B	X-10GW2-B	X-10GM-B	X-10GM22-B	X-10GM2-B
OF max.	250 gf	110 gf	25 gf	220 gf	145 gf	220 gf	700 gf	320 gf
RF min.	32 gf	14 gf	5 gf	35 gf	21 gf	25 gf	155 gf	50 gf
PT max.	—	—	14.3 mm	—	—	—	—	—
OT min.	2.1 mm	4.8 mm	4.8 mm	2.4 mm	4 mm	5.5 mm	2 mm	4 mm
MD max.	1.7 mm	3.9 mm	3.9 mm	1.7 mm	3 mm	2.1 mm	0.75 mm	1.5 mm
FP max.	25.5 mm	34.6 mm	—	37.1 mm	40.5 mm	26.8 mm	36.1 mm	37.4 mm
OP	20.7±0.8 mm	21.1±0.8 mm	21.1±0.8 mm	32.2±0.8 mm	32.2±0.8 mm	21.1±0.8 mm	32.2±0.8 mm	32.2±0.8 mm

# Safety Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## Precautions for Safe Use

### Terminal Connection

When soldering lead wires to the Switch, make sure that the capacity of the soldering iron is 60 W maximum. Do not take more than 5 s to solder any part of the Switch. The characteristics of the Switch will deteriorate if a soldering iron with a capacity of more than 60 W is applied to any part of the Switch for 5 s or more.

### Operation

- Make sure that the switching frequency or speed is within the specified range.

- If the switching speed is extremely slow, the contact may not be switched smoothly, which may result in a contact failure or contact welding.
- If the switching speed is extremely fast, switching shock may damage the Switch soon. If the switching frequency is too high, the contact may not catch up with the speed.

The rated permissible switching speed and frequency indicate the switching reliability of the Switch.

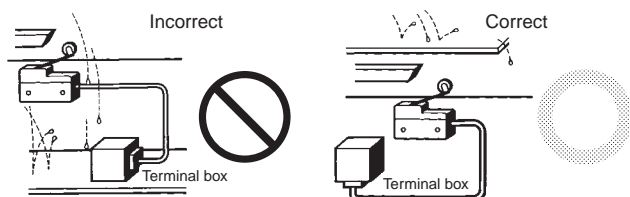
The life of a Switch is determined at the specified switching speed. The life varies with the switching speed and frequency even when they are within the permissible ranges. In order to determine the life of a Switch model to be applied to a particular use, it is best to conduct an appropriate durability test on some samples of the model under actual conditions.

- Make sure that the actuator travel does not exceed the permissible OT position. The operating stroke must be set to 70% to 100% of the rated OT.

## Precautions for Correct Use

### Mounting Location

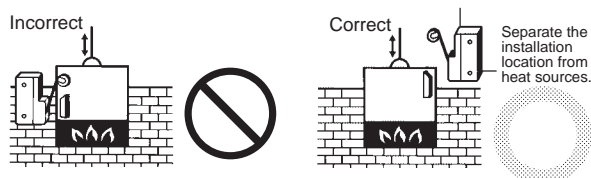
- Do not use the switch alone in atmospheres such as flammable or explosive gases. Arcing and heat generation associated with switching may cause fires or explosions.
- Switches are generally not constructed with resistance against water. Use a protective cover to prevent direct spraying if the switch is used in locations subject to splashing or spurting oil or water, dust adhering.



- Install the switch in a location that is not directly subject to debris and dust from cutting. The actuator and the switch body must be protected from accumulated cutting debris and dirt.



- Do not use the switch in locations subject to hot water (greater than 60°C) or in water vapor.
- Do not use the switch outside the specified temperature and atmospheric conditions. The permissible ambient temperature depends on the model. (Refer to the specifications in this catalog.) Sudden thermal changes may cause thermal shock to distort the switch and result in faults.



- Mount a cover if the switch is to be installed in a location where worker inattention could result in incorrect operation or accidents.



- Subjecting the switch to continuous vibration or shock may result in contact failure, faulty operation or reduced service life due to abrasion powder. Excessive vibration or shock will cause the contacts to operate malfunction or become damaged. Mount the switch in a location that is not subject to vibration or shock and in a direction that does not subject the switch to resonance.
- If silver contacts are used with relatively low frequency for a long time or are used with microloads, the sulfide coating produced on the contact surface will not be broken down and contact faults will result. Use a microload switch that uses gold contacts.
- Do not use the switch in atmospheres with high humidity or heat or in harmful gases, such as sulfide gas ( $\text{H}_2\text{S}$ ,  $\text{SO}_2$ ), ammonia gas ( $\text{NH}_3$ ), nitric acid gas ( $\text{HNO}_3$ ), or chlorine gas ( $\text{Cl}_2$ ). Doing so may impair functionality, such as with damage due to contacting faults or corrosion.
- The switch includes contacts. If the switch is used in an atmosphere with silicon gas, arc energy may cause silicon oxide ( $\text{SiO}_2$ ) to accumulate on the contacts and result in contact failure. If there is silicon oil, silicon filling, silicon wiring, or other silicon products in the vicinity of the switch, use a contact protection circuit to limit arcing and remove the source of the silicon gas.

### Handling

- Set the common (COM) terminal to the positive terminal. If it is set to the negative terminal, the Switch will not turn OFF.
- When using the Switch under an inductive load, the arc suppression capability varies depending on current. If the current becomes 0.6 to 1.2 A or of the time constant L/R exceeds 7 ms, be sure to provide an arc suppressor.
- Since the Switch incorporates a permanent magnet, attention must be paid to the following points:
  - Avoid mounting the Switch directly onto a magnetic substance.
  - Do not subject the Switch to severe shocks.
  - Avoid placing the Switch in a strong magnetic field.
  - Be sure to prevent iron dust or iron chips from adhering to the built-in magnet or the magnetic blowout function of the Switch will be adversely affected.
  - Do not apply thermal shock to the Switch, or the magnetic flux will be diminished.
- Since a ventilation hole is provided to avoid abnormal corrosion due to operating conditions, provide a dustproofing device in locations where the Switch is exposed to dust.
- Do not change operating positions for the actuator. Changing the position may cause malfunction.

### Panel-mounted Model (X-10G□)

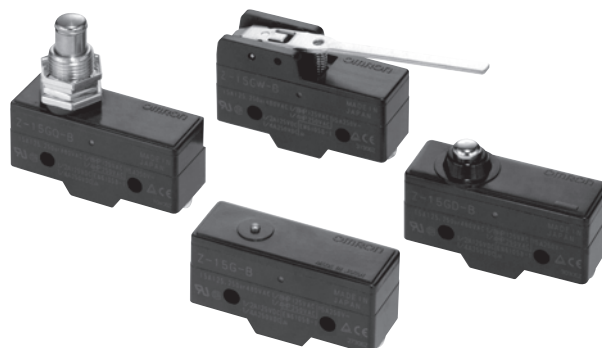
- To side-mount the panel-mount Switch to the panel with screws, remove the hexagonal nut from the actuator.
- Too large a dog angle and too fast operating speed may damage the Switch when the Switch is side-mounted on the panel.
- Too fast operating speed and too long overtravel of the roller plunger Switch may result in damage to the Switch.

# General-purpose Basic Switch

# Z

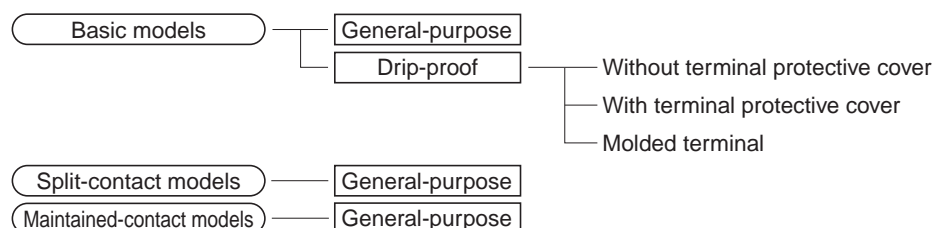
## Best-selling Basic Switch Boasting High Precision and Wide Variety

- A large switching capacity of 15 A with high repeat accuracy.
- A wide range of variations in contact form for your selection: basic, split-contact and maintained-contact.
- A series of standard models for micro loads is available.
- A series of molded terminal-type models incorporating safety terminal protective cover is available.



## Model Number Structure

### Available types



### Basic Models

#### General-purpose

- A variety of actuators is available for a wide range of application.
- The contact mechanism of models for micro loads is a crossbar type with gold-alloy contacts, which ensures highly reliable operations for micro loads.
- Contact Gap:
  - H2: 0.20 mm (extra-high-sensitivity)
  - H: 0.25 mm (high-sensitivity, micro voltage current load)
  - G: 0.5 mm (standard)
  - E: 1.8 mm (high-capacity)
  - F: 1.0 mm (split-contact models)

#### Drip-proof

- These Switches use a rubber boot on the actuator and adhesive fill between the case and cover to increase resistance to drips.
- Models with drip-proof terminal protective covers and molded terminals with resin filling are also available.

### Split-contact Models

- This type is identical in construction to the general-purpose basic switch except that it has two pairs of simultaneous acting contacts by splitting moving contacts.
- Since the moving contacts are connected to a common terminal, either parallel or series connection is possible.
- Highly reliable micro load switching is ensured if the model is used as a twin-contact switch.

### Maintained-contact Models

- The maintained-contact type has a reset button at the bottom of the switch case, in addition to the pushbutton (plunger) located on the opposite side of the reset button. Use these buttons alternately.
- Since the Switch has greater pretravel than overtravel, it is suitable for use in reversible control circuits, manual reset circuits, safety limit circuits, and other circuits which are not preferable for automatic resetting. (For further details, refer to individual datasheets.)

# Model Number Legend

## Basic Models

Z -             -     
1 2 3 4 5

### 1. Ratings

01: 0.1 A (micro load)  
15: 15 A

### 2. Contact Gap

H2: 0.20 mm  
(extra-high sensitivity)  
H: 0.25 mm  
(high-sensitivity,  
micro load)  
G: 0.5 mm  
E: 1.8 mm (high-capacity)

### 3. Actuator

None: Pin plunger  
S: Slim spring plunger  
D: Short spring plunger  
K: Spring plunger (medium OP)  
K3: Spring plunger (high OP)  
Q3: Panel mount plunger (low OP)  
Q: Panel mount plunger  
(medium OP)  
Q8: Panel mount plunger (high OP)  
Q22: Panel mount roller plunger  
Q21: Panel mount cross roller plunger  
L: Leaf spring (high OF)  
L2: Roller leaf spring  
W21: Short hinge lever  
W: Hinge lever (low OF)  
W3: Hinge lever (medium OF)  
W32: Hinge lever (high OF)  
W4: Low-force hinge lever

W44: Long hinge lever  
W78: Low-force wire  
hinge lever (low OF)  
W52: Low-force wire  
hinge lever (high OF)  
W22: Short hinge roller lever  
W2: Hinge roller lever  
W25: Hinge roller lever  
(large roller)  
W49: Short hinge  
cross roller lever  
W54: Hinge cross roller lever  
W2277: Unidirectional short hinge  
roller lever (low OF)  
M: Reverse hinge lever  
M22: Reverse short hinge roller lever  
M2: Reverse hinge roller lever  
NJ: Flexible rod (high OF)  
NJS: Flexible rod (low OF)

### 4. Degree of Protection

None: General-purpose  
55: Drip-proof  
A55: Drip-proof  
(including terminals)

### 5. Terminals

None: Solder terminal  
B: Screw terminal  
(with toothed washer)  
B5V: Screw terminal with  
terminal cover  
(for Z-15G□A55 only)

## Split-contact Models

Z - 10 F    Y - B  
1 2 3 4 5

### 1. Ratings

10: 10 A (split-contact models)

### 2. Contact Gap

F: 1 mm (high-capacity)

### 3. Actuator

None: Pin plunger  
S: Slim spring plunger  
D: Short spring plunger  
Q: Panel mount plunger  
Q22: Panel mount roller plunger  
W: Hinge lever  
W22: Short hinge roller lever  
W2: Hinge roller lever  
M22: Reverse short hinge roller lever

### 4. Construction

Y: Split-contact type

### 5. Terminals

None: Solder terminal  
B: Screw terminal  
(with toothed washer)

## Maintained-contact models

Z - 15 E    R  
1 2 3 4

### 1. Ratings

15: 15 A

### 2. Contact Gap

E: 1.8 mm (high-capacity)

### 3. Actuator

None: Pin plunger  
S: Slim spring plunger  
W: Hinge lever

### 4. Construction

R: Maintained-contact  
models

## Drip-proof with Molded Terminal Models

Z -    55 - M          M  
1 2 3 4

### 1. Drip-proof model

(Insert model number of basic,  
drip-proof version with solder terminals)

### 2. Lead Outlets

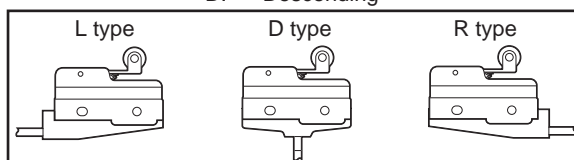
None: VSF  
E: VCT

### 3. Direction of Lead Outlets

L: Left  
R: Right  
D: Descending

### 4. Length of Leads
















































1: 1 m  
3: 3 m

















# Ordering Information

## Basic Models (General-purpose)

Actuator		Classification		Standard	High-sensitivity	Extra-high sensitivity	High-capacity	Micro load
		Contact gap		G (0.5 mm)	H (0.25 mm)	H2 (0.20 mm)	E (1.8 mm)	H (0.25 mm)
		Terminal *1		Model	Model	Model	Model	Model
Pin plunger			Z-15G	Z-15H	Z-15H2	Z-15E	Z-01H	
			Z-15G-B	Z-15H-B	Z-15H2-B	Z-15E-B	Z-01H-B	
Slim spring plunger			Z-15GS	Z-15HS	---	---	Z-01HS	
			Z-15GS-B	Z-15HS-B			Z-01HS-B	
Short spring plunger			Z-15GD	Z-15HD	---	Z-15ED	Z-01HD	
			Z-15GD-B	Z-15HD-B		Z-15ED-B	Z-01HD-B	
Panel mount plunger	Low OP		Z-15GQ3	---	---	---	---	
			Z-15GQ3-B					
	Medium OP		Z-15GQ	Z-15HQ		Z-15EQ	Z-01HQ	
			Z-15GQ-B	Z-15HQ-B		Z-15EQ-B	Z-01HQ-B	
	High OP		Z-15GQ8	---		---	---	
			Z-15GQ8-B					
Panel mount roller plunger			Z-15GQ22	Z-15HQ22	---	Z-15EQ22	---	
			Z-15GQ22-B	Z-15HQ22-B		Z-15EQ22-B		
Panel mount cross roller plunger			Z-15GQ21	Z-15HQ21	---	Z-15EQ21	---	
			Z-15GQ21-B	Z-15HQ21-B		Z-15EQ21-B		
Leaf spring			Z-15GL	---	---	---	---	
			Z-15GL-B					
Roller leaf spring			Z-15GL2	---	---	---	---	
			Z-15GL2-B					
Short hinge lever			Z-15GW21	---	---	---	---	
			Z-15GW21-B					
Hinge lever	Low OP		Z-15GW	Z-15HW	---	---	---	
			Z-15GW-B	Z-15HW-B				
	Medium OP		Z-15GW3	---				
			Z-15GW3-B					
	High OP		Z-15GW32	---				
			Z-15GW32-B					
Low-force hinge lever			Z-15GW4	Z-15HW24	---	---	---	
			Z-15GW4-B	Z-15HW24-B				
Low-force wire hinge lever	Low OP		---	Z-15HW78	---	---	---	
				Z-15HW78-B				
	High OP			Z-15HW52				
				Z-15HW52-B				
Short hinge roller lever			Z-15GW22	Z-15HW22	---	Z-15EW22	Z-01HW22	
			Z-15GW22-B	Z-15HW22-B		Z-15EW22-B	Z-01HW22-B	
Short hinge cross roller lever			Z-15GW49	---	---	---	---	
			Z-15GW49-B					
Hinge roller lever	Standard		Z-15GW2	Z-15HW2	---	---	---	
			Z-15GW2-B	Z-15HW2-B				
	Large roller		Z-15GW25	---		---	---	
			Z-15GW25-B					






























Actuator	Classification		Standard	High-sensitivity	Extra-high sensitivity	High-capacity	Micro load
	Contact gap		G (0.5 mm)	H (0.25 mm)	H2 (0.20 mm)	E (1.8 mm)	H (0.25 mm)
	Terminal *1		Model	Model	Model	Model	Model
Hinge cross roller lever			Z-15GW54	---	---	---	---
			Z-15GW54-B				
Unidirectional short hinge roller lever		Parallel	Z-15GW2277	---	---	---	---
			Z-15GW2277-B				
Reverse hinge lever *2			Z-15GM	---	---	---	---
			Z-15GM-B				
Reverse short hinge roller lever *2			Z-15GM22	---	---	---	---
			Z-15GM22-B				
Reverse hinge roller lever *2			Z-15GM2	---	---	---	---
			Z-15GM2-B				

\*1.  : Solder terminal  : Screw terminal

\*2. The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.




### Split-contact Models

Actuator	Contact gap	Terminal *1	F (1.0 mm)
			Model
Pin plunger			---
			Z-10FY-B
Slim spring plunger			---
			Z-10FSY-B
Short spring plunger			---
			Z-10FDY-B
Panel mount plunger			---
			Z-10FQY-B
Panel mount roller plunger			---
			Z-10FQ22Y-B
Hinge lever			---
			Z-10FWY-B
Short hinge roller lever			---
			Z-10FW22Y-B
Hinge roller lever			---
			Z-10FW2Y-B
Reverse short hinge roller lever *2			---
			Z-10FM22Y-B








































\*1.  : Solder terminal  : Screw terminal

\*2. The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.

### Maintained-contact Models

Actuator	Model
Pin plunger 	Z-15ER
Slim spring plunger 	Z-15ESR
Hinge lever 	Z-15EWR

Drip-proof Models

Actuator	Classification Contact gap Drip-proof terminal protective cover Terminal *1	Standard G (0.5 mm)		High-sensitivity H (0.25 mm)	Micro load H (0.25 mm)
		Not provided	Provided	Not provided	Not provided
		Model	Model	Model	Model
Pin plunger		 Z-15G55	---		Z-01H55
		 Z-15G55-B	Z-15GA55-B5V		Z-01H55-B
Short spring plunger		 Z-15GD55	---		Z-01HD55
		 Z-15GD55-B			Z-01HD55-B
Spring plunger		Low OP  Z-15GK55	---		---
		 Z-15GK55-B			
		High OP  Z-15GK355	---		---
		 Z-15GK355-B	Z-15GK3A55-B5V		
Panel mount plunger		 Z-15GQ55	---		---
		 Z-15GQ55-B	Z-15GQA55-B5V		
Panel mount roller plunger		 Z-15GQ2255	---		---
		 Z-15GQ2255-B	Z-15GQ22A55-B5V		
Panel mount cross roller plunger		---	---		---
		 Z-15GQ2155-B	Z-15GQ21A55-B5V		
Leaf spring		 Z-15GL55	---		---
		 Z-15GL55-B			
Roller leaf spring		 Z-15GL255	---		---
		 Z-15GL255-B			
Short hinge lever		 Z-15GW2155	---		---
		 Z-15GW2155-B			
Long hinge lever		 Z-15GW4455	---		---
		 Z-15GW4455-B	Z-15GW44A55-B5V		
Hinge lever		 Z-15GW55	---		---
		 Z-15GW55-B	Z-15GWA55-B5V		
Short hinge roller lever		 Z-15GW2255	---		Z-01HW2255
		 Z-15GW2255-B	Z-15GW22A55-B5V		Z-01HW2255-B
Hinge roller lever		 Z-15GW255	---		---
		 Z-15GW255-B	Z-15GW2A55-B5V		
Unidirectional short hinge roller lever		 Z-15GW227755	---		---
		 Z-15GW227755-B	Z-15GW2277A55-B5V		
Reverse hinge lever *2		 Z-15GM55	---		---
		 Z-15GM55-B			
Reverse short hinge roller lever *2		 Z-15GM2255	---		---
		 Z-15GM2255-B			
Reverse hinge roller lever *2		 Z-15GM255	---		---
		 Z-15GM255-B			
Flexible rod (coil spring) *3		 Z-15GNJ55	---		---
		 Z-15GNJ55-B			
Flexible rod (steel wire)		---	---	Z-15HNJS55	---
				Z-15HNJS55-B	

\*1.  : Solder terminal  : Screw terminal

\*2. The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers.

\*3. The tip is made of resin.

# Specifications

## ■ Characteristics

Classification		Z-15 (except micro load and flexible rod)	Z-01H	Z-15 (flexible rod)	Z-10F	Z-15H2
Item						
Operating speed		0.01 mm to 1 m/s (*1)		1 mm to 1 m/s	0.1 mm to 1 m/s (*1)	0.01 mm to 1 m/s
Operating frequency	Mechanical	240 operations/min		120 operations/min	240 operations/min	240 operations/min
	Electrical	20 operations/min				
Contact resistance		15 mΩ max. (initial value)	50 mΩ max. (initial value)	15 mΩ max. (initial value)	25 mΩ max. (initial value)	15 mΩ max. (initial value)
Insulation resistance		100 MΩ min. (at 500 VDC)				
Dielectric strength (50 / 60 Hz for 1 min.)		Between contacts of same polarity Contact gap G: 1,000 VAC Contact gap H: 600 VAC Contact gap E: 1,500 VAC		Between contacts of same polarity Contact gap G: 1,000 VAC Contact gap H: 600 VAC	Between contacts of same polarity Contact gap F: 1,500 VAC	Between contacts of same polarity 600VAC
		Between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts: 2,000 VAC				
Vibration resistance	Malfunction	10 to 55 Hz, 1.5-mm double amplitude (*5)		10 to 20 Hz, 1.5-mm double amplitude (*5)	10 to 55 Hz, 1.5-mm double amplitude (*5)	
Shock resistance	Destruction	1,000 m/s <sup>2</sup> max.				
	Malfunction	300 m/s <sup>2</sup> max. (*2, *5)		50 m/s <sup>2</sup> max. (*5)	300 m/s <sup>2</sup> max. (*3, *5)	100 m/s <sup>2</sup> max.
Degree of protection	General-purpose	IP00				
	Drip-proof	Equivalent to IP62 (except terminals)				
Degree of protection against electric shock		Class I				
Proof tracking index (PTI)		175				
Ambient operating temperature	General-purpose	−25°C to 80°C (with no icing)				
	Drip-proof	−15°C to 80°C (with no icing)				
Ambient operating humidity	General-purpose	35% to 85%RH				
	Drip-proof	35% to 95%RH				
Service life	Mechanical	Contact gap H2: 10,000,000 operations min. Contact gap G, H: 20,000,000 operations min.(*4) Contact gap E: 300,000 operations		1,000,000 operations min.	500,000 operations min. (*1)	20,000,000 operations min.
	Electrical	Contact gap G, H: 500,000 operations min. Contact gap E: 100,000 operations min.		100,000 operations min.	100,000 operations min.	500,000 operations min.
Weight		Approx. 22 to 58 g		Approx. 42 to 48 g	Approx. 34 to 61 g	Approx. 22 g

\*1 The values are for the plunger models. (For the lever models, the values are at the plunger section.)

\*2 The values are for the Z-15G pin plunger.

\*3 The values are for the Z-10FY-B.

\*4 The values are for the pin plunger. The service life for models other than the pin plunger is 10,000,000 min.

\*5 Malfunction: 1 ms max.

## ■ Ratings (Basic, Split-contact and Maintained contact Models)

### Z-15 (Except Micro Load and Flexible Rod Models)

Item		Non-inductive load (A)				Inductive load (A)			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
Contact gap	Rated voltage								
	125 VAC	15 (10) *		3	1.5	15 (10) *		5	2.5
	250 VAC	15 (10) *		2.5	1.25	15 (10) *		3	1.5
G, H, H2, E	500 VAC *	10		1.5	0.75	6		1.5	0.75
	8 VDC	15		3	1.5	15		5	2.5
	14 VDC	15		3	1.5	10		5	2.5
G	30 VDC	6		3	1.5	5		5	2.5
	125 VDC	0.5		0.5	0.5	0.05		0.05	0.05
	250 VDC	0.25		0.25	0.25	0.03		0.03	0.03
H, H2	8 VDC	15		3	1.5	15		5	2.5
	14 VDC	15		3	1.5	10		5	2.5
	30 VDC	2		2	1.4	1		1	1
E	125 VDC	0.4		0.4	0.4	0.03		0.03	0.03
	250 VDC	0.2		0.2	0.2	0.02		0.02	0.02
E	8 VDC	15		3	1.5	15		5	2.5
	14 VDC	15		3	1.5	15		5	2.5
	30 VDC	15		3	1.5	10		5	2.5
E	125 VDC	0.75		0.75	0.75	0.4		0.4	0.4
	250 VDC	0.3		0.3	0.3	0.2		0.2	0.2

\* Figures in parentheses are for the Z-15HW52, Z-15HW78(-B) and Z-15H2(-B) models, the AC ratings of these models are 125 and 250 V only.

## Z-15 (Flexible Rod Models)

Rated voltage	Non-inductive load (A)				Inductive load (A)			
	Resistive load		Lamp load		Inductive load		Motor load	
	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	15		2	1	7		2.5	2
250 VAC	15		1	0.5	5		1.5	1
8 VDC	15		2	1	7		3	1.5
14 VDC	15		2	1	7		3	1.5
30 VDC	2		2	1	1		1	0.5
125 VDC	0.4		0.4	0.4	0.03		0.03	0.03
250 VDC	0.2		0.2	0.2	0.02		0.02	0.02

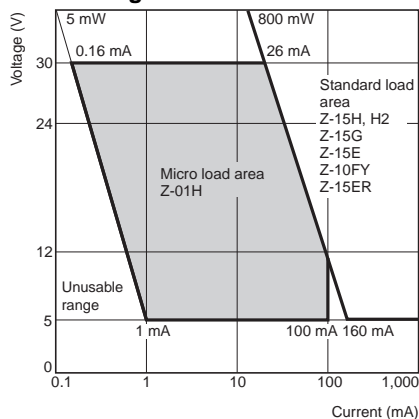
## Z-10F

Contact gap	Rated voltage	Item	Non-inductive load (A)				Inductive load (A)			
			Resistive load		Lamp load		Inductive load		Motor load	
			NC	NO	NC	NO	NC	NO	NC	NO
Series connection	125 VAC		10		4	2	6		5	2.5
	250 VAC		10		2.5	1.5	6		3	1.5
	30 VDC		10		4	2	6		6	3
	125 VDC		1		1	1	0.1		0.1	0.1
Parallel connection	250 VDC		0.6		0.6	0.6	0.05		0.05	0.05
	125 VAC		6		3	1.5	4		4	2
	250 VAC		6		2.5	1.25	4		2	1
	30 VDC		6		4	2	4		6	3
	125 VDC		0.6		0.6	0.6	0.1		0.1	0.1
	250 VDC		0.3		0.3	0.3	0.05		0.05	0.05

## Z-01H

Rated voltage	Resistive load (A)	
	NC	NO
125 VAC	0.1	
8 VDC	0.1	
14 VDC	0.1	
30 VDC	0.1	

## Applicable Load Range



	Z-01H	Z-15□, Z-10FY
Minimum applicable load	1 mA at 5 VDC	160 mA at 5 VDC

## Contacts Specification

Item	Classification	Z-15	Z-01H	Z-10F
Contacts	Shape	Rivet	Single crossbar	Rivet
	Material	Silver	Gold alloy	Silver
Inrush current	NC	30 A max.	0.1 A max.	40 A max.
	NO	15 A max.	0.1 A max.	20 A max.

## Safety Standards Ratings

UL/CSA (General ratings only)

Rated voltage	Model	Z-15	Z-10F	Z-01H
125 VAC		15A and 1/8HP	6A and 1/10HP	0.1A
250 VAC		15A and 1/4HP	6A and 1/8HP	---
480 VAC		15A	6A	---
30 VDC		---	---	0.1A
125 VDC		0.5A	0.6A	---
250 VDC		0.25A	0.3A	---

TÜV (EN61058-1)

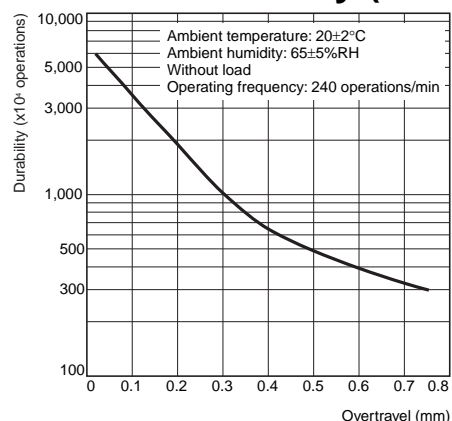
Rated voltage	Model	Z-15H□-B	Z-15G□-B	Z-01H□-B
250 VAC		15 A	15 A	---
125 VAC		---	---	0.1 A
30 VDC		---	---	0.1 A

- Note:**
1. The above current ratings are the values of the steady-state current.
  2. Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
  3. Lamp load has an inrush current of 10 times the steady-state current.
  4. Motor load has an inrush current of 6 times the steady-state current.
  5. The normally closed and normally open ratings of reverse hinge lever models are opposite to each other.

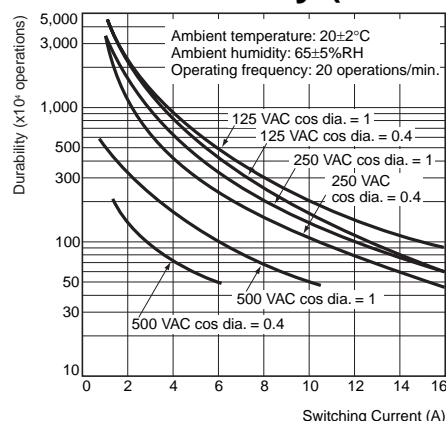
6. The AC ratings of molded terminals are 125 and 250 V only.
7. The ratings values apply under the following test conditions:
  - (1) Ambient temperature: 20±2°C
  - (2) Ambient humidity: 65±5%RH
  - (3) Operating frequency: 20 operations/min

# Engineering Data

## Mechanical Durability (Z-15G)



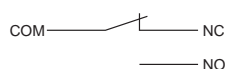
## Electrical Durability (Z-15G)



## Structure

### Basic Models

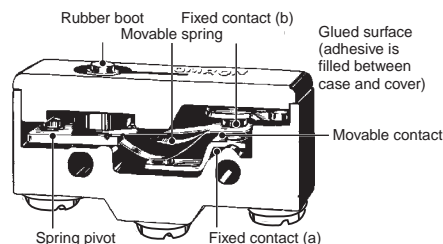
#### Contact Form (SPDT)



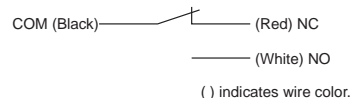
**Note:** The Z-15GM is a reversible model and the NO and NC positions are reversed.

### Drip-proof Construction

#### Without Terminal Protective Cover

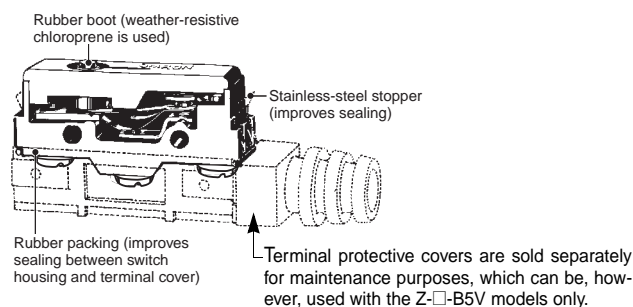


#### Molded Terminals



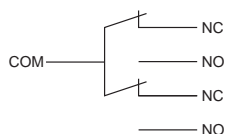
**Note:** The Z-15GM is a reversible model and the NO and NC positions are reversed.

#### With Terminal Protective Cover



## Split-Contact Models

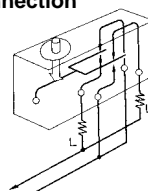
### Contact Form



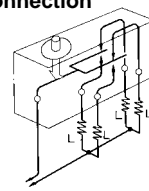
**Note:** The NO and NC terminal arrangement is reversed for Models with reverse operation (Z-10FM).

### Connection Example

#### Series Connection

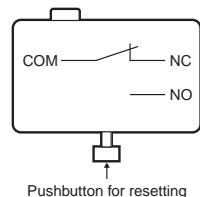


#### Parallel Connection



## Maintained-contact Models

### Contact Form



# Dimensions

## General-purpose and Split Contact Models

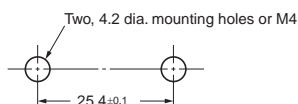
**Note:** Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions

### Terminals

General-purpose Models		Split-contact Models
<b>Screw Terminals (-B)</b> <p>Three, M4 × 5.5 Terminal screws (with toothed washer)</p> <p>Appropriate terminal screw tightening torque: 0.78 to 1.18 N·m.</p>	<b>Solder Terminal (Blank)</b>	<b>Screw Terminals (Y-B)</b> <p>Five, M3.5 × 5.5 terminal screws (with toothed washer)</p> <p>Appropriate terminal screw tightening torque: 0.49 to 0.78 N·m.</p> <p><b>Note:</b> With reverse action models (Z-10FM), the positions of NO and NC terminals are reversed.</p>
<b>Note:</b> With reverse action models (Z-15GM), the positions of NO and NC terminals are reversed.		

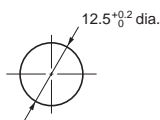
### Mounting

All switches can be side mounted using M4 mounting screws with plane washers or spring washers to securely mount the Switch. Tighten the screws to a torque of 1.18 to 1.47 N·m.

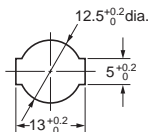


Versions with panel mount plungers can be panel mounted via the plunger, provided that the hexagonal nut of the actuator is tightened to a torque of 2.94 to 4.9 N·m.

#### Panel Mount Plunger



#### Panel Mount Roller Plunger



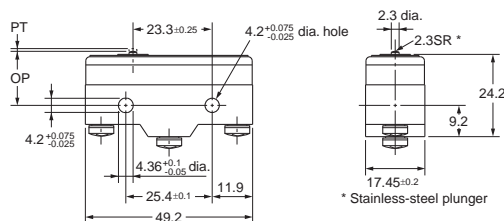
**Note:** Mount using either the side mounting holes or the panel mount plunger, not both. If using the side mounting holes, then remove the hexagonal nut(s) from the panel mount plunger.

Accessories (Terminal Covers, Actuators, and Separators): Refer to 'Z/A/X/DZ Common Accessories' datasheet

**Note:** 1. All drawings show the switches with screw terminals. For versions with solder terminals, remove the “-B” from the end of the part number.  
2. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## Pin Plunger

Z-15G-B Z-15E-B  
Z-15H2-B Z-01H-B  
Z-15H-B Z-10FY-B

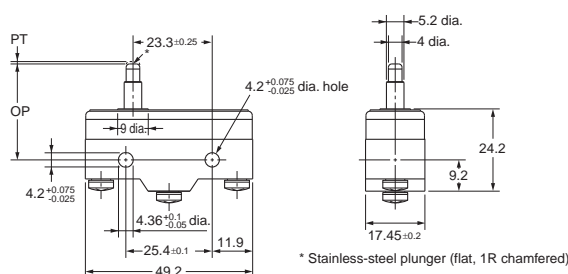
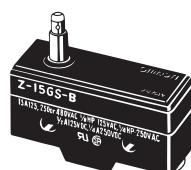


\* Stainless-steel plunger

Operating Characteristics		Z-15G-B	Z-15H2-B	Z-15H-B	Z-15E-B	Z-01H-B	Z-10FY-B
Operating force	OF	250 to 350 gf	200 to 255 gf	200 to 280 gf	625 to 800 gf	250 gf max.	455 to 740 gf
Release force	RF min.	114 gf	114 gf	114 gf	114 gf	80 gf	114 gf
Pretravel	PT max.	0.4 mm	0.3 mm	0.3 mm	0.8 mm	0.5 mm	0.8 mm
Overtravel	OT min.	0.13 mm	0.13 mm	0.13 mm	0.13 mm	0.13 mm	0.13 mm
Movement Differential	MD max.	0.05 mm	0.005 to 0.008 mm	0.025 mm	0.13 mm	0.04 mm	0.1 mm
Operating Position	OP	15.9±0.4 mm					

## Slim Spring Plunger

Z-15GS-B Z-01HS-B  
Z-15HS-B Z-10FSY-B

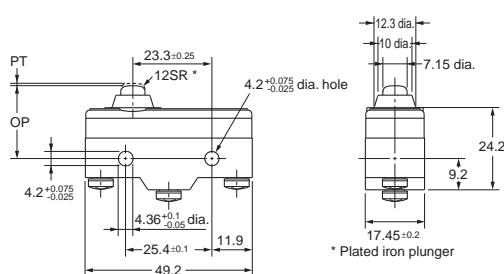
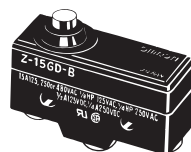


\* Stainless-steel plunger (flat, 1R chamfered)

Model	Z-15GS-B	Z-15HS-B	Z-01HS	Z-10FSY-B
OF	250 to 350 gf	200 to 285 gf	250 gf max.	455 to 740 gf
RF min.	114 gf	114 gf	80 gf	114 gf
PT max.	0.4 mm	0.3 mm	0.5 mm	0.8 mm
OT min.	1.6 mm	1.6 mm	1.6 mm	1.6 mm
MD max.	0.05 mm	0.025 mm	0.05 mm	0.1 mm
OP	28.2±0.5 mm			

## Short Spring Plunger

Z-15GD-B Z-01HD-B  
Z-15HD-B Z-10FDY-B  
Z-15ED-B



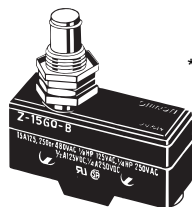
\* Plated iron plunger

Model	Z-15GD-B	Z-15HD-B	Z-15ED-B	Z-01HD-B	Z-10FDY-B
OF	250 to 350 gf	200 to 285 gf	625 to 800 gf	250 gf max.	455 to 740 gf
RF min.	114 gf	114 gf	114 gf	80 gf	114 gf
PT max.	0.4 mm	0.3 mm	0.8 mm	0.5 mm	0.8 mm
OT min.	1.6 mm	1.6 mm	1.6 mm	1.6 mm	1.6 mm
MD max.	0.05 mm	0.025 mm	0.13 mm	0.05 mm	0.1 mm
OP	21.5±0.5 mm				

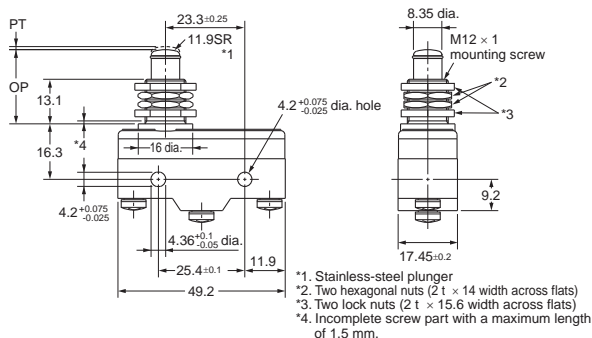
**Note:** 1. All drawings show the switches with screw terminals. For versions with solder terminals, remove the "B" from the end of the part number.  
2. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## Panel Mount Plunger

Z-15GQ-B Z-01HQ-B  
Z-15HQ-B Z-10FQY-B  
Z-15EQ-B Z-15GQ3-B \*  
Z-15GQ8-B \*



\* The external dimensions of the actuator vary.

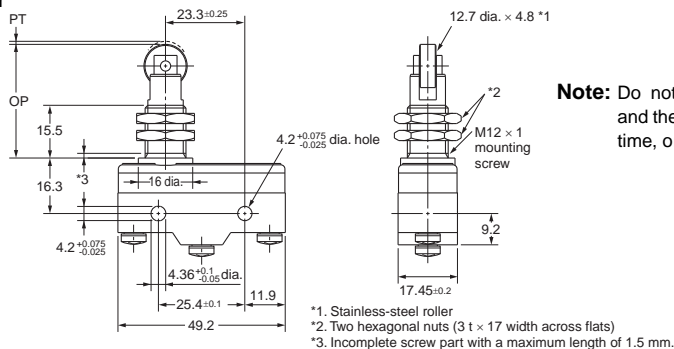
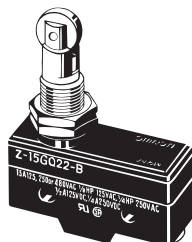


- Note:** 1. Do not use the M12 mounting screw and the case mounting hole at the same time, or excessive pulling force will be imposed on the switch and the case and cover may be damaged.  
2. On the model Z-15GQ3-B, PT can be set to a value larger than that for the Z-15GQ.  
3. On the model Z-15GQ8-B, operating position can be adjusted by providing a screw in the plunger section.  
4. On the model Z-15GQ8-B, the M3 hole with a depth of 10 mm is a through hole. Take precautions so that no water or screw lock agent penetrates into the hole.

Model	Z-15GQ-B	Z-15HQ-B	Z-15EQ-B	Z-01HQ-B	Z-10FQY-B	Z-15GQ3-B	Z-15GQ8-B
OF	250 to 350 gf	200 to 285 gf	625 to 800 gf	250 gf max.	455 to 740 gf	250 to 350 gf	250 to 350 gf
RF min.	114 gf	114 gf	114 gf	80 gf	114 gf	114 gf	114 gf
PT max.	0.4 mm	0.3 mm	0.8 mm	0.5 mm	0.8 mm	4.2 mm	0.5 mm
OT min.	5.5 mm	5.5 mm	5.5 mm	5.5 mm	5.5 mm	2.5 mm	5.5 mm
MD max.	0.05 mm	0.025 mm	0.13 mm	0.05 mm	0.1 mm	2.2 mm	0.05 mm
OP	21.8 $\pm$ 0.8 mm					18.8 $\pm$ 0.8 mm	32.5 $\pm$ 1 mm

## Panel Mount Roller Plunger

Z-15GQ22-B Z-15EQ22-B  
Z-15HQ22-B Z-10FQ22Y-B

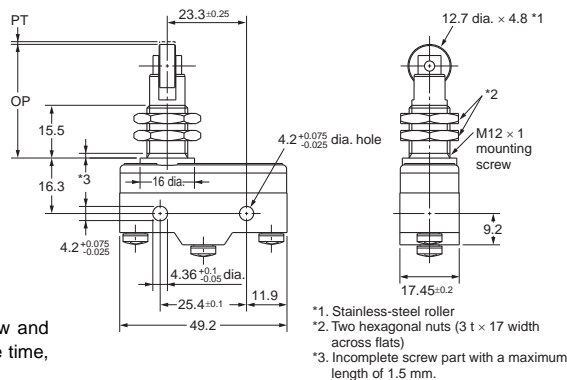
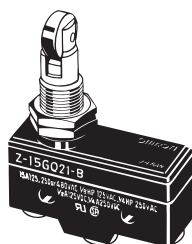


**Note:** Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Model	Z-15GQ22-B	Z-15HQ22-B	Z-15EQ22-B	Z-10FQ22Y-B
OF	250 to 350 gf	200 to 285 gf	625 to 800 gf	455 to 740 gf
RF min.	114 gf	114 gf	114 gf	114 gf
PT max.	0.4 mm	0.3 mm	0.8 mm	1 mm
OT min.	3.58 mm	3.58 mm	3.58 mm	3.55 mm
MD max.	0.05 mm	0.025 mm	0.13 mm	0.1 mm
OP	33.4 $\pm$ 1.2 mm			

## Panel Mount Cross Roller Plunger

Z-15GQ21-B Z-15EQ21-B  
Z-15HQ21-B



**Note:** Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

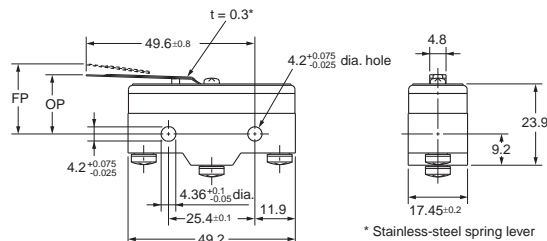
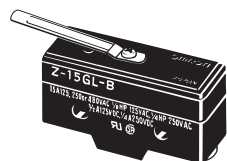
Model	Z-15GQ21-B	Z-15HQ21-B
OF	250 to 350 gf	200 to 285 gf
RF min.	114 gf	114 gf
PT max.	0.4 mm	0.3 mm
OT min.	3.58 mm	3.58 mm
MD max.	0.05 mm	0.025 mm
OP	33.4 $\pm$ 1.2 mm	

Model	Z-15EQ21-B
OF	625 to 800 gf
RF min.	114 gf
PT max.	0.8 mm
OT min.	3.58 mm
MD max.	0.13 mm
OP	33.4 $\pm$ 1.2 mm



**Note:** 1. All drawings show the switches with screw terminals. For versions with solder terminals, remove the “-B” from the end of the part number.  
2. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

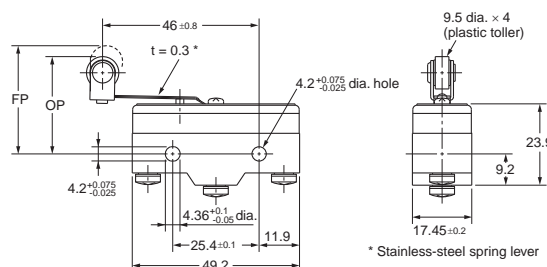
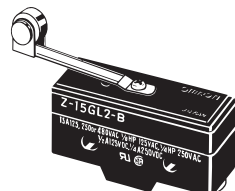
## Leaf Spring Z-15GL-B



OF max.	141 gf
RF min.	14 gf
*OT min.	1.6 mm
MD max.	1.3 mm
FP max.	20.6 mm
OP	17.4±0.8 mm

\* When operating, be sure not to exceed 1.6 mm.

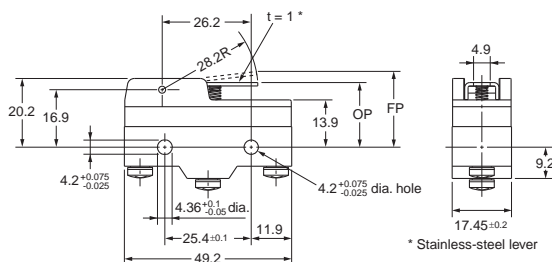
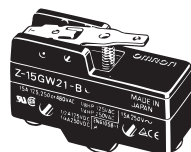
## Roller Leaf Spring Z-15GL2-B



OF max.	141 gf
RF min.	14 gf
*OT min.	1.6 mm
MD max.	1.3 mm
FP max.	31.8 mm
OP	28.6±0.8 mm

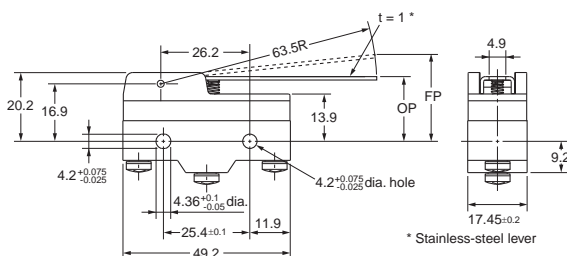
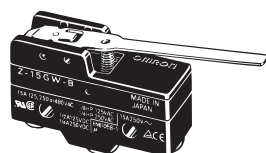
\* When operating, be sure not to exceed 1.6 mm.

## Short Hinge Lever Z-15GW21-B



OF max.	160 gf
RF min.	28 gf
OT min.	2 mm
MD max.	1 mm
FP max.	24.8 mm
OP	19±0.8 mm

## Hinge Lever Z-15GW-B    Z-15GW32-B Z-15HW-B    Z-10FWY-B Z-15GW3-B (Lever Length: 56R)\*



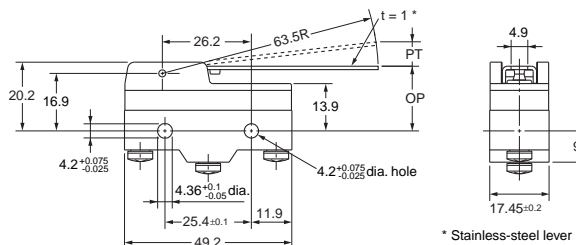
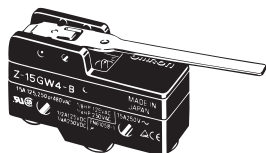
\* The external dimensions of the actuator vary.

Model	Z-15GW-B	Z-15HW-B	Z-15GW32-B	Z-10FWY-B	Z-15GW3-B
OF max.	70 gf max.	67 gf max.	150 to 200 gf	90 gf max.	80 gf max.
RF min.	14 gf	14 gf	93 gf	14 gf	15 gf
OT min.	5.6 mm	5.6 mm	5.6 mm	5.6 mm	4.8 mm
MD max.	1.27 mm	0.63 mm	1.27 mm	2.4 mm	1.12 mm
FP max.	28.2 mm	27.4 mm	28.2 mm	29.8 mm	27.2 mm
OP	19±0.8 mm				

**Note:** 1. All drawings show the switches with screw terminals. For versions with solder terminals, remove the “B” from the end of the part number.  
2. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

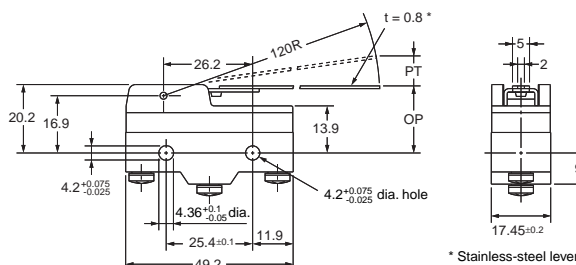
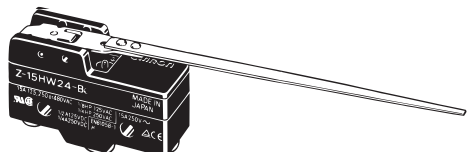
## Low-force Hinge Lever

### Z-15GW4-B



OF max.	28 gf
RF min.	3.5 gf
PT max.	10 mm
OT min.	5.6 mm
MD max.	1.27 mm
OP	19 $\pm 0.8$ mm

### Z-15HW24-B

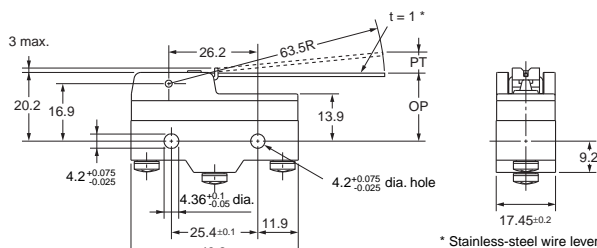
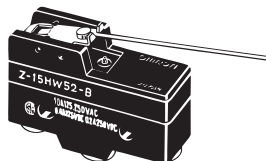


OF max.	6 gf
RF min.	0.5 gf
PT max.	19.8 mm
OT min.	10 mm
MD max.	2 mm
OP	19.8 $\pm 1.6$ mm

## Low-force Wire Hinge Lever

### Z-15HW52-B

### Z-15HW78-B (Lever Length: 110R) \*



Model	Z-15HW52-B
OF max.	6 gf
RF min.	0.5 gf
PT max.	8.3 mm
OT min.	5.6 mm
MD max.	0.65 mm
OP	19 $\pm 1$ mm

Model	Z-15HW78-B
OF max.	4 gf
RF min.	0.3 gf
PT max.	10 mm
OT min.	6 mm
MD max.	3 mm
OP	20 $\pm 1$ mm

\* The external dimensions of the actuator vary.

**Note:** AC electrical ratings: 10 A, 125/250 V.

## Short Hinge Roller Lever

### Z-15GW22-B

### Z-01HW22-B

### Z-15HW22-B

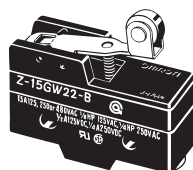
### Z-10FW22Y-B

### Z-15EW22-B

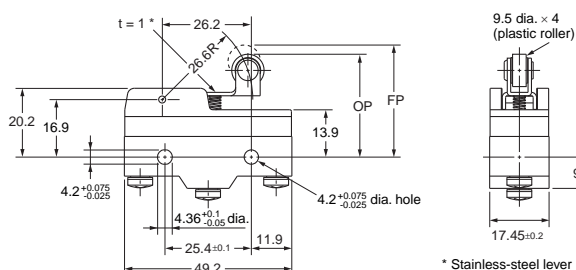
### Z-15GW2-B \*

### Z-15HW2-B \*

### Z-10FW2Y-B \*



\* The external dimensions of the actuator vary.  
(Lever Length: 48.5R)



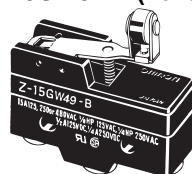
Model	Z-15GW22-B	Z-15HW22-B	Z-15EW22-B	Z-01HW22-B	Z-10FW22Y-B	Z-15GW2-B	Z-15HW2-B	Z-10FW2Y-B
OF max.	160 gf	150 gf	198 gf	160 gf	250 gf	100 gf	86 gf	130 gf
RF min.	42 gf	42 gf	42 gf	28 gf	35 gf	22 gf	22 gf	22 gf
OT min.	2.4 mm	2.4 mm	2.4 mm	2.4 mm	2.4 mm	4 mm	4 mm	4 mm
MD max.	0.5 mm	0.45 mm	1.3 mm	0.5 mm	1 mm	1.02 mm	0.6 mm	2 mm
FP max.	32.5 mm		35.1 mm	32.5 mm	34.8 mm	36.5 mm		37.4 mm
OP	30.2 $\pm 0.4$ mm		30.2 $\pm 0.4$ mm	30.2 $\pm 0.4$ mm	30.2 $\pm 0.4$ mm	30.2 $\pm 0.8$ mm		30.2 $\pm 0.8$ mm

**Note:** 1. All drawings show the switches with screw terminals. For versions with solder terminals, remove the “-B” from the end of the part number.  
2. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

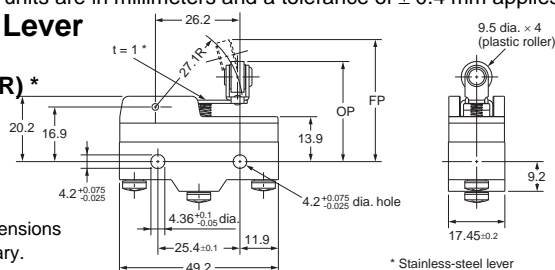
## Short Hinge Cross Roller Lever

Z-15GW49-B

Z-15GW54-B (Lever Length: 48.7R) \*



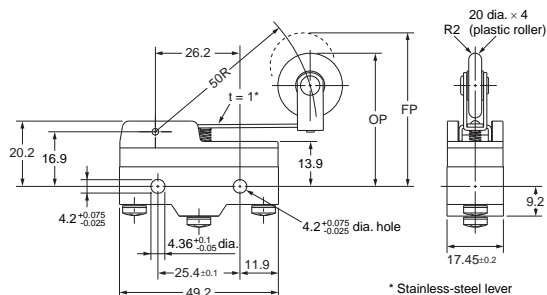
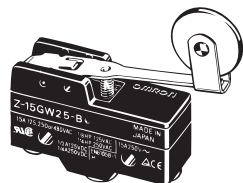
\* The external dimensions of the actuator vary.



Model	Z-15GW49-B	Z-15GW54-B
OF max.	170 gf	100 gf
RF min.	42 gf	22 gf
OT min.	2.4 mm	4 mm
MD max.	0.51 mm	1 mm
FP max.	33.3 mm	37.3 mm
OP	31 $\pm$ 0.4 mm	31 $\pm$ 0.8 mm

## Hinge Roller Lever

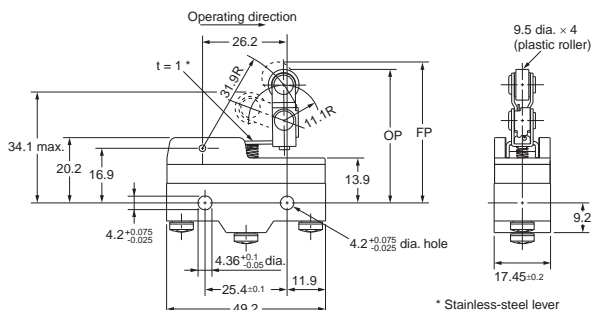
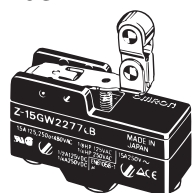
Z-15GW25-B



OF max.	100 gf
RF min.	21 gf
OT min.	4 mm
MD max.	1.6 mm
FP max.	47.5 mm
OP	41.2 $\pm$ 0.8 mm

## Unidirectional Short Hinge Roller Lever

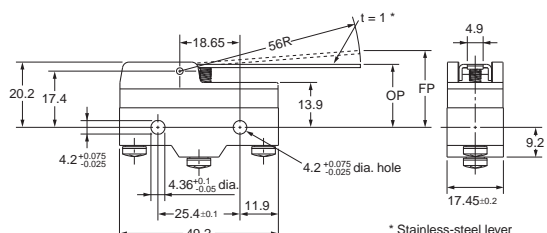
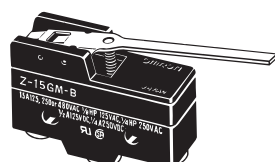
Z-15GW2277-B



OF max.	170 gf
RF min.	42 gf
OT min.	2.4 mm
MD max.	0.51 mm
FP max.	43.6 mm
OP	41.3 $\pm$ 0.8 mm

## Reverse Hinge Lever \*\*

Z-15GM-B

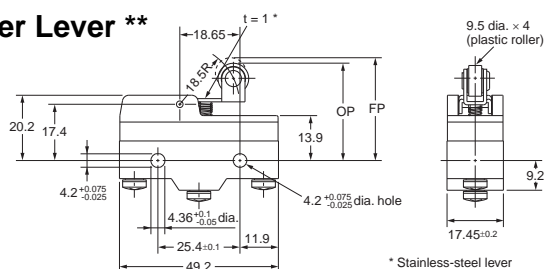


OF max.	170 gf
RF min.	28 gf
OT min.	5.6 mm
MD max.	0.89 mm
FP max.	23.8 mm
OP	19 $\pm$ 0.8 mm

## Reverse Short Hinge Roller Lever \*\*

Z-15GM22-B

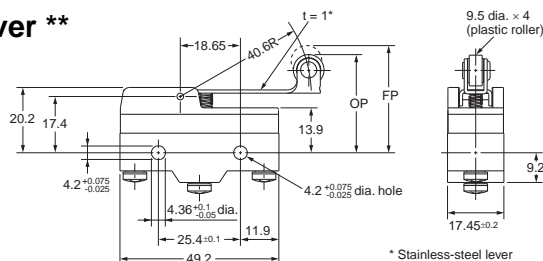
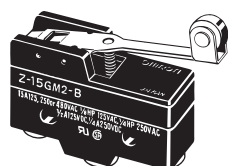
Z-10FM22Y-B



	Z-15GM22-B	Z-10FM22Y-B
OF max.	538 gf	650 gf
RF min.	170 gf	170 gf
OT min.	2 mm	2 mm
MD max.	0.28 mm	0.56 mm
FP max.	31.8 mm	33 mm
OP	29.4 $\pm$ 0.4 mm	29.4 $\pm$ 0.4 mm

## Reverse Hinge Roller Lever \*\*

Z-15GM2-B



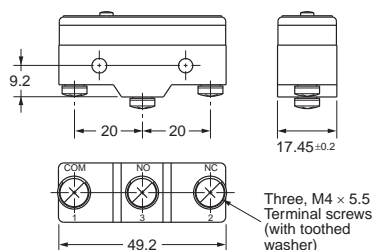
OF max.	240 gf
RF min.	56 gf
OT min.	4 mm
MD max.	0.64 mm
FP max.	35 mm
OP	30.2 $\pm$ 0.8 mm

\*\*The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistant because the pin plungers are normally pressed.

## ■ Drip-proof Models (without Terminal Protective Cover)

**Note:** 1. All drawings show the switches with screw terminals. For versions with solder terminals, remove the "-B" from the end of the part number.  
2. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

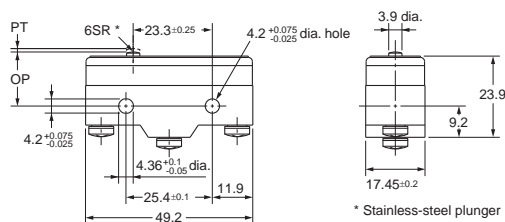
### Terminals



**Note:** With reverse action models (Z-15GM), the positions of NO and NC terminals are reversed.

### Pin Plunger

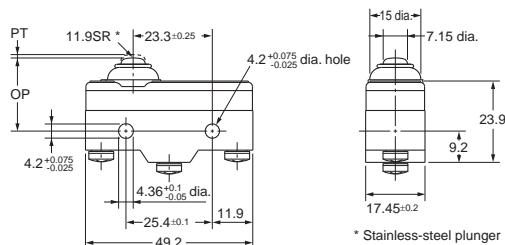
Z-15G55-B  
Z-01H55-B



Model	Z-15G55-B	Z-01H55-B
OF	250 to 430 gf	350 gf max.
RF min.	114 gf	80 gf
PT max.	2.2 mm	2.2 mm
OT min.	0.13 mm	0.13 mm
MD max.	0.06 mm	0.06 mm
OP	15.9±0.4 mm	

### Short Spring Plunger

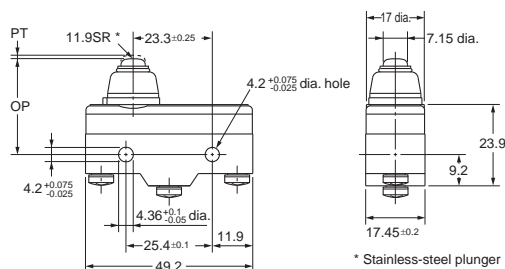
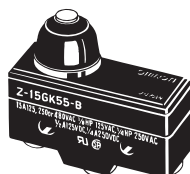
Z-15GD55-B  
Z-01HD55-B



Model	Z-15GD55-B	Z-01HD55-B
OF max.	540 gf	370 gf
RF min.	114 gf	80 gf
PT max.	1.8 mm	1.9 mm
OT min.	1.6 mm	1.6 mm
MD max.	0.06 mm	0.06 mm
OP	21.5±0.5 mm	

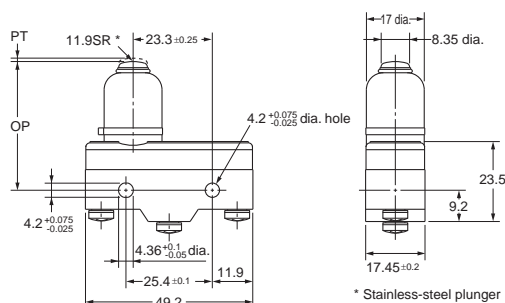
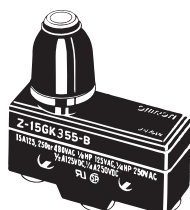
### Spring Plunger

Z-15GK55-B



OF max.	540 gf
RF min.	114 gf
PT max.	2.3 mm
OT min.	1.6 mm
MD max.	0.06 mm
OP	28.2±0.5 mm

Z-15GK355-B

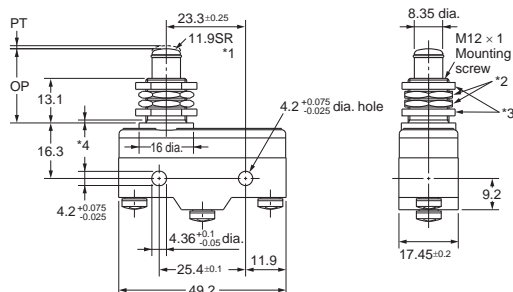
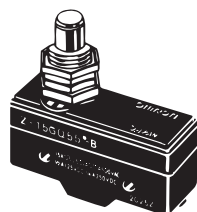


OF max.	540 gf
RF min.	114 gf
PT max.	2.4 mm
OT min.	3.5 mm
MD max.	0.06 mm
OP	37.8±1.2 mm

**Note:** 1. All drawings show the switches with screw terminals. For versions with solder terminals, remove the “-B” from the end of the part number.  
2. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## Panel Mount Plunger

### Z-15GQ55-B



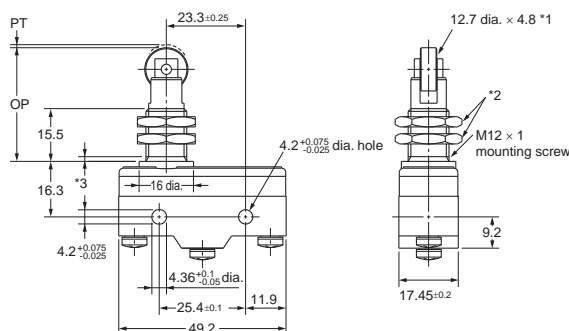
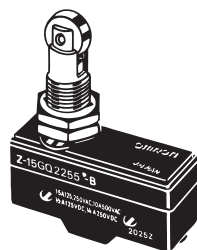
- \*1. Stainless-steel plunger  
\*2. Two hexagonal nuts (2 t × 14 width across flats)  
\*3. Two lock nuts (2 t × 15.6 width across flats)  
\*4. Incomplete screw part with a maximum length of 1.5 mm.

OF max.	540 gf
RF min.	114 gf
PT max.	1.8 mm
OT min.	5.5 mm
MD max.	0.06 mm
OP	21.8 ± 0.8 mm

**Note:** Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

## Panel Mount Roller Plunger

### Z-15GQ2255-B



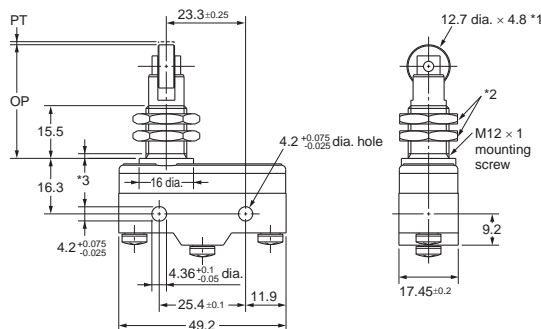
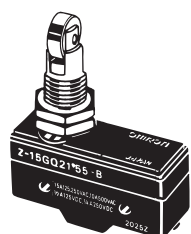
- \*1. Stainless-steel roller  
\*2. Two hexagonal nuts (3 t × 17 width across flats)  
\*3. Incomplete screw part with a maximum length of 1.5 mm.

OF max.	540 gf
RF min.	114 gf
PT max.	1.8 mm
OT min.	3.58 mm
MD max.	0.06 mm
OP	33.4 ± 1.2 mm

**Note:** Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

## Panel Mount Cross Roller Plunger

### Z-15GQ2155-B



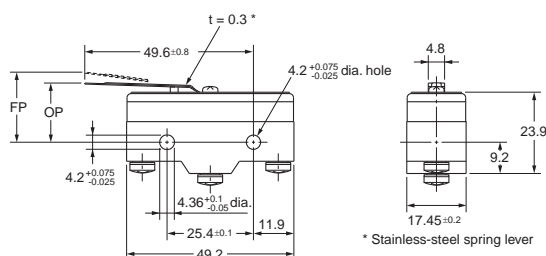
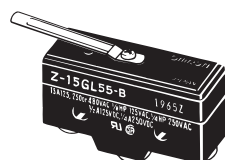
- \*1. Stainless-steel roller  
\*2. Two hexagonal nuts (3 t × 17 width across flats)  
\*3. Incomplete screw part with a maximum length of 1.5 mm.

OF max.	540 gf
RF min.	114 gf
PT max.	1.8 mm
OT min.	3.58 mm
MD max.	0.06 mm
OP	33.4 ± 1.2 mm

**Note:** Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

## Leaf Spring

### Z-15GL55-B

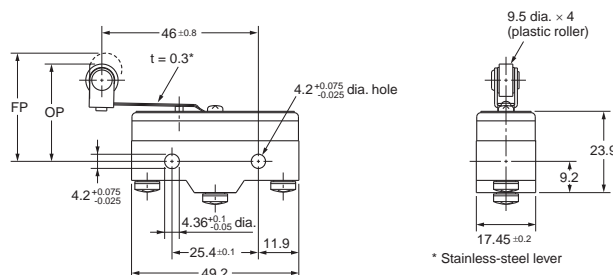
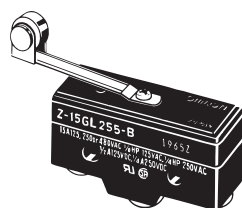


\* Stainless-steel spring lever

OF max.	200 gf
RF min.	14 gf
*OT min.	1.6 mm
MD max.	1.3 mm
FP max.	20.6 mm
OP	17.5 ± 0.8 mm

\* When operating, be sure not to exceed 1.6 mm.

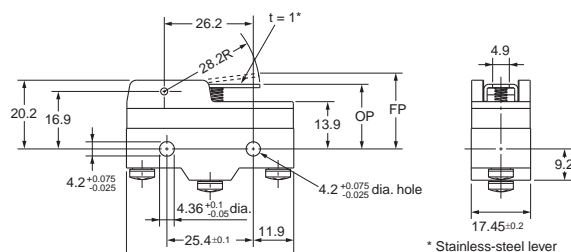
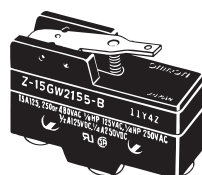
- Note:** 1. All drawings show the switches with screw terminals. For versions with solder terminals, remove the “-B” from the end of the part number.  
2. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.



OF max.	200 gf
RF min.	14 gf
* OT min.	1.6 mm
MD max.	1.3 mm
FP max.	31.8 mm
OP	28.6 $\pm 0.8$ mm

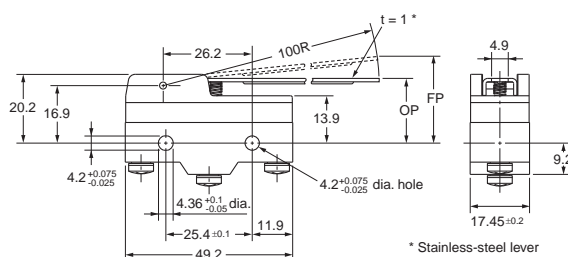
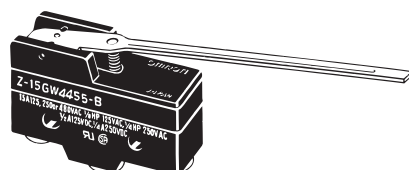
\* When operating, be sure not to exceed 1.6 mm.

## Short Hinge Lever Z-15GW2155-B



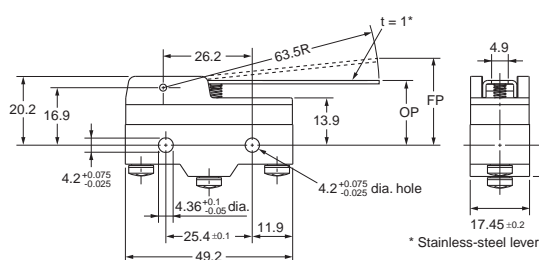
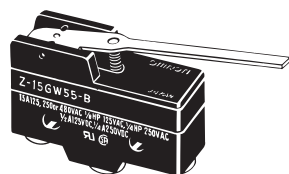
OF max.	190 gf
RF min.	28 gf
OT min.	2 mm
MD max.	1 mm
FP max.	25 mm
OP	19 $\pm 0.8$ mm

## Long Hinge Lever Z-15GW4455-B



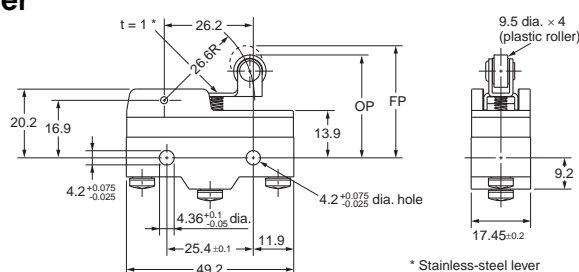
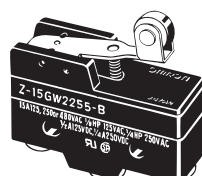
OF max.	90 gf
RF min.	14 gf
OT min.	5.6 mm
MD max.	3.5 mm
FP max.	33 mm
OP	19 $\pm 1.2$ mm

## Hinge Lever Z-15GW55-B



OF max.	100 gf
RF min.	14 gf
OT min.	5.6 mm
MD max.	2 mm
FP max.	28.2 mm
OP	19 $\pm 0.8$ mm

## Short Hinge Roller Lever Z-15GW2255-B Z-01HW2255-B

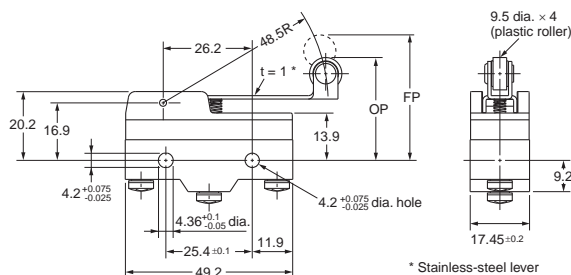
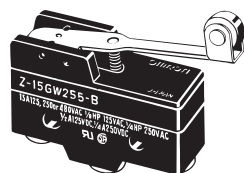


Model	Z-15GW2255-B	Z-01HW2255-B
OF max.	200 gf	200 gf
RF min.	42 gf	28 gf
OT min.	2.4 mm	2.4 mm
MD max.	0.8 mm	0.8 mm
FP max.	32.9 mm	
OP	30.2 $\pm 0.4$ mm	

**Note:** 1. All drawings show the switches with screw terminals. For versions with solder terminals, remove the "B" from the end of the part number.  
2. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## Hinge Roller Lever

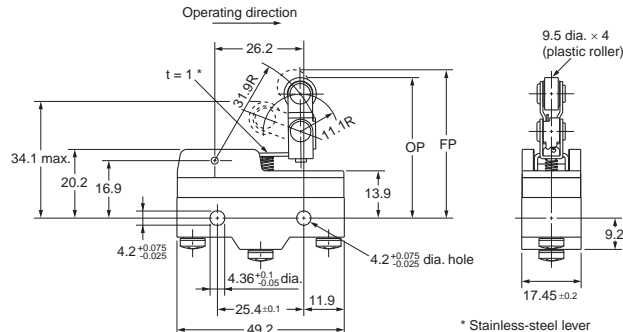
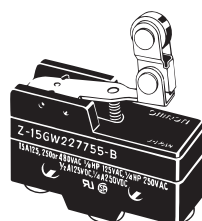
### Z-15GW255-B



OF max.	130 gf
RF min.	21 gf
OT min.	4 mm
MD max.	1.6 mm
FP max.	36.5 mm
OP	30.2±0.8 mm

## Unidirectional Short Hinge Roller Lever

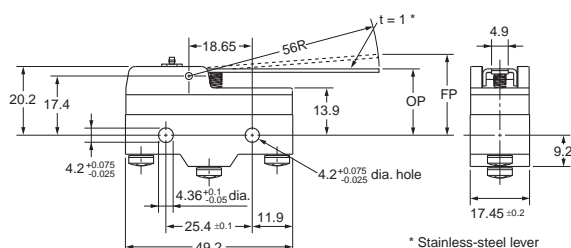
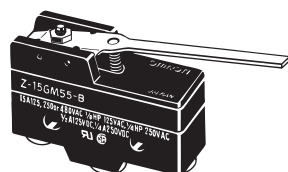
### Z-15GW227755-B



OF max.	180 gf
RF min.	50 gf
OT min.	2.4 mm
MD max.	0.8 mm
FP max.	43.6 mm
OP	41.3±0.8 mm

## Reverse Hinge Lever \*

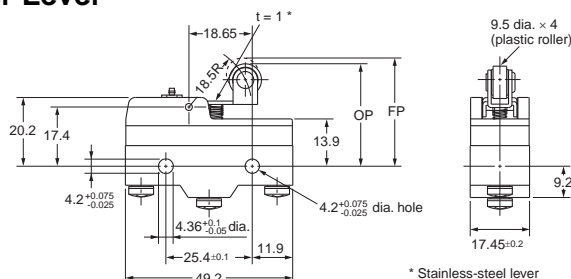
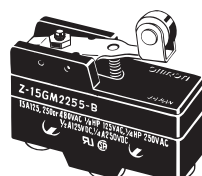
### Z-15GM55-B



OF max.	200 gf
RF min.	28 gf
OT min.	5.6 mm
MD max.	0.89 mm
FP max.	23.8 mm
OP	19±0.8 mm

## Reverse Short Hinge Roller Lever \*

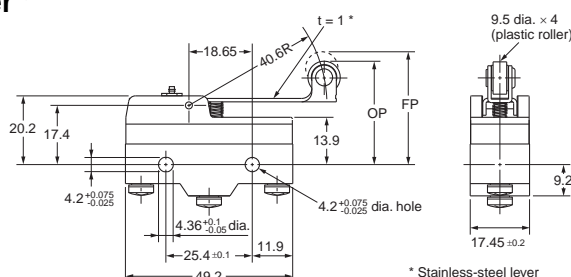
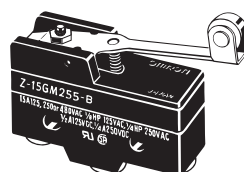
### Z-15GM2255-B



OF max.	580 gf
RF min.	170 gf
OT min.	2 mm
MD max.	0.28 mm
FP max.	31.8mm
OP	29.4±0.4mm

## Reverse Hinge Roller Lever \*

### Z-15GM255-B



OF max.	270 gf
RF min.	56 gf
OT min.	4 mm
MD max.	0.64 mm
FP max.	35 mm
OP	30.2±0.8 mm

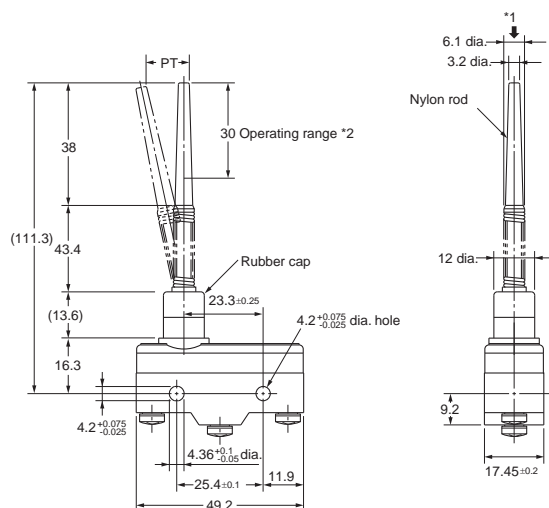
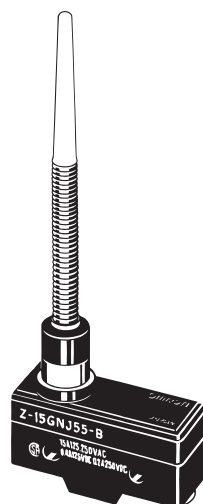
\* The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers.



- Note:** 1. All drawings show the switches with screw terminals. For versions with solder terminals, remove the “-B” from the end of the part number.  
2. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## Flexible Rod (Coil Spring)

### Z-15GNJ55-B

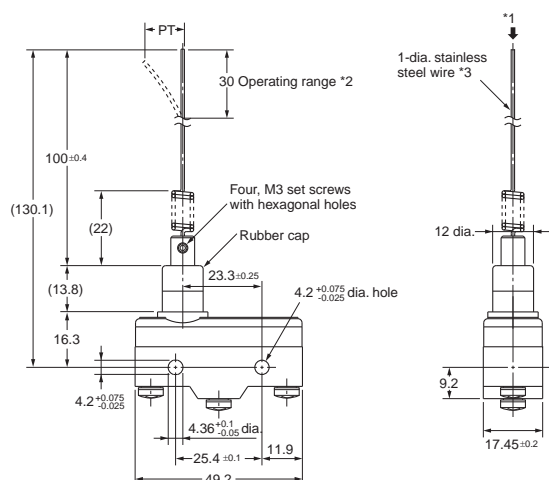
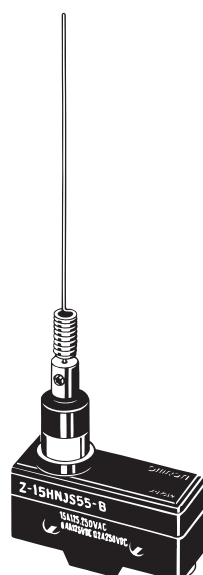


OF max.	50 gf
PT max.	(20 mm)
TT max.	40 mm

- \*1. Operation is possible in any direction other than the axial direction (indicated by the arrow ↓).  
\*2. Use only the area within the top 30 mm of the rod as the operating part. (Do not use the area that falls within 80 mm from the mounting hole as the operating part. Using this area may cause damage to the nylon rod.)

## Flexible Rod (Steel Wire)

### Z-15HNJS55-B



OF max.	15 gf
PT max.	(25 mm)

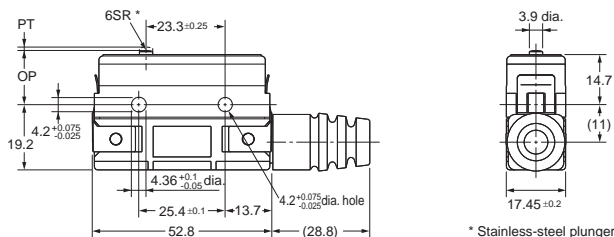
- \*1. Operation is possible in any direction other than the axial direction (indicated by the arrow ↓).  
\*2. Use only the area within the top 30 mm of the rod as the operating part. (Do not use the area that falls within 100 mm from the mounting hole as the operating part. Using this area may cause damage to the steel wire.)  
\*3. The steel wire can be replaced if damaged. (Model: Lever for HNJS55)



# ■ Drip-proof Models (with Terminal Protective Cover)

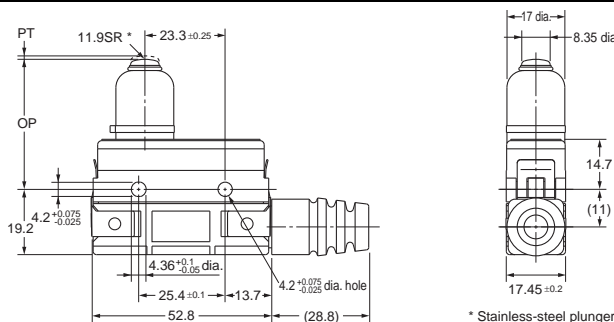
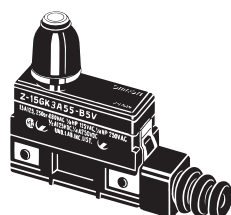
Note: Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## Pin Plunger Z-15GA55-B5V



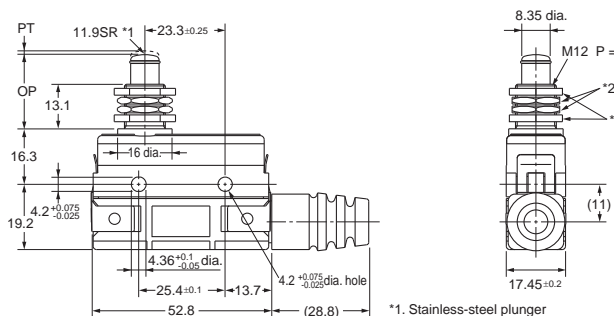
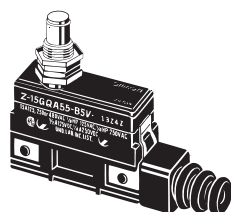
OF max.	250 to 430 gf
RF min.	114 gf
PT max.	2.2 mm
OT min.	0.13 mm
MD max.	0.06 mm
OP	15.9 $\pm 0.4$ mm

## Z-15GK3A55-B5V



OF max.	540 gf
RF min.	114 gf
PT max.	2.4 mm
OT min.	3.5 mm
MD max.	0.06 mm
OP	37.8 $\pm 1.2$ mm

## Panel Mount Plunger Z-15GQA55-B5V

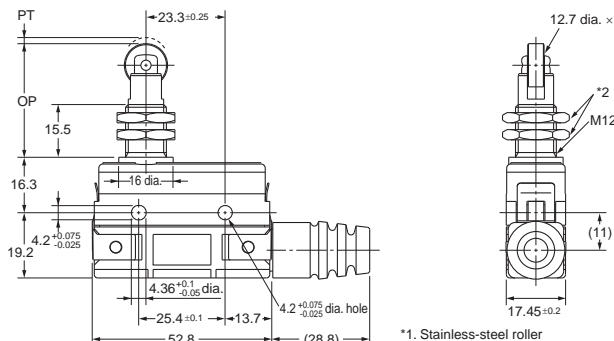
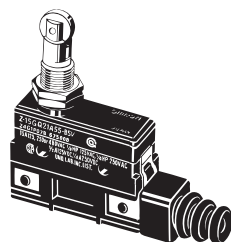


OF max.	540 gf
RF min.	114 gf
PT max.	1.8 mm
OT min.	5.5 mm
MD max.	0.06 mm
OP	21.8 $\pm 0.8$ mm

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

\*2. Two hexagonal nuts (2 t x 14 width across flats)  
\*3. Two lock nuts (2 t x 15.6 width across flats)

## Panel Mount Roller Plunger Z-15GQ22A55-B5V

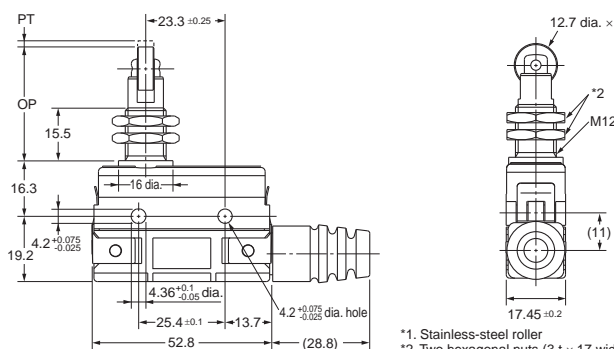
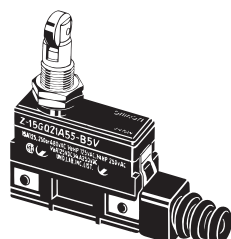


OF max.	540 gf
RF min.	114 gf
PT max.	1.8 mm
OT min.	3.58 mm
MD max.	0.06 mm
OP	33.4 $\pm 1.2$ mm

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

\*2. Two hexagonal nuts (3 t x 17 width across flats)

## Panel Mount Cross-roller Plunger Z-15GQ21A55-B5V



OF max.	540 gf
RF min.	114 gf
PT max.	1.8 mm
OT min.	3.58 mm
MD max.	0.06 mm
OP	33.4 $\pm 1.2$ mm

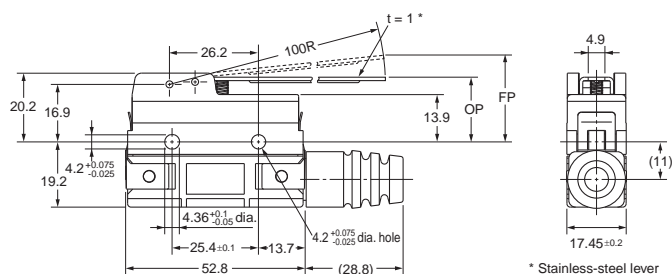
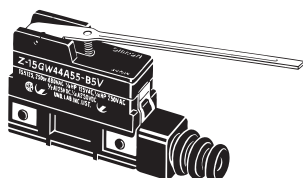
Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

\*2. Two hexagonal nuts (3 t x 17 width across flats)

Note: Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## Long Hinge Lever

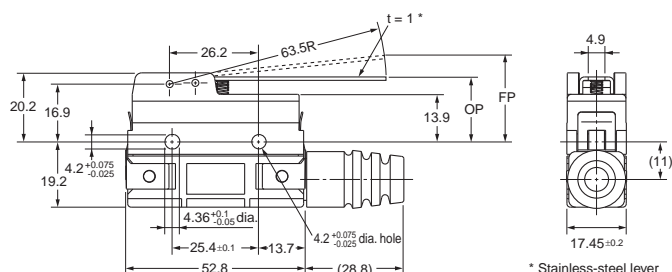
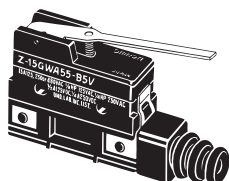
### Z-15GW44A55-B5V



OF max.	90 gf
RF min.	14 gf
OT min.	5.6 mm
MD max.	3.5 mm
FP max.	33 mm
OP	$19 \pm 1.2$ mm

## Hinge Lever

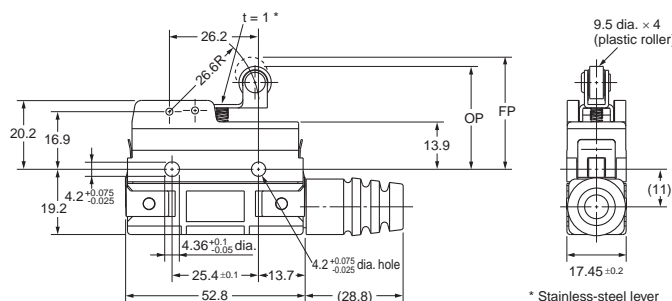
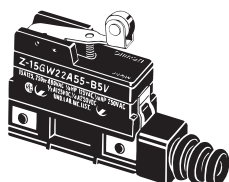
### Z-15GWA55-B5V



OF max.	100 gf
RF min.	14 gf
OT min.	5.6 mm
MD max.	2 mm
FP max.	28.2 mm
OP	$19 \pm 0.8$ mm

## Short Hinge Roller Lever

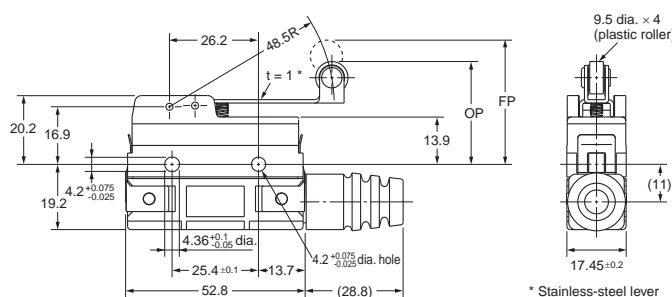
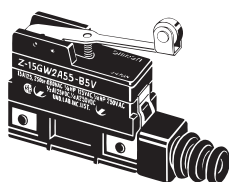
### Z-15GW22A55-B5V



OF max.	200 gf
RF min.	42 gf
OT min.	2.4 mm
MD max.	0.8 mm
FP max.	32.9 mm
OP	$30.2 \pm 0.4$ mm

## Hinge Roller Lever

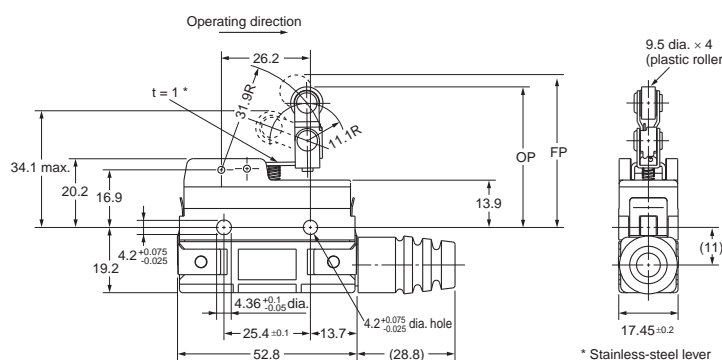
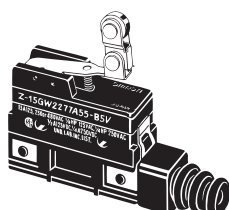
### Z-15GW2A55-B5V



OF max.	130 gf
RF min.	21 gf
OT min.	4 mm
MD max.	1.6 mm
FP max.	36.5 mm
OP	$30.2 \pm 0.8$ mm

## Unidirectional Short Hinge Roller Lever

### Z-15GW2277A55-B5V



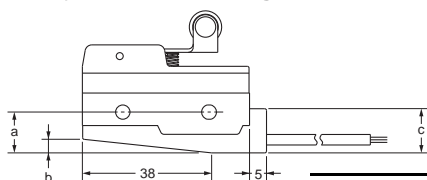
OF max.	180 gf
RF min.	50 gf
OT min.	2.4 mm
MD max.	0.8 mm
FP max.	43.6 mm
OP	$41.3 \pm 0.8$ mm

# ■ Drip-proof Models (with Molded Terminal Cover)

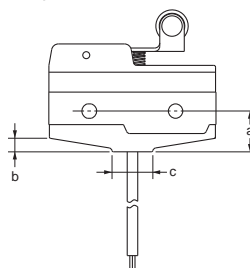
**Note:** Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

**L/R Type** (The following illustration is the R type.)

**D Type**



Size (mm)	a	b	c
Lead wire			
VSF	12	4	13
VCT	19	11	20



Size (mm)	a	b	c
Lead wire			
VSF	12	4	12
VCT	19	11	16

## Lead Wire Specifications

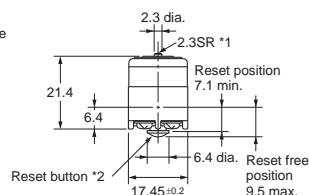
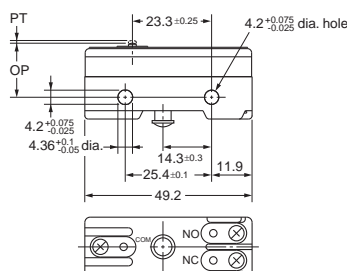
Specifications	Nominal cross sectional area (mm <sup>2</sup> )	Finished outer diameter (mm)	Connection to terminal	Length (m)
Lead wire				
VSF (single-core, vinyl cord)	1.25	Approx. 3.1 dia.	Black: COM White: NO Red: NC	1, 3
VCT (vinyl-insulated cable)		Three-core: approx. 10.5 dia.		

- Note:** 1. No models with molded terminals are approved by UL, CSA, or EN.  
2. Molded terminals are not available on all models. Contact your OMRON representative for applicable products.

# ■ Maintained Contact Models

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

## Pin Plunger Z-15ER



- \*1. Stainless steel plunger  
\*2. Plastic plunger

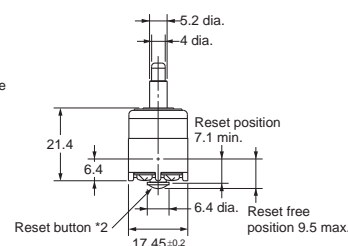
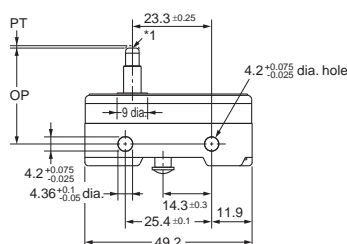
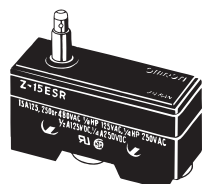
### Plunger

OF	200 to 255 gf
PT max.	0.4 mm
OT min.	0.13 mm
OP	15.9 $\pm$ 0.4 mm

### Reset Button

OF max.	56 to 285 gf
OT min.	0.4 mm

## Slim Spring Plunger Z-15ESR



- \*1. Stainless steel plunger (tip only, flat, R1 bevel).  
\*2. Plastic plunger

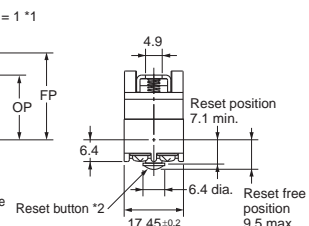
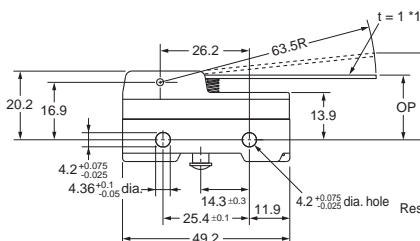
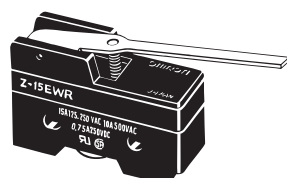
### Plunger

OF max.	270 gf
PT max.	0.4 mm
OT min.	1.6 mm
OP	28.2 $\pm$ 0.5 mm

### Reset Button

OF max.	285 gf
OT min.	0.4 mm

## Hinge Lever Z-15EWR



- \*1. Stainless steel lever  
\*2. Plastic plunger

### Lever Tip

OF max.	55 gf
OT min.	5.6 mm
FP max.	28.2 mm
OP	19 $\pm$ 0.8 mm

### Reset Button

OF max.	300 gf
OT min.	0.4 mm

# Safety Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## Precautions for Safe Use

### Terminal Connection

When soldering lead wires to the Switch, make sure that the capacity of the soldering iron is 60 W maximum. Do not take more than 5 s to solder any part of the Switch. The characteristics of the Switch will deteriorate if a soldering iron with a capacity of more than 60 W is applied to any part of the Switch for 5 s or more.

### Operation

- Make sure that the switching frequency or speed is within the specified range.
- If the switching speed is extremely slow, the contact may not be switched smoothly, which may result in a contact failure or contact welding.
- If the switching speed is extremely fast, switching shock may damage the Switch soon. If the switching frequency is too high, the contact may not catch up with the speed.

The rated permissible switching speed and frequency indicate the switching reliability of the Switch.

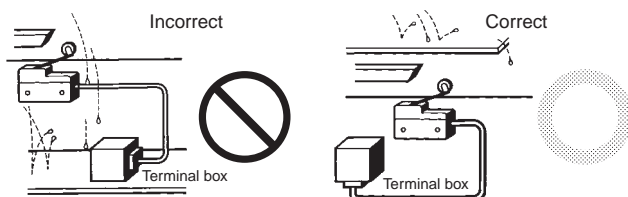
The life of a Switch is determined at the specified switching speed. The life varies with the switching speed and frequency even when they are within the permissible ranges. In order to determine the life of a Switch model to be applied to a particular use, it is best to conduct an appropriate durability test on some samples of the model under actual conditions.

- Make sure that the actuator travel does not exceed the permissible OT position. The operating stroke must be set to 70% to 100% of the rated OT.

## Precautions for Correct Use

### Mounting Location

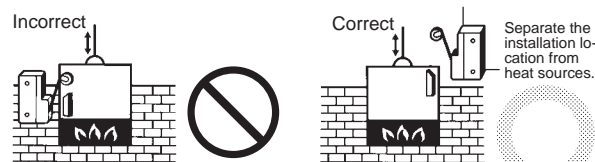
- Do not use the switch alone in atmospheres such as flammable or explosive gases. Arcing and heat generation associated with switching may cause fires or explosions.
- Switches are generally not constructed with resistance against water. Use a protective cover to prevent direct spraying if the switch is used in locations subject to splashing or spurting oil or water, dust adhering.



- Install the switch in a location that is not directly subject to debris and dust from cutting. The actuator and the switch body must be protected from accumulated cutting debris and dirt.



- Do not use the switch in locations subject to hot water (greater than 60°C) or in water vapor.
- Do not use the switch outside the specified temperature and atmospheric conditions. The permissible ambient temperature depends on the model. (Refer to the specifications in this catalog.) Sudden thermal changes may cause thermal shock to distort the switch and result in faults.



- Mount a cover if the switch is to be installed in a location where worker inattention could result in incorrect operation or accidents.



- Subjecting the switch to continuous vibration or shock may result in contact failure or faulty operation due to abrasion powder and in reduced durability. Excessive vibration or shock will cause the contacts to operate malfunction or become damaged. Mount the switch in a location that is not subject to vibration or shock and in a direction that does not subject the switch to resonance.
- If silver contacts are used with relatively low frequency for a long time or are used with microloads, the sulfide coating produced on the contact surface will not be broken down and contact faults will result. Use a microload switch that uses gold contacts.
- Do not use the switch in atmospheres with high humidity or heat or in harmful gases, such as sulfide gas ( $\text{H}_2\text{S}$ ,  $\text{SO}_2$ ), ammonia gas ( $\text{NH}_3$ ), nitric acid gas ( $\text{HNO}_3$ ), or chlorine gas ( $\text{Cl}_2$ ). Doing so may impair functionality, such as with damage due to contacting faults or corrosion.
- The switch includes contacts. If the switch is used in an atmosphere with silicon gas, arc energy may cause silicon oxide ( $\text{SiO}_2$ ) to accumulate on the contacts and result in contact failure. If there is silicon oil, silicon filling, silicon wiring, or other silicon products in the vicinity of the switch, use a contact protection circuit to limit arcing and remove the source of the silicon gas.

### Mounting

Always make sure that the power is turned OFF before mounting, removing, or wiring the Switch, or performing maintenance. Electric shock or burning may occur.

### Selecting Models

We recommend using Drip-proof Models (protection equivalent to IP62) in locations subject to floating dirt and dust. Other models do not have a protective structure.

### Wiring

For wiring, use a wire size that is appropriate for the applied voltage and the supplied current. When soldering the Switch, make sure that the capacity of the soldering iron is 60 W maximum. Do not take more than 5 s to solder any part of the Switch. Using the Switch with incomplete soldering may result in errors and heat, which may cause burning. The characteristics of the Switch will deteriorate if a soldering iron with a capacity of more than 60 W is used or if any part of the Switch is soldered for 6 s or longer.

## Tightening

The suitable tightening torque for screw terminals is given below.

- Screw terminals except for those on Split-contact Models (Z-10FY-B): 0.78 to 1.18 N·m
- Screw terminals on Split-contact Models (Z-10FY-B): 0.49 to 1.18 N·m

## Operation

- Make sure that the switching speed and frequency are within the specified ranges.

1. If the switching speed is extremely slow, the contacts may not be switched smoothly, which may result in a contact failure or contact welding.

2. If the switching speed is extremely fast, switching shock may damage the Switch prematurely. If the switching frequency is too high, the contacts may not be able to keep up with the speed.

The rated permissible switching speed and frequency indicate the switching reliability of the Switch.

The life of a Switch is determined at the specified switching speed. The life varies with the switching speed and frequency even when they are within the permissible ranges.

Always conduct appropriate durability tests under actual conditions before using a Switch.

- Make sure that the actuator travel does not exceed the permissible OT position. The operating stroke must be set to 70% to 100% of the rated OT.

## Panel Mount Switch (Z-15□Q□, Z-01□Q□)

- When mounting the panel mount plunger model with screws on a side surface, be careful of the dog angle and operation speed. Excessive dog angle or operation speed may damage the Switch.
- When using the panel mount plunger model mounted with screws on a side surface, be careful not to apply a large shock. Applying a shock exceeding 1,000 m/s<sup>2</sup> may damage the Switch.
- When using the panel mount plunger model mounted with screws on a side surface, remove the hexagonal nuts from the actuator.

## High-sensitivity Switch (Z-15H)/

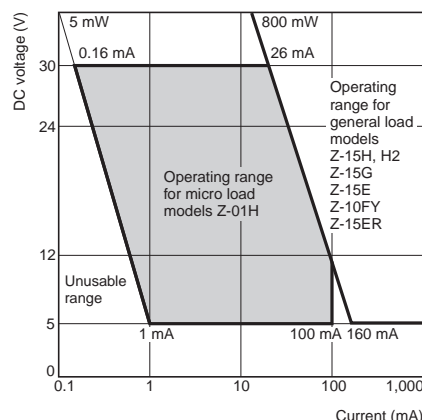
## Extra-high-sensitivity Switch (Z-15H2)

- When using the Switch in a DC circuit, be sure to provide an arc suppressor as well because the small contact gap of the Switch may result in contact troubles.
- In an application where a high repeat accuracy is required, limit the current that flows through the Switch to within 0.1 A. Also, use a relay to control a high-capacity load if the Switch is connected to such a load. (In this case, the exciting current of the relay coil is the load of the Switch.)
- Do not apply a force of 19.6 N or higher to the pin plunger.
- Exercise care that the environment conditions such as temperature and humidity do not change abruptly.

## Micro Load Applicable Range

Using a model for ordinary loads to open or close the contact of a micro load circuit may result in faulty contact. Use models that operate in the following range. However, even when using micro load models within the operating range shown here, if inrush current occurs when the contact is opened or closed, it may increase contact wear and so decrease durability. Therefore, insert a contact protection circuit where necessary.

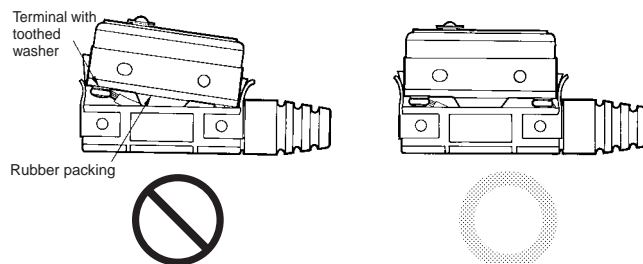
The minimum applicable load is the N-level reference value. This value indicates the malfunction reference level for the reliability level of 60% ( $\lambda_{60}$ ). The equation,  $\lambda_{60} = 0.5 \times 10^{-6} / \text{operations}$  indicates that the estimated malfunction rate is less than 1/2,000,000 operations with a reliability level of 60%.



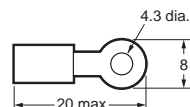
	Z-01H	Z-15□, Z-10FY
Minimum applicable load	1 mA at 5 VDC	160 mA at 5 VDC

## Models with Drip-proof Terminal Cover (Z-□A55-B5V) Wiring

- To attach the Protective Cover to the case, hold the cover in almost parallel to the case and then push it to the case. If the cover is pushed diagonally, the rubber packing may slip off, degrading the sealability of the Switch.



- Use round solderless terminals having the following dimensions to connect leads to the terminals. Tighten the screws of terminals to a torque of 0.78 to 1.18 N·m. Use the terminal shown below.



- A cable 8.5 to 10.5 mm in diameter can be applicable to the sealing rubber of the lead outlet of the Switch. A two-core or three-core VCT cable having a cross-sectional area of 1.25 mm<sup>2</sup> is especially suitable for this.
- M4 small screws with spring toothed washer are used as the terminal screws.

Drip-proof Switch (Z-□55)

- The Switch is not perfectly oil-tight; so do not dip it in oil or water.
- The rubber boots are made from weather-resistive chloroprene rubber.
- Do not use Basic Switches in places with radical changes in temperature.
- Rubber boots and rubber caps will tend to harden at lower ambient temperatures. If an Actuator is used in a pressed state for an extended period of time at low temperatures, it may return slowly or it may not return at all. OMRON can provide special Actuators for use at low temperature with rubber boots or rubber caps made of silicon rubber, which has superior resistance to cold. Ask your OMRON representative for details.

Split-contact Switch (Z-10F□Y)

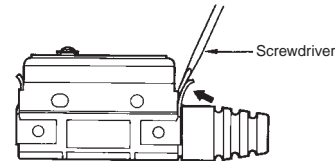
The applicable current varies depending on how the contacts are used. If the Switch is connected in series, the Switch can endure a current 1.5 to 2 times higher than the current that can be applied in parallel connection.

Flexible Rod Switch (Z-15□NJ□55, Drip-proof)

- When the rod is fully swung, the Switch may operate when the lever returns, causing chattering. Use a circuit that compensates for chattering wherever possible.
- Do not switch the rod to the fullest extent when the Switch is to break a power circuit because such a practice may cause metal deposition to occur between the mating contacts of the Switch.

Other Precautions

- Do not apply excessive force with a screwdriver or other tool when attaching or removing the Protective Cover. Doing so may deform the Switch.



- The Drip-proof Terminal Protective Cover (AP-DV) can be used only with Switches with model numbers ending in “-B5V.”
- The Drip-proof Terminal Protective Cover is only available for maintenance purposes.

Accessories (Order Separately)

Refer to “Z/A/X/DZ Common Accessories” datasheet for details about Terminal Covers, Separators, and Actuators.

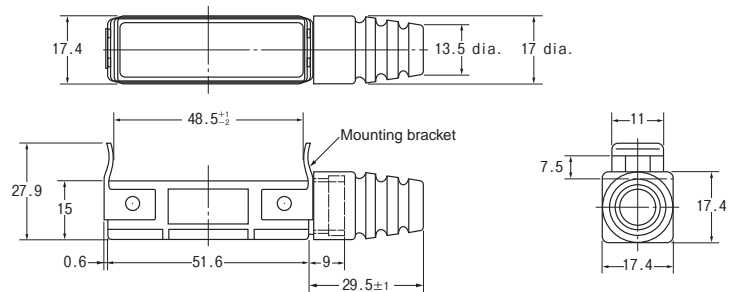
Drip-proof Terminal Cover  
(Order Separately)

The Drip-proof Terminal Protective Cover is provided for maintenance for Z-□A55-B5V Switches.

Ordering Information

Name	Model
Drip-proof Terminal Protective Cover	AP-DV

Dimensions (Unit: mm)



# MEMO



# V/VX/D3V Common Accessories












## Ordering Information

### ■ Actuators (Sold Separately)

Actuators are supplementary components used when operating pin plunger switches using cams or dogs or when transmitting mechanical movements that are not in alignment with the switch plunger. Three series of actuators are optionally available: VAL, VAM and VAV series.

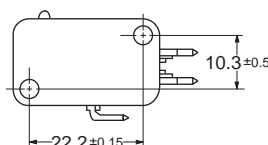
1. The VAL series are designated for operation by rotary cam or sliding devices.
2. The VAM series actuators designed are operate in reverse movement and are highly resistive to vibration and shock. The large OT of these models make them ideal for machine tools and automatic doors where the switches are subject to heavy vibration or shock.
3. The VAV series actuators are highly sensitive to force. Therefore, they should be used in applications where the operating force to be applied to the switch is very low.

### Common to Miniature Basic Models (V, VX and D3V)

Actuator	Series	Common to Miniature, V-Size models
Leaf Spring 	VAL	VAL
Simulated Roller Leaf Spring 		VAL12
Roller Leaf Spring 		VAL2, VAL02
Reverse Long Hinge 	VAM	VAM
Reverse Hinge 		VAM21
Reverse Roller Modified 		VAM-1
Reverse Hinge Roller 		VAM22
Reverse Long Hinge Roller 		VAM2
Long Hinge 	VAV	VAV
Hinge Wire 		VAV-5
Hinge Roller 		VAV2


**Note:** 1. These actuators do not include switches

2. Pin plunger versions of Omron's miniature basic snap-action switches, with the mounting hole locations shown below, can be used with the actuators (except for special models).





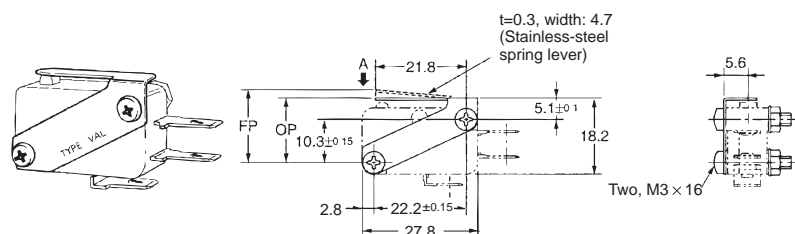
# Dimensions

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
 2. The operating characteristics below apply when the actuator is attached to V-15-1A5-K basic switch. (Except the VAV-5, which applies when VX-5-1A2 is attached.) Consult Omron for operating characteristics of models not listed in the following tables.  
 3. Model numbers are for the actuator only. These actuators do not include the switch.  
 4. The operating characteristics are for operation in the A direction (  ).

## VAL Series

### Leaf Spring

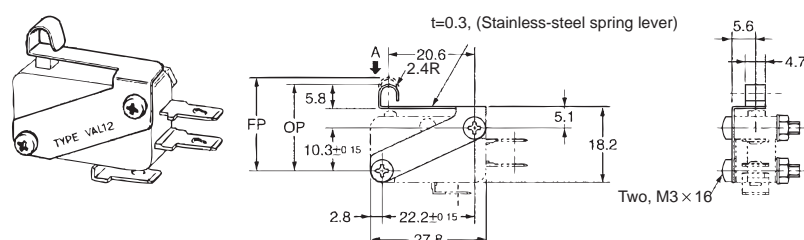
VAL (Designed for models of OF 200 gf and greater)



Characteristics when used with V-15-1A5	
OF max.	230 gf
RF min.	50 gf
OT min.	0.8 mm
MD max.	0.4 mm
FP max.	17 mm
OP	14.9 ± 0.5 mm

### Simulated Roller Leaf Spring

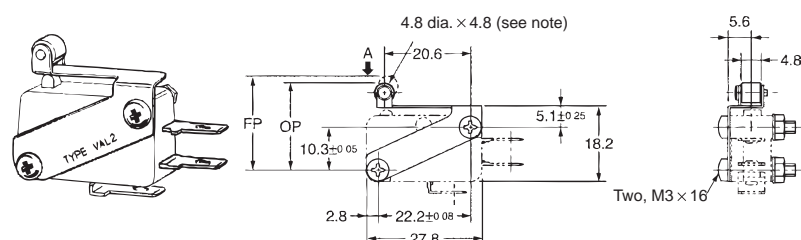
VAL12 (Designed for models of OF 200 gf and greater)



Characteristics when used with V-15-1A5	
OF max.	230 gf
RF min.	50 gf
OT min.	0.8 mm
MD max.	0.4 mm
FP max.	22.9 mm
OP	20.5 ± 0.8 mm

### Roller Leaf Spring

VAL2, VAL02 (Designed for models of OF 200 gf max.)



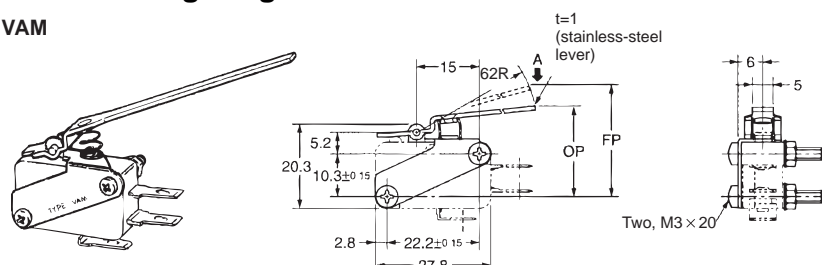
**Note:** VAL2: Unlubricated polyacetal resin roller  
 VAL02: Stainless-steel roller

Characteristics when used with V-15-1A5	
OF max.	230 gf
RF min.	50 gf
OT min.	0.8 mm
MD max.	0.4 mm
FP max.	22.6 mm
OP	20.5 ± 0.5 mm


## VAM Series

### Reverse Long Hinge Lever

VAM

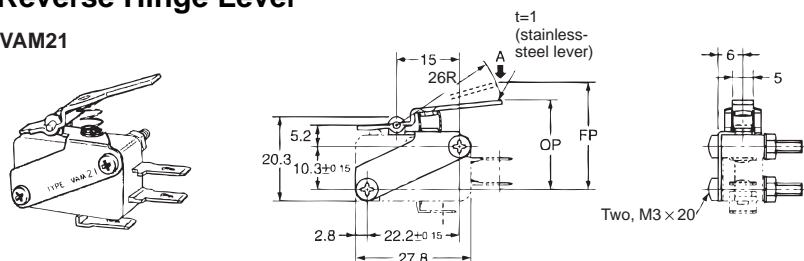


Characteristics when used with V-15-1A5	
OF max.	200 gf
RF min.	30 gf
OT min.	7 mm (reference value)
MD max.	5 mm
FP max.	45 mm
OP	20 ± 9 mm

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
 2. The operating characteristics below apply when the actuator is attached to V-15-1A5-K basic switch. (Except the VAV-5, which applies when VX-5-1A2 is attached.) Consult Omron for operating characteristics of models not listed in the following tables.  
 3. Model numbers are for the actuator only. These actuators do not include the switch.  
 4. The operating characteristics are for operation in the A direction (  ).

## Reverse Hinge Lever

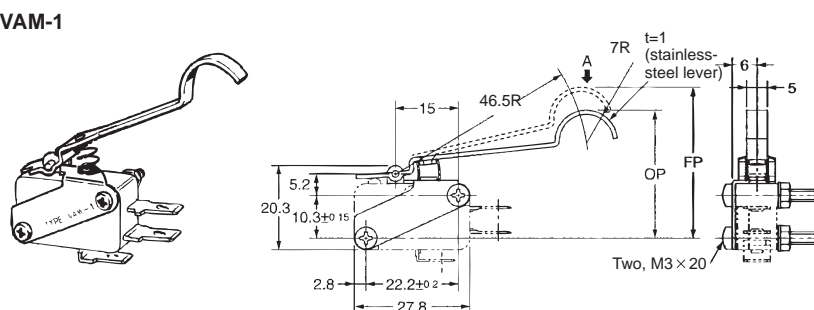
VAM21



Characteristics when used with V-15-1A5	
OF max.	360 gf
RF min.	70 gf
OT min.	5 mm (reference value)
MD max.	4 mm
FP max.	30 mm
OP	20 ± 4 mm

## Reverse Roller Modified Lever

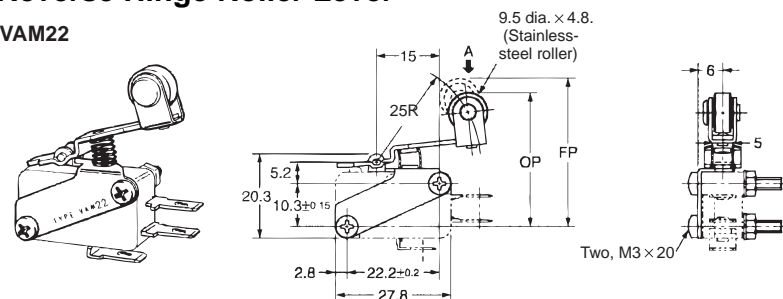
VAM-1



Characteristics when used with V-15-1A5	
OF max.	300 gf
RF min.	40 gf
OT min.	5 mm (reference value)
MD max.	6 mm
FP max.	47 mm
OP	30 ± 5 mm

## Reverse Hinge Roller Lever

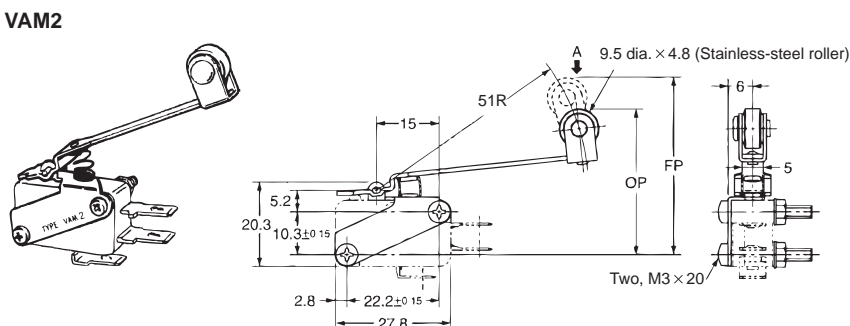
VAM22




Characteristics when used with V-15-1A5	
OF max.	360 gf
RF min.	70 gf
OT min.	3 mm (reference value)
MD max.	4 mm
FP max.	38 mm
OP	31.3 ± 3 mm

## Reverse Long Hinge Roller Lever

VAM2



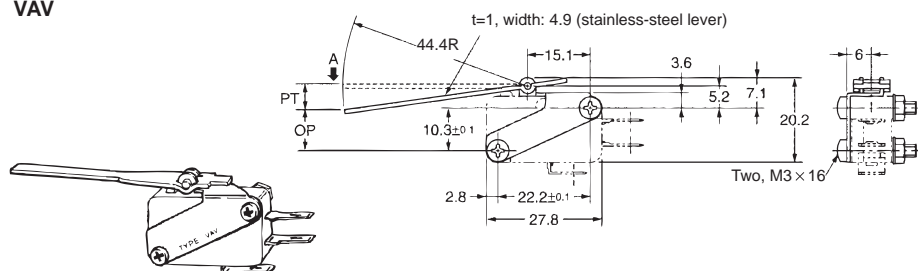
Characteristics when used with V-15-1A5	
OF max.	250 gf
RF min.	40 gf
OT min.	7 mm (reference value)
MD max.	6 mm
FP max.	48 mm
OP	31 ± 6 mm

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions
2. The operating characteristics below apply when the actuator is attached to V-15-1A5-K basic switch. (Except the VAV-5, which applies when VX-5-1A2 is attached.) Consult Omron for operating characteristics of models not listed in the following tables.
3. Model numbers are for the actuator only. These actuators do not include the switch.
4. The operating characteristics are for operation in the A direction (  ).

## ■ VAV Series

### Long Hinge Lever

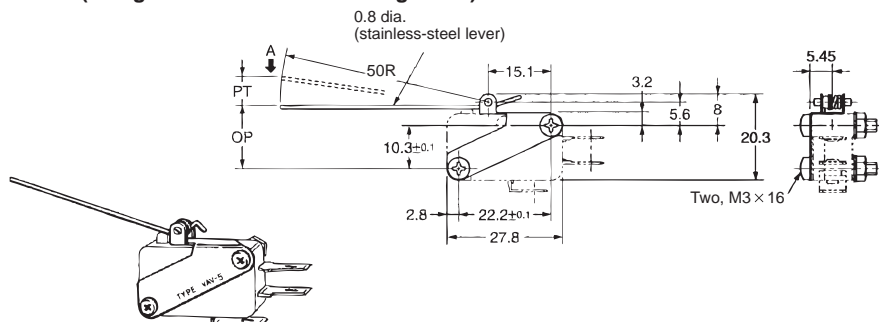
VAV



Characteristics when used with V-15-1A5	
OF max.	35 gf
RF min.	4 gf
OT min.	7.6 mm
MD max.	3.6 mm
FP max.	4.7 mm
OP	Approx 10.6 mm

### Hinge Wire Lever

VAV-5 (Designed for models of OF 25 gf max.)

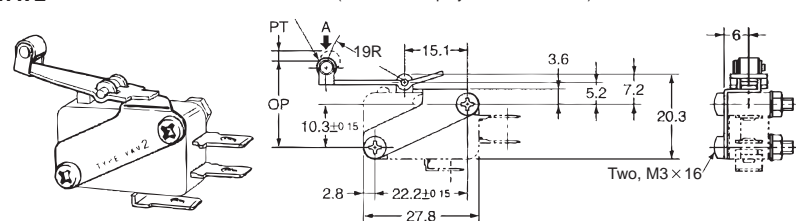


Characteristics when used with VX-5-1A2	
OF max.	2.8 gf
RF min.	0.2 gf
OT min.	16 mm
MD max.	2 mm
FP max.	5 mm
OP	Approx 16.7 mm

### Hinge Roller Lever

VAV2

4.8 dia. x 4.8 (Unlubricated polyacetal resin roller)



Characteristics when used with V-15-1A5	
OF max.	75 gf
RF min.	9 gf
OT min.	4.8 mm
MD max.	1.5 mm
FP max.	1.2 mm
OP	18.6 ± 1.6 mm

# Z/A/X/DZ Common Accessories

## Ordering Information

### ■ Terminal Covers (Sold Separately)

#### Common to Z, A, X, and DZ Models

The Terminal Cover is secured using the switch's side mounting screws and protects the casing and terminal wires from dust, vibration, or fingers, thus preventing terminal short-circuiting, ground faults, wire disconnection or improper connection, and electric shock accidents.

Terminal Covers made of phenol resin have five or six thin wall sections.

These sections can be torn open to provide holes for lead cables at desired points.

Application		Soldering terminal use	Screw terminal use	Remarks
Material	Mounting direction	Model		
Phenol resin	Side mounting	AP-A	AP-B	---
Metal press mold	Side mounting	AP1-A	AP1-B	Used for AP-A and AP-B
Vinyl chloride	Side mounting	AP-Z		---

**Note:** Use the 'Screw-terminal use' Terminal Cover for DZ-series solder terminal models.

### ■ Separator (Sold Separately)





#### Common to Z, A, X, and DZ Models

**Model:** Separator for Z

### ■ Actuators (Sold Separately)

#### Common to Z and X Models

Pin Plunger Switches might need to be actuated by a cam or similar object, in which case, use one of the following Actuators according to the application.

Actuator		Common to Z and X models
Hinge lever 		ZAA-1
Hinge roller lever 		ZAA-2
Panel mount plunger 	Short	ZAQ-3
	Medium	ZAQ-2
	Long	ZAQ-1
Panel mount roller plunger 		ZAQ-22

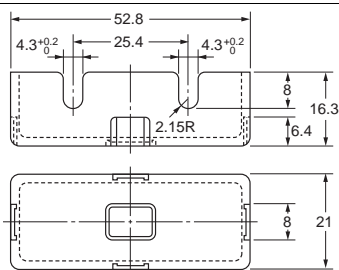
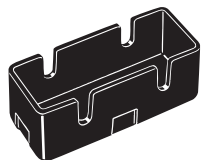
**Note:** ZAQ-22 is constructed of ferrous material. Therefore, it cannot be used with the X Switch, because of the permanent magnet contained within those models. Use the ZAQ-22 external panel mount roller plunger only with the Z or DZ switch.

# Dimensions

**Note:** Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm ( $\pm 0.8$  mm for the AP-Z) applies to all dimensions.

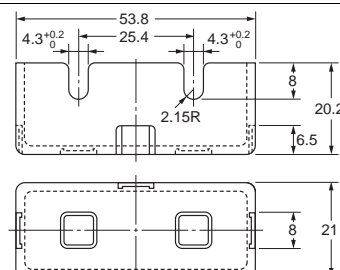
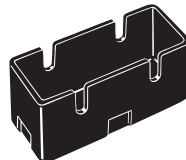
## Terminal Covers

### AP-A Soldering Terminal Use (Phenol Resin)



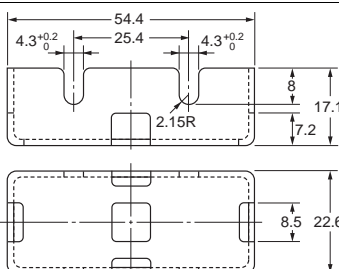
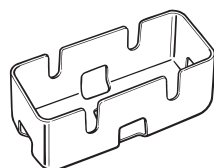
**Note:** The Cover has five thin, easy-to-separate portions for easy lead wire connections.

### AP-B Screw Terminal Use (Phenol Resin)



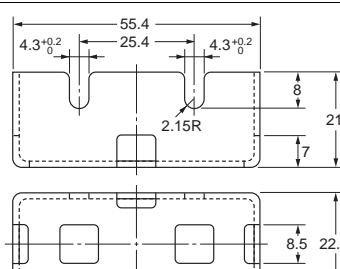
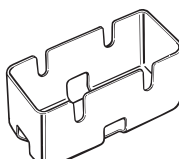
**Note:** The Cover has six thin, easy-to-separate portions for easy lead wire connections.

### AP1-A Soldering Terminal Use (Metal Press Mold)



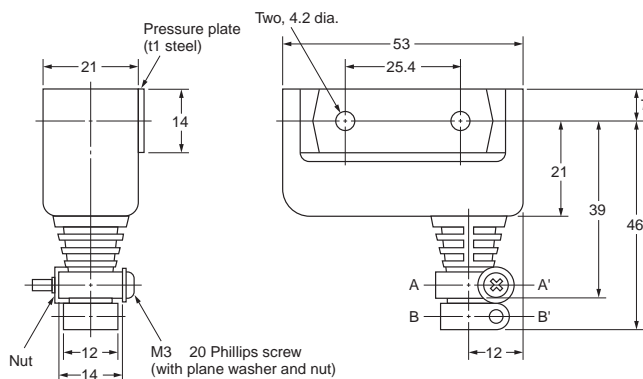
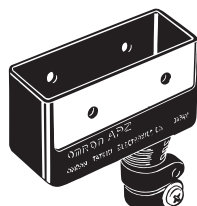
**Note:** 1. The Cover has five holes for easy lead wire connections.  
2. AP1-A should be used with the AP-A

### AP1-B Screw Terminal Use (Metal Press Mold)

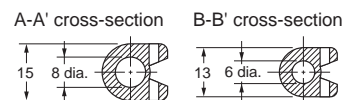


**Note:** 1. The Cover has six holes for easy lead wire connections.  
2. AP1-B should be used with the AP-B

### AP-Z Soldering or Screw Terminal Use (Vinyl Chloride)



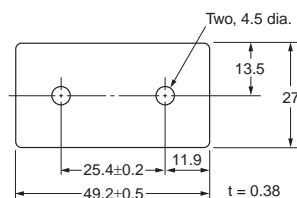
#### Cable Pull-out Dimension



**Note:** A 6-dia. or 8-dia. cable can be used by cutting the cable pull-out hole to the size of the cable to be used.

## Separator

### SEPARATOR FOR Z

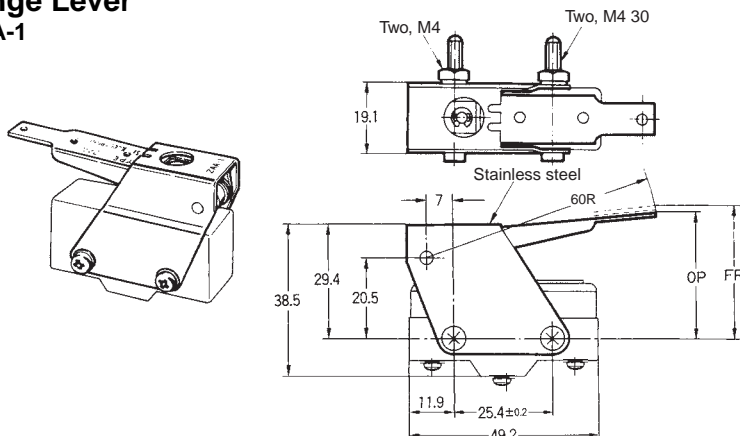


**Note:** The separator's material is EAVTC (Epoxide Alkyd Varnished Tetron Cloth) and its heat-resisting temperature is 130°C.

# Actuators

**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.  
2. These Actuators are not provided with Switches.

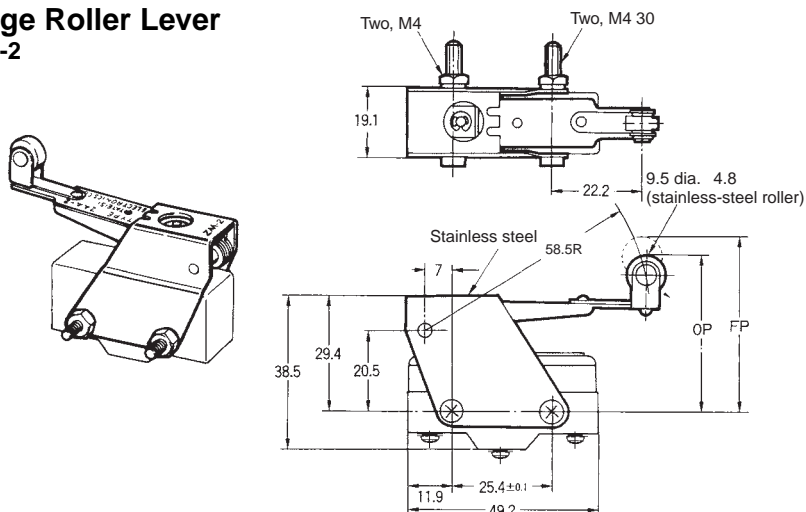
## Hinge Lever ZAA-1



Model	Z-15G-B	X-10G-B
OF max.	500 gf	500 gf
RF min.	170 gf	170 gf
PT max.	6 mm	6 mm
OT min.	12.7 mm	12.7 mm
MD max.	2.2 mm	3.3 mm
FP max.	32.9±1.6 mm	

**Note:** This Actuator can be used with the Z-15G(-B) and X-10G(-B). When mounting the Switch, set the overtravel to between 32% and 100%, taking into consideration the operating body and the distance between the Actuator and the dog.

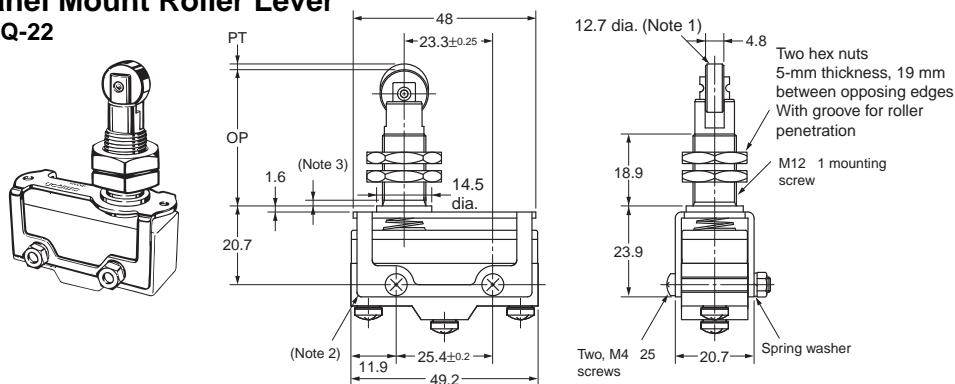
## Hinge Roller Lever ZAA-2



Model	Z-15G-B	X-10G-B
OF max.	500 gf	500 gf
RF min.	170 gf	170 gf
PT max.	6 mm	6 mm
OT min.	12.7 mm	12.7 mm
MD max.	2.2 mm	3.3 mm
FP max.	44.5±1.6 mm	

**Note:** This Actuator can be used with the Z-15G(-B) and X-10G(-B). When mounting the Switch, set the overtravel to between 32% and 100%, taking into consideration the operating body and the distance between the Actuator and the dog.

## Panel Mount Roller Lever ZAQ-22



Model	ZAQ-22	
	Z-15E-B	DZ-10G-B
OF max.	850 gf	1,131 gf
RF min.	114 gf	114 gf
PT max.	2 mm	2 mm
OT min.	3.58 mm	1 mm
MD max.	0.15 mm	0.46 mm
OP	37±0.8 mm	35.4±1.2 mm

**Note:** This Actuator (panel mount roller plunger) can be used with standard pin plungers (Z-15G(-B), Z-15E(-B), and DZ-10G-1A(-1B)).

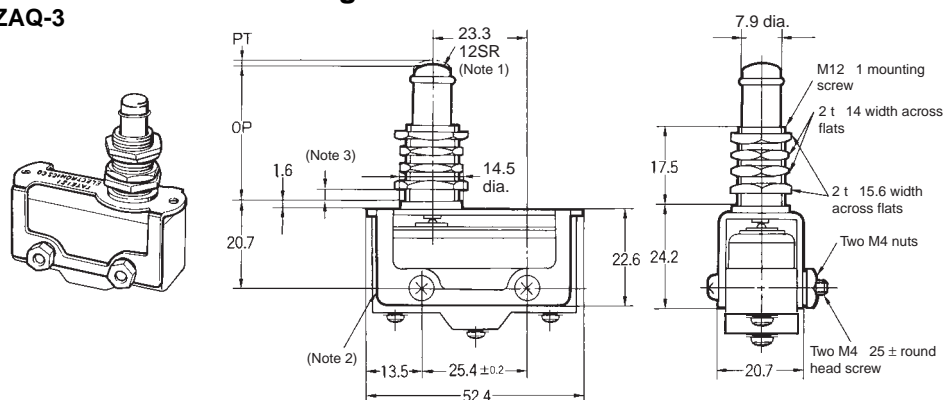
The ZAQ-22 is constructed of ferrous material. Therefore, it cannot be used with X switches due to the permanent magnet used within those models.

**Note:** 1. Stainless-steel pin plunger  
2. Bronze frame  
3. Incomplete screw section part with a maximum of 1.5 mm.

**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.  
2. These Actuators are not provided with Switches.

## Short Panel Mount Plunger

### ZAQ-3

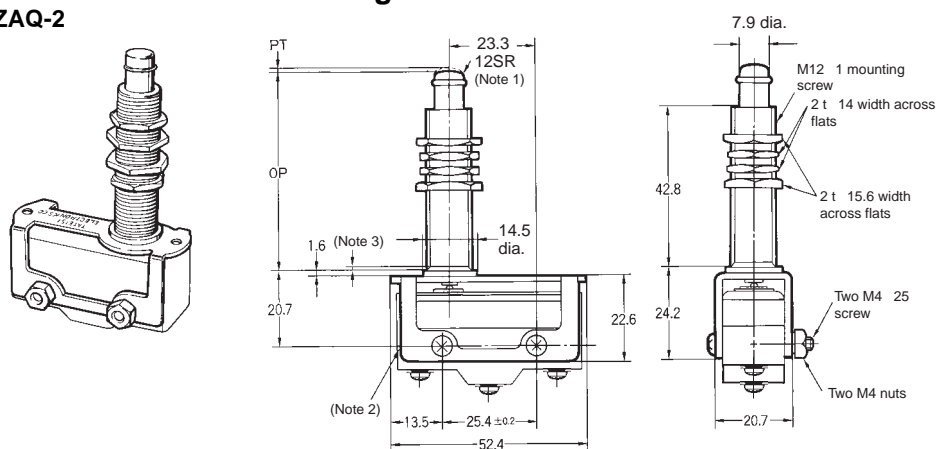


Model	ZAQ-3	
	Z-15E-B	X-10G-B
OF max.	850 gf	550 gf
RF min.	114 gf	114gf
PT max.	0.8 mm	1 mm
OT min.	4.8 mm	4.5 mm
MD max.	0.15 mm	0.2 mm
OP	27.8 $\pm$ 1.5 mm	

**Note:** 1. Stainless-steel pin plunger  
2. Bronze frame  
3. Incomplete screw section part with a maximum of 1.5 mm

## Medium Panel Mount Plunger

### ZAQ-2

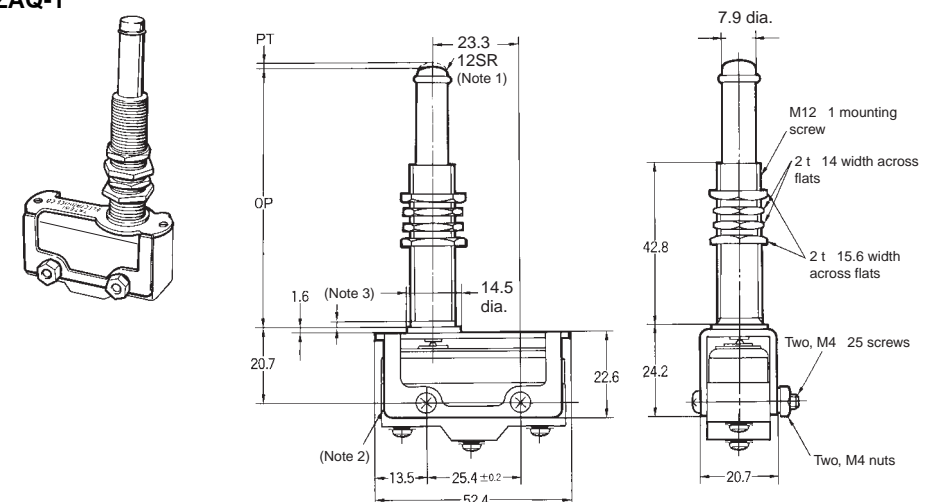


Model	ZAQ-2	
	Z-15E-B	X-10G-B
OF max.	850 gf	550 gf
RF min.	114 gf	114 gf
PT max.	0.8 mm	1 mm
OT min.	4.8 mm	4.5 mm
MD max.	0.15 mm	0.2 mm
OP	53.2 $\pm$ 1.5 mm	

**Note:** 1. Stainless-steel pin plunger  
2. Bronze frame  
3. Incomplete screw section part with a maximum of 1.5 mm

## Long Panel Mount Plunger

### ZAQ-1



Model	ZAQ-1	
	Z-15E-B	X-10G-B
OF max.	850 gf	550 gf
RF min.	114 gf	114 gf
PT max.	0.8 mm	1 mm
OT min.	20.6 mm	20.4 mm
MD max.	0.15 mm	0.2 mm
OP	69.1 $\pm$ 1.5 mm	

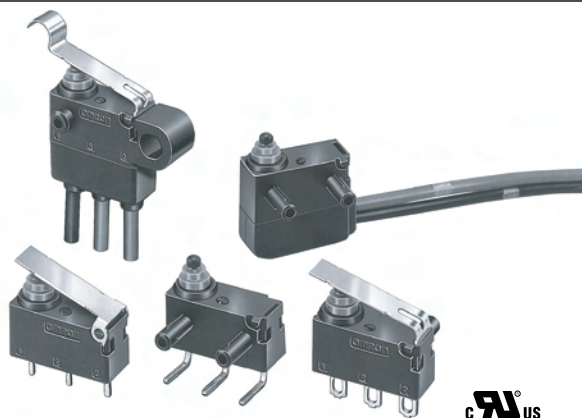
**Note:** 1. Stainless-steel pin plunger  
2. Bronze frame  
3. Incomplete screw section part with a maximum of 1.5 mm

**Note:** Except for the ZAQ-22, these actuators (panel mount plungers) can be used with standard pin plunger versions of the Z and X models. (Z-15G(-B), Z-15E(-B), X-10G(-B))

# Sealed Subminiature Snap Action Switch D2HW

**Smallest Sealed Snap-Action Switch in the Industry With a Long Stroke For Reliable ON/OFF Action**








- Conforms to IP67
- Case dimensions 22% smaller than conventional models
- Extra-long stroke even without levers (OT: 1.4 mm)
- All models are lead-free, including lead wire models
- RoHS Compliant







## Ordering Information

Add "S" to the end of the model number for the UL/CSA-approved version. Consult your OMRON sales representative for details.

### ■ PCB-Mounted Models










Actuator	Terminals		Contact form	Model		
				With posts on right 	With posts on left 	Without posts 
Pin plunger 	For PCB	Straight	SPDT	---	---	D2HW-A201D
		Angled		D2HW-BR201DR	D2HW-BL201DL	---
Hinge lever 		Straight		---	---	D2HW-A211D
		Angled		D2HW-BR211DR	D2HW-BL211DL	---
Long hinge lever 		Straight		---	---	D2HW-A221D
		Angled		D2HW-BR221DR	D2HW-BL221DL	---
Simulated roller lever 		Straight		---	---	D2HW-A231D
		Angled		D2HW-BR231DR	D2HW-BL231DL	---

### ■ Models with Solder Terminals or Lead Wire Terminals

Actuator	Terminals		Contact form	Model		
				With posts on right 	With posts on left 	M3-screw mounting 
Pin plunger 	Solder		SPDT	D2HW-BR201H	D2HW-BL201H	D2HW-C201H
	Lead wire	Downwards	SPDT	D2HW-BR201M	D2HW-BL201M	D2HW-C201M
			SPST-NC	D2HW-BR202M	D2HW-BL202M	D2HW-C202M
			SPST-NO	D2HW-BR203M	D2HW-BL203M	D2HW-C203M

(This table continues on the next page.)








Actuator	Terminals		Contact form	Model			
				With posts on right 	With posts on left 	M3-screw mounting 	
	Lead wire	Right-side	SPST-NC	D2HW-BR202MR	D2HW-BL202MR	D2HW-C202MR	
			SPST-NO	D2HW-BR203MR	D2HW-BL203MR	D2HW-C203MR	
		Left-side	SPST-NC	D2HW-BR202ML	D2HW-BL202ML	—	
			SPST-NO	D2HW-BR203ML	D2HW-BL203ML	—	
	Solder		SPDT	D2HW-BR211H	D2HW-BL211H	D2HW-C211H	
	Lead wire	Downwards	SPDT	D2HW-BR211M	D2HW-BL211M	D2HW-C211M	
			SPST-NC	D2HW-BR212M	D2HW-BL212M	D2HW-C212M	
			SPST-NO	D2HW-BR213M	D2HW-BL213M	D2HW-C213M	
		Right-side	SPST-NC	D2HW-BR212MR	D2HW-BL212MR	D2HW-C212MR	
			SPST-NO	D2HW-BR213MR	D2HW-BL213MR	D2HW-C213MR	
		Left-side	SPST-NC	D2HW-BR212ML	D2HW-BL212ML	—	
			SPST-NO	D2HW-BR213ML	D2HW-BL213ML	—	
	Solder		SPDT	D2HW-BR221H	D2HW-BL221H	D2HW-C221H	
	Lead wire	Downwards	SPDT	D2HW-BR221M	D2HW-BL221M	D2HW-C221M	
			SPST-NC	D2HW-BR222M	D2HW-BL222M	D2HW-C222M	
			SPST-NO	D2HW-BR223M	D2HW-BL223M	D2HW-C223M	
		Right-side	SPST-NC	D2HW-BR222MR	D2HW-BL222MR	D2HW-C222MR	
			SPST-NO	D2HW-BR223MR	D2HW-BL223MR	D2HW-C223MR	
		Left-side	SPST-NC	D2HW-BR222ML	D2HW-BL222ML	—	
			SPST-NO	D2HW-BR223ML	D2HW-BL223ML	—	
				Solder		SPDT	D2HW-BR231H
	Lead wire	Downwards		SPDT	D2HW-BR231M	D2HW-BL231M	D2HW-C231M
SPST-NC				D2HW-BR232M	D2HW-BL232M	D2HW-C232M	
SPST-NO				D2HW-BR233M	D2HW-BL233M	D2HW-C233M	
Right-side		SPST-NC		D2HW-BR232MR	D2HW-BL232MR	D2HW-C232MR	
		SPST-NO		D2HW-BR233MR	D2HW-BL233MR	D2HW-C233MR	
	Solder		SPDT	D2HW-BR241H	D2HW-BL241H	D2HW-C241H	
	Lead wire	Downwards	SPDT	D2HW-BR241M	D2HW-BL241M	D2HW-C241M	
			SPST-NC	D2HW-BR242M	D2HW-BL242M	D2HW-C242M	
			SPST-NO	D2HW-BR243M	D2HW-BL243M	D2HW-C243M	
		Right-side	SPST-NC	D2HW-BR242MR	D2HW-BL242MR	D2HW-C242MR	
SPST-NO			D2HW-BR243MR	D2HW-BL243MR	D2HW-C243MR		
Left-side		SPST-NC	D2HW-BR242ML	D2HW-BL242ML	---		
		SPST-NO	D2HW-BR243ML	D2HW-BL243ML	---		
			Solder		SPDT	D2HW-BR261H	D2HW-BL261H
Lead wire	Downwards		SPDT	D2HW-BR261M	D2HW-BL261M	D2HW-C261M	
			SPST-NC	D2HW-BR262M	D2HW-BL262M	D2HW-C262M	
			SPST-NO	D2HW-BR263M	D2HW-BL263M	D2HW-C263M	
	Right-side		SPST-NC	D2HW-BR262MR	D2HW-BL262MR	D2HW-C262MR	
			SPST-NO	D2HW-BR263MR	D2HW-BL263MR	D2HW-C263MR	
	Left-side		SPST-NC	D2HW-BR262ML	D2HW-BL262ML	—	
			SPST-NO	D2HW-BR263ML	D2HW-BL263ML	—	

Add "S" to the end of the model number for the UL/CSA-approved version. Consult your OMRON sales representative for details.

(This table continues on the next page.)

Ordering Information - continued from previous page

Actuator	Terminals		Contact form	Model		
				With posts on right 	With posts on left 	M3-screw mounting 
Simulated roller leaf lever 	Solder		SPDT	D2HW-BR271H	D2HW-BL271H	D2HW-C271H
	Lead wire	Downwards	SPDT	D2HW-BR271M	D2HW-BL271M	D2HW-C271M
			SPST-NC	D2HW-BR272M	D2HW-BL272M	D2HW-C272M
			SPST-NO	D2HW-BR273M	D2HW-BL273M	D2HW-C273M
		Right-side	SPST-NC	D2HW-BR272MR	D2HW-BL272MR	D2HW-C272MR
			SPST-NO	D2HW-BR273MR	D2HW-BL273MR	D2HW-C273MR
		Left-side	SPST-NC	D2HW-BR272ML	D2HW-BL272ML	—
			SPST-NO	D2HW-BR273ML	D2HW-BL273ML	—
Long leaf lever 	Lead wire	Downwards	SPDT	D2HW-BR281M	D2HW-BL281M	D2HW-C281M
			SPST-NC	D2HW-BR282M	D2HW-BL282M	D2HW-C282M
			SPST-NO	D2HW-BR283M	D2HW-BL283M	D2HW-C283M
		Right-side	SPST-NC	—	—	D2HW-C282MR
			SPST-NO	—	—	D2HW-C283MR

**Note:** 1. The length of standard lead wires (AVSS 0.5 = standard with UL1007 AWG 24 used on UL/CSA models.) for lead wire models is 30 cm (12 in).  
2. Add "S" to the end of the model number for the UL/CSA-approved version. Consult your OMRON sales representative for details.

## Specifications

### ■ Characteristics

Item	Specification
Operating speed	1 mm to 500 mm/s (for pin plunger models)
Operating frequency	30 operations/min.
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance (initial value)	100 mΩ max. (lead wire models: 150 mΩ max.)
Dielectric strength	600 VAC, 50/60 Hz for 1 min. between terminals of the same polarity 1,500 VAC, 50/60 Hz for 1 min. between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts
Vibration resistance (See note 2)	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance (See note 2)	Destruction: 1,000 m/s <sup>2</sup> max. Malfunction: 300 m/s <sup>2</sup> max.
Life expectancy (Consult Omron for test conditions)	Mechanical: 1,000,000 operations min. (30 operations/min.) Electrical: 100,000 operations min. (20 operations/min.)
Degree of protection	IP67 (excluding the terminals on terminal models)
Degree of protection against electric shock	Class I
Proof tracking index (PTI)	175
Ambient operating temperature	-40 to 85°C (with no icing)
Ambient operating humidity	95% max. (in temperature range 5° to 35°C)
Weight	Approx. 0.7 g (for pin plunger models with terminals)

**Note:** 1. The data given above are initial values.

2. For the pin plunger models, the above values apply for use at the free position, operating position, and total travel position. For the lever models, they apply at the total travel position. The values shown apply for malfunctions of 1 ms max.

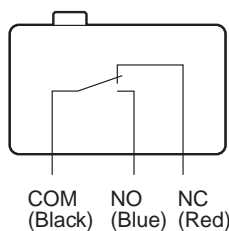
### ■ Ratings

Rated voltage (V)	Resistive load
125 VAC	0.1 A
12 VDC	2 A
24 VDC	1 A
42 VDC	0.5 A

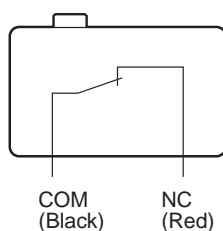
**Note:** The ratings apply under the following test conditions: Ambient Temperature = 20±2°C, Ambient Humidity = 65±5%, Operating frequency = 30 operations/min.

## ■ Contact Form

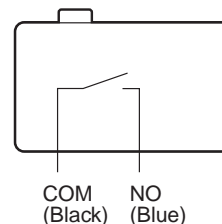
### SPDT



### SPST-NC (Lead Wire Models Only)



### SPST-NO (Lead Wire Models Only)



**Note:** Lead wire colors are indicated in parentheses.

## ■ Approved Standards

Consult your OMRON sales representative for specific models with standard approvals.

**UL1054 (File No. E41515)/CSA C22.2 No. 55 (UL approval)**

Rated voltage	D2HW
125 VAC	0.1 A
12 VDC	2 A

## ■ Contact Specifications

Item	Specification
<b>Specification</b>	Crossbar
<b>Material</b>	Gold alloy
<b>Gap (standard value)</b>	0.5 mm
<b>Minimum applicable load (see note)</b>	1 mA at 5 VDC

**Note:** Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003).

The equation  $\lambda_{60}=0.5 \times 10^{-6}/\text{operations}$  indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%.

# Dimensions

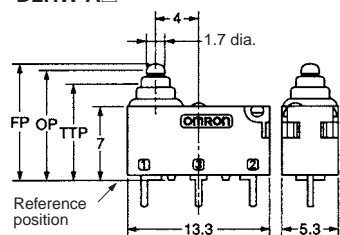
## ■ Mounting Structure and Reference Positions for Operating Characteristics

**Note:** 1. All units are in millimeters unless otherwise indicated.

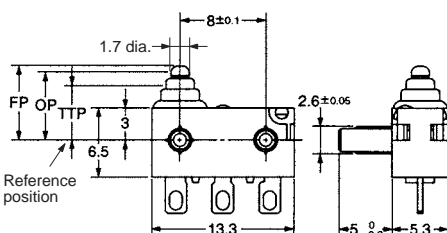
2. Dimensions not indicated in the diagrams have a tolerance of  $\pm 0.2$  mm

3. The reference positions used for FP, OP, and TTP values are as shown below for each type of mounting.

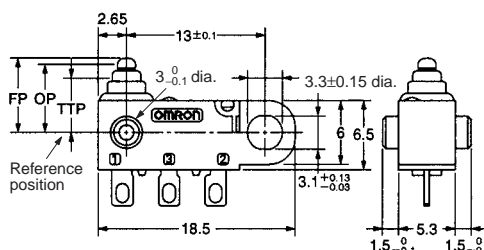
### Models without Posts D2HW-A□



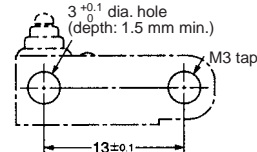
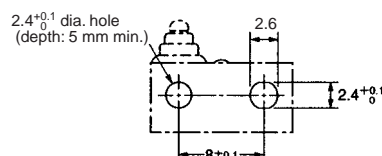
### Models with Posts D2HW-B□



### M3-screw Mounting Models D2HW-C□

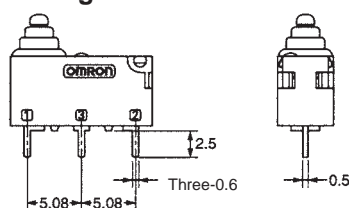


### Mounting Hole Dimensions (Reference) Mounting Hole Dimensions (Reference)

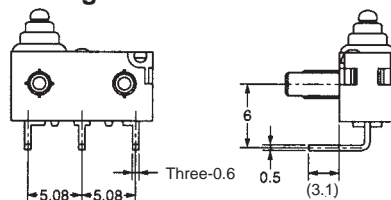


## ■ Terminals

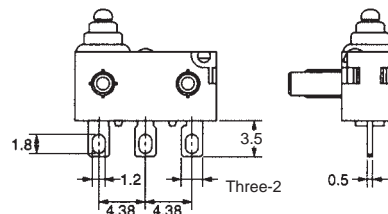
### Straight PCB Terminals



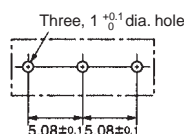
### Angled PCB Terminals



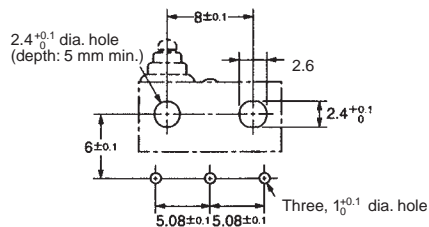
### Solder Terminals



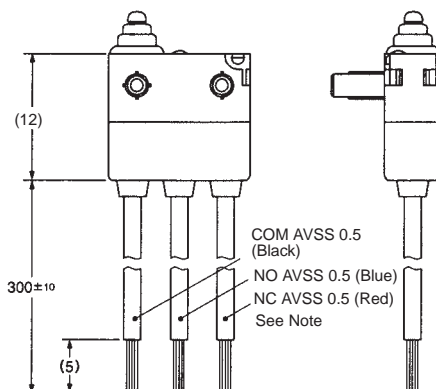
### PCB Cutout Dimensions (Reference)



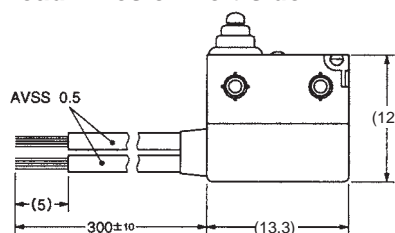
### PCB Cutout Dimensions (Reference)



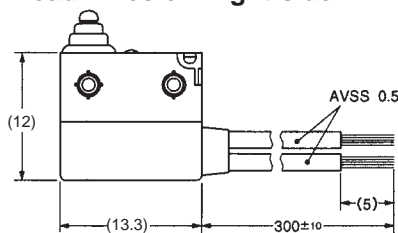
### Lead Wires Downwards



### Lead Wires on Left-side

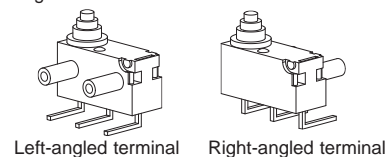


### Lead Wires on Right-side



**Note:** UL1007 AWG24 wires are used for UL/CSA approved models.


Angled terminal directions are shown below.



Left-angled terminal

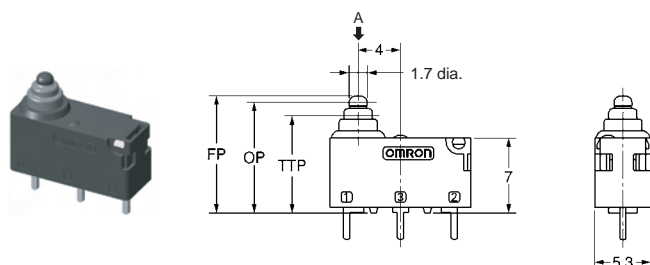
Right-angled terminal

# Dimensions and Operating Characteristics

- Note:** 1. All units are in millimeters unless otherwise indicated.  
2. Dimensions not indicated in the diagrams below have a tolerance of  $\pm 0.2$  mm.  
3. The operating characteristics are for operation in the A direction (  ).

## Pin Plunger Models

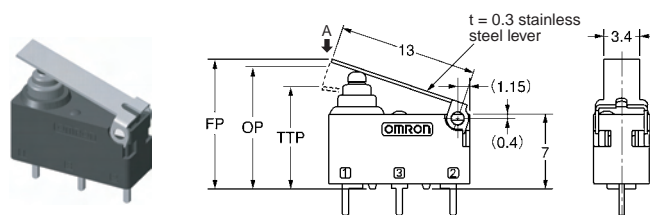
D2HW-□20□□



Characteristic	Models without posts	Models with posts and M3-mounting models
OF max. RF min.	0.75 N {76 gf} 0.10 N {10 gf}	
OT ref. MD max.	1.4 mm (reference value) 0.25 mm	
FP max. OP TTP max.	11.2 mm 10.4 $\pm$ 0.2 mm 9.1 mm	7.2 mm 6.4 $\pm$ 0.2 mm 5.1 mm

## Hinge Lever Models

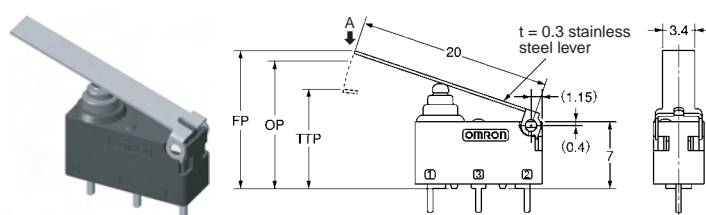
D2HW-□21□□



Characteristic	Models without posts	Models with posts and M3-mounting models
OF max. RF min.	0.75 N {76 gf} 0.07 N {7 gf}	
OT ref. MD max.	1.6 mm (reference value) 0.5 mm	
FP max. OP TTP max.	12.8 mm 11.5 $\pm$ 0.5 mm 10 mm	8.8 mm 7.5 $\pm$ 0.5 mm 6 mm

## Long Hinge Lever Models

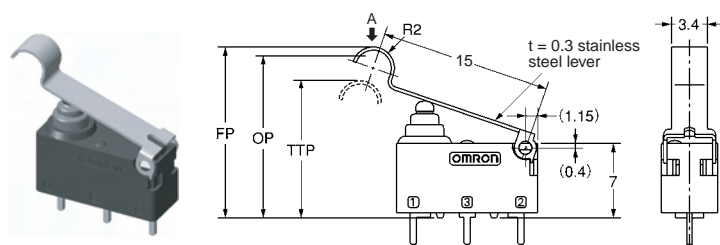
D2HW-□22□□



Characteristic	Models without posts	Models with posts and M3-mounting models
OF max. RF min.	0.5 N {50 gf} 0.03 N {3 gf}	
OT ref. MD max.	2.5 mm (reference value) 0.8 mm	
FP max. OP TTP max.	15.5 mm 13.3 $\pm$ 0.8 mm 11 mm	11.5 mm 9.3 $\pm$ 0.8 mm 7 mm

## Simulated Roller Hinge Lever Models

D2HW-□23□□

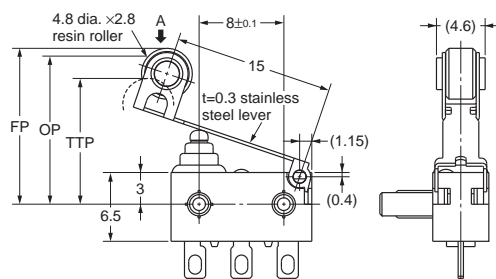


Characteristic	Models without posts	Models with posts and M3-mounting models
OF max. RF min.	0.65 N {66 gf} 0.05 N {5 gf}	
OT ref. MD max.	1.9 mm (reference value) 0.5 mm	
FP max. OP TTP max.	16.5 mm 15.2 $\pm$ 0.5 mm 13.5 mm	12.5 mm 11.2 $\pm$ 0.5 mm 9.5 mm

- Note:** 1. All units are in millimeters unless otherwise indicated.  
 2. Dimensions not indicated in the diagrams below have a tolerance of  $\pm 0.2$  mm.  
 3. The operating characteristics are for operation in the A direction (  $\downarrow$  ).

## Hinge Roller Lever Models

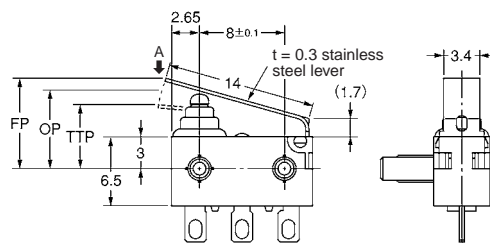
D2HW-□24□□



Characteristic	Models with posts and M3-mounting models
OF max. RF min.	0.65 N {66 gf} 0.03 N {3 gf}
OT ref. MD max.	1.9 mm (reference value) 0.6 mm
FP max. OP TTP max.	15.3 mm 14 $\pm 0.6$ mm 12.3 mm

## Leaf Lever Models

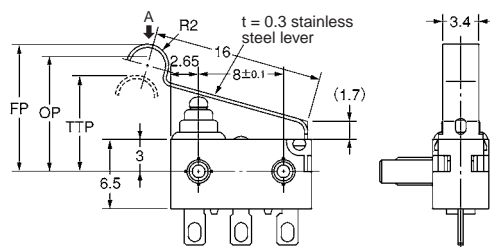
D2HW-□26□□



Characteristic	Models with posts and M3-mounting models
OF max. RF min.	1.8 N {183 gf} 0.20 N {20 gf}
OT ref. MD max.	1.8 mm (reference value) 0.5 mm
FP max. OP TTP max.	9.3 mm 7.4 $\pm 0.5$ mm 5.8 mm

## Simulated Roller Leaf Lever Models

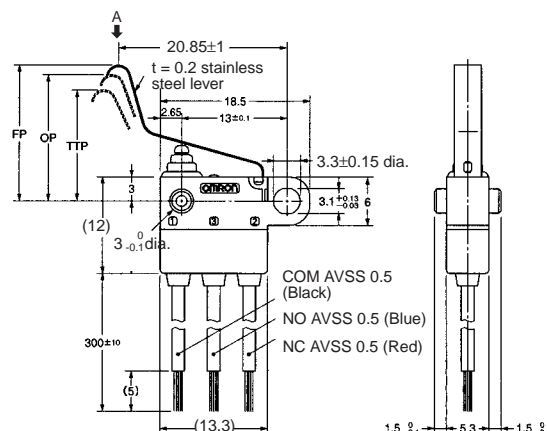
D2HW-□27□□



Characteristic	Models with posts and M3-mounting models
OF max. RF min.	1.8 N {183 gf} 0.20 N {20 gf}
OT ref. MD max.	2.0 mm (reference value) 0.5 mm
FP max. OP TTP max.	12.5 mm 10.8 $\pm 0.5$ mm 8.9 mm

## Long Leaf Lever Models

D2HW-□28□□



Characteristic	Models with posts and M3-mounting models
OF max. RF min.	0.9 N {92 gf} 0.05 N {5 gf}
OT ref. MD max.	2.8 mm (reference value) 0.7 mm
FP max. OP TTP max.	19 mm 15.4 $\pm 1.5$ mm 12.8 mm

**Note:** UL1007 AWG24 wires are used for UL/CSA approved models.

# Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## ■ Cautions

### Degree of Protection

IEC Publication 529, degree of protection IP67.

Do not use this product in water. Although molded lead wire models satisfy the test conditions for the standard given below, this test is to check the ingress of water into the switch enclosure after submerging the Switch in water for a given time. Satisfying this test condition does not mean that the Switch can be used in water.

Do not operate the Switch when it is exposed to water spray, or when water drops adhere to the Switch surface, or during sudden temperature changes, otherwise water may intrude into the interior of the Switch due to a suction effect.

Prevent the Switch from coming into contact with oil and chemicals. Otherwise, damage to or deterioration of Switch materials may result.

Do not use the Switch in areas where it is exposed to silicon adhesives, oil, or grease, otherwise faulty contact may result due to the generation of silicon oxide.

### Terminal Connection

When soldering the lead wire to the terminal, first insert the lead wire conductor through the terminal hole and then conduct soldering.

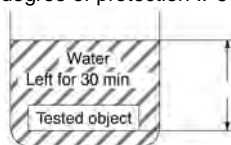
Made sure that the capacity of the soldering iron is 30 W maximum. Do not take more than 3 s to solder the switch terminal. Improper soldering involving an excessively high temperature or excessive soldering time may deteriorate the characteristics of the Switch.

When soldering the lead wire to the PCB terminal, pay careful attention so that the flux and solder liquid level does not exceed the PCB level.

### Side-actuated (Cam/Dog) Operation

When using a cam or dog to operate the Switch, factors such as the operating speed, operating frequency, push-button indentation, and material and shape of the cam or dog will affect the durability of the Switch. Confirm performance specifications under actual operation conditions before using the Switch in applications.

IEC Publication 529, degree of protection IP67.



## ■ Correct Use

### Mounting

Turn OFF the power supply before mounting or removing the Switch, wiring, or performing maintenance or inspection. Failure to do so may result in electric shock or burning.

For M3-screw mounting models, use M3 mounting screws with plane washers or spring washers to securely mount the Switch. Tighten the screws to a torque of 0.27 to 0.29 N·m. Exceeding the specified torque may result in deterioration of the sealing or damage.

For models with posts, secure the posts by thermal caulking or by pressing into an attached device. When pressed into an attached device, provide guides on the opposite ends of the posts to ensure that they do not fall out or rattle.

Mount the Switch onto a flat surface. Mounting on an uneven surface may cause deformation of the Switch, resulting in faulty operation or damage.

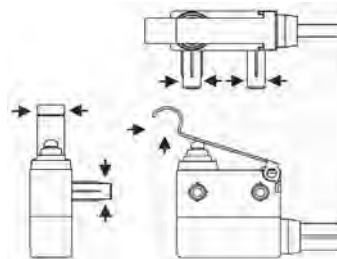
### Operating Body

Use an operating body with low frictional resistance and of a shape that will not interfere with the sealing rubber, otherwise the plunger may be damaged or the sealing may deteriorate.

### Handling

Do not handle the Switch in a way that may cause damage to the sealing rubber.

When handling the Switch, ensure that pressure is not applied to the posts in the directions shown in the following diagram. Also, ensure that uneven pressure or pressure in a direction other than the operating direction is not applied to the Actuator as shown in the following diagram. Otherwise, the post, Actuator, or Switch may be damaged, or the service life may be reduced.



### Wiring Molded Lead Wire Models

When wiring molded lead wire models, ensure that there is no weight on the wire or that there are no sharp bends near the parts where the wire is drawn out. Otherwise, damage to the Switch or deterioration in the sealing may result.

### Using Micro Loads

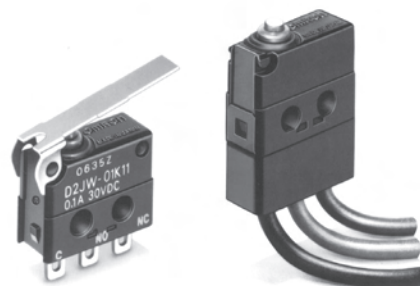
Even when using micro load models within the operating range, inrush currents or surges may decrease the life expectancy of the Switch. Therefore, insert a contact protection circuit where necessary.

# Sealed Snap Action Switch








## D2JW

### Immersion-Proof Subminiature Snap Action Switch

- Ultra-small and highly sealed
- Water-tight housing conforming to IEC IP67
- Wide range of operating temperature from -40° to 85°C
- Gold crossbar contact and coil spring offer long life expectancy and high reliability
- RoHS Compliant



## Ordering Information

Actuator		Model	
		Solder terminal 	Molded lead wires 
Pin plunger		D2JW-011	D2JW-011-MD
Short hinge lever		D2JW-01K1A1	D2JW-01K1A1-MD
Hinge lever		D2JW-01K11	D2JW-01K11-MD
Simulated roller lever		D2JW-01K31	D2JW-01K31-MD
Hinge roller lever		D2JW-01K21	D2JW-01K21-MD

**Note:** The length of the standard molded lead wire (AVS0.3f, equivalent to AWG18) is 30 cm (12 in).

### Model Number Legend

D2JW-01   -   -    

1   2   3   4

- |  |  |   |  |
|--|--|---|--|
| <b>1. Ratings</b><br>01: 0.1 A at 30 VDC | <b>2. Actuator</b><br>None: Pin plunger<br>K1A: Short hinge lever<br>K1: Hinge lever<br>K3: Simulated roller lever<br>K2: Hinge roller lever | <b>3. Contact Form</b><br>1: SPDT<br>2: SPST-NC*<br>3: SPST-NO*<br><br>*Lead wire versions only | <b>4. Terminals</b><br>None: Solder terminals<br>MD: Molded lead wires |
|--|--|---|--|

**Note:** Consult Omron regarding SPST-NO and SPST-NC models.



# Specifications

## ■ Characteristics

Operating speed (see note 2)	1 mm to 250 mm/second
Operating frequency	Mechanical: 240 operations per minute max. Electrical: 30 operations per minute max.
Contact resistance	100 mΩ max. (Molded lead type: 140 mΩ min.)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength (See note 3)	600 VAC, 50/60 Hz for 1 minute between terminals of same polarity 1,000 VAC, 50/60 Hz for 1 minute between current-carrying metal part and ground, and between each terminal and noncurrent-carrying metal part
Vibration resistance (See note 4)	Malfunction: 10 to 55 Hz, 1.5 mm double amplitude
Shock resistance (See note 4)	Destruction: 1,000 m/s <sup>2</sup> (approx. 100G) max. Malfunction: 200 m/s <sup>2</sup> (approx. 20G) max.
Ambient operating temperature	-40° to 85°C (at 60% RH) with no icing or condensation
Ambient operating humidity	35% to 98% (for 5°C to 35°C)
Degree of protection	IEC IP67 (excluding the terminals on terminal models)
Degree of protection against electric shock	Class I
Proof tracking index (PRTI)	175
Service life	Mechanical: 1,000,000 operations min. at 60 operations per minute Electrical: 100,000 operations min. at 30 operations per minute
Weight	Approx. 7 g (pin plunger with molded lead wire models)

- Note:** 1. Data shown are of initial value.  
 2. The values are for pin plunger type.  
 3. The dielectric strength values shown apply when using a separator (terminal type)  
 4. The values shown apply for malfunctions of 1 ms max.

## ■ Ratings

Electrical rating	0.1 A, 30 VDC (resistive load)
-------------------	--------------------------------

- Note:** The ratings apply under the following test conditions:  
 Ambient Temperature = 20±2°C,  
 Ambient Humidity = 65±5%,  
 Operating frequency = 30 operations/min.

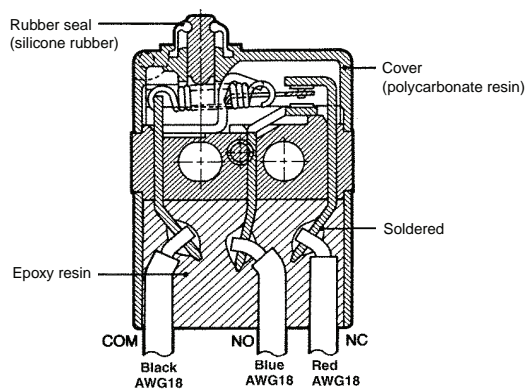
## ■ Contact Specifications

Item	Specification
Specification	Crossbar
Material	Gold alloy
Gap (standard value)	0.5 mm
Inrush current	0.1 A max.
Minimum applicable load (see note)	1 mA at 5 VDC

- Note:** Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003).  
 The equation  $\lambda_{60}=0.5 \times 10^{-6}$  / operations indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%

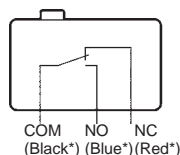
# Engineering Data

## ■ Construction

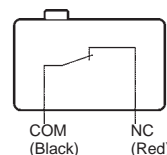


## ■ Contact Form

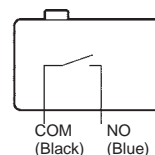
SPDT



SPST-NC



SPST-NO



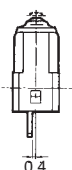
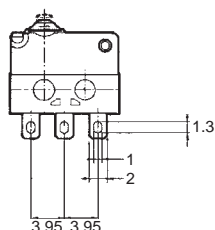
\*Indicates the color of the lead wire.

# Dimensions

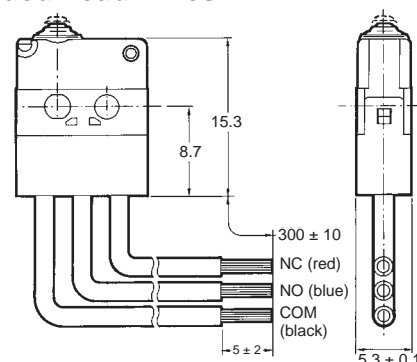
## ■ Terminals

**Note:** Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions

### Solder Terminals

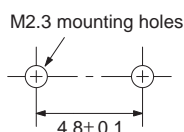


### Molded Lead Wires



## ■ Mounting

All switches may be panel mounted using M2.3 mounting screws with plane washers or spring washers to securely mount the switch. Tighten the screws to a torque of 0.20 to 0.29 N·m.

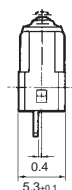
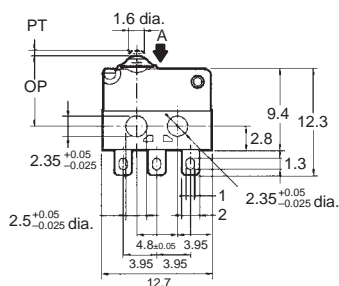
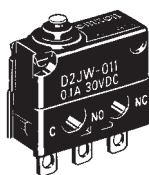


## ■ Dimensions and Operating Characteristics

- Note:**
1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions
  2. The following illustrations and dimensions are for models with PCB terminals. Refer to "Terminals" for models with molded lead wires.
  3. The operating characteristics are for operation in the A direction (▼)

### Pin Plunger Models

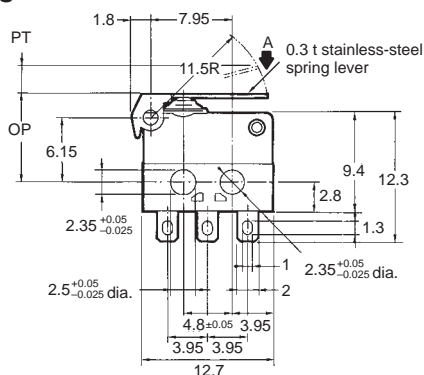
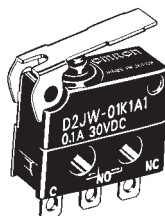
D2JW-011



OF max.	250 gf
RF min.	100 gf
PT max.	0.6 mm
OT min.	0.3 mm
MD max.	0.1 mm
OP	8.1 ± 0.3 mm

### Short Hinge Lever Models

D2JW-01K1A1

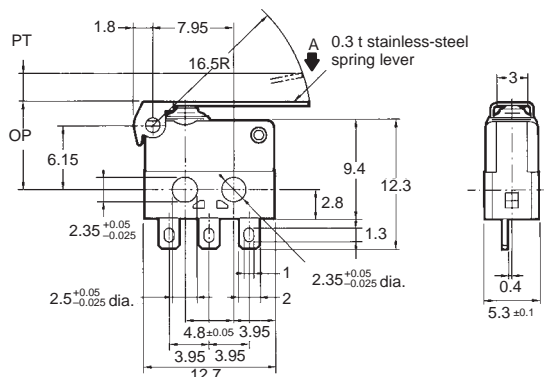
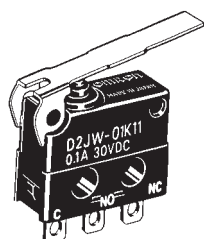


OF max.	117 gf
RF min.	23 gf
PT max.	5.4 mm
OT min.	0.7 mm
MD max.	0.5 mm
OP	8.4 ± 0.8 mm

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
 2. The following illustrations and dimensions are for models with PCB terminals. Refer to "Terminals" for models with molded lead wires.  
 3. The operating characteristics are for operation in the A direction(▼)

## Hinge Lever Models

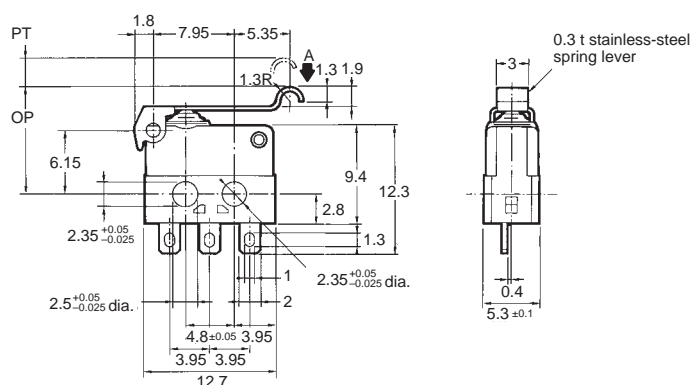
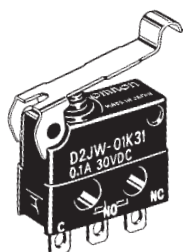
### D2JW-01K11



OF max.	82 gf
RF min.	16 gf
PT max.	6.4 mm
OT min.	1.4 mm
MD max.	0.7 mm
OP	$8.4 \pm 0.8$ mm

## Simulated Roller Lever Models

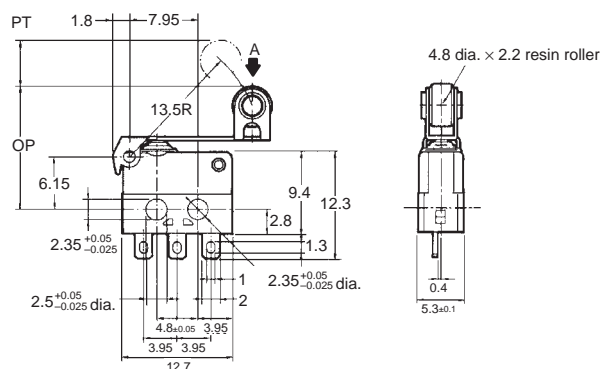
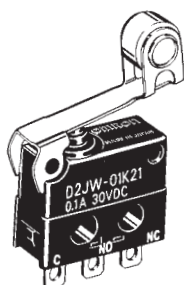
### D2JW-01K31



OF max.	97 gf
RF min.	20 gf
PT max.	5.5 mm
OT min.	1.1 mm
MD max.	0.6 mm
OP	$10.3 \pm 0.8$ mm

## Hinge Roller Lever Models

### D2JW-01K21



OF max.	100 gf
RF min.	20 gf
PT max.	5.2 mm
OT min.	1.1 mm
MD max.	0.5 mm
OP	$14.6 \pm 0.8$ mm

# Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## ■ Protection against chemicals

Prevent the switch from coming into contact with oil and chemicals. Otherwise, damage to or deterioration of switch materials may result.

Because the switch uses polycarbonate resin as material for its component parts, contact OMRON if the switch material is likely to deteriorate due to adherence of oil or chemicals to the switch housing.

## ■ Soldering

To solder the lead to the terminal, apply a soldering iron rated at 30 W max. (temperature of soldering iron: 250°C max.) for no more than 3 seconds.

Note that if soldering is not carried out under the proper conditions, there is a danger of over-heating and subsequent heat damage.

Applying a soldering iron for more than three seconds or using one that is rated at more than 30 W may degrade the switch characteristics.

## ■ Operation

Make sure that the operating body pushes the switch actuator with an adequate force when the switch is to be operated, and that it does not touch the actuator when the switch is released.

Install the pin plunger switch so that the operating force is applied in alignment with the stroke of the actuator.

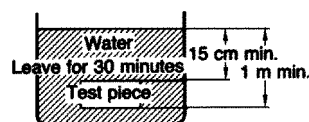
Do not apply excessive force to the actuator; otherwise, the switch may be damaged.

## ■ Degree of Protection

The D2JW satisfies the following test condition specified by the IEC Publication 529 (Degree of Protection by Enclosure):

Degree of protection: IP67

Test method: See the figure below.



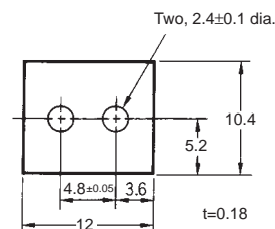
Leave the test piece in water for 30 minutes with the top of the test piece submerged 15 cm or more below the water level and the bottom of the test piece submerged 1 m or more below the water level.

This test is to check the ingress of water into the switch enclosure after submerging the switch in water for a given time. Note that even if this test condition is met, the switch cannot be used in water.

## ■ Separator

When mounting the switch on a metallic surface, be sure to provide a separator between the switch and the mounting plates.

Reference the following dimensions when designing the separator;

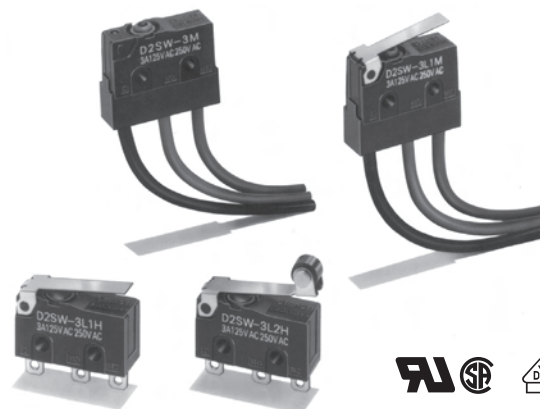


# MEMO





# Sealed Snap Action Switch D2SW

## Watertight Miniature Snap Action Switch

- High-quality watertight miniature Snap Action switch. Switch Body meets IP67 (IEC 529) requirements
- Monoblock construction assures high sealing capability and is ideal for dusty places or where water is sprayed
- Wide operating temperature range of -40°C to 85°C
- Perfect for the automobile, agriculture machinery, automatic vending machine, refrigerator, ice-manufacturing, hot-water supply, air conditioner, and industrial equipment, which require highly environment-resistive capabilities
- RoHS Compliant



## Ordering Information

Actuator	Terminal	Model	
		Model 3 A	Model 0.1 A
Pin plunger 	Solder terminals	D2SW-3HS	D2SW-01HS
	Quick-connect terminals (#110)	D2SW-3TS	D2SW-01TS
	PCB terminals	D2SW-3DS	D2SW-01DS
	With lead wires	D2SW-3MS	D2SW-01MS
Hinge lever 	Solder terminals	D2SW-3L1HS	D2SW-01L1HS
	Quick-connect terminals (#110)	D2SW-3L1TS	D2SW-01L1TS
	PCB terminals	D2SW-3L1DS	D2SW-01L1DS
	With lead wires	D2SW-3L1MS	D2SW-01L1MS
Simulated roller lever 	Solder terminals	D2SW-3L3HS	D2SW-01L3HS
	Quick-connect terminals (#110)	D2SW-3L3TS	D2SW-01L3TS
	PCB terminals	D2SW-3L3DS	D2SW-01L3DS
	With lead wires	D2SW-3L3MS	D2SW-01L3MS
Hinge roller lever 	Solder terminals	D2SW-3L2HS	D2SW-01L2HS
	Quick-connect terminals (#110)	D2SW-3L2TS	D2SW-01L2TS
	PCB terminals	D2SW-3L2DS	D2SW-01L2DS
	With lead wires	D2SW-3L2MS	D2SW-01L2MS

**Note:** 1. "S" at the end of the part number signifies UL/CSA approved models.

2. The standard lengths of the lead wires (UL1015 AWG22 for UL/CSA models, AV0.5f otherwise.) of models incorporating them are 30 cm.

## Model Number Legend

D2SW-    

1   2   3   4

### 1. Ratings

3: 3 A at 125 VAC  
01: 0.1 A at 30 VDC

### 2. Actuator

None: Pin plunger  
L1: Hinge lever  
L2: Hinge roller lever  
L3: Simulated roller lever

### 3. Contact Form

None: SPDT  
-2: SPST-NC\*  
-3: SPST-NO\*

\*Lead wire versions only

### 4. Terminals

H, HS: Solder terminals (HS for UL and CSA approval)  
D, DS: PCB terminals (DS for UL and CSA approval)  
T, TS: Quick-connect terminals (#110)  
(TS for UL and CSA approval)  
M, MS: Molded lead wires (MS for UL and CSA approval)

# Specifications

## ■ Characteristics

Item		D2SW-3	D2SW-01
Operating speed		0.1 mm to 1 m/second (at pin plunger)	
Operating frequency		Mechanical: 300 operations/minute max. Electrical: 30 operations/minute max.	
Insulation resistance		100 MΩ min. (at 500 VDC)	
Contact resistance		30 mΩ max. for terminal models	50 mΩ max. for terminal models
		50 mΩ max. for lead wire models	70 mΩ max. for lead wire models
Dielectric strength (See note 2)		1,000 VAC, 50/60 Hz for 1 min. between terminals of the same polarity	600 VAC, 50/60 Hz for 1 min. between terminals of the same polarity
		1,500 VAC, 50/60 Hz for 1 min. between current-carrying metal parts and ground, and between each terminal and noncurrent-carrying metal parts	
Vibration resistance (See note 3)		Malfunction: 10 to 55 Hz, 1.5 mm double amplitude	
Shock resistance (See note 3)		Destruction: 1,000 m/s <sup>2</sup> (approx. 100G) max. Malfunction: 300 m/s <sup>2</sup> (approx. 30G) max.	
Ambient operating temperature		-40° to 85°C (at 60% RH) with no icing	
Ambient operating humidity		95% max. (for 5°C to 35°C)	
Degree of protection		IEC IP67 (excluding the terminals on terminal models)	
Degree of protection against electric shock		Class I	
Proof tracking index (PTI)		175	
Life expectancy	Mechanical	5,000,000 operations min. at 60 operations per minute	
	Electrical (30 operations per minute)	200,000 operations min. (3 A at 125 VAC) 100,000 operations min. (2 A at 250 VAC)	200,000 operations min. (at rated resistive load)
Weight	Terminal model	Approx. 2 g	
	Lead wire model	Approx. 10 g	

Note: 1. Data shown are of initial value.

2. The dielectric strength shown is measured using a separator between the switch and metal mounting plate

3. For pin plunger models, the above values apply for use at the free position, operating position, and total travel position. For models with levers, the values apply at the total travel position.

## ■ Ratings (reference values)

### D2SW-3

Rated Voltage	Non-inductive load (A)				Inductive load			
	Resistive load		Lamp load		Inductive load		Motor load	
	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	3 A		1 A	0.5 A	1 A	0.5 A	1 A	0.5 A
250 VAC	2 A		0.5 A	0.3 A	0.5 A	0.3 A	0.5 A	0.3 A
30 VDC	3 A		1 A		1 A		1 A	

### D2SW-01

Rated Voltage	Non-inductive load				Inductive load			
	Resistive load		Lamp load		Inductive load		Motor load	
	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	0.1 A		—		—		—	
30 VDC	0.1 A		—		—		—	

Note: 1. The resistive load ratings apply under the following test conditions:

Ambient Temperature = 20±2°C, Ambient Humidity = 65±5%, Operating frequency = 30 operations/min.

2. The above current ratings are the values of the steady-state current.

3. Inductive load has a power factor of 0.7 min. (AC) and a time constant of 7 ms max. (DC).

4. Lamp load has an inrush current of 10 times the steady-state current.

5. Motor load has an inrush current of 6 times the steady-state current.

## ■ Approvals

UL Recognized, CSA Certified

Rated Voltage	D2SW-3	D2SW-01
125 VAC	3 A	0.1 A
250 VAC	2 A	---
30 VDC	3 A	0.1 A

EN 61058-1 (VDE Approval)

Rated Voltage	D2SW-01
125 VAC	0.1 A

Testing conditions: 5E4 (50,000 operations), T85 (0°C to 85°C)

## ■ Contact Specifications

Item	D2SW-3	D2SW-01
Specification	Rivet	Crossbar
Material	Silver	Gold alloy
Gap (standard value)	0.5 mm	
Inrush current	NC: 20 A max. NO: 10 A max.	1 A max.
Minimum applicable load (see note)	160 mA at 5 VDC	1 mA at 5 VDC

**Note:** Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003).  
The equation  $\lambda_{60}=0.5 \times 10^{-6}$  / operations indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%

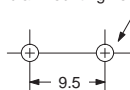
## Engineering data

### ■ Mounting

All switches may be panel mounted using M2.3 mounting screws with plane washers or spring washers to securely mount the switch. Tighten the screws to a torque of 0.23 to 0.26 N·m.

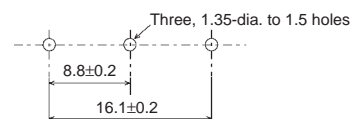
#### Panel Mounting

Two, 2.4-dia. mounting hole or M2.3 screw hole



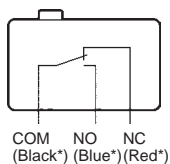
### ■ PCB Layout (reference)

#### PCB Mounting

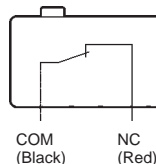


### ■ Structure

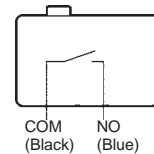
#### SPDT



#### SPST-NC



#### SPST-NO



\*Indicates the color of the lead wire.



**Note:** Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions

Technical drawing of the nozzle assembly showing front and side views with dimensions.

**Front View Dimensions:**

- Top flange thickness:  $3.3 \pm 0.1$
- Distance from top flange to first hole center:  $7.2$
- Distance between first and second hole centers:  $0.8$
- Distance between second and third hole centers:  $1.2$
- Distance from second hole center to nozzle tip:  $8.8 \pm 0.2$
- Distance from third hole center to nozzle tip:  $9.5 \pm 0.1$
- Distance from nozzle tip to side flange:  $0.7$
- Side flange thickness:  $2.9$
- Distance from nozzle tip to left edge:  $5.15$
- Distance from nozzle tip to right edge:  $16.1 \pm 0.2$
- Total width:  $19.8 \pm 0.2$
- Distance from left edge to first hole center:  $1.85$

**Side View Dimensions:**

- Top flange thickness:  $1.8 \pm 0.1$
- Distance from top flange to nozzle tip:  $3.9$
- Nozzle tip diameter:  $0.5$
- Distance from nozzle tip to side flange:  $1.3$
- Distance from nozzle tip to right edge:  $6.4 \pm 0.2$

Technical drawing of the 300V 10A 2P+N+PE type plug, showing front and side views with dimensions and labels.

**Dimensions:**

- Overall width: 16.9
- Width of the main body: 16.4
- Height of the main body: 9.2
- Height of the terminal block: 300±10
- Distance between the two main terminals: 5.15
- Distance between the main terminal and the ground terminal: 21.2
- Distance between the two ground terminals: 6.4±0.2
- Width of the terminal block: 6.4±0.2
- Height of the terminal block: 5
- Distance between the two main terminals: 9.5±0.1
- Distance between the main terminal and the ground terminal: 0.7

**Labels:**

- Common terminal (black) (see note)
- Vinyl insulator
- Normally open terminal (blue) (see note)
- Normally closed terminal (red)\*
- Stranded annealed copper wires

Stranded annealed copper wires

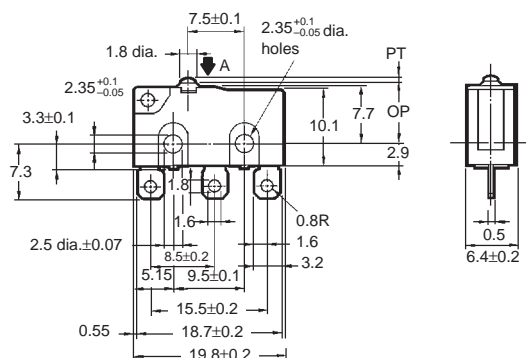
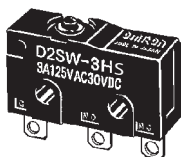
\* UL/CSA approved models have UL approved AWG22 wiring.

# Dimensions and Operating Characteristics

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
2. Omitted dimensions are the same as pin plunger type.  
3. The following illustrations and dimensions are for models with solder terminals. Refer to "Terminals" for models with quick-connect (#110) and PCB terminals.  
4. The operating characteristics are for operation in the A direction(▼)

## Pin Plunger Models

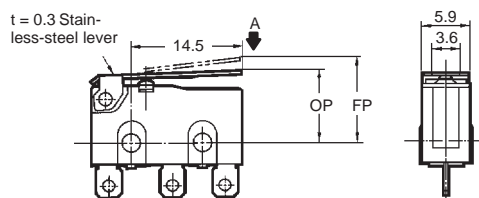
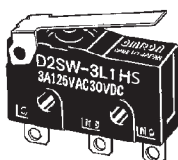
D2SW-3□S  
D2SW-01□S



OF	180 gf
RF min.	30 gf
PT max.	0.6 mm
OT min.	0.5 mm
MD max.	0.1 mm
OP	8.4 $\pm$ 0.3 mm

## Hinge Lever Models

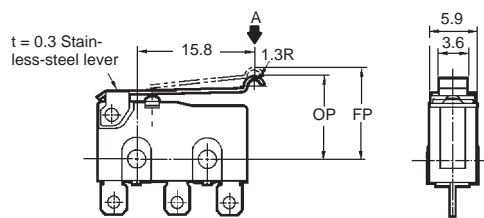
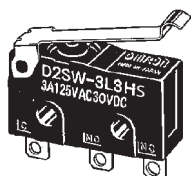
D2SW-3L1□S  
D2SW-01L1□S



OF	60 gf
RF min.	6 gf
OT min.	1.0 mm
MD max.	0.8 mm
FP max.	13.6 mm
OP	8.8 $\pm$ 0.8 mm

## Simulated Roller Lever Models

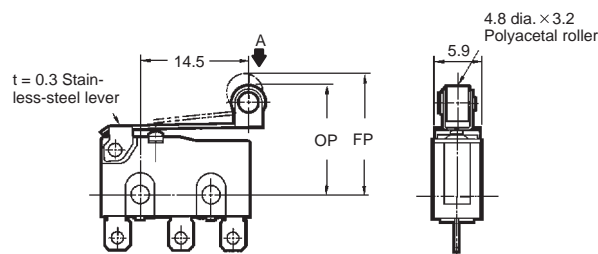
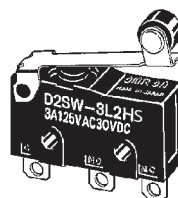
D2SW-3L3□S  
D2SW-01L3□S



OF	60 gf
RF min.	6 gf
OT min.	1.0 mm
MD max.	0.8 mm
FP max.	15.5 mm
OP	10.7 $\pm$ 0.8 mm

## Hinge Roller Lever Models

D2SW-3L2□S  
D2SW-01L2□S



OF	60 gf
RF min.	6 gf
OT min.	1.0 mm
MD max.	0.8 mm
FP max.	19.3 mm
OP	14.5 $\pm$ 0.8 mm

# Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## Correct Use

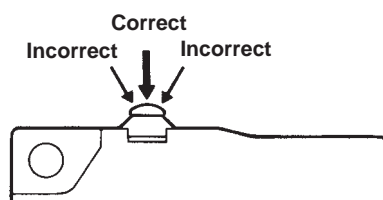
### Operation stroke

Make sure that the switching object is perfectly separated from the actuator when the switch is not operated and the actuator is pressed appropriately by the switching object when the switch is operated.

The switch should be set so that its stroke will be within the rated OT when the switch is operated.

### Handling

Install the switching object so that its moving direction is the same as that of the actuator. With the pin plunger models, set the switch so that the plunger can be actuated from directly above. Since the plunger is covered with a rubber cap, applying a force from lateral directions may cause damage to the plunger or reduction in the sealing capability.

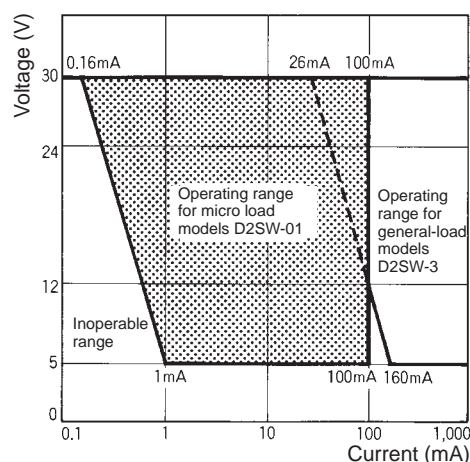


Handle D2SW models with pin plungers with care so that the sealing rubber parts around the pin plungers will not be damaged.

Make sure that there is no icing when using the D2SW at low ambient temperatures.

### Using Microloads

Using a model for ordinary loads to switch microloads may result in faulty operation. Instead, use the models that are designed for microloads and that operate in the following range;



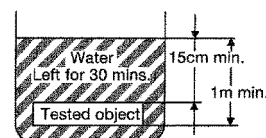
However, even when using microload models within the operating range shown above, if inrush current or inductive voltage spikes occur when the contact is opened or closed, then contact wear may increase and so decrease the service life. Therefore, insert a contact protection circuit where necessary.

## Cautions

### Degree of Protection

The D2SW was tested under water and passed the following watertightness test, which however, does not mean that the D2SW can be used in the water. JIS C0929 (rules for testing the watertightness of electrical devices and materials), class 7 (watertightness test). Refer to the following illustration for the test method.

IEC Publication 529, class IP67. Refer to the following illustration for the test method.



**Note:** The object to be tested is left in the water for 30 minutes on condition that the distance between the surface of the water and the top of the object be 15 cm minimum, and the distance between the surface of the water and the bottom of the object be 1 m minimum.

### Protection Against Chemicals

Prevent the switch from coming into contact with oil and chemicals. Otherwise, damage and deterioration to the switch materials may occur.

### Soldering

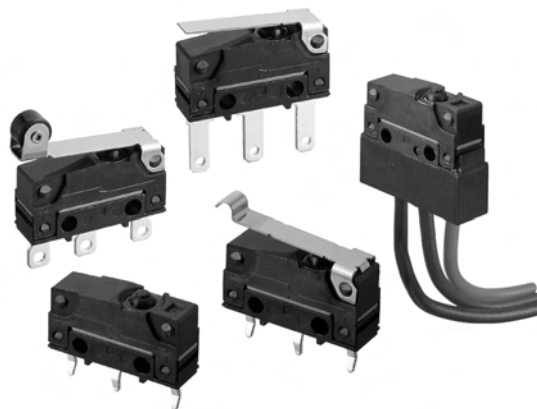
When soldering a lead wire to a terminal of the D2SW, use a soldering iron with a maximum capacity of 30 W and do not take more than 5 seconds to solder the lead wire, otherwise the characteristics of the D2SW may be altered.

# Sealed Subminiature Basic Switch

## D2SW-P

### Sealed Basic Switch with Simplified Construction, Mounting Compatible with SS and D2SW Series.

- Sealed to IEC IP67.
- Switch rating of 2A at 250 VAC possible with a single-leaf movable spring. Models for micro loads are also available.
- Solder, quick-connect terminals (#110), PCB terminals and molded lead wires are available. Even-pitched PCB terminals are also standardized.

C<sup>®</sup> US

## Ordering Information

Rating	Actuator	Terminal	Solder terminals	Quick-connect terminals (#110)	PCB terminals		Molded lead wires
					Uneven pitch	Even pitch	
2A	Pin plunger		D2SW-P2H	D2SW-P2T	D2SW-P2D	D2SW-P2B	D2SW-P2M
	Hinge lever		D2SW-P2L1H	D2SW-P2L1T	D2SW-P2L1D	D2SW-P2L1B	D2SW-P2L1M
	Hinge roller lever		D2SW-P2L2H	D2SW-P2L2T	D2SW-P2L2D	D2SW-P2L2B	D2SW-P2L2M
	Simulated roller lever		D2SW-P2L3H	D2SW-P2L3T	D2SW-P2L3D	D2SW-P2L3B	D2SW-P2L3M
0.1A	Pin plunger		D2SW-P01H	D2SW-P01T	D2SW-P01D	D2SW-P01B	D2SW-P01M
	Hinge lever		D2SW-P01L1H	D2SW-P01L1T	D2SW-P01L1D	D2SW-P01L1B	D2SW-P01L1M
	Hinge roller lever		D2SW-P01L2H	D2SW-P01L2T	D2SW-P01L2D	D2SW-P01L2B	D2SW-P01L2M
	Simulated roller lever		D2SW-P01L3H	D2SW-P01L3T	D2SW-P01L3D	D2SW-P01L3B	D2SW-P01L3M

**Note:** Consult your OMRON sales representative for details on SPST-NO and SPST-NC models.

### Model Number Legend

D2SW-P        

1   2   3   4

#### 1. Ratings

2: 2 A at 250 VAC  
01: 0.1 A at 30 VDC

#### 2. Actuator

None: Pin plunger  
L1: Hinge lever  
L2: Hinge roller lever  
L3: Simulated roller lever

#### 3. Contact Form

None: SPDT  
-2: SPST-NC\*  
-3: SPST-NO\*

\*Lead wire versions only

#### 4. Terminals

H: Solder terminals  
T: Quick-connect terminals (#110)  
D: PCB terminals (Uneven pitch)  
B: PCB terminals (even pitch)  
M: Molded lead wires

# Specifications

## ■ Characteristics

Item	Model	
	D2SW-P2	D2SW-P01
Operating speed	0.1 mm to 500 mm/s (pin plunger models)	
Operating frequency	Mechanical: 120 operations/min max. Electrical: 20 operations/min max.	
Insulation resistance	100 MΩ min. (at 500 VDC)	
Contact resistance	Terminal models: 50 mΩ max. Molded lead wire models: 100 mΩ max.	Terminal models: 100 mΩ max. Molded lead wire models: 150 mΩ max.
Dielectric strength (see note 2)	1,000 VAC, 50/60 Hz for 1 min. between terminals of the same polarities 1,500 VAC, 50/60 Hz for 1 min. between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts	600 VAC, 50/60 Hz for 1 min. between terminals of the same polarities
Vibration resistance (see note 3)	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude	
Shock resistance (see note 3)	Destruction: 1,000 m/s <sup>2</sup> (approx. 100 G) max. Malfunction: 300 m/s <sup>2</sup> (approx. 30 G) max.	
Degree of protection	IEC IP67 (excluding the terminals on terminal models)	
Degree of protection against electric shock	Class I	
Proof tracking index (PTI)	175	
Ambient operating temperature	-20°C to 70°C (at 60% RH max.) with no icing	
Ambient operating humidity	85% max. (for 5°C to 35°C)	
Life expectancy	Mechanical: 1,000,000 operations min. (60 operations/min.) Electrical: 50,000 operations min. (20 operations/min.)	Mechanical: 1,000,000 operations min. (60 operations/min.) Electrical: 200,000 operations min. (20 operations/min.)
Weight	Approx. 2 g (pin plunger models with terminals)	

**Note:** 1. The data given above are initial values.

2. The dielectric strength shown is measured using a separator between the switch and metal mounting plate.

3. For the pin plunger models, the above values apply for both the free position and total travel position. For the lever models, the values apply at the total travel position. Contact opening or closing time is within 1ms.

## ■ Ratings

Model	Rated voltage	Resistive load
D2SW-P2	30 VDC	2 A
	250 VAC	
D2SW-P01	30 VDC	0.1 A
	125 VAC	

**Note:** The ratings values apply under the following test conditions.

Ambient temperature: 20±2°C

Ambient humidity: 65±5%

Operating frequency: 20 operations/min.

## ■ Approved Standards

UL Recognized  
CSA Certified

Rated voltage	D2SW-P2	D2SW-P01
125 VAC	—	0.1 A
250 VAC	2 A	—
30 VDC	2 A	0.1 A

## ■ Contact Specifications

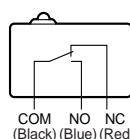
Item	D2SW-P2	D2SW-P01
Specification	Rivet	Crossbar
Material	Silver alloy	Gold alloy
Gap (standard value)	0.5 mm	
Minimum applicable load (see note)	160 mA at 5 VDC	1 mA at 5 VDC

**Note:** Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003).

The equation  $\lambda_{60}=0.5 \times 10^{-6}$  / operations indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%

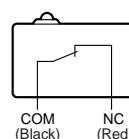
## ■ Contact Form

SPDT



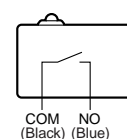
SPST-NC

(wire models, only)



SPST-NO

(wire models, only)



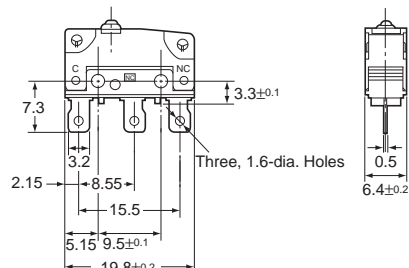
**Note:** Lead wire colors are indicated in parentheses.

# Dimensions

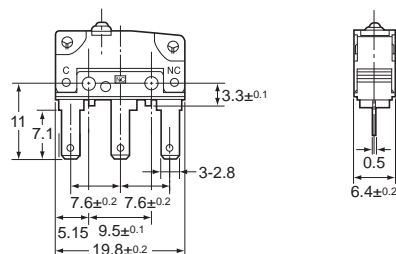
## ■ Terminals

- Note:** 1. All units are in millimeters unless otherwise indicated.  
2. Terminal plate thickness is 0.5 mm for all models.

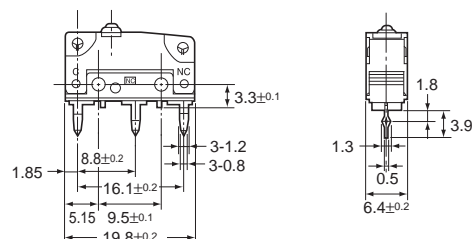
### Solder Terminals



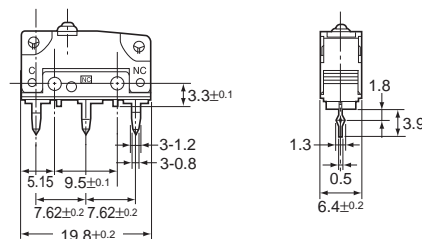
### Quick-connect Terminals (#110)



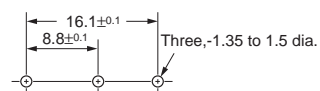
### PCB Terminals (Uneven pitch)



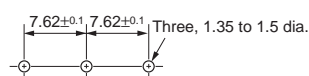
### PCB Terminals (Even pitch)



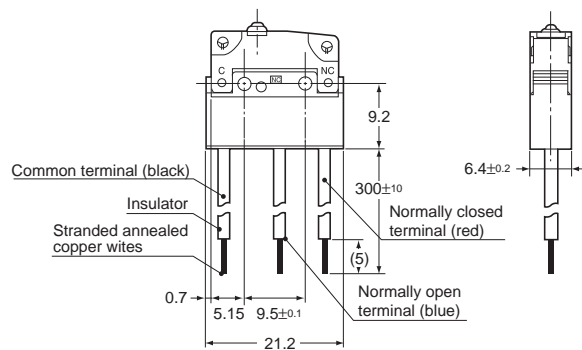
### PCB Mounting Dimensions (Reference)



### PCB Mounting Dimensions (Reference)



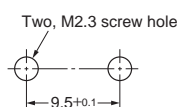
### Molded Lead Wires



## ■ Mounting Holes

All switches may be panel mounted using M2.3 mounting screws with plane washers or spring washers to securely mount the switch. Tighten the screws to a torque of 0.23 to 0.26 N·m

Exceeding the specified torque may result in deterioration of the sealing or damage.



# Dimensions and Operating Characteristics

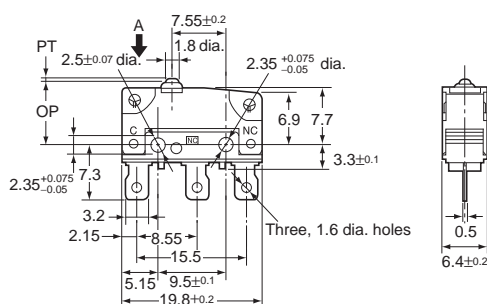
**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions

2. The following illustrations and drawings are for solder terminal models. Refer to *Terminals* section for details on models with quick-connect terminals (#110) or PCB terminals or molded lead wires.

3. The operating characteristics are for operation in the A direction (↓).

## Pin Plunger Models

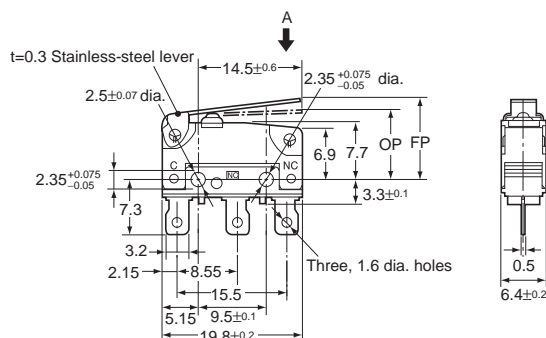
D2SW-P2□□  
D2SW-P01□□



OF max.	183 gf
RF min.	20 gf
PT max.	0.6 mm
OT min.	0.4 mm
MD max.	0.15 mm
OP	8.4±0.3 mm

## Hinge Lever Models

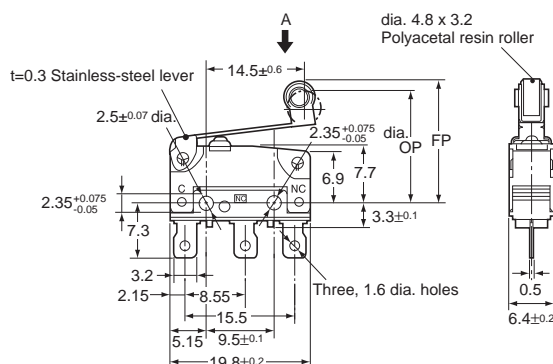
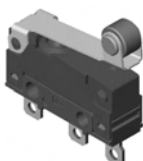
D2SW-P2L1□□  
D2SW-P01L1□□



OF max.	61 gf
RF min.	5 gf
OT min.	0.8 mm
MD max.	0.8 mm
FP max.	13.6 mm
OP	8.8±0.8 mm

## Hinge Roller Lever Models

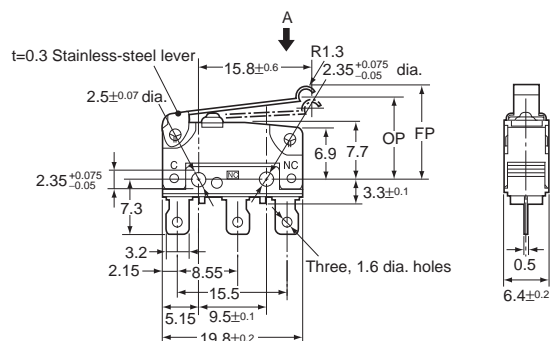
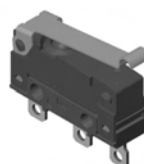
D2SW-P2L2□□  
D2SW-P01L2□□



OF max.	61 gf
RF min.	5 gf
OT min.	0.8 mm
MD max.	0.8 mm
FP max.	19.3 mm
OP	14.5±0.8 mm

## Simulated Roller Lever Models

D2SW-P2L3□□  
D2SW-P01L3□□



OF max.	61 gf
RF min.	5 gf
OT min.	0.8 mm
MD max.	0.8 mm
FP max.	15.5 mm
OP	10.7±0.8 mm

# Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## Correct Use

### Mounting

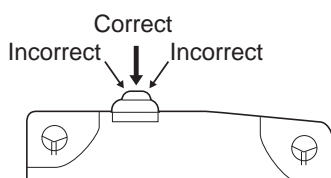
Turn OFF the power supply before mounting or removing the Switch, wiring, or performing maintenance or inspection. Failure to do so may result in electric shock or burning.

Mount the Switch onto a flat surface. Mounting on an uneven surface may cause deformation of the Switch, resulting in faulty operation or damage.

### Operating Body

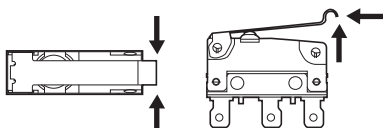
Use an operating body with low frictional resistance and of a shape that will not interfere with the sealing rubber, otherwise the plunger may be damaged or the sealing may deteriorate.

With the pin plunger models, set the Switch so that the plunger can be pushed in from directly above. Since the plunger is covered with a rubber cap, applying a force from lateral directions may cause damage to the plunger or reduction in the sealing capability



### Handling

Do not handle the Switch in a way that may cause damage to the sealing rubber. When handling the Switch, ensure that uneven pressure or, as shown in the following diagram, pressure in a direction other than the operating direction is not applied to the Actuator, otherwise the Actuator or Switch may be damaged, or durability may be decreased.



### Wiring Molded Lead Wire Models

When wiring molded lead wire models, ensure that there is no weight on the wire or that there are no sharp bends near the parts where the wire is drawn out. Otherwise, damage to the Switch or deterioration in the sealing may result.

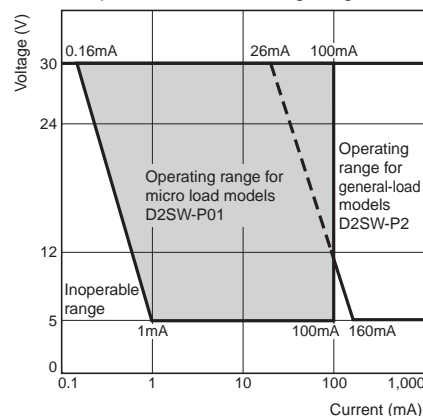
### Operating Stroke Setting

Set the operating stroke so that the actuator is completely disengaged when the switch is in the free position (FP), and is pushed to a point between 60% and 90% of the OT distance after the switch is operated.

Insufficient or excessive pushing of the actuator may result in decreased switch durability or damage to the switch.

### Using Micro Loads

Using a model for ordinary loads to switch microloads may result in faulty operation. Instead, use the models that are designed for microloads and that operate in the following range;



However, even when using microload models within the operating range shown above, if inrush current or inductive voltage spikes occur when the contact is opened or closed, then contact wear may increase and so decrease the service life. Therefore, insert a contact protection circuit where necessary.



## ■ Cautions

### Degree of Protection

Do not use this product in water. Although these models satisfy the test conditions for the standard given below, this test is to check the ingress of water into the switch enclosure after submerging the Switch in water for a given time. Satisfying this test condition does not mean that the Switch can be used in water.

IEC 60529: 2001 Degrees of protection provided by enclosures (IP Code)

Code: IP67 (The test to meet the standard checks for water intrusion after immersion for 30 minutes.)

Do not operate the Switch when it is exposed to water spray, or when water drops adhere to the Switch surface, or during sudden temperature changes, otherwise water may intrude into the interior of the Switch due to a suction effect.

Prevent the Switch from coming into contact with oil and chemicals. Otherwise, damage to or deterioration of Switch materials may result.

Do not use the Switch in areas where it is exposed to silicon adhesives, oil, or grease, otherwise faulty contact may result due to the generation of silicon oxide.

The environment-resistant performance of the switch differs depending on operating loads, ambient atmospheres, and installation conditions, etc. Please perform an operating test of the switch in advance under actual usage conditions.

### Connecting to Terminals

#### Connecting to Solder Terminals

When soldering the lead wire to the terminal, first insert the lead wire conductor through the terminal hole and then conduct soldering.

Make sure that the temperature at the tip of the soldering iron is 350 to 400°C. Do not take more than 3 seconds to solder the switch terminal, and do not impose external force on the terminal for 1 min. after soldering. Improper soldering involving an excessively high temperature or excessive soldering time may deteriorate the characteristics of the Switch.

#### Connecting to Quick-connect Terminals

Wire the quick-connect terminals (#110) with receptacles. Insert the terminals straight into the receptacles. Do not impose excessive force on the terminal in the horizontal direction, otherwise the terminal may be deformed or the housing may be damaged.

#### Connecting to PCB Terminal Boards

When using automatic soldering baths, we recommend soldering at 260±5°C within 5 seconds. Make sure that the liquid surface of the solder does not flow over the edge of the board.

When soldering by hand, as a guideline, solder with a soldering iron with a tip temperature of 350 to 400°C within 3 seconds, and do not apply any external force for at least 1 minute after soldering. When applying solder, keep the solder away from the case of the Switch and do not allow solder or flux to enter the case.

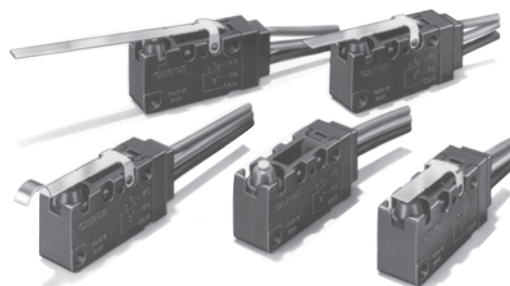
### Side-actuated (Cam/Dog) Operation

When using a cam or dog to operate the Switch, factors such as the operating speed, operating frequency, push-button indentation, and material and shape of the cam or dog will affect the durability of the Switch. Confirm performance specifications under actual operation conditions before using the Switch in applications.

# Sealed Snap Action Switch D2VW

## Watertight Miniature Snap Action Switch

- High-quality watertight, high-precision miniature Snap Action switch. Switch Body meets IP67 requirements
- Use of epoxy resin assures high sealing capability and is ideal for dusty places or where water is sprayed
- V-series internal mechanism assures high precision and long life
- General-load (5 A at 250 VAC) models and micro-load models are available
- RoHS Compliant



## Ordering Information

Actuator		Terminal	Model	
			Model 0.1 A	Model 5 A
Pin plunger		With solder and #187 tab terminals	D2VW-01-1HS	D2VW-5-1HS
		With lead wires	D2VW-01-1MS	D2VW-5-1MS
Short hinge lever		With solder and #187 tab terminals	D2VW-01L1A-1HS	D2VW-5L1A-1HS
		With lead wires	D2VW-01L1A-1MS	D2VW-5L1A-1MS
Hinge lever		With solder and #187 tab terminals	D2VW-01L1-1HS	D2VW-5L1-1HS
		With lead wires	D2VW-01L1-1MS	D2VW-5L1-1MS
Long hinge lever		With solder and #187 tab terminals	D2VW-01L1B-1HS	D2VW-5L1B-1HS
		With lead wires	D2VW-01L1B-1MS	D2VW-5L1B-1MS
Simulated roller lever		With solder and #187 tab terminals	D2VW-01L3-1HS	D2VW-5L3-1HS
		With lead wires	D2VW-01L3-1MS	D2VW-5L3-1MS
Short hinge roller lever		With solder and #187 tab terminals	D2VW-01L2A-1HS	D2VW-5L2A-1HS
		With lead wires	D2VW-01L2A-1MS	D2VW-5L2A-1MS
Hinge roller lever		With solder and #187 tab terminals	D2VW-01L2-1HS	D2VW-5L2-1HS
		With lead wires	D2VW-01L2-1MS	D2VW-5L2-1MS

**Note:** 1. The standard lengths of the lead wires (UL1015 AWG20 for UL/CSA models, AV0.75f otherwise) of models incorporating them are 30 cm.  
 2. Remove "-HS" from the end of solder/quick-connect models to obtain non-UL/CSA versions. (e.g.: D2VW-01-1HS → D2VW-01-1)  
 3. Remove "S" from the end of lead wire models to obtain non-UL/CSA versions with AV0.75f wire. (e.g.: D2VW-5L3-1MS → D2VW-5L3-1M)

## Model Number Legend

D2VW-  -    
           1   2      3   4

1. Ratings	2. Actuator	3. Contact Form	4. Terminals
5: 5 A at 250 VAC 01: 0.1 A at 30 VDC	None: Pin plunger L1A: Short hinge lever L1: Hinge lever L1B: Long hinge lever L3: Simulated roller lever L2A: Short hinge roller lever L2: Hinge roller lever	1: SPDT 2: SPST-NC* 3: SPST-NO*  *Lead wire versions only	None, HS: Solder terminals (HS for UL and CSA approval.) M, MS: Molded lead wires (MS for UL and CSA approval)

# Specifications

## ■ Characteristics

Model		D2VW-01	D2VW-5
Operating speed		0.1 mm to 1 m/s (at pin plunger)	
Operating frequency		Mechanical: 300 operations/minute max. Electrical: 30 operations/minute max.	
Insulation resistance		100 MΩ min. (at 500 VDC)	
Contact resistance		50 mΩ max. (100 mΩ max. for molded lead wire models)	
Dielectric strength (See note 2)		1,000 VAC, 50/60 Hz for 1 min. between terminals of the same polarity 1,500 VAC, 50/60 Hz for 1 min. between each current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts.	
Vibration resistance (See note 3)		Malfunction: 10 to 55 Hz, 1.5 mm double amplitude	
Shock resistance (See note 3)		Destruction: 1,000 m/s <sup>2</sup> (approx. 100G) max. Malfunction: 300 m/s <sup>2</sup> (approx. 30G) max.	
Degree of protection		IEC IP67 (excluding the terminals on terminal models).	
Degree of protection against electric shock		Class I	
Proof tracking index (PTI)		175	
Ambient operating temperature		-40° to 85°C (at 60% RH max.) with no icing	
Ambient operating humidity		95% max. (for 5°C to 35°C)	
Life expectancy	Mechanical	10,000,000 operations min. at 60 operations per minute	
	Electrical	1,000,000 operations min. at 30 ops. per minute.	100,000 operations min. at 30 ops. per minute
Weight		Approx. 7g (pin plunger models without wires)	

Note: 1. Data shown are of initial value.

2. The dielectric strength shown is measured using a separator between the switch and metal mounting plate.

3. For the pin plunger models, the above values apply for use at the free position and total travel position. For the lever models, the values apply at the total travel position.

4. The operating temperature of the lead wire (AV0.75f) for non-UL/CSA molded lead wire models is between -40 to 85°C.

## ■ Ratings (reference values)

### D2VW-5

Rated Voltage	Non-inductive load				Inductive load			
	Resistive load		Lamp load		Inductive load		Motor load	
	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	5 A		0.5 A		4 A		—	
250 VAC	5 A		0.5 A		4 A		—	
30 VDC	5 A		3 A		4 A		—	
125 VDC	0.4 A		0.1 A		0.4 A		—	

### D2VW-01

Rated Voltage	Non-inductive load				Inductive load			
	Resistive load		Lamp load		Inductive load		Motor load	
	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	0.1 A		—		—		—	
30 VDC	0.1 A		—		—		—	

Note: 1. The resistive load ratings apply under the following test conditions:

Ambient Temperature = 20±2°C, Ambient Humidity = 65±5%, Operating frequency = 30 operations/min.

2. The above current ratings are the values of the steady-state current.

3. Inductive load has a power factor of 0.7 min. (AC) and a time constant of 7 ms max. (DC).

4. Lamp load has an inrush current of 10 times the steady-state current.

5. Rating for UL/CSA approval is as follows (See "Approved Standards" section):

**D2VW-01** 0.1A @ 125 VAC

0.1A @ 30 VDC

**D2VW-5** 3A @ 125 VAC, 250 VAC

## ■ Approved Standards

UL Recognized, CSA Certified

Rated Voltage	D2VW-5	D2VW-01
125 VAC	3 A	0.1 A
250 VAC	3 A	---
30 VDC	---	0.1 A

EN 61058-1 (VDE Approval)

Rated Voltage	D2VW-5	D2VW-01
125 VAC	---	0.1 A
250 VAC	3 A	---

Testing conditions:

25E3 (25,000 operations), T85 (0°C to 85°C) for D2VW-5  
1E5 (100,000 operations), T85 (0°C to 85°C) for D2VW-01

## ■ Contact Specifications

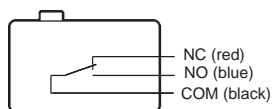
Item	D2VW-5	D2VW-01
Specification	Rivet	Crossbar
Material	Silver alloy	Gold alloy
Gap (standard value)	0.5 mm	
Inrush current	NC: 15 A max. NO: 15 A max.	---
Minimum applicable load (see note)	160 mA at 5 VDC	1 mA at 5 VDC

**Note:** Minimum applicable loads are indicated by N standard reference values. This value represents the failure rate at a 60% ( $\lambda_{60}$ ) reliability level (JIS C5003).  
The equation  $\lambda_{60}=0.5 \times 10^{-6}$  / operations indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%

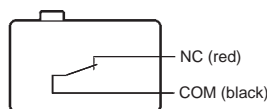
# Engineering Data

## ■ Structure

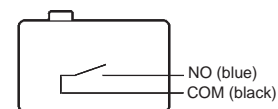
SPDT



SPST-NC



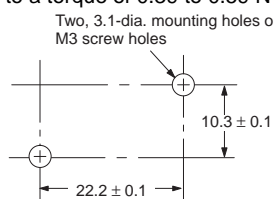
SPST-NO



**Note:** Colors in parentheses indicate lead wire colors.

## ■ Mounting

All switches may be panel mounted using M3 mounting screws with plane washers or spring washers to securely mount the switch. Tighten the screws to a torque of 0.39 to 0.59 N·m.



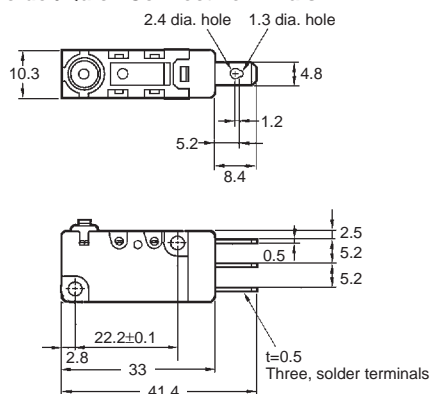
# Dimensions

## ■ Terminals

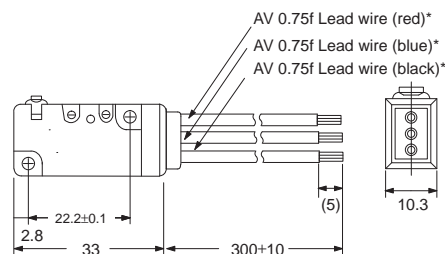
**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions

2. The pin plunger model is shown here as a typical example for both the solder/quick connect terminals and the molded lead wire versions.

### Solder/Quick Connect Terminals



### Molded Lead Wires



\* UL/CSA approved models have AWG20 UL approved wiring.

## ■ Dimensions and Operating Characteristics

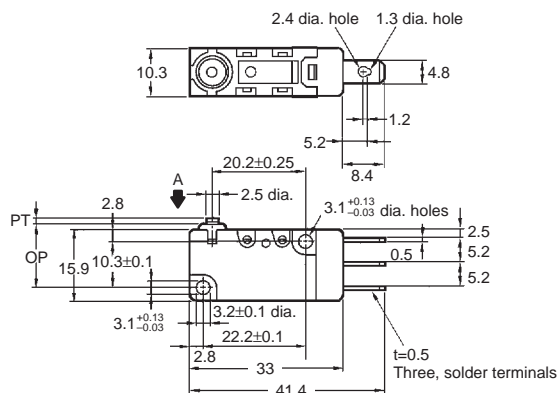
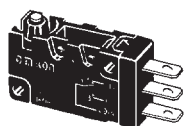
**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions

2. Omitted dimensions are the same as pin plunger type.

3. The operating characteristics are for operation in the A direction(▼)

### Pin Plunger Models

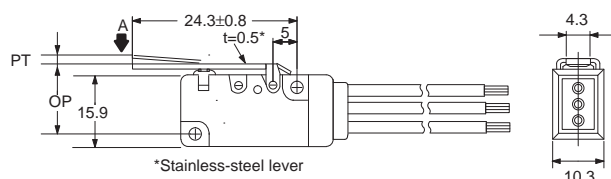
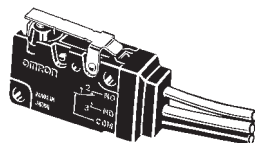
D2VW-01-1HS  
D2VW-5-1HS



OF max	200 gf
RF min.	30 gf
PT max.	1.2 mm
OT min.	1.0 mm
MD max.	0.4 mm
OP	14.7 $\pm$ 0.4 mm

### Short Hinge Lever Models

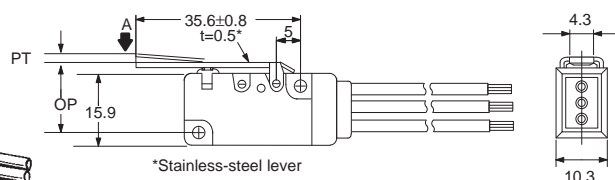
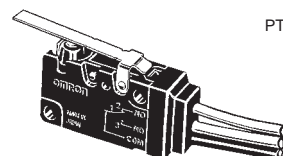
D2VW-01L1A-1MS  
D2VW-5L1A-1MS



OF max	200 gf
RF min.	20 gf
PT max.	1.6 mm
OT min.	0.8 mm
MD max.	0.5 mm
OP	15.2 $\pm$ 0.5 mm

### Hinge Lever Models

D2VW-01L1-1MS  
D2VW-5L1-1MS

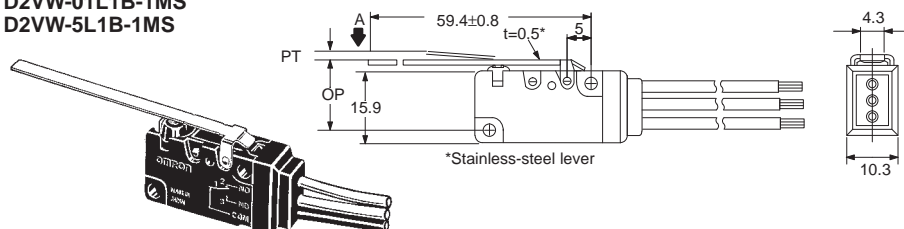


OF max	120 gf
RF min.	15 gf
PT max.	4.0 mm
OT min.	1.6 mm
MD max.	0.8 mm
OP	15.2 $\pm$ 1.2 mm

- Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions  
 2. Omitted dimensions are the same as pin plunger type.  
 3. The operating characteristics are for operation in the A direction(↓)

### Long Hinge Lever Models

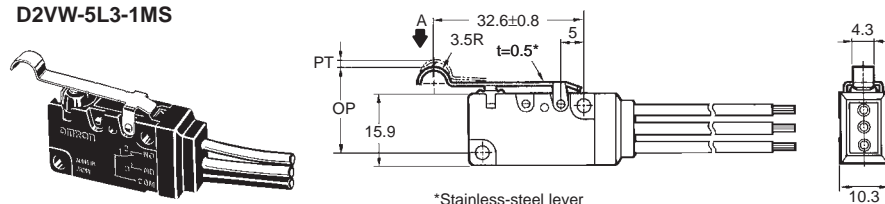
D2VW-01L1B-1MS  
 D2VW-5L1B-1MS



OF max	60 gf
RF min.	5 gf
PT max.	9.0 mm
OT min.	3.2 mm
MD max.	2.0 mm
OP	$15.2 \pm 2.6$ mm

### Simulated Roller Lever Models

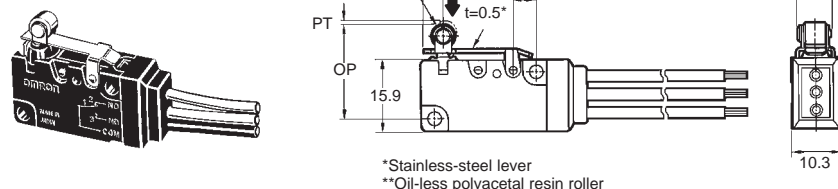
D2VW-01L3-1MS  
 D2VW-5L3-1MS



OF max	120 gf
RF min.	15 gf
PT max.	4.0 mm
OT min.	1.6 mm
MD max.	0.8 mm
OP	$18.7 \pm 1.2$ mm

### Short Hinge Roller Lever Models

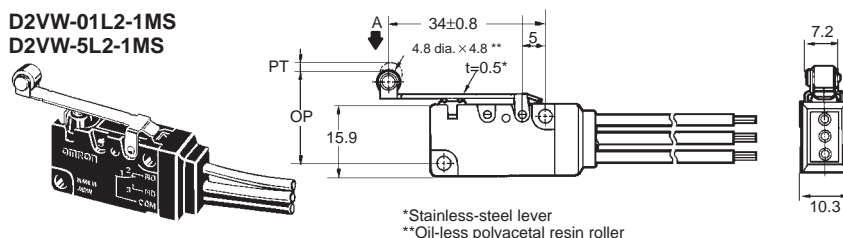
D2VW-01L2A-1MS  
 D2VW-5L2A-1MS



OF max	230 gf
RF min.	20 gf
PT max.	1.6 mm
OT min.	0.8 mm
MD max.	0.5 mm
OP	$20.7 \pm 0.6$ mm

### Hinge Roller Lever Models

D2VW-01L2-1MS  
 D2VW-5L2-1MS



OF max	120 gf
RF min.	15 gf
PT max.	4.0 mm
OT min.	1.6 mm
MD max.	0.8 mm
OP	$20.7 \pm 1.2$ mm

# Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

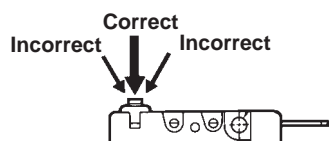
## ■ Correct Use

### Operations

Make sure that the switching object is perfectly separated from the actuator when the switch is not operated and the actuator is pressed appropriately by the switching object when the switch is operated.

The switch should be set so that its stroke will be within the rated OT when the switch is operated.

With the pin plunger models, set the switch so that the plunger can be actuated from directly above. Since the plunger is covered with a rubber cap, applying a force from lateral directions may cause damage to the plunger or reduction in the sealing capability.

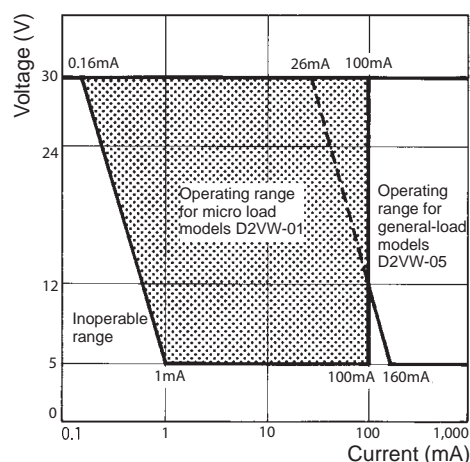


### Handling

Handle the switch carefully so as not to break the sealing rubber of the plunger.

### Using Microloads

Using a model for ordinary loads to switch microloads may result in faulty operation. Instead, use the models that are designed for microloads and that operate in the following range;



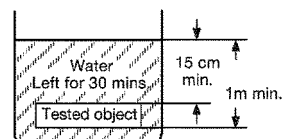
However, even when using microload models within the operating range shown above, if inrush current or inductive voltage spikes occur when the contact is opened or closed, then contact wear may increase and so decrease the service life. Therefore, insert a contact protection circuit where necessary.

## ■ Cautions

### Degree of Protection

The D2VW was tested under water and passed the following watertightness test, which however, does not mean that the D2VW can be used in the water.

JIS C0929 (rules for testing the watertightness of electrical devices and materials), class 7 (watertightness test). Refer to the following illustration for the test method at OMRON.



**Note:** The object to be tested is left in the water for 30 minutes on condition that the distance between the surface of the water and the top of the object be 15 cm minimum and the distance between the surface of the water and the bottom of the object be 1 m minimum.

### Protection Against Chemicals

Prevent the switch from coming into contact with oil and chemicals. Otherwise, damage to or deterioration of the switch materials may occur.

## Tactile Switches

## Technical Information

## Cautions

Use the Switch within the rated voltage and current ranges, otherwise the Switch may have a shortened life expectancy, radiate heat, or burn out.

This particularly applies to the instantaneous voltages and currents when switching.

## Correct Use

## ■ Storage

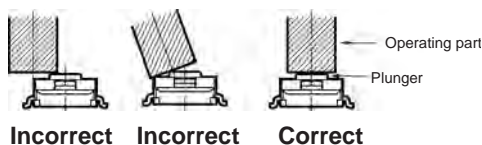
To prevent degradation, such as discoloration, in the terminals during storage, do not store the switches in locations that are subject to high temperature, high humidity, corrosive gases or direct sunlight.

## ■ Handling

## Operation

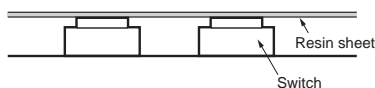
Do not repeatedly operate the Switch with excessive force. Applying excessive pressure or applying additional force after the plunger has stopped may deform the disc spring of the Switch, resulting in malfunction. Do not apply force in excess of 29.4N for 1 minute to Side-actuated models.

Be sure to set up the Switch so that the plunger will operate in a straight vertical line. A decrease in the life of the Switch may result if the plunger is pressed off-center or from an angle.



## Dust Protection

Do not use switches that are not sealed in dust-prone environments. Doing so may cause dust to penetrate inside the switch and cause faulty contact. If a switch that is not sealed must be used in this kind of environment, use a resin sheet as shown below or other measure to protect it against dust.



## ■ PCBs

The Switch is designed for a 1.6-mm thick, single-side PCB.

Using PCBs with a different thickness or using double-sided, through-hole PCBs may result in loose mounting, improper insertion, or poor heat resistance in soldering. These effects will occur, depending on the type of holes and patterns of the PCB. Therefore, it is recommended that a verification test is conducted before use.

If the PCBs are separated after mounting the Switch, particles from the PCBs may enter the Switch. If PCB particles or foreign particles from the surrounding environment, workbench, containers, or stacked PCB's become attached to the switch, faulty contact may result.

## ■ Soldering

## General Precautions

Before soldering the Switch on a multilayer PCB, test to confirm that soldering can be performed properly. Otherwise the Switch may be deformed by the soldering heat on the pattern or lands of the multilayer PCB.

Do not solder the Switch more than twice, including rectification soldering. An interval of five minutes is required between the first and second soldering.

## Automatic Soldering Baths

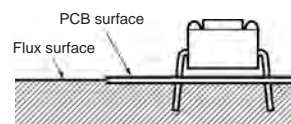
(B3F, B3W, B3WN, B3M, B3J)

Soldering temperature: 260°C max.

Soldering time: 5 s max. for a 1.6-mm thick single-side PCB

Preheating Temp: 100°C max. (ambient Temp.) within 60 s.

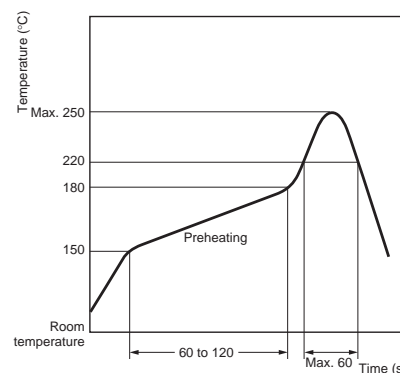
Make sure that no flux will rise above the level of the PCB. If flux overflows onto the mounting surface of the PCB, it may enter the Switch and cause a malfunction.



## Reflow Soldering (Surface Mounting)

(B3FS, B3SN, B3S)

Solder the terminals within the heating curve shown in the following diagram.



**Note:** The above heating curve applies if the PCB thickness is 1.6 mm.

The peak temperature may vary depending on the reflow bath used. Confirm the conditions beforehand.

Do not use an automatic soldering bath for surface-mounted Switches. The soldering gas or flux may enter the Switch and damage the Switch's push-button operation.



## Manual Soldering (All Models)

Soldering temperature: 350°C max. at the tip of the soldering iron

Soldering time: 3 s max. for a 1.6-mm thick, single-side PCB

Before soldering the Switch on a PCB, make sure that there is no unnecessary space between the Switch and the PCB.

## ■ Washing

### Washable and Non-washable Models

Washable (sealed types)	B3W, B3WN, B3S, B3SN
Non-washable (Standard types)	B3F, B3FS, B3M, B3J, B3D, B3DA

Standard Switches are not sealed, and cannot be washed. Doing so will cause the washing agent, together with flux or dust particles on the PCB, to enter the Switch, resulting in malfunction.

### Washing Methods

Washing equipment incorporating more than one washing bath can be used to clean washable models, provided that the washable models are cleaned for one minute maximum per bath and the total cleaning time does not exceed three minutes.

### Washing Agents

Apply alcohol-based solvents to clean washable models. Do not apply any other agents or water to clean any washable model, as such agents may degrade the materials or performance of the Switch.

### Washing Precautions

Do not impose any external force on washable models while washing.

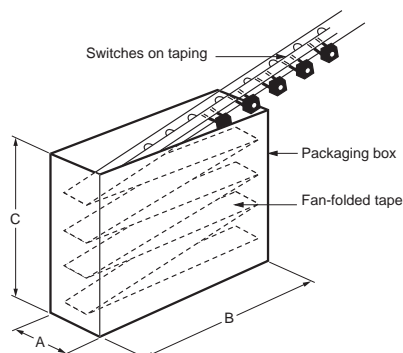
Do not clean washable models immediately after soldering. The cleaning agent may be absorbed into the Switch through respiration as the Switch cools. Wait for at least three minutes after soldering before cleaning washable models.

Do not use Sealed Switches while submersed in water or in locations exposed to water.

## ■ Tape Packaging

### Radial Types

The tape is packaged by fan-folding into the box, as shown in the following diagram.



Model	A	B	C
B3F	50 mm	325 mm	275 mm
B3WN	53 mm	326 mm	350 mm

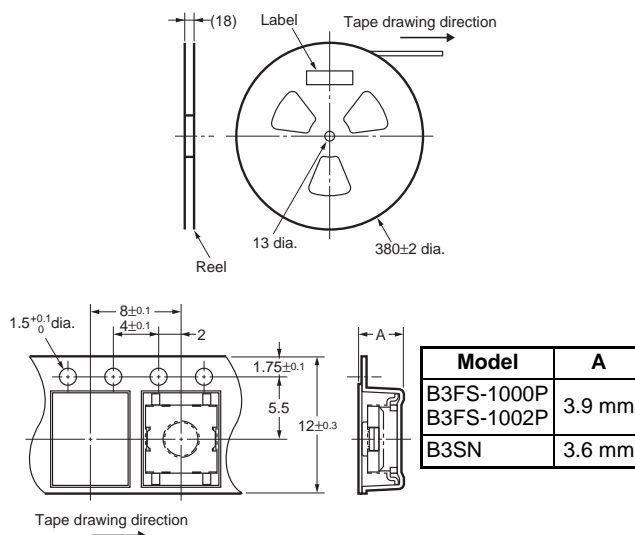
Do not apply any external force to the packaging box, or subject it to vibration. Doing so may deform the Switch terminals.

Remove the tape slowly, making sure that the Switches are not entangled or caught. Otherwise the terminals may be deformed.

Do not store the packaged Switches in locations subject to high temperatures or high humidity. The packaging boxes are sealed with paper tape and are not airtight. Storing the packaged Switches in locations with high temperature or high humidity may result in deterioration of the tape and Switches, and long-term storage under such conditions may cause discoloration of the Switch terminals.

## Packaging for Embossed Tape

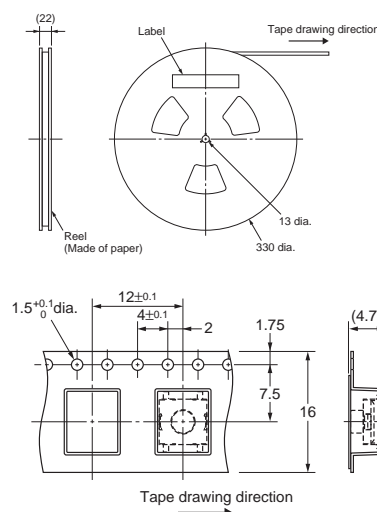
### B3FS-1000P/-1002P, B3SN



Standards	Conforms to JEITA.
Package	3,000 Switches
Heat resistance	50°C for 24 hours (without deformation)

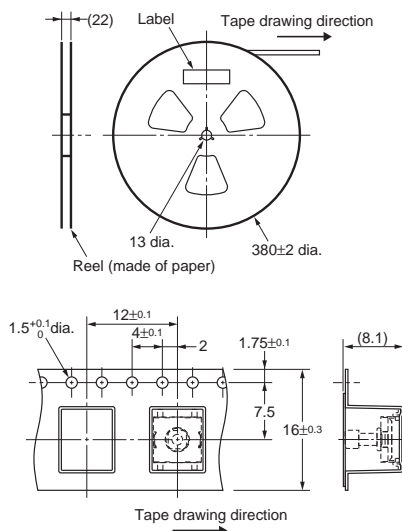
**Note:** Switches with ground terminals are packaged with the ground terminal on the opposite side of the guide hole.

### B3FS-1010P



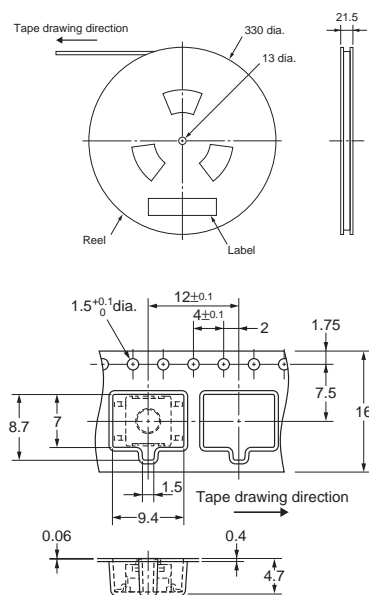
Standards	Conforms to JEITA.
Package	1,000 Switches
Heat resistance	60°C for 24 hours (without deformation)

## B3FS-1050P



<b>Standards</b>	Conforms to JEITA.
<b>Package</b>	1,000 Switches
<b>Heat resistance</b>	60°C for 24 hours (without deformation)

## B3S



<b>Standards</b>	Conforms to JEITA.
<b>Package</b>	1,000 Switches
<b>Heat resistance</b>	50°C for 24 hours (without deformation)

**Note:** Switches with ground terminals are packaged with the ground terminal on the opposite side of the guide hole.

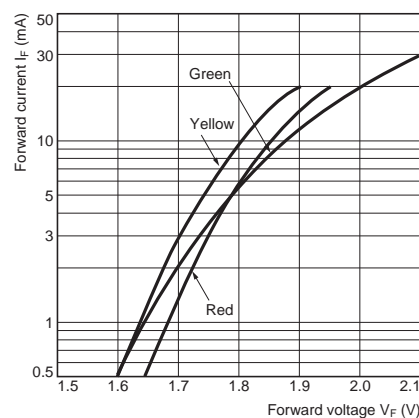
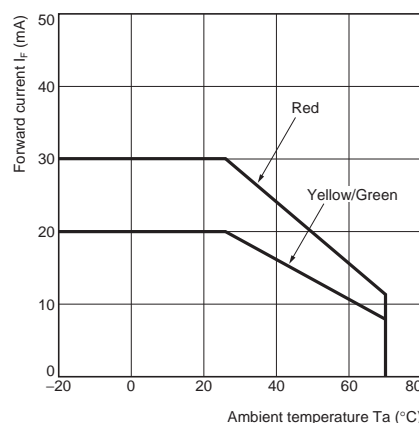
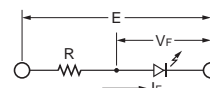
➡ For taping specifications of other models, such as B3SL and B3U, see their respective datasheets.

## LEDs (B3J)

Make sure that the polarity of the LEDs is correct. The polarity is not indicated on the Switch, but the positive pole is located on the back surface of the Switch on the side without the OMRON mark.

Connect limiting resistors to the LEDs. The Switch does not have built-in limiting resistors, so satisfy the LED characteristics by obtaining the limiting resistance according to the following formula based on the voltage to be used.

$$\text{Limiting resistance (R)} = \frac{(\text{Voltage used (E)} - \text{LED forward voltage (VF)})}{\text{LED forward current (IF)}} (\Omega)$$



## RoHS Compliant

The "RoHS Compliant" designation indicates that the listed models do not contain the six hazardous substances covered by the RoHS Directive.

### Reference:


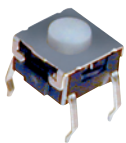
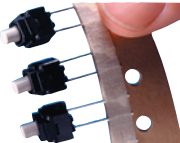

The following standards are used to determine compliance for the six substances.

Lead:	1,000 ppm max.
Mercury:	1,000 ppm max.
Cadmium:	100 ppm max.
Hexavalent chromium:	1,000 ppm max.
PBB:	1,000 ppm max.
PBDE:	1,000 ppm max.

# MEMO



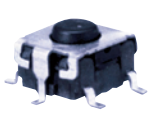


## Tactile Switch

## Selection Guide

<b>General Attributes</b>	 Page 221	 Page 231	 Page 239	 Page 241
	<b>B3F</b>	<b>B3W</b>	<b>B3WN</b>	<b>B3M</b>
<b>Dimensions mm (in)</b>	Varies by type	Varies by type	13 H x 8.0 D x 8.0 W (0.51 x 0.31 x 0.31)	7.3 H x 6.0 D x 6.0 W (0.29 x 0.24 x 0.24)
<b>Features</b>	<ul style="list-style-type: none"> <li>Tactile 6 mm/12 mm Square Switch</li> <li>Space saving switch with extended mechanical/ electrical service life</li> <li>6 mm x 6 mm switch available in top or side actuated versions.</li> <li>Taped radial packaging available for top actuated models</li> <li>Gold plated terminal versions provide for increased contact reliability</li> </ul>	<ul style="list-style-type: none"> <li>Sealed construction conforming to IP67</li> <li>Available in 6mm or 12 mm square</li> <li>Ground terminal option</li> <li>Projected plunger versions accept Omron's "B32" series of keycaps</li> </ul>	<ul style="list-style-type: none"> <li>Double sealed tactile switch with 13 mm height, conforming to IP67</li> <li>Radial tape packaging</li> <li>Rated up to 85°C ambient operating temperature</li> </ul>	<ul style="list-style-type: none"> <li>High profile tactile switch</li> <li>Stroke length of 0.85 mm</li> <li>Light touch with overstroke of 0.25 mm</li> </ul>
<b>Service life (Mechanical/Electrical)</b>	<b>B3F-1 / B3F-3 / B3F-6: (6x6mm)</b> 1,000,000 operations (100 gf) 300,000 operations (150 gf) 100,000 operations (260 gf)  <b>B3F-4: (12 x 12 mm)</b> 3,000,000 operations (130 gf) 1,000,000 operations (260 gf)  <b>B3F-5: (12 x 12 mm)</b> 10,000,000 operations  <b>B3F-G: (6 x 6 mm)</b> 300,000 operations (180 gf)	<b>B3W-1: (6 x 6 mm)</b> 1,000,000 operations (General purpose versions) 300,000 operations (High force versions)  <b>B3W-4: (12 x 12 mm)</b> 3,000,000 operations (General purpose versions) 1,000,000 operations (High force versions)	100,000 operations	2,000,000 operations
<b>Contact Rating(s) Resistive load</b>	1 to 50 mA @ 5 to 24 VDC (100 µA to 50 mA for gold plated versions)	1 to 50 mA @ 5 to 24 VDC	50 mA @ 12 VDC	1 to 50 mA @ 5 to 12 VDC
<b>Contact form</b>	SPST-NO	SPST-NO	SPST-NO	SPST-NO
<b>Action</b>	Momentary	Momentary	Momentary	Momentary
<b>Ground terminal</b>	Models available with or without ground terminal	Models available with or without ground terminal	None	None
<b>Keycap (optional)*</b>	Yes (Refer to "B32" datasheet)	Yes (Refer to "B32" datasheet)	None	None
<b>Operating force (OF)</b>	Refer to "Operating Characteristics" section of the datasheet	Refer to "Operating Characteristics" section of the datasheet	200 ± 70 gf (General purpose) 260 ± 70 gf (High force)	70 ± 20 gf
<b>Actuator type</b>	Plunger, top or side actuated	Plunger, top actuated	Plunger, top actuated	Plunger, top actuated
<b>Terminal Choices</b>	Through-hole PCB	Through-hole PCB	Through-hole PCB	Through-hole PCB
<b>Cleaning**</b>	Not possible	Possible	Possible	Not possible





\* Projected plunger versions of the B3F, B3W and B3FS are designed to be used with the B32 series of keycaps. Refer to the "B32" datasheet on page 235 of this catalog for available models.

\*\* None of the tactile switches contained in this catalog are water-washable. Be sure to read the precautions and information common to all tactile switches, contained in the Technical User's Guide, "Tactile Switches, Technical Information" for correct use.

	 Page 243	 Page 247	 Page 249	 Page 251	 Page 255
<b>General Attributes</b>	<b>B3U</b>	<b>B3FS</b>	<b>B3S</b>	<b>B3SL</b>	<b>B3SN</b>
<b>Dimensions mm (in)</b>	Side Actuated: 1.2 H x 2.5 D x 3.0 W (0.047 x 0.098 x 0.118) Top Actuated: 1.6 H x 2.5 D x 3.0 W (0.063 x 0.098 x 0.118)	Varies by type	4.3 H x 6.0 D x 6.6 W (0.17 x 0.24 x 0.26)	3.4 or 5.1H x 6.5 D x 6.2 W (0.13 or 0.20 x 0.26 x 0.24)	3.1 H x 6.5 D x 7.0 W (0.12 x 0.26 x 0.28)
<b>Features</b>	<ul style="list-style-type: none"> <li>Industries smallest Tactile switch (as of Oct. 2006)</li> <li>Dust-proof construction</li> <li>Models available with ground terminal or PCB positioning boss</li> <li>Top or side actuated versions available</li> </ul>	<ul style="list-style-type: none"> <li>Tape and reel 6 x 6.3 mm surface mount switch</li> <li>Three plunger heights: Projected Plunger version accepts Omron's B32 Keycaps</li> </ul>	<ul style="list-style-type: none"> <li>Surface mount tactile switch with sealed construction conforming to IP67</li> <li>Ground terminal option</li> <li>Embossed tape packaging</li> </ul>	<ul style="list-style-type: none"> <li>Surface mount tactile switch rated up to 90°C</li> <li>Sealed construction conforming to IP67</li> <li>Crisp click and middle stroke with rubber plunger</li> <li>Embossed tape packaging</li> </ul>	<ul style="list-style-type: none"> <li>Surface mount tactile switch with sealed construction conforming to IP67</li> <li>Ground terminal option</li> <li>Use of stainless-steel spring provides a crisp clicking action</li> <li>Gold plated terminal version provides for increased contact reliability</li> <li>Embossed tape packaging</li> </ul>
<b>Service life (Mechanical/Electrical)</b>	Top Actuated: 200,000 operations Side Actuated 100,000 operations	1,000,000 operations (General purpose type) 300,000 operations (High force type)	500,000 operations (General purpose type) 300,000 operations (High force type)	100,000 operations	100,000 operations
<b>Contact Rating(s) Resistive load</b>	1 to 50 mA @ 5 to 12 VDC	50 mA @ 24 VDC	1 to 50 mA @ 5 to 24 VDC	1 to 50 mA @ 5 to 12 VDC	1 to 50 mA @ 5 to 24 VDC
<b>Contact form</b>	SPST-NO	SPST-NO	SPST-NO	SPST-NO	SPST-NO
<b>Action</b>	Momentary	Momentary	Momentary	Momentary	Momentary
<b>Ground terminal</b>	Models available with or without ground terminal	None	Models available with or without ground terminal	None	Models available with or without ground terminal
<b>Keycap (optional)*</b>	None	Yes (Refer to "B32" datasheet)	None	None	None
<b>Operating force (OF)</b>	Top Actuated: 153 ± 50 gf Side Actuated 162 ± 50 gf	100 ± 30 gf (General purpose) 150 ± 50 gf (High force)	160 gf (General purpose) 230 gf (High force)	200 ± 50 gf	160 gf ± 50 gf (General purpose) 180 gf ± 50 gf (Gold-plated version)
<b>Actuator type</b>	Plunger, top or side actuated	Plunger, top actuated	Plunger, top actuated	Plunger, top actuated	Plunger, top actuated
<b>Terminal Choices</b>	Surface Mount PCB	Surface Mount PCB	Surface Mount PCB	Surface Mount PCB	Surface Mount PCB
<b>Cleaning**</b>	Not possible	Not possible	Possible	Not possible	Possible

\* Projected plunger versions of the B3F, B3W and B3FS are designed to be used with the B32 series of keycaps. Refer to the "B32" datasheet on page 235 of this catalog for available models.

\*\* None of the tactile switches contained in this catalog are water-washable. Be sure to read the precautions and information common to all tactile switches, contained in the Technical User's Guide, "Tactile Switches, Technical Information" for correct use.

General Attributes	 Page 257	 Page 265	 Page 269	 Page 273
	B3W-9	B3J	B3D	B3DA
<b>Dimensions mm (in)</b>	11 H x 10 W x 10 D (0.43 x 0.39 x 0.39) 11 H x 12 W x 12 D (0.43 x 0.47 x 0.47)	10.3 H x 18.0 D x 12.0 W (0.41 x 0.71 x 0.47)	4 mm or 5 mm dia. domes	4 mm or 5 mm dia. domes, arranged in an array
<b>Features</b>	<ul style="list-style-type: none"> <li>Lighted tactile switch with 12 x 12 mm or 10 x 10 mm cap size</li> <li>Available with one or two LED's</li> <li>Colored, milky white or transparent caps</li> <li>Special "Tri-color" version (red + green LED, combined with milky white cap, produces orange)</li> <li>Uses standard B3W footprint as the base design</li> </ul>	<ul style="list-style-type: none"> <li>Hinged tactile switch, available in a wide variety of colors</li> <li>Available with one, two or no LED's</li> </ul>	<ul style="list-style-type: none"> <li>Adhesive-backed, single point of contact, individual dome</li> <li>Matrix adhesive design provides superior dust-tight performance</li> <li>No soldering required</li> <li>Unique circular contact action ensures high level of resistance to foreign matter</li> </ul>	<ul style="list-style-type: none"> <li>Adhesive-backed domes, arranged in a custom-made array (Consult Omron)</li> <li>Matrix adhesive design provides superior dust-tight performance</li> <li>No soldering required</li> <li>Unique circular contact action ensures high level of resistance to foreign matter</li> </ul>
<b>Service life (Mechanical/Electrical)</b>	1,000,000 operations (Standard type) 300,000 operations (High force type)	3,000,000 operations	1,000,000 operations (5 mm dome) 500,000 operations (4 mm dome)	1,000,000 operations (per 5 mm dome) 500,000 operations (per 4 mm dome)
<b>Contact Rating(s) Resistive load</b>	1 to 50 mA @ 5 to 24 VDC	1 to 50 mA @ 5 to 24 VDC	1 to 10 mA @ 3 to 12 VDC	1 to 10 mA @ 3 to 12 VDC
<b>Contact form</b>	SPST-NO	SPST-NO	SPST-NO (after placed on PCB with proper land design)	SPST-NO (after placed on PCB with proper land design)
<b>Action</b>	Momentary (LED's controlled by external circuit, not provided)	Momentary (LED's controlled by external circuit, not provided)	Momentary	Momentary
<b>Ground terminal</b>	None	None	None	None
<b>Keycap (optional)*</b>	Integral to the switch	Integral to the switch	None (Designer provides overlay)	None (Designer provides overlay)
<b>Operating force (OF)</b>	160 gf (Standard) 230 gf (High force)	130 gf ± 50 gf	170 gf ± 50 gf	160 gf ± 50 gf
<b>Actuator type</b>	Integral Keycap, top actuated	Integral Keycap, top actuated	None (Designer provided overlay)	None (Designer provided overlay)
<b>Terminal Choices</b>	Through-hole PCB (Additional terminals provided for LED cathode and anode)	Through-hole PCB (Additional terminals provided for LED cathode and anode)	None (PCB Layout provides continuity when depressing the dome)	None (PCB Layout provides continuity when depressing the dome)
<b>Cleaning**</b>	Not possible	Not possible	Not possible	Not possible

\* Projected plunger versions of the B3F, B3W and B3FS are designed to be used with the B32 series of keycaps. Refer to the "B32" datasheet on page 235 of this catalog for available models.

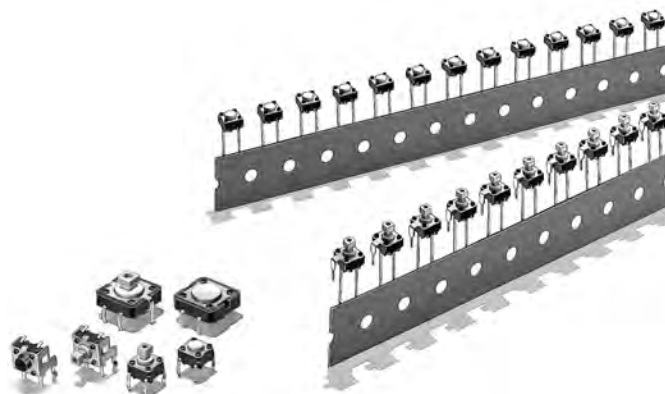
\*\* None of the tactile switches contained in this catalog are water-washable. Be sure to read the precautions and information common to all tactile switches, contained in the Technical User's Guide, "Tactile Switches, Technical Information" for correct use.

# MEMO

# Tactile Switch B3F

## Miniature, Space-Saving Tactile Switch Provides Long Service Life and Easy Mounting


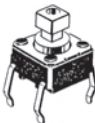


- Extended mechanical/electrical service life:  $10 \times 10^6$  operations for 12 x 12 mm type and  $1 \times 10^6$  operations for the 6 x 6 mm type
- Ideal for applications such as audio, office and communications equipment, measuring instruments, TVs, VCRs, etc.
- Taped radial type, vertical type and high force types are available.
- Gold plated models available for increased contact reliability, resistance to corrosive gas and insulation fault prevention for ion migration in harsh environments
- RoHS Compliant



## Ordering Information

■ B3F-1□□□, B3F-3□□□

### 6 x 6 mm type


Type	Plunger	Switch height	Operating force	Model	
				Without ground terminal	With ground terminal
				Bags	Bags
Standard		4.3 mm	General-purpose: 100 g	<b>B3F-1000</b>	<b>B3F-1100</b>
			150 g	<b>B3F-1002</b>	<b>B3F-1102</b>
			High-force: 260 g	<b>B3F-1005</b>	<b>B3F-1105</b>
		5.0 mm	General-purpose: 100 g	<b>B3F-1020</b>	<b>B3F-1120</b>
			150 g	<b>B3F-1022</b>	<b>B3F-1122</b>
			High-force: 260 g	<b>B3F-1025</b>	<b>B3F-1125</b>
	5.0 mm (7.5 mm pitch)	General-purpose: 100 g	—	<b>B3F-1110</b>	
		7.3 mm	General-purpose: 100 g	<b>B3F-1050</b>	<b>B3F-1150</b>
			150 g	<b>B3F-1052</b>	<b>B3F-1152</b>
High-force: 260 g			<b>B3F-1055</b>	<b>B3F-1155</b>	
Vertical		3.15 mm	General-purpose: 100 g	—	<b>B3F-3100</b>
			150 g	—	<b>B3F-3102</b>
			High-force: 260 g	—	<b>B3F-3105</b>
		3.85 mm	General-purpose: 100 g	—	<b>B3F-3120</b>
			150 g	—	<b>B3F-3122</b>
	High-force: 260 g	—	<b>B3F-3125</b>		
		6.15 mm	General-purpose: 100 g	—	<b>B3F-3150</b>
			150 g	—	<b>B3F-3152</b>
High-force: 260 g			—	<b>B3F-3155</b>	

**Important Note:** Switches cannot be water-washed.



## ■ B3F-1□□□-G

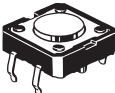
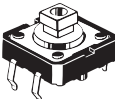
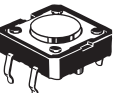
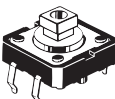

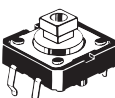
### 6 x 6 mm type with Gold Plating

Type	Plunger	Switch height	Form of shipment operating force	Model	
				Without ground terminal	With ground terminal
				Bags (100 Switches)	
6 x 6 mm switches with gold plating		4.3 mm	180 g	<b>B3F-1002-G</b>	<b>B3F-1102-G</b>
		5.0 mm		<b>B3F-1022-G</b>	<b>B3F-1122-G</b>

**Note:** The minimum order is 100 Switches. Order in multiples of the minimum order.

## ■ B3F-4□□□, B3F-5□□□



### 12 x 12 mm type

Type	Plunger	Switch height	Operating force	Model	
				Without ground terminal	With ground terminal
				Bags	Bags
Standard		4.3 mm	General-purpose: 130 g	<b>B3F-4000</b>	<b>B3F-4100</b>
			High-force: 260 g	<b>B3F-4005</b>	<b>B3F-4105</b>
		7.3 mm	General-purpose: 130 g	<b>B3F-4050</b>	<b>B3F-4150</b>
			High-force: 260 g	<b>B3F-4055</b>	<b>B3F-4155</b>
Long service life		4.3 mm	General-purpose: 130 g	<b>B3F-5000</b>	<b>B3F-5100</b>
		7.3 mm		<b>B3F-5050</b>	<b>B3F-5150</b>
High reliability gold-plated contact		4.3 mm		<b>B3F-5001</b>	<b>B3F-5101</b>
		7.3 mm		<b>B3F-5051</b>	<b>B3F-5151</b>

**Important Note:** Switches cannot be water-washed.

## ■ B3F-6□□□□

### Taped Radial (Auto Insertion) 6 x 6 mm type

Type	Plunger	Switch height	Operating force	Model	
				Without ground terminal	With ground terminal
B3F-6000	Flat 	4.3 mm	General-purpose: 100 g	<b>B3F-6000</b>	<b>B3F-6100</b>
			High-force: 150 g	<b>B3F-6002</b>	<b>B3F-6102</b>
		5.0 mm	General-purpose: 100 g	<b>B3F-6020</b>	<b>B3F-6120</b>
			High-force: 150 g	<b>B3F-6022</b>	<b>B3F-6122</b>
	Projected 	7.3 mm	General-purpose: 100 g	<b>B3F-6050</b>	<b>B3F-6150</b>
			High-force: 150 g	<b>B3F-6052</b>	<b>B3F-6152</b>

**Note:** The above switches must be ordered in units of 1,000.

**Important Note:** Switches cannot be water-washed.

## ■ Accessories

See “B32” Tactile Switch Key Top data sheet for keycaps that fit projected plunger B3F models.

## ■ Plunger Identification Tables

Use these tables to determine tactile switch type by plunger color.

### B3F-1□□□/-3□□□/-6□□□

Plunger color	Operating force	Type
Ivory	100 g	B3F-1000, 1100, 1050, 1150, 3100, 3150, 6000, 6100, 6050, 6150
Black	100 g	B3F-1020, 1120, 1110, 3120, 6020, 6120
Yellow	150 g	B3F-1002, 1102, 1052, 1152, 3102, 3152, 6002, 6102, 6052, 6152
	180 g	B3F-1002-G, 1102-G
Gray	150 g	B3F-1022, 1122, 3122, 6022, 6122
	180 g	B3F-1022-G, 1122-G
Orange	260 g	B3F-1005, 1105, 1055, 1155, 3105, 3155, 6005, 6055
Pink	260 g	B3F-1025, 1125, 3125, 6025

### B3F-4□□□/-5□□□

Plunger color	Operating force	Type
Ivory	130 g	B3F-4000, 4100, 4050, 4150
Yellow	260 g	B3F-4005, 4105, 4055, 4155
Blue	130 g	B3F-5000 Series

# Specifications

## ■ Characteristics

	Part Number				
	B3F-1□□□ B3F-3□□□	B3F-4□□□	B3F-5□□□	B3F-6□□□	B3F-1□□□-G
Contact form	SPST-NO				
Switching capacity	1 to 50 mA, 5 to 24 VDC (resistive load)				100 μA to 50 mA, 5 to 24 VDC (resistive load)
Contact resistance	100 MΩ max. (rated: 1mA, 5VDC)				100 MΩ max. (rated: 100 μA, 5 VDC)
Insulation resistance	100 MΩ min. (at 250 VDC)				
Dielectric strength	500 VAC, 50/60 Hz for 1 minute				
Bounce time	5 ms max.				
Vibration resistance	Malfunction durability: 10 to 55 Hz, 1.5 mm double amplitude for 30 to 60 s				
Shock resistance	Mechanical durability: 1,000 m/s <sup>2</sup> (approx. 100 G) Malfunction durability: 100 m/s <sup>2</sup> (approx. 10 G)				
Ambient operating temperature	-25° to 70°C (at 60% RH max.) with no icing or condensation				
Ambient operating humidity	35% to 85% RH (at 5 to 35 °C)				
Weight	Approx. 0.25 g	Approx. 0.85 g		Approx. 0.25 g	

Note: Data shown are of initial value.

## ■ Life Expectancy

B3F-1000, B3F-3000, B3F-6000:
1,000,000 operations min (OF: 100gf) (B3F-1070: 500,000 operations min)
300,000 operations min (OF: 150 gf)
100,000 operations min (OF: 260gf)
B3F-G:
300,000 operations min (OF: 180gf)
B3F-4000:
3,000,000 operations min (OF: 130gf)
1,000,000 operations min (OF: 260gf)
B3F-5000:
10,000,000 operations min.

## ■ Operating Characteristics

Characteristics	Part Number						
	B3F-1□□□ / -3□□□			B3F-4□□□ / -5□□□		B3F-6□□□	
	General purpose type		High force type	General purpose type	High force type	General purpose type	High force type
Operating force (OF)	100 ± 30 g	150 ± 50 g	260 ± 70 gf	130 ± 50 g	260 ± 70 g	100 ± 30 g	150 ± 50 g
Release force (RF) min.	20 g	50 g	50 gf	30 g	50 g	20 g	50 g
Pretravel (PT)	0.25 <sup>+0.2</sup> / <sub>-0.1</sub> mm			0.3 <sup>+0.2</sup> / <sub>-0.1</sub> mm		0.25 <sup>+0.2</sup> / <sub>-0.1</sub> mm	

# Dimensions

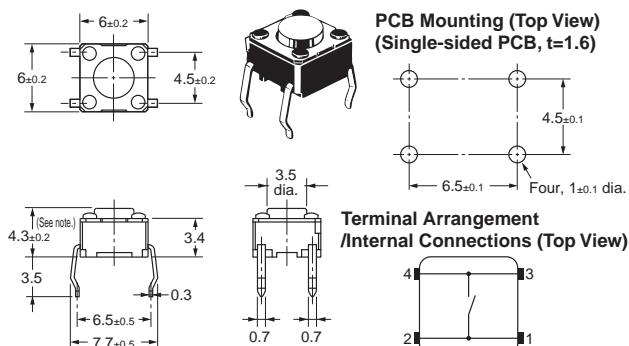
**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

2. Terminal numbers are not indicated on this switch. With the switch turned over so that the logo mark "OMRON" is visible on the upper part of the rear side of the switch base, the terminal on the right of the logo mark is numbered "1" and that on the bottom right is "3." Accordingly, two terminals on the left side are numbered "2" and "4" respectively.

## ■ 6 x 6 mm Models

### Standard, Flat Plunger Type (without Ground Terminal)

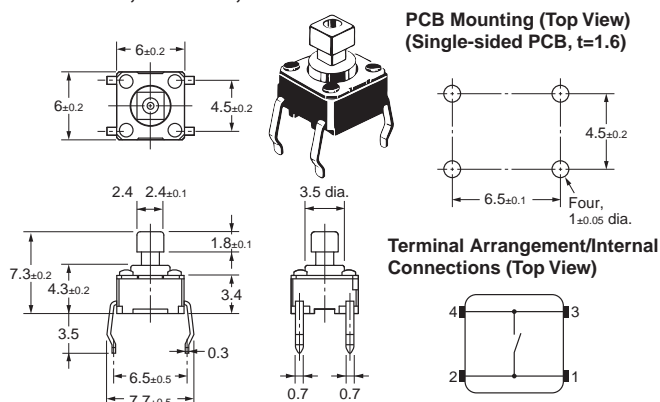
B3F-1000, B3F-1002, B3F-1005, B3F-1020\*, B3F-1022\*,  
B3F-1025\*, B3F-1002-G, B3F-1022-G\*



\* The height of B3F-1020, B3F-1022, B3F-1025, and B3F-1026 is  $5\pm0.2$  mm.

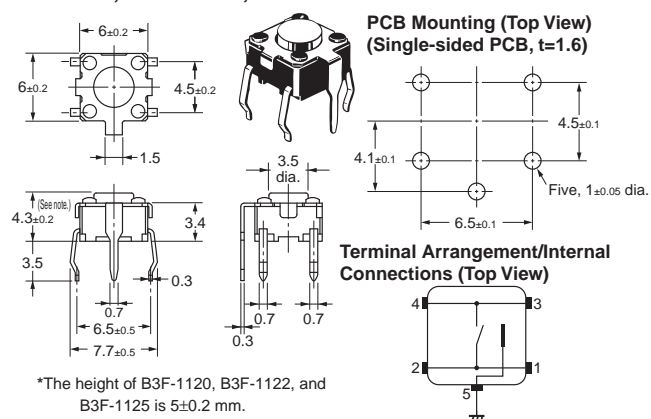
### Standard, Projected Plunger Type (without Ground Terminal)

B3F-1050, B3F-1052, B3F-1055



### Standard, Flat Plunger Type (with Ground Terminal, Pitch: 6.5 mm)

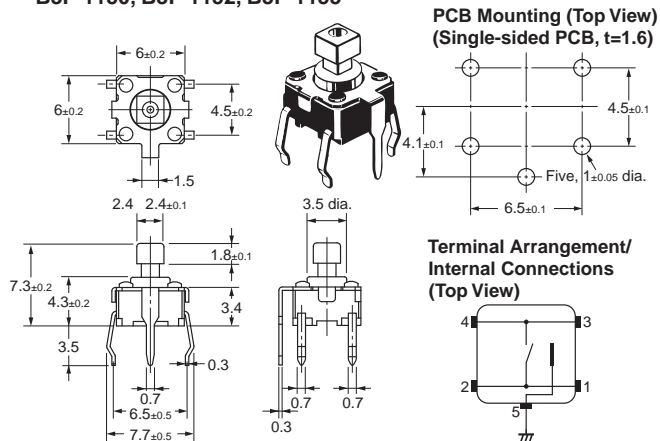
B3F-1100, B3F-1102, B3F-1105, B3F-1120\*, B3F-1122\*,  
B3F-1125\*, B3F-1102-G, B3F-1122-G\*



\*The height of B3F-1120, B3F-1122, and B3F-1125 is  $5\pm0.2$  mm.

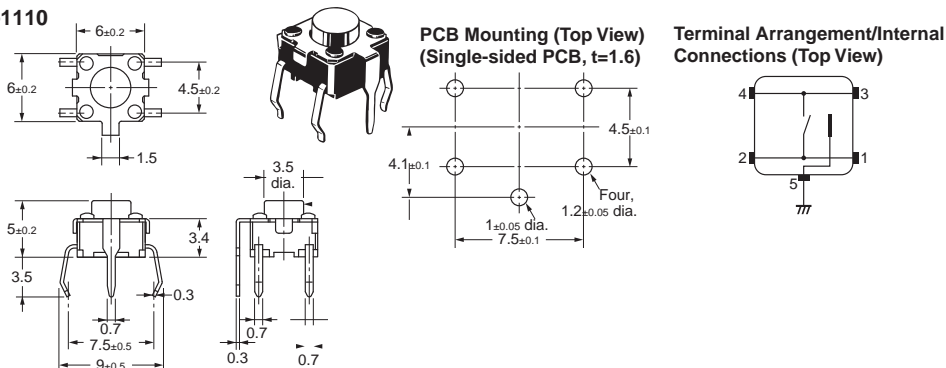
### Standard, Projected Plunger Type (with Ground Terminal)

B3F-1150, B3F-1152, B3F-1155



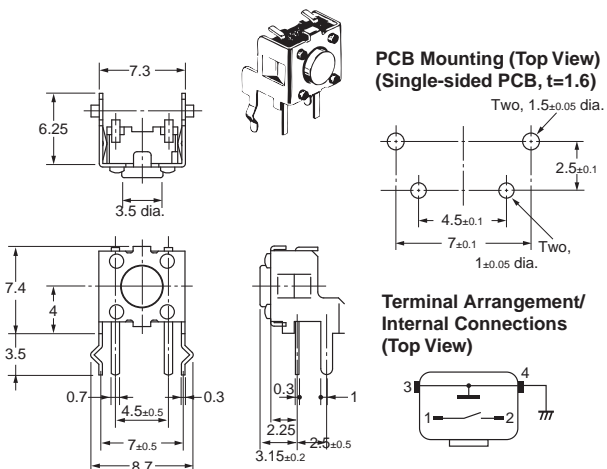
### Standard, Flat Plunger Type (with Ground Terminal, Pitch: 7.5 mm)

B3F-1110



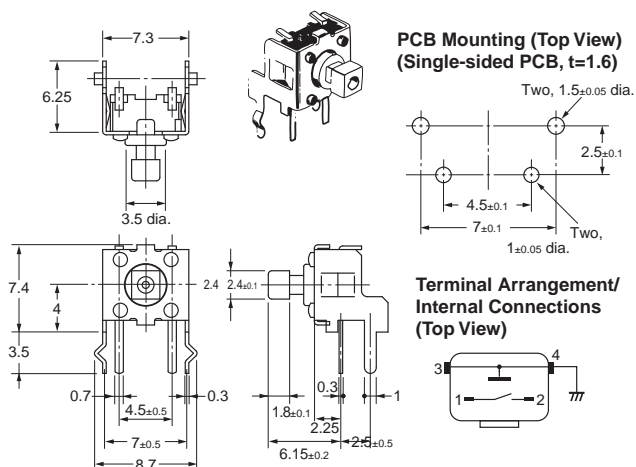
# Side-operated, Flat Plunger Type

B3F-3100, B3F-3102, B3F-3105



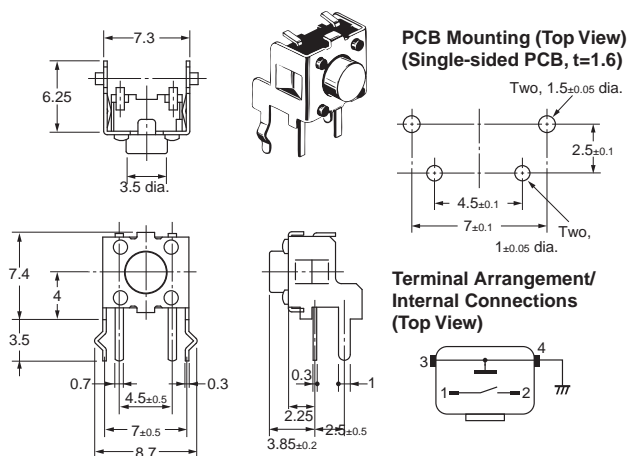
# Side-operated, Projected Plunger Type

B3F-3150, B3F-3152, B3F-3155



# Side-operated, Flat Plunger Type (Height: 3.85 mm)

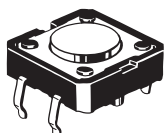
B3F-3120, B3F-3122, B3F-3125



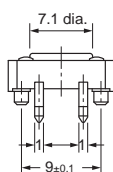
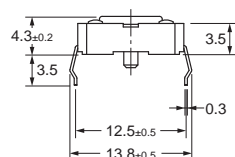
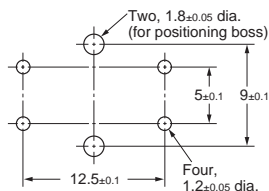
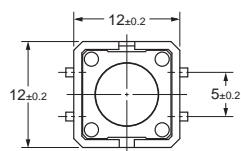
## ■ 12 x 12 mm Models

Standard, Long-life,  
and High-reliability Models  
Flat Plunger Type  
(without Ground Terminal)

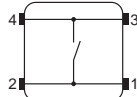
B3F-4000, B3F-4005,  
B3F-5000, B3F-5001



PCB Mounting (Top View)  
(Single-sided PCB,  $t=1.6$ )

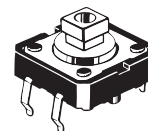


Terminal Arrangement/  
Internal Connections  
(Top View)

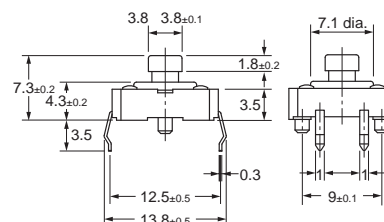
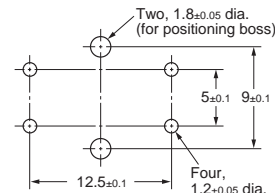
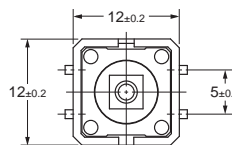


Standard, Long-life,  
and High-reliability Models  
Projected Plunger Type  
(without Ground Terminal)

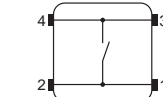
B3F-4050, B3F-4055,  
B3F-5050, B3F-5051



PCB Mounting (Top View)  
(Single-sided PCB,  $t=1.6$ )

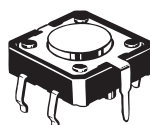


Terminal Arrangement/  
Internal Connections  
(Top View)

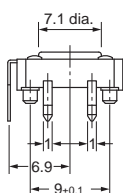
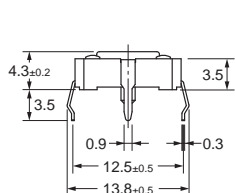
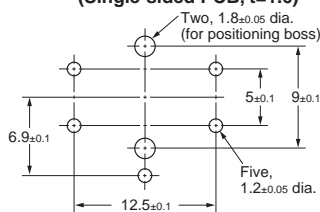
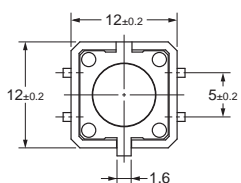


Standard, Long-life,  
and High-reliability Models  
Flat Plunger Type  
(with Ground Terminal)

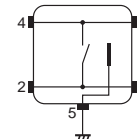
B3F-4100, B3F-4105,  
B3F-5100, B3F-5101



PCB Mounting (Top View)  
(Single-sided PCB,  $t=1.6$ )

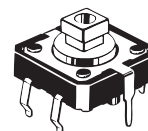


Terminal Arrangement/  
Internal Connections  
(Top View)

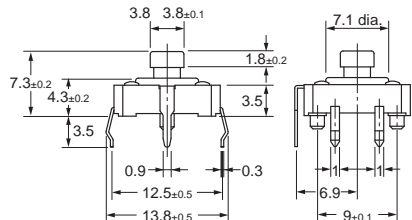
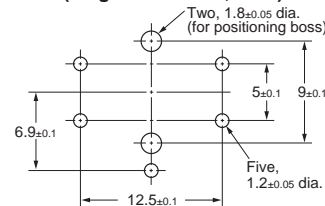
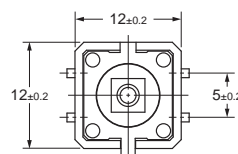


Standard, Long-life,  
and High-reliability Models  
Projected Plunger Type  
(with Ground Terminal)

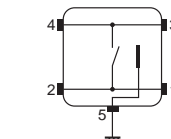
B3F-4150, B3F-4155,  
B3F-5150, B3F-5151



PCB Mounting (Top View)  
(Single-sided PCB,  $t=1.6$ )



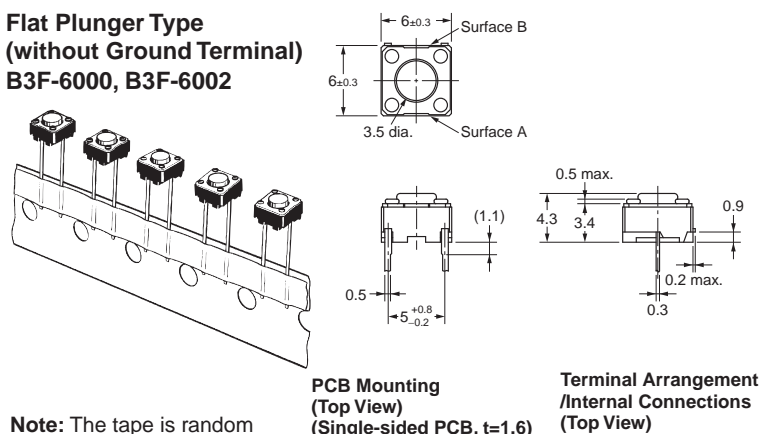
Terminal Arrangement/  
Internal Connections  
(Top View)



# ■ 6 x 6 mm Radial Taped Models: Sold in units of 1,000 switches

**Note:** Terminal numbers are not indicated on this switch. With the switch turned over so that the logo mark "OMRON" is visible on the upper part of the rear side of the switch base, the terminal on the top of the logo mark is numbered "1" and that on the bottom is "2."

## Flat Plunger Type (without Ground Terminal) B3F-6000, B3F-6002

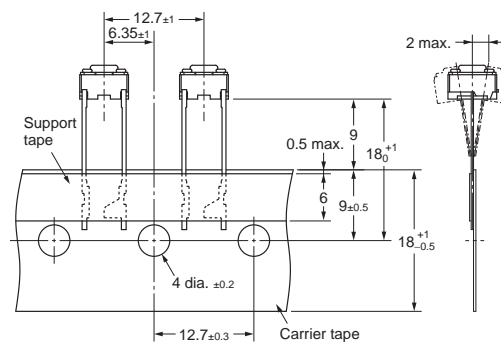
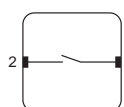


**Note:** The tape is random between surface A and surface B.

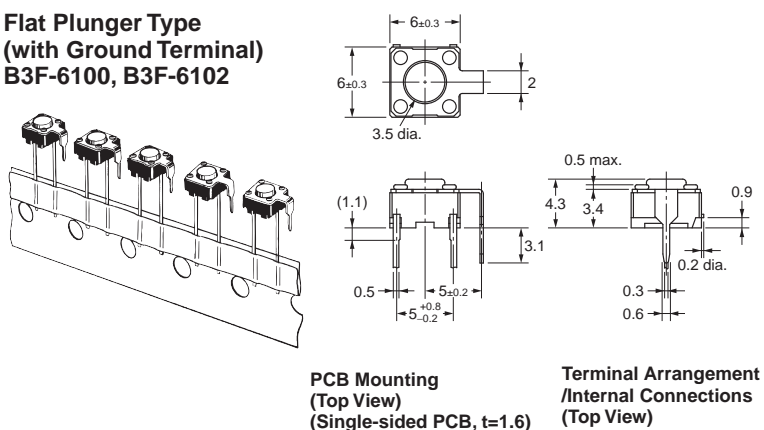
PCB Mounting  
(Top View)  
(Single-sided PCB, t=1.6)



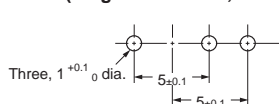
Terminal Arrangement  
/Internal Connections  
(Top View)



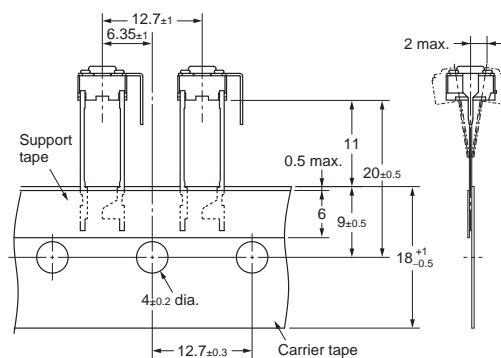
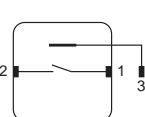
## Flat Plunger Type (with Ground Terminal) B3F-6100, B3F-6102



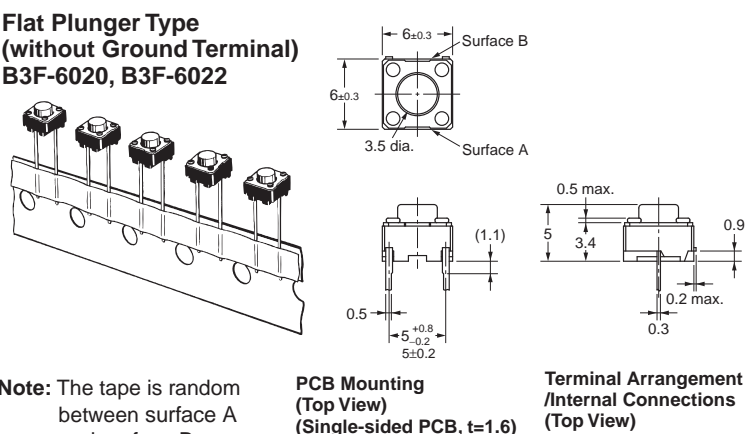
PCB Mounting  
(Top View)  
(Single-sided PCB, t=1.6)



Terminal Arrangement  
/Internal Connections  
(Top View)



## Flat Plunger Type (without Ground Terminal) B3F-6020, B3F-6022

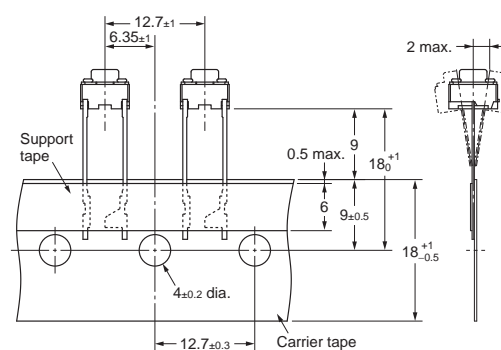
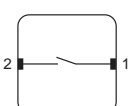


**Note:** The tape is random between surface A and surface B.

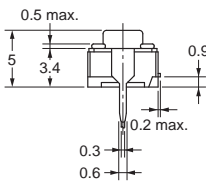
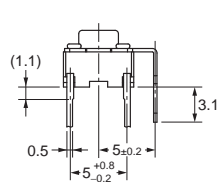
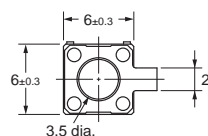
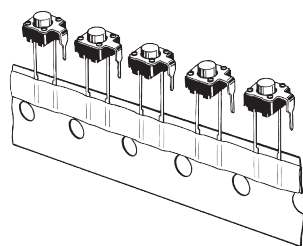
PCB Mounting  
(Top View)  
(Single-sided PCB, t=1.6)



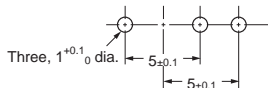
Terminal Arrangement  
/Internal Connections  
(Top View)



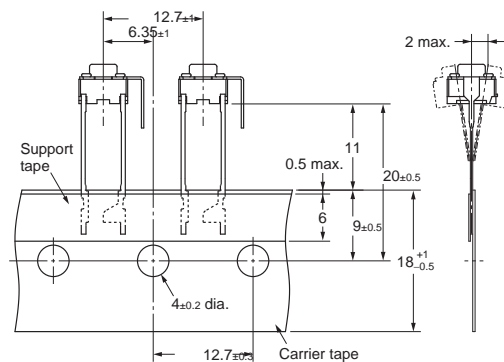
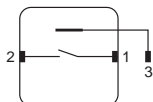
**Flat Plunger Type  
(with Ground Terminal)  
B3F-6120, B3F-6122**



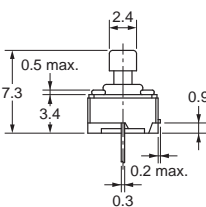
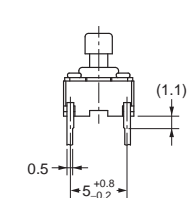
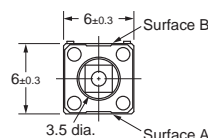
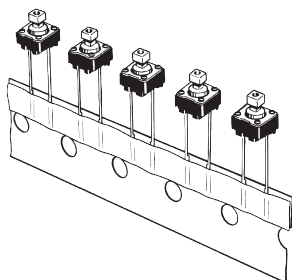
**PCB Mounting  
(Top View)  
(Single-sided PCB, t=1.6)**



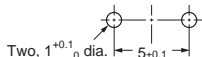
**Terminal Arrangement  
/Internal Connections  
(Top View)**



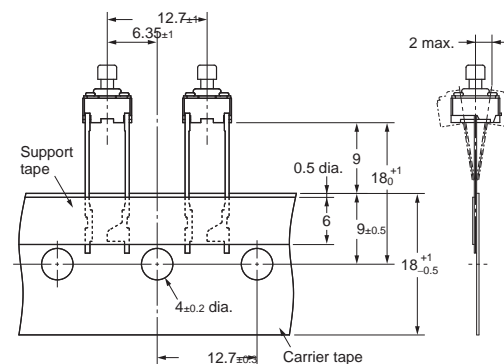
**Projected Plunger Type  
(without Ground Terminal)  
B3F-6050, B3F-6052**



**PCB Mounting  
(Top View)  
(Single-sided PCB, t=1.6)**

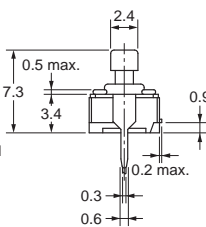
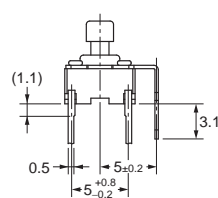
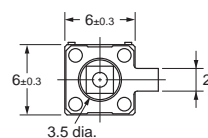
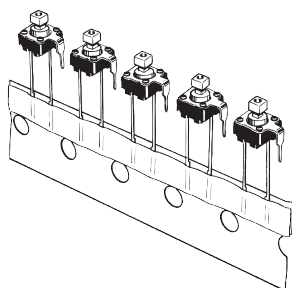


**Terminal Arrangement  
/Internal Connections  
(Top View)**

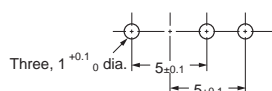


**Note:** The tape is random between surface A and surface B.

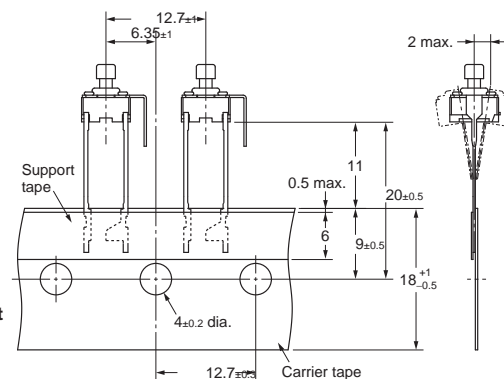
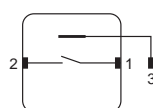
**Projected Plunger Type  
(with Ground Terminal)  
B3F-6150, B3F-6152**



**PCB Mounting  
(Top View)  
(Single-sided PCB, t=1.6)**



**Terminal Arrangement  
/Internal Connections  
(Top View)**



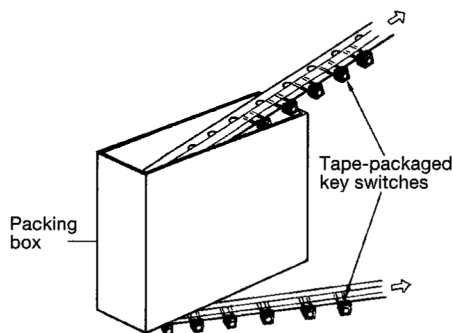
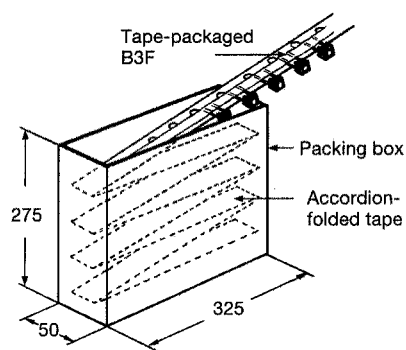


# Hints on Correct Use

See the Tactile Switch User's Guide, "Tactile Switches - Technical Information" for information regarding processing and handling.

## ■ Taped Radial (Auto Insertion) Packaging

- Tactile switches packed on tape are placed into packing boxes as shown below.
- Number of switches per box: 1,000
- Tape may be drawn from the box either from the top or from the bottom.

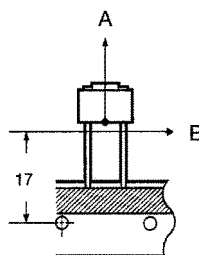


## ■ Taping Strength

The tactile switches will not release from the tape when pulled in directions A and B at the following forces.

A: 500 g

B: 100 g



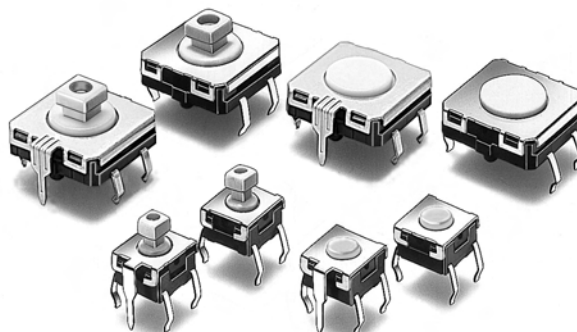
## Precautions

Be sure to read the precautions common to all Tactile Switches, contained in the Technical User's Guide, "Tactile Switches, Technical Information" for correct use.





# Tactile Switch B3W

## Tactile Switch with Sealed Construction for Automatic Soldering

- Sealed construction conforming to IP67 (IEC-60529) provides high reliability in locations exposed to dust or water.
- Available in two sizes: 6 mm square and 12 mm square
- Dome-shaped contact mechanism assures short key stroke and a sharp click to confirm actuation
- Ground terminal available to protect against static electricity
- Projected plunger types that allow the installation of B32-series Special Key Tops are available.
- RoHS Compliant



## Ordering Information

Type	Plunger	Switch height	Operating force	Model	
				Without ground terminal	With ground terminal
				Bags	Bags
Standard 6x6 mm	Flat 	4.3 mm	General-purpose: 160 g	<b>B3W-1000</b>	<b>B3W-1100</b>
			High-force: 230 g	<b>B3W-1002</b>	<b>B3W-1102</b>
	Projected 	7.3 mm	General-purpose: 160 g	<b>B3W-1050</b>	<b>B3W-1150</b>
			High-force: 230 g	<b>B3W-1052</b>	<b>B3W-1152</b>
Standard 12x12 mm	Flat 	4.3 mm	General-purpose: 200 g	<b>B3W-4000</b>	<b>B3W-4100</b>
			High-force: 350 g	<b>B3W-4005</b>	<b>B3W-4105</b>
	Projected 	7.3 mm	General-purpose: 200 g	<b>B3W-4050</b>	<b>B3W-4150</b>
			High-force: 350 g	<b>B3W-4055</b>	<b>B3W-4155</b>

**Note:** Bulk Packaged, 100 switches per bag. Order in multiples of the package quantity.

**Important Note:** Switches cannot be water-washed.

## Accessories

See “B32” Tactile Switch Key Top data sheet for keycaps that fit projected plunger B3W models.

## Plunger Identification Table

Use this table to determine keyswitch type by plunger color.

Plunger color	Operating force	Type
White	160 g	B3W-1000, 1050, 1100, 1150
White	200 g	B3W-4000, 4050, 4100, 4150
Yellow	230 g	B3W-1002, 1052, 1102, 1152
Yellow	350 g	B3W-4005, 4055, 4105, 4155

# Specifications

## ■ Characteristics

Contact form		SPST-NO	
Switching capacity		1 to 50 mA, 5 to 24 VDC (resistive load)	
Contact resistance		100 mΩ max. (rated: 1 mA, 5 VDC)	
Insulation resistance		100 MΩ min. (at 250 VDC)	
Dielectric strength		500 VAC, 50/60 Hz for 1 min.	
Bounce time		5 ms max.	
Vibration resistance		Malfunction: 10 to 55 Hz, 1.5-mm double amplitude	
Shock resistance		Destruction: 1,000 m/s <sup>2</sup> (approx. 100 G) max. Malfunction: 100 m/s <sup>2</sup> (approx. 10 G) max.	
Ambient operating temperature		-25° to 70°C (at 60% RH max.) with no icing or condensation	
Ambient operating humidity		35% to 85% (at 5 to 35°C)	
Service life	General purpose	B3W-1□□□ : 1,000,000 operations min.	B3W-4□□□ : 3,000,000 operations min.
	High force	300,000 operations min.	1,000,000 operations min.
Weight		B3W-1□□□ : Approx. 0.30 g	B3W-4□□□ : Approx. 1.00 g

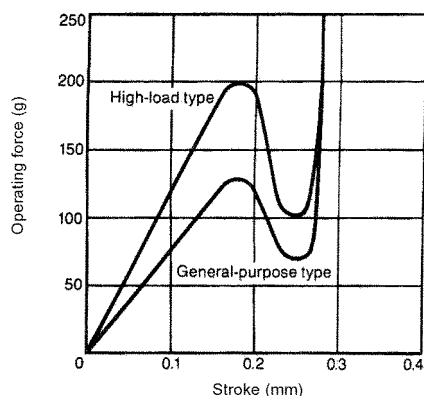
## ■ Operating Characteristics

Characteristics	B3W-1□□□		B3W-4□□□	
	General-purpose	High-force	General-purpose	High-force
Operating force (OF) max.	160 g	230 g	200 g	350 g
Release force (RF) min.	20 g	50 g	30 g	50 g
Pretravel (PT)	0.25 <sup>+0.2</sup> / <sub>-0.1</sub> mm		0.3 <sup>+0.2</sup> / <sub>-0.1</sub> mm	

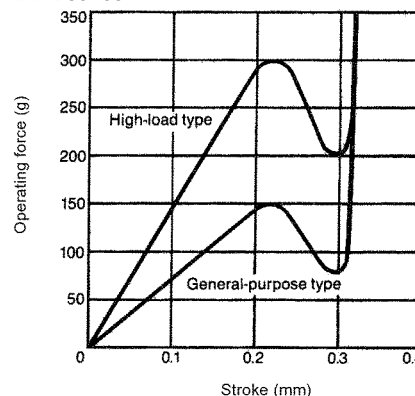
# Engineering Data

## ■ Operating Force vs. Stroke (Typical Example)

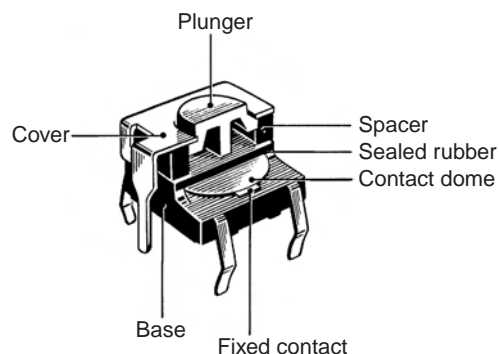
B3W-1□□□ series



B3W-4□□□ series



## ■ Construction



# Dimensions

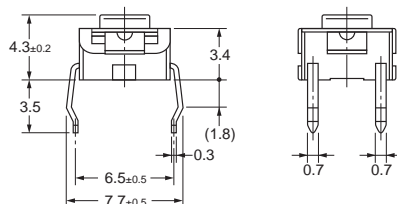
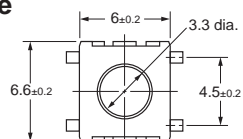
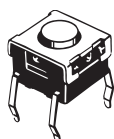
**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

2. Terminal numbers are not indicated on this switch. With the switch turned over so that the logo mark "OMRON" is visible on the upper part of the rear side of the switch base, the terminal on the right of the logo mark is numbered "1" and that on the bottom right is "3." Accordingly, two terminals on the left side are numbered "2" and "4" respectively.

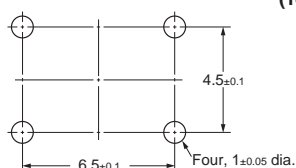
## 6 x 6 mm Models

### Flat Plunger Type (without Ground Terminal)

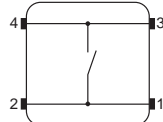
B3W-1000  
B3W-1002



PCB Mounting (Top View)  
(Single-sided PCB,  $t=1.6$ )

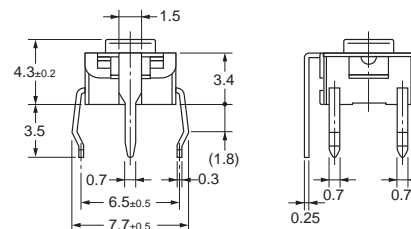
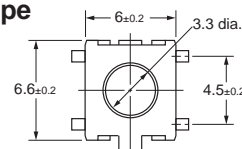
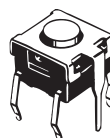


Terminal Arrangement  
/Internal Connections  
(Top View)

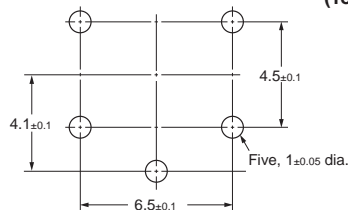


### Flat Plunger Type (with Ground Terminal)

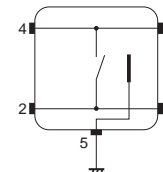
B3W-1100  
B3W-1102



PCB Mounting (Top View)  
(Single-sided PCB,  $t=1.6$ )

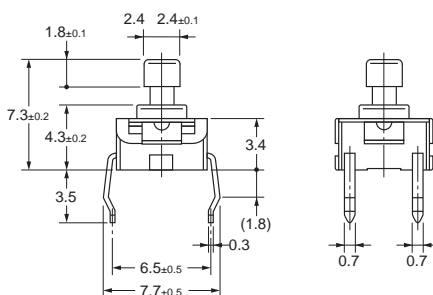
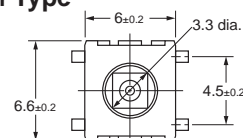
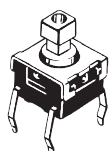


Terminal Arrangement  
/Internal Connections  
(Top View)

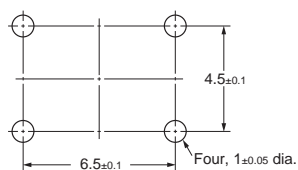


### Projected Plunger Type (without Ground Terminal)

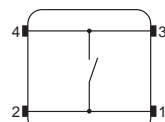
B3W-1050  
B3W-1052



PCB Mounting (Top View)  
(Single-sided PCB,  $t=1.6$ )

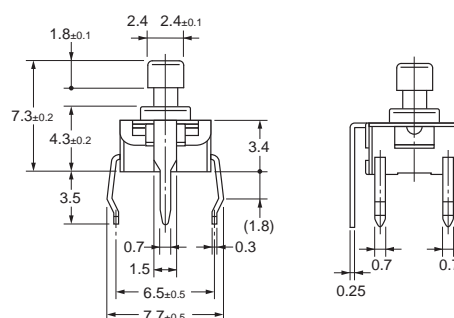
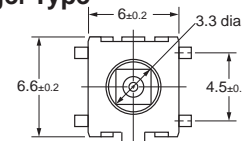
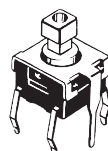


Terminal Arrangement  
/Internal Connections  
(Top View)

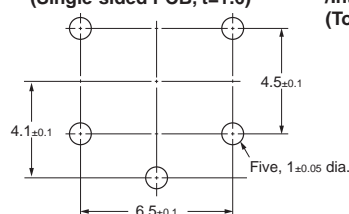


### Projected Plunger Type (with Ground Terminal)

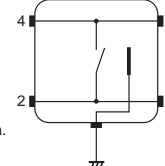
B3W-1150  
B3W-1152



PCB Mounting (Top View)  
(Single-sided PCB,  $t=1.6$ )



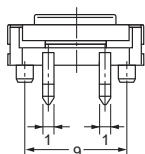
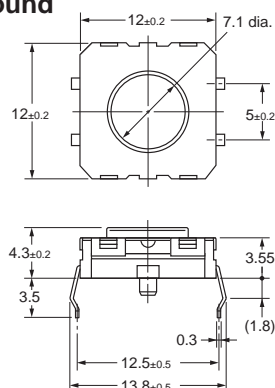
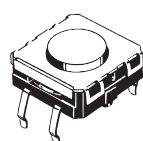
Terminal Arrangement  
/Internal Connections  
(Top View)



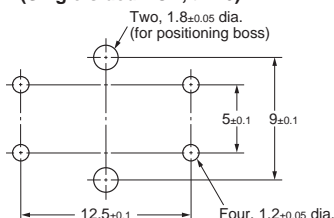
## 12 x 12 mm Models

### Flat Plunger Type (without Ground Terminal)

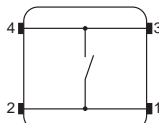
B3W-4000  
B3W-4005



PCB Mounting (Top View)  
(Single-sided PCB,  $t=1.6$ )

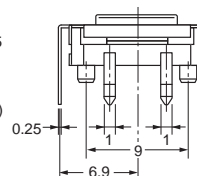
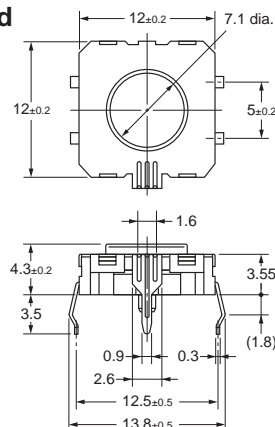
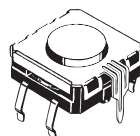


Terminal Arrangement  
/Internal Connections  
(Top View)

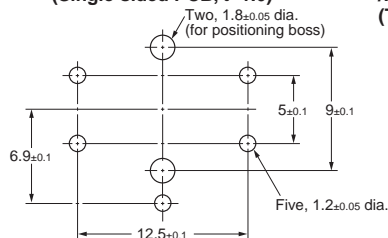


### Flat Plunger Type (with Ground Terminal)

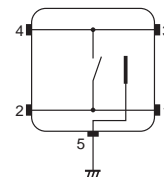
B3W-4100  
B3W-4105



PCB Mounting (Top View)  
(Single-sided PCB,  $t=1.6$ )

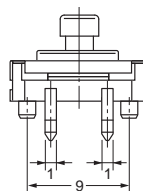
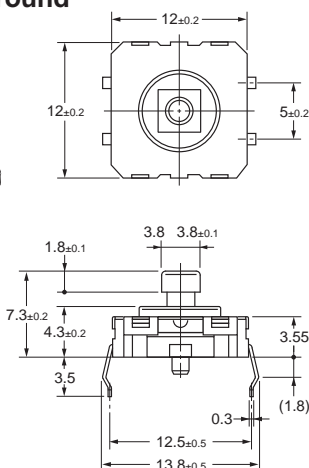
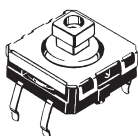


Terminal Arrangement  
/Internal Connections  
(Top View)

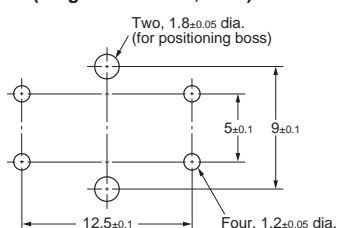


### Projected Plunger Type (without Ground Terminal)

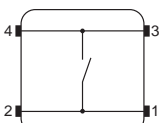
B3W-4050  
B3W-4055



PCB Mounting (Top View)  
(Single-sided PCB,  $t=1.6$ )

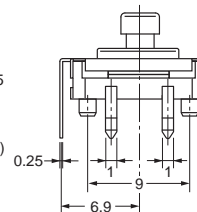
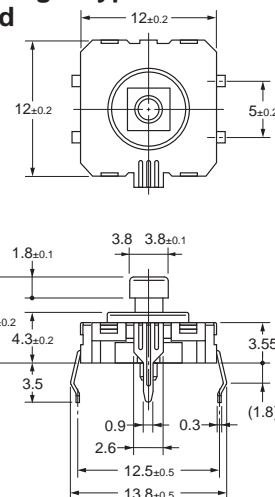
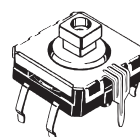


Terminal Arrangement  
/Internal Connections  
(Top View)

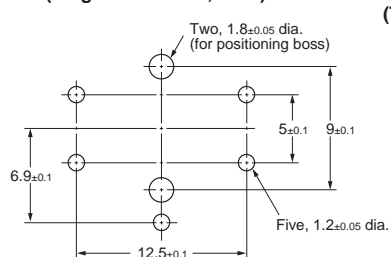


### Projected Plunger Type (with Ground Terminal)

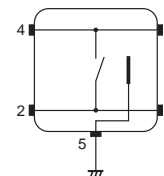
B3W-4150  
B3W-4155



PCB Mounting (Top View)  
(Single-sided PCB,  $t=1.6$ )



Terminal Arrangement  
/Internal Connections  
(Top View)



## Precautions

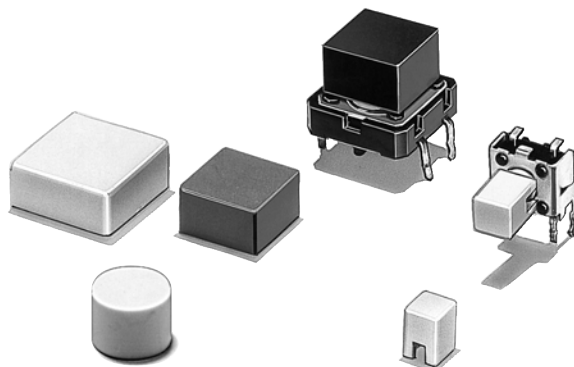
Be sure to read the precautions common to all Tactile Switches, contained in the Technical User's Guide, "Tactile Switches, Technical Information" for correct use.

# Tactile Switch Key Top

## B32

**Key Top Designed Specially for Projected-plunger-type B3F, B3FS and B3W Switches**

- Available in a wide range of colors and sizes.
- RoHS Compliant.



## Ordering Information

**For B3F, B3FS and B3W Switches**

Color	6 x 6 mm Switches (B3F-1000, B3F-3000, B3F-6000, B3W-1000, B3FS)			12 x 12 mm Switches (B3F-4000, B3F-5000, B3W-4000)		
	4 x 4 mm Key Top	6 mm dia. Key Top	D-type Key Top	9 x 9 mm Key Top	12 x 12 mm Key Top	9.5-mm dia. Key Top
Light gray	B32-1000	B32-2000	B32-2100	B32-1200	B32-1300	B32-1600
Black	B32-1010	B32-2010	B32-2110	B32-1210	B32-1310	B32-1610
Orange	B32-1020	—	—	B32-1220	B32-1320	B32-1620
Yellow	B32-1030	—	—	B32-1230	B32-1330	B32-1630
Blue	B32-1040	—	—	B32-1240	B32-1340	—
White	B32-1060	—	—	B32-1260	B32-1360	—
Light green	B32-1070	—	—	B32-1270	B32-1370	—
Red	B32-1080	—	—	B32-1280	B32-1380	—

## Specifications

### ■ Characteristics

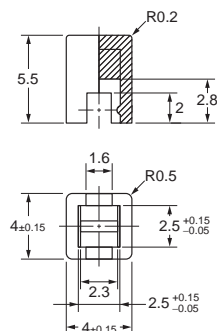
Ambient operating temperature	–25°C to 70°C (at 60% RH max.) with no icing or condensation
Ambient operating humidity	35% to 85% (at 5 to 35°C)

# Dimensions

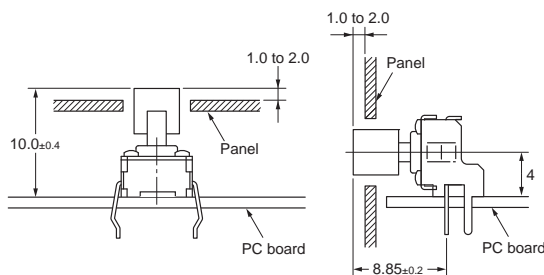
**Note:** Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## ■ For 6 x 6 mm Tactile Switch

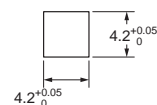
### B32-10□0



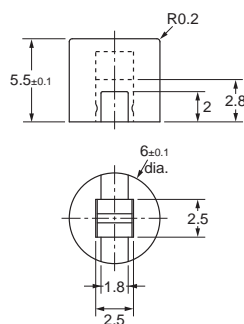
Reference Dimensions



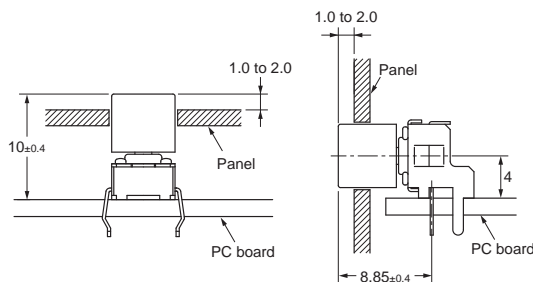
Panel Cutout



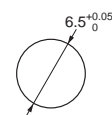
### B32-2000 B32-2010



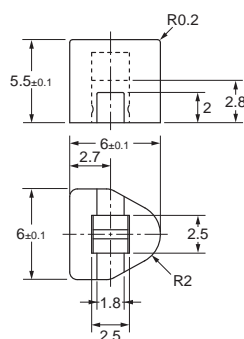
Reference Dimensions



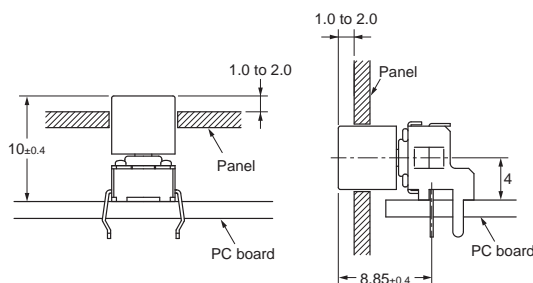
Panel Cutout



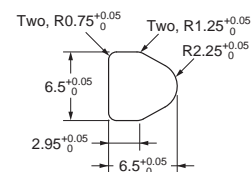
### B32-2100 B32-2110



Reference Dimensions

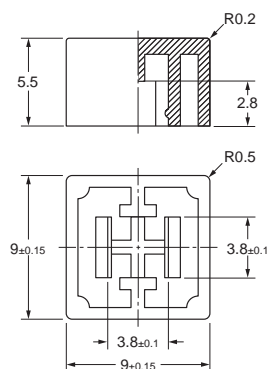


Panel Cutout

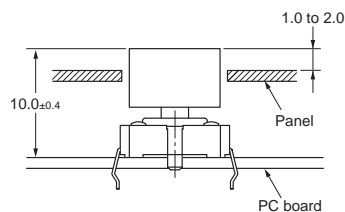


# ■ For 12 x 12 mm Tactile Switch

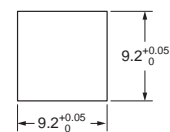
## B32-12□0



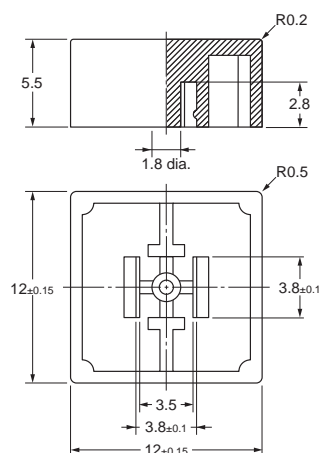
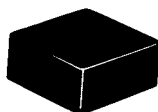
Reference Dimensions



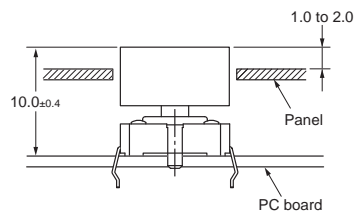
Panel Cutout



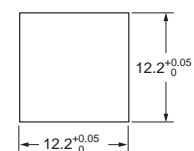
## B32-13□0



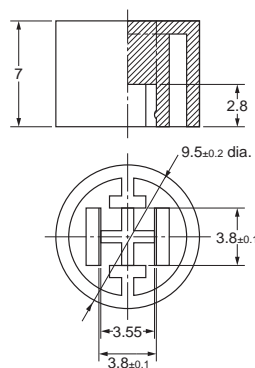
Reference Dimensions



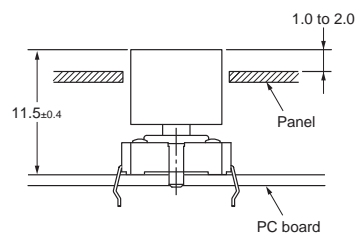
Panel Cutout



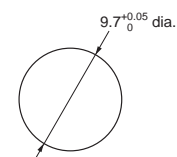
## B32-16□0



Reference Dimensions



Panel Cutout





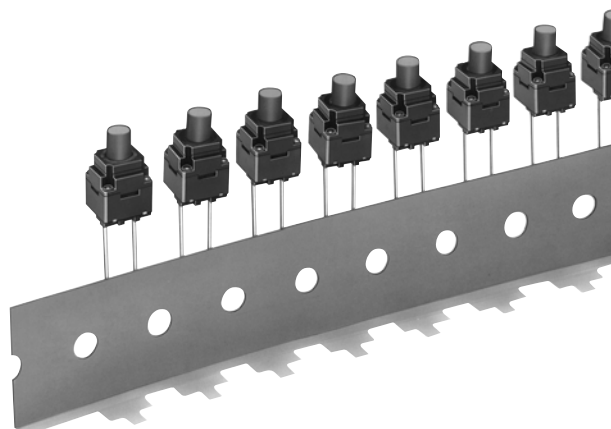
# MEMO

The image displays a 10x10 grid of 100 small squares. Each square contains a unique 4x4 arrangement of symbols. The symbols used are dots (.), horizontal lines (—), vertical lines (|), and crosses (x). The patterns within each square are complex and varied, with some squares featuring more symbols than others. The overall effect is a dense, textured field of geometric shapes.


# Sealed Tactile Switch B3WN

## Double-sealed Construction Assures Watertight/Dust-tight Protection

- Sealed construction conforming to IP67 (IEC-60529) provides high reliability even in locations exposed to dust or water.
- 8 mm x 8 mm compact size.
- Allows the use of radial-taping part insertion machines.
- RoHS Compliant



## Ordering Information

Type	Plunger	Height	Operating force (OF)	Model
8 x 8 mm		13 mm	General-purpose: 200 gf	B3WN-6002
			High-force: 260 gf	B3WN-6005

**Note:** The switches are tape packaged in units of 1,000 per package. Order in multiples of the package size. Switches are not sold individually.

**Important Note:** Switches cannot be water-washed.

## Specifications

### ■ Characteristics

Contact form	SPST-NO
Switching capacity	50 mA, 12 VDC (resistive load)
Contact resistance	100 mΩ max. (rated: 1 mA, 5 VDC)
Insulation resistance	100 MΩ min. (at 100 VDC)
Dielectric strength	250 VAC, 50/60Hz for 1 min
Bounce time	10 ms max.
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 784 m/s <sup>2</sup> (approx. 80G) max. Malfunction: 100 m/s <sup>2</sup> (approx. 10G) max.
Life expectancy	100,000 operations min.
Ambient operating temperature	–25°C to 85°C (at 60% RH max.) with no icing or condensation
Ambient operating humidity	35% to 85% (at 5 to 35°C)
Weight	Approx. 0.7 g

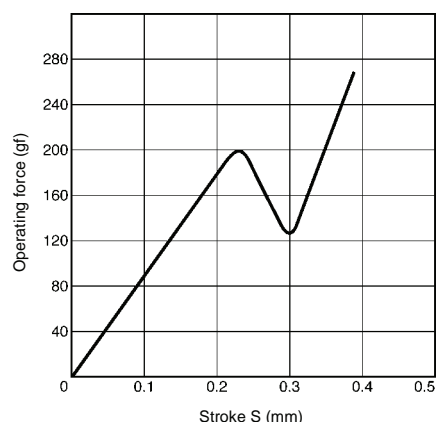
**Note:** Data shown are of initial value

### ■ Operating Characteristics

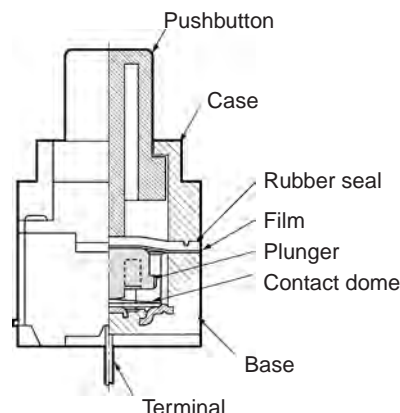
Item	B3WN-6002	B3WN-6005
Operating force (OF)	200 ± 70 gf	260 ± 70 gf
Releasing force (RF) min.		50 gf
Pretravel (PT)		0.3 <sup>+0.2</sup> <sub>–0.1</sub> mm

# Engineering Data

## ■ Operating Force vs. Stroke (Typical Example)



## ■ Construction



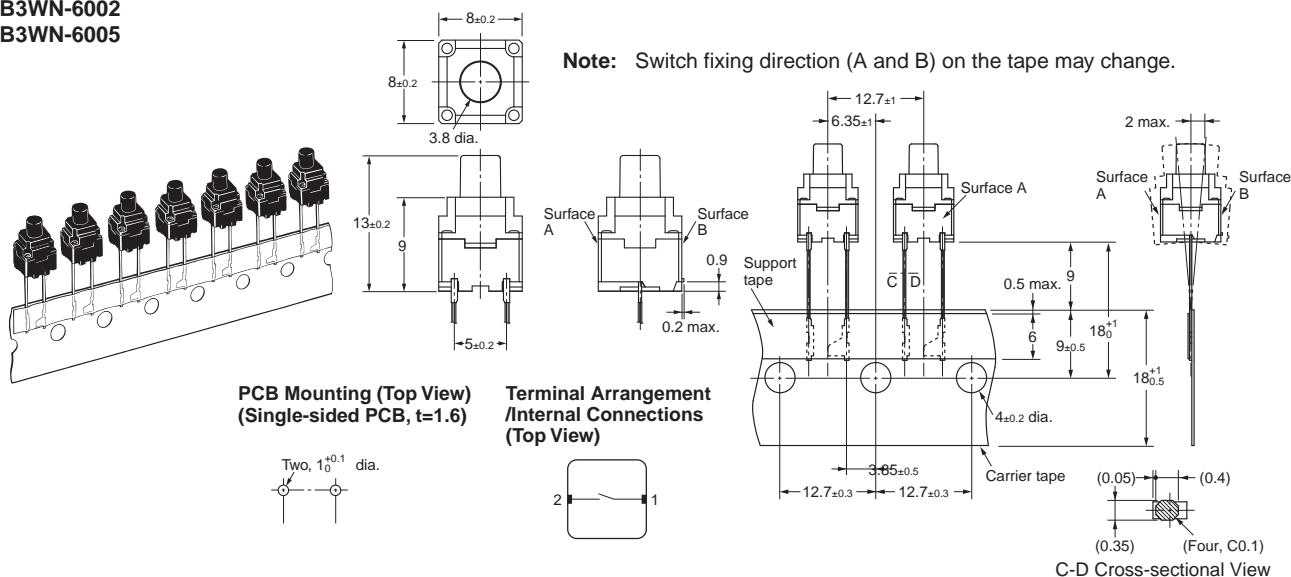
## Dimensions

**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

2. Terminal numbers are not indicated on this switch. With the switch turned over so that the logo mark "OMRON" is visible on the upper part of the rear side of the switch base, the terminal on the top of the logo mark is numbered "1" and that on the bottom is "2."

B3WN-6002  
B3WN-6005

**Note:** Switch fixing direction (A and B) on the tape may change.



## Precautions

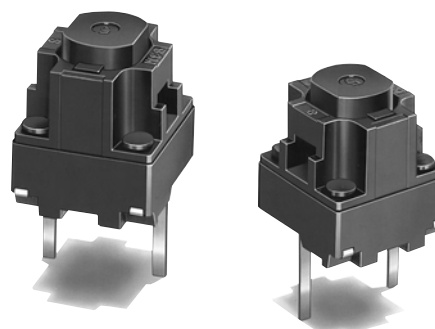
Be sure to read the precautions common to all Tactile Switches, contained in the Technical User's Guide, "Tactile Switches, Technical Information" for correct use.

# Tactile Switch

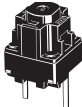
## B3M

### Designed for a Long Stroke and Positive Click

- Long stroke of 0.85 mm provides radically improved operability.
- Light touch with a minimum overstroke of 0.25 mm.
- Improved reliability with a service life of 2,000,000 operations.
- RoHS Compliant.



## Ordering Information

Size	Switch height	Operating force (OF)	Model
6 x 6 mm type 	7.3	70 ± 20 gf	B3M-6009

**Important Note:** Switches cannot be water-washed.

## Specifications

### ■ Characteristics

Contact form	SPST-NO
Switching capacity	1 to 50 mA, 5 to 12 VDC (resistive load)
Contact resistance	500 mΩ max. (rated: 1 mA, 5 VDC)
Insulation resistance	100 MΩ min. (at 250 VDC)
Dielectric strength	250 VAC, 50/60 Hz for 1 min.
Bounce time	5 ms max.
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5 mm double amplitude
Shock resistance	Malfunction: 100 m/s <sup>2</sup> max. (approx. 10 G max.)
Life expectancy	2,000,000 operations min.
Ambient operating temperature	-25° to 70°C (at 60% RH max.) with no icing or condensation
Ambient operating humidity	35% to 85% (at 5 to 35°C)
Weight	Approx. 0.27 g

### ■ Operating Characteristics

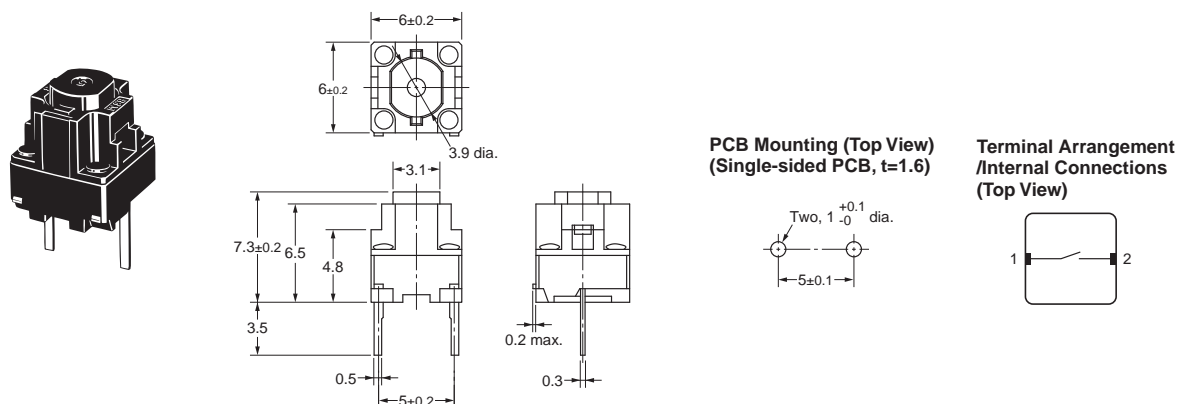
Operating force (OF)	70 ± 20 gf
Releasing force (RF min.)	20 gf min.
Pretravel (PT)	0.5 mm max.
Overtravel (OT)	0.2 mm min.

## Dimensions

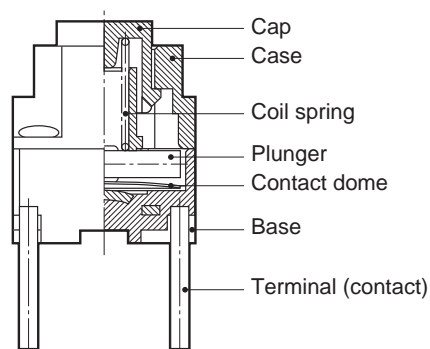
**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

2. Terminal numbers are not indicated on this switch. With the switch turned over so that the logo mark "OMRON" is visible on the upper part of the rear side of the switch base, the terminal on the top of the logo mark is numbered "1" and that on the bottom is "2."

### ■ B3M-6009



### ■ Construction



## Precautions

Be sure to read the precautions common to all Tactile Switches, contained in the Technical User's Guide, "Tactile Switches, Technical Information" for correct use.

# Ultra-small Tactile Switch

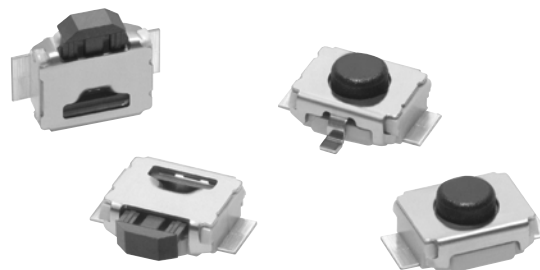
## B3U

### Ultra-small-sized Tactile Switch with High Contact Reliability: 1.2 x 3 x 2.5 mm (H x W x D)

- Industry's smallest switch\* allows high-density mounting on PCBs for mobile equipment.

\*As of October 2006 (according to OMRON survey).

- Dust-proof construction provides high reliability in dusty environments.
- Surface mounted: Ideal for high-density mounting.
- Models with ground terminals are available for protection against static electricity.
- RoHS Compliant



**NEW**

## Ordering Information

Type	Quantity per reel	Locating pin	Model	
			Without ground terminal	With ground terminal
Top-actuated	3,500 pieces	Without boss	B3U-1000P	B3U-1100P
		With boss	B3U-1000P-B	B3U-1100P-B
Side-actuated	4,000 pieces	Without boss	B3U-3000P	B3U-3100P
		With boss	B3U-3000P-B	B3U-3100P-B

**Note:** 1. Order in multiples of the quantities given for each package  
 2. Replace "P" in the part number with "PM" to order versions with 1,000 pieces per reel. Example: B3U-3100PM-B

## Specifications

### ■ Characteristics

Item	Top-actuated (B3U-1000 Series)	Side-actuated (B3U-3000 Series)
Contact form	SPST-NO	
Switching capacity	1 to 50 mA, 5 to 12 VDC (resistive load)	
Contact resistance	100 mΩ max. (rated: 1 mA, 5 VDC)	
Insulation resistance	100 MΩ min. (at 100 VDC)	
Dielectric strength	250 VAC, 50/60 Hz for 1 min	
Bounce time	5 ms max.	
Vibration resistance	10 to 55 Hz, 1.5 mm double amplitude	
Shock resistance	1,000 m/s <sup>2</sup> max.	
Life expectancy	200,000 operations min.	100,000 operations min.
Ambient operating temperature	-25 to 70°C, (at 60% RH max.) with no icing or condensation	
Ambient operating humidity	35% to 85% (at 5 to 35°C)	
Weight	Approx. 0.022 g	

**Note:** Data shown are of initial value

### ■ Operating Characteristics

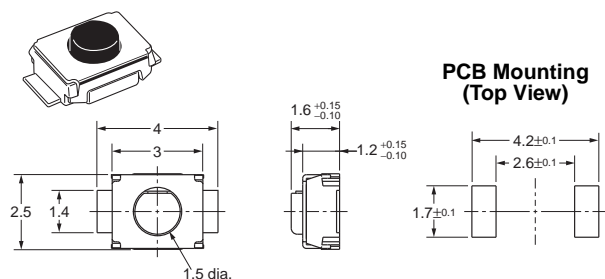
Characteristics	Top-actuated (B3U-1000 Series)	Side-actuated (B3U-3000 Series)
Operating force (OF)	153 ± 50 gf	162 ± 50 gf
Releasing force (RF) min.	20.3 gf	
Pretravel (PT)	0.15 <sup>+0.2</sup> <sub>-0.1</sub> mm	0.2 <sup>+0.2</sup> <sub>-0.1</sub> mm

# Dimensions

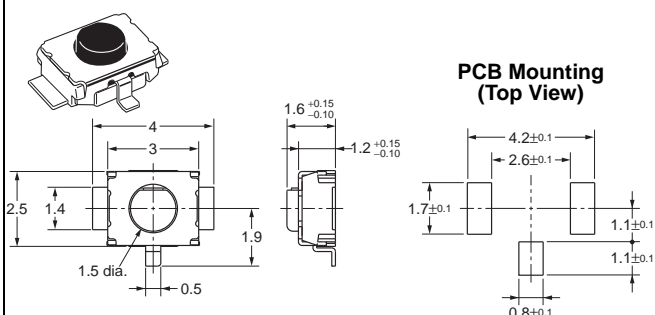
**Note:** All dimensions are in millimeters unless otherwise indicated. Unless otherwise specified, a tolerance of  $\pm 0.2$  mm applies to all dimensions.

## ■ Top-actuated Models

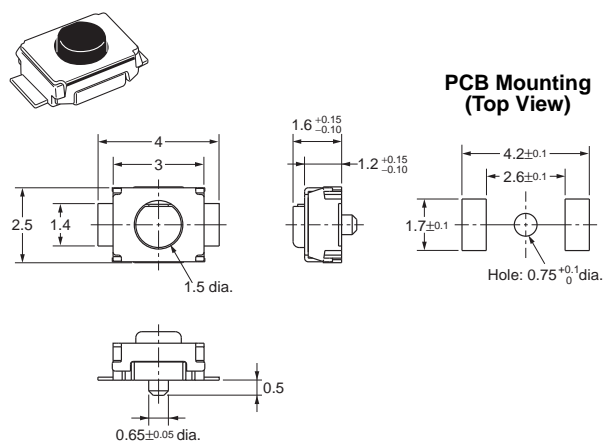
### Without Ground Terminal, without Boss B3U-1000P



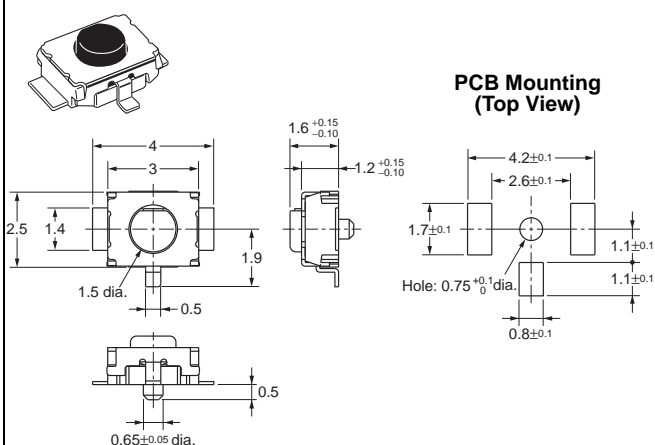
### With Ground Terminal, without Boss B3U-1100P



### Without Ground Terminal, with Boss B3U-1000P-B



### With Ground Terminal, with Boss B3U-1100P-B

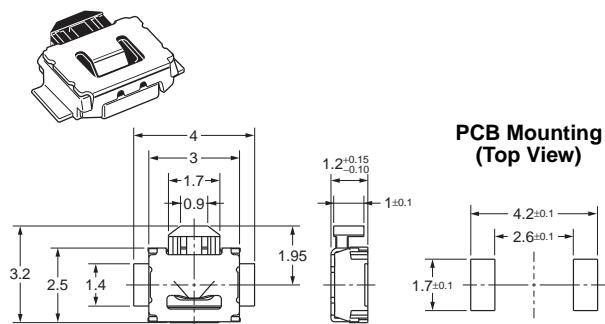


## ■ Side-actuated Models

**Note:** All dimensions are in millimeters unless otherwise indicated. Unless otherwise specified, a tolerance of  $\pm 0.2$  mm applies to all dimensions.

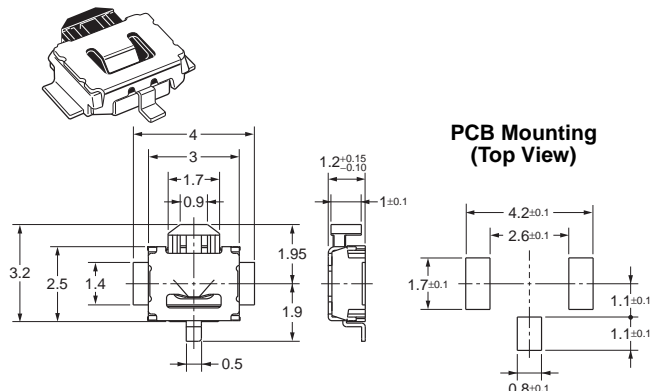
### Without Ground Terminal, without Boss

B3U-3000P



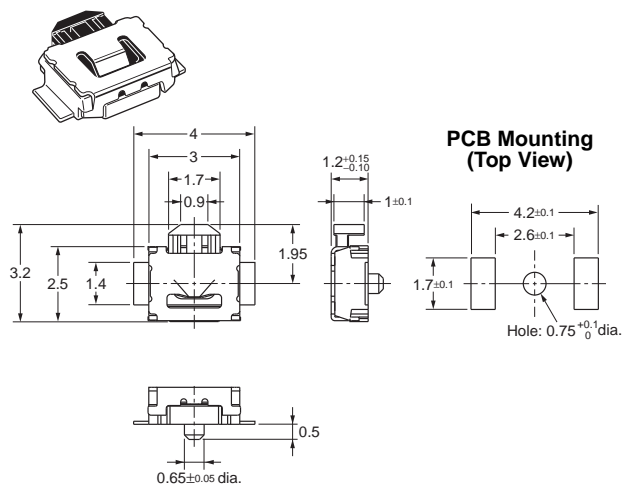
### With Ground Terminal, without Boss

B3U-3100P



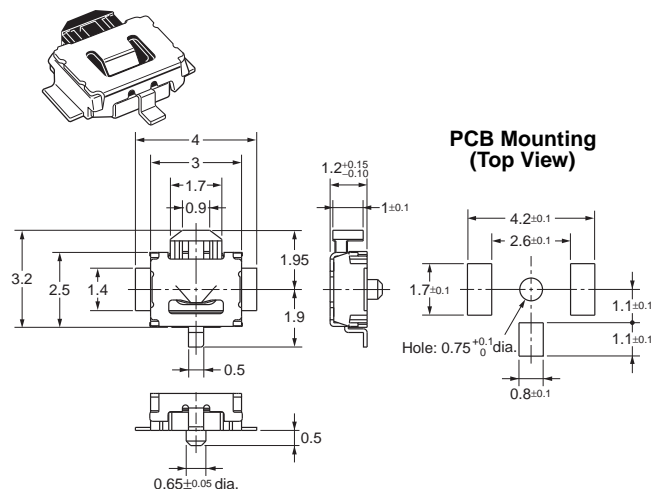
### Without Ground Terminal, with Boss

B3U-3000P-B



### With Ground Terminal, with Boss

B3U-3100P-B





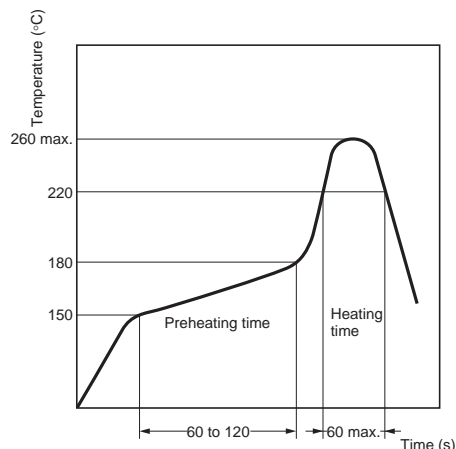
# Precautions

Be sure to read the precautions common to all Tactile Switches, contained in the Technical User's Guide, "Tactile Switches, Technical Information" for correct use.

## ■ Precautions for Correct Use

### Soldering

Perform reflow soldering within the ranges shown in the terminal temperature profile in the following diagram.



### Washing

B3U Switches cannot be washed. Doing so will cause the washing agent, together with flux or dust particles on the PCB, to enter the Switch, resulting in malfunction.

### Compliance with RoHS Directive

The "RoHS Compliant" designation indicates that the product does not contain the following six hazardous substances covered by the RoHS Directive.

Reference: The following standards are used to determine compliance for the six substances.

Lead: 1,000 ppm max.  
 Mercury: 1,000 ppm max.  
 Cadmium: 100 ppm max.  
 Hexavalent chromium: 1,000 ppm max.  
 PBB: 1,000 ppm max.  
 PBDE: 1,000 ppm max.

### Storage and Operating Environment

Do not store the product under the following conditions to prevent discoloration and other deterioration of the terminals.

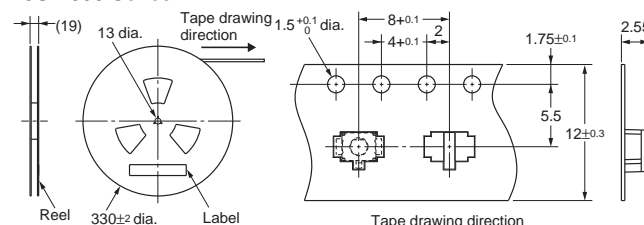
1. Locations subject to high temperatures or humidity
2. Locations containing corrosive gases
3. Locations subject to direct sunlight

The Switch is not provided with a watertight or drip-proof construction. Do not install or operate the product in locations subject to water spray or splashes.

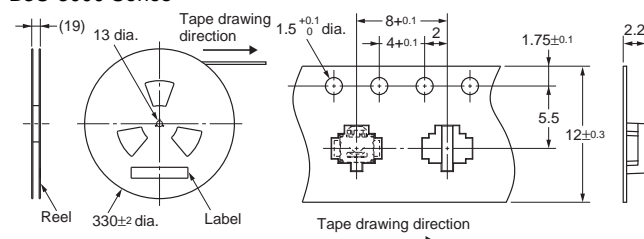
### Packaging Specifications

The specifications for B3U Switches packaged on embossed tape are as follows:

#### B3U-1000 Series



#### B3U-3000 Series

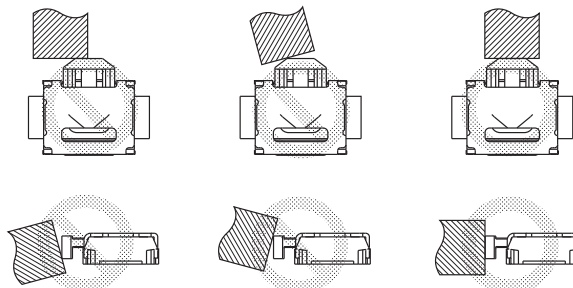


<b>Standards</b>	Conforms to JEITA.
<b>Package</b>	3,500 Switches (B3U-1000 Series)
	4,000 Switches (B3U-3000 Series)
<b>Heat resistance</b>	50°C for 24 hours (without deformation)

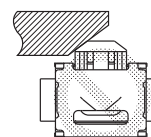
### Operation

Do not repeatedly operate the Switch with excessive force. Applying excessive pressure or applying additional force after the plunger has stopped may deform the disc spring of the Switch, resulting in malfunction. (Maximum force = 30N)

Be sure to set up the Switch so that the plunger will be pressed straight in. The life of the Switch may be reduced if the plunger is pressed off-center or from an angle. Do not apply pressure from above or below the plunger. Doing so may deform or damage parts or cause faulty operation.



Do not operate the plunger from the side. Doing so may deform or damage the Switch.

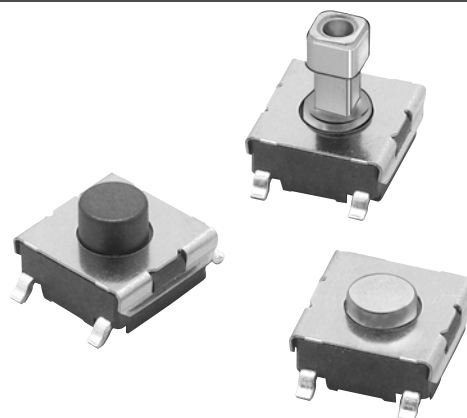


# Tactile Switch (SMD)




## B3FS

### Surface-mounting Switches Ideal for High-density Mounting

- Tape packing style also available
- Allows reflow soldering
- 3 actuator heights for design flexibility; Projected plunger versions allow installation of B32-series keytops
- RoHS Compliant



### Ordering Information

Item				Model			
Type	Plunger	Height	Operating force (OF)	Bag packaging		Embossed tape packaging	
Standard 6 x 6 mm		3.1 mm	General-purpose: 100 gf	B3FS-1000	100 (qty/bag)	B3FS-1000P	3,000 (qty/reel)
			High-force: 150 gf	B3FS-1002		B3FS-1002P	
		4.3 mm	General-purpose: 100 gf	B3FS-1010		B3FS-1010P	1,000 (qty/reel)
			High-force: 150 gf	B3FS-1012		B3FS-1012P	
		7.3 mm	General-purpose: 100 gf	B3FS-1050		B3FS-1050P	
			High-force: 150 gf	B3FS-1052		B3FS-1052P	

**Note:** Order in multiples of the quantities given for each package

**Important Note:** Switches cannot be water-washed.

## Specifications

### Characteristics

Contact form		SPST-NO
Switching capacity		50 mA, 24 VDC (resistive load)
Contact resistance		100 mΩ max. (rated: 1 mA, 5 VDC)
Insulation resistance		100 MΩ min. (at 100 VDC)
Dielectric strength		250 VAC, 50/60 Hz for 1 min.
Bounce time		5 ms max.
Vibration resistance		Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance		Destruction: 1,000 m/s <sup>2</sup> max. (approx. 100G max.) Malfunction: 100 m/s <sup>2</sup> max. (approx. 10G max.)
Life expectancy	General-purpose	1,000,000 operations min.
	High-force type	300,000 operations min.
Ambient operating temperature		–25°C to +70°C (at 60% RH max.) with no icing or condensation
Ambient operating humidity		35% to 85% (at 5 to 35°C)
Weight		Approx. 0.2 g

**Note:** Data shown are of initial value

# Engineering Data

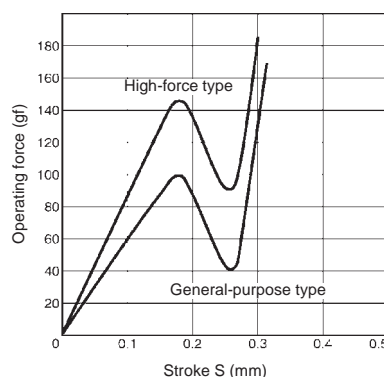
## ■ Operating Characteristics

Characteristics	B3FS-1000 series	
	General-purpose	High-force
Operating force (OF)	100 ± 30 gf	150 ± 50 gf
Releasing force (RF)	20 gf	50 gf
Pretravel (PT)	0.25 <sup>+0.2</sup> / <sub>-0.1</sub> mm	

## ■ Accessories

See "B32" Tactile Switch Key Top data sheet for keycaps that fit projected plunger B3FS models.

## ■ Operating Force vs Stroke (Typical Example)



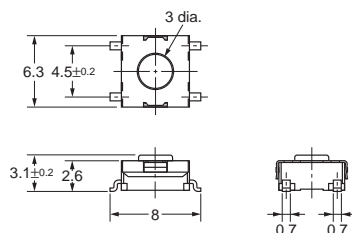
## Dimensions

**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of ± 0.4 mm applies to all dimensions.

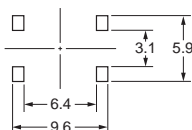
2. Terminal numbers are not indicated on this switch. With the switch turned over so that the logo mark "OMRON" is visible on the upper part of the rear side of the switch base, the terminal on the right of the logo mark is numbered "1" and that on the bottom right is "3." Accordingly, two terminals on the left side are numbered "2" and "4" respectively.

### Flat Type

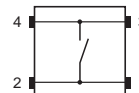
B3FS-1000  
B3FS-1002  
B3FS-1000P  
B3FS-1002P



PCB Pad  
(Top View)  
(One-side PCB t= 1.6)

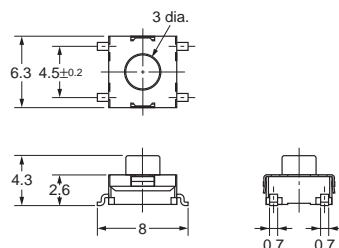


Terminal Arrangement/  
Internal Connection  
(Top View)

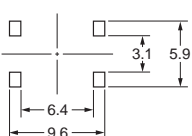


### Flat Type

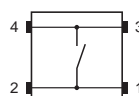
B3FS-1010  
B3FS-1012  
B3FS-1010P  
B3FS-1012P



PCB Pad  
(Top View)  
(One-side PCB t= 1.6)

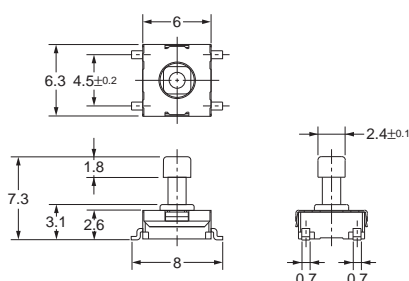


Terminal Arrangement/  
Internal Connection  
(Top View)

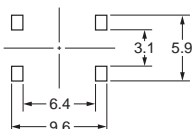


### Projected Type

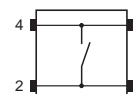
B3FS-1050  
B3FS-1052  
B3FS-1050P  
B3FS-1052P



PCB Pad  
(Top View)  
(One-side PCB t= 1.6)



Terminal Arrangement/  
Internal Connection  
(Top View)



## Precautions

Be sure to read the precautions common to all Tactile Switches, contained in the Technical User's Guide, "Tactile Switches, Technical Information" for correct use.

# Tactile Switch B3S

## Surface Mount Tactile Switch for High-Density Packaging

- Sealed construction conforming to IP67 (IEC-60529) provides high contact reliability in locations exposed to dust or water (\*Excluding the terminal section)
- Surface-mounting terminals for high-density mounting
- Ground terminal available to protect against static electricity
- Available in embossed taping packages for automatic insertion
- RoHS Compliant



## Ordering Information

Switch height	Operating force	Model			
		Without ground terminal		With ground terminal	
		Bags (100 per bag)	Embossed Tape (1,000 per reel)	Bags (100 per bag)	Embossed Tape (1,000 per reel)
4.3	General-purpose: 160 g	<b>B3S-1000</b>	<b>B3S-1000P</b>	<b>B3S-1100</b>	<b>B3S-1100P</b>
	High-force: 230 g	<b>B3S-1002</b>	<b>B3S-1002P</b>	<b>B3S-1102</b>	<b>B3S-1102P</b>

**Note:** Order in multiples of the quantities given for each package

**Important Note:** Switches cannot be water-washed.

## Specifications

### ■ Characteristics

<b>Contact form</b>		SPST-NO
<b>Switching capacity</b>		1 to 50 mA, 5 to 24 VDC (resistive load)
<b>Contact resistance</b>		100 mΩ max. (rated: 1 mA, 5 VDC)
<b>Insulation resistance</b>		100 MΩ min. (at 250 VDC)
<b>Dielectric strength</b>		500 VAC, 50/60 Hz for 1 minute
<b>Bounce time</b>		5 ms max.
<b>Vibration resistance</b>		Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
<b>Shock resistance</b>		Destruction: 1,000 m/s <sup>2</sup> (approx. 100 G) max. Malfunction: 100 m/s <sup>2</sup> (approx. 10 G) max.
<b>Ambient operating temperature</b>		-25° to 70°C (at 60% RH max.) with no icing or condensation
<b>Ambient operating humidity</b>		35% to 85% (at 5 to 30°C)
<b>Service life</b>	<b>General-purpose type</b>	500,000 operations min.
	<b>High-force type</b>	300,000 operations min.
<b>Weight</b>		Approx. 0.30 g

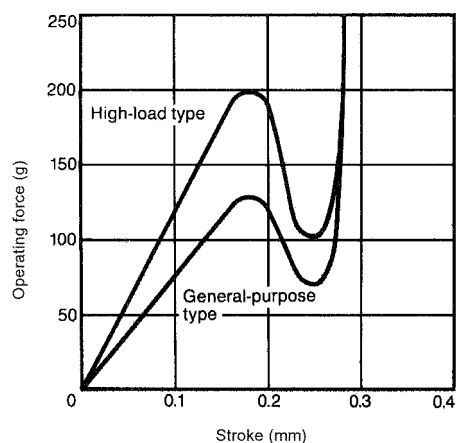
**Note:** Data shown are of initial value.

### ■ Operating Characteristics

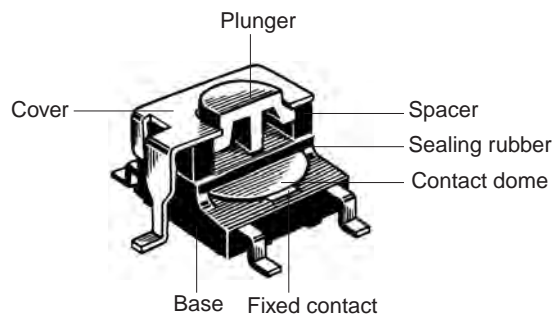
Characteristics	General-purpose	High-force
Operating force (OF) max.	160 g	230 g
Release force (RF) min.	20 g	50 g
Pretravel (PT)	0.25 + <sup>0.2</sup> / <sub>-0.1</sub> mm	

# Engineering Data

## ■ Operating Force vs. Stroke (Typical Example)



## ■ Construction



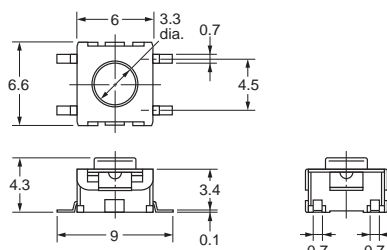
## Dimensions

**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

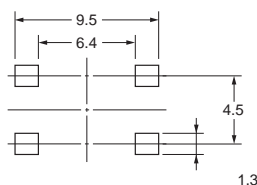
2. Terminal numbers are not indicated on this switch. With the switch turned over so that the logo mark "OMRON" is visible on the upper part of the rear side of the switch base, the terminal on the right of the logo mark is numbered "1" and that on the bottom right is "3." Accordingly, two terminals on the left side are numbered "2" and "4" respectively.

### Without Ground Terminal

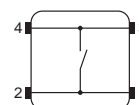
B3S-1000  
B3S-1002



### PCB Pad (Top View)

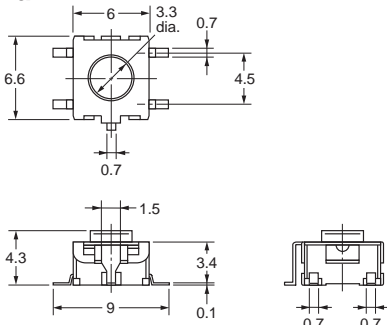


### Terminal Arrangement /Internal Connections (Top View)

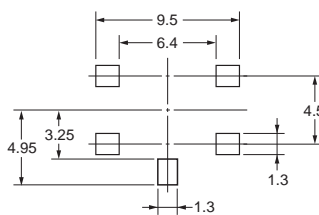


### With Ground Terminal

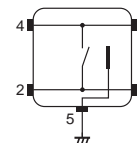
B3S-1100  
B3S-1102



### PCB Pad (Top View)



### Terminal Arrangement /Internal Connections (Top View)



## Precautions

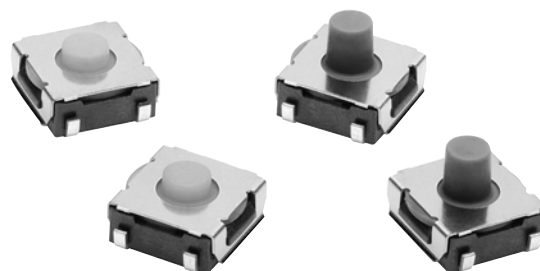
Be sure to read the precautions common to all Tactile Switches, contained in the Technical User's Guide, "Tactile Switches, Technical Information" for correct use.

# Middle Stroke Tactile Switch

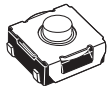
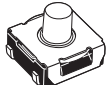
## B3SL

### Surface-mount Sealed Tactile Switch with Mid-length Pretravel and Crisp Clicking Action.

- 90°C Maximum operating Temperature
- Sealed construction conforming to IP67 (IEC 60529) provides high contact reliability in dusty environments.
- Crisp click feeling and middle stroke with rubber plunger.
- Two heights available, 3.4 mm and 5.1 mm
- Tape packing is available
- RoHS Compliant


**NEW**

## Ordering Information

Type	Plunger	Height	Operating force (OF)	Embossed tape	
				Model	Quantity per reel
6 x 6 mm B3SL Series	 (Flat type)	3.4 mm	1.96 N (200 gf)	B3SL-1002P	2,000
	 (Flat type)	5.1 mm		B3SL-1022P	1,400

**Note:** Order in multiples of the quantities given. Switches are not sold individually.

## Specifications

### ■ Characteristics

<b>Contact form</b>	SPST-NO
<b>Switching capacity</b>	1 to 50 mA at 5 to 12 VDC (resistive load)
<b>Contact resistance</b>	100 mΩ max. (rated: 1 mA at 5 VDC)
<b>Insulation resistance</b>	100 MΩ min. (at 250 VDC)
<b>Dielectric strength</b>	250 VAC, 50/60 Hz for 1 min.
<b>Bounce time</b>	5 ms max.
<b>Vibration resistance</b>	Destruction: 10 to 55 Hz, 1.5-mm double amplitude
<b>Shock resistance</b>	Destruction: 1,000 m/s <sup>2</sup> (approx. 100 G) max.
<b>Ambient operating temperature</b>	-25 to 90°C (at 60% RH max.) with no icing or condensation
<b>Ambient operating humidity</b>	35% to 85% (at 5 to 35°C)
<b>Service Life</b>	100,000 operations min.

**Note:** Data shown are of initial value

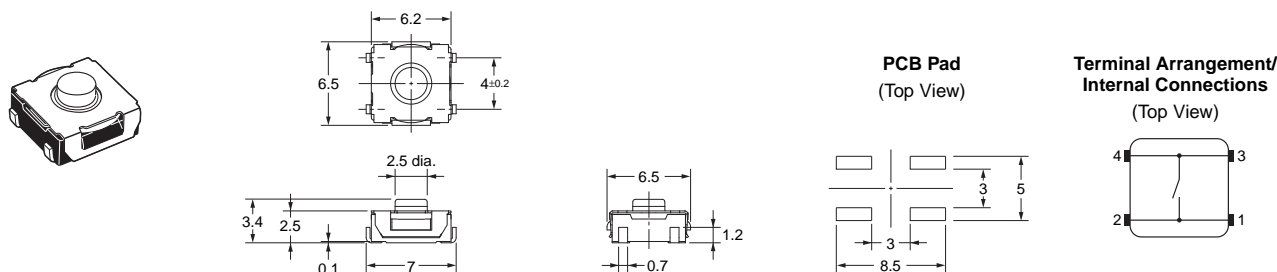
### ■ Operating Characteristics

Characteristics	B3SL-1002P	B3SL-1022P
Operating force (OF)	200 ± 50 gf (1.96 ± 0.49 N)	
Release force (RF) min.	35 gf (0.35 N)	
Pretravel (PT)	0.3 ± 0.2 mm	0.5 ± 0.2 mm

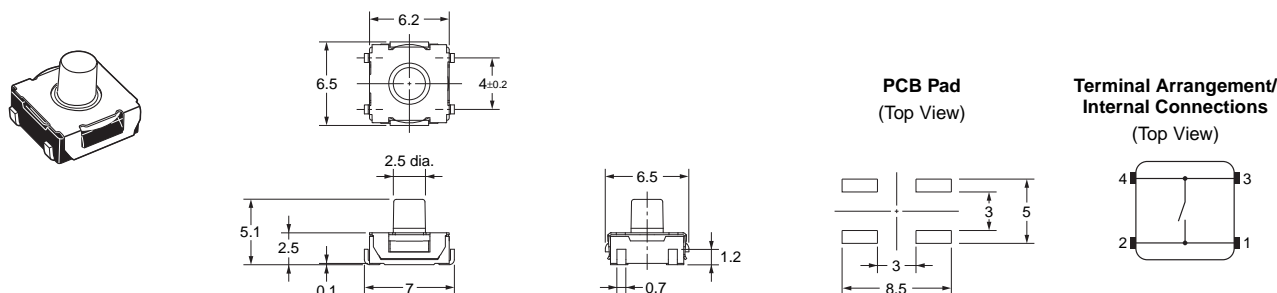
# Dimensions

**Note:** Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.2\text{mm}$  applies to all dimensions.

## B3SL-1002P



## B3SL-1022P



# Precautions

## ■ Precautions for Correct Use

### Storage

#### Storage Environment

To prevent degradation, such as discoloration of the terminals during storage, do not store the Switch in locations that are subject to the following conditions;

- High temperature or humidity
- Corrosive gases
- Direct sunlight

#### Storage condition

Store the Switches in the packaging box.

After the packaging box is opened, use the contents as quickly as possible. When storing leftover parts, make sure that appropriate measures are taken against humidity and corrosive gases.

### Handling

#### Usage Environment

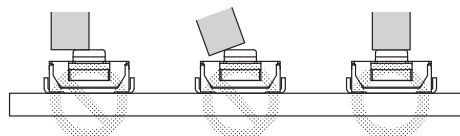
Before installing the Switch, make sure that the area of installation is not subject to corrosive gases emitted from surrounding parts.

1. Do not use in areas subject to high temperatures, high humidity, or toxic gases such as sulfuric gas ( $\text{H}_2\text{S}$ ,  $\text{SO}_2$ ), ammonia gas ( $\text{NH}_3$ ), nitric gas ( $\text{HNO}_3$ ), or chlorine gas ( $\text{Cl}_2$ ). It can cause corrosive damage to the contacts and result in malfunction.

2. If there is silicon in the atmosphere, it may stop the contacts from functioning properly. If silicon products, such as silicon oil, silicon filler, or silicon wires, are used in the surrounding area, install a contact protection circuit to prevent arching or remove the silicon source. The Switch is not completely sealed. The following situations may cause water to enter inside the Switch, resulting in a malfunction due to contact failure or corrosion.
  - Using the Switch in an outdoor environment where it is exposed to water drops for an extended period of time
  - Using the Switch in an underwater setting where it is subject to strong water pressure.

### Operation

- Do not repeatedly operate the Switch with excessive force. Applying excessive pressure or applying additional force after the plunger has stopped may deform the disk spring of the Switch, resulting in malfunction. (Maximum force = 30N)
- Be sure to set up the Switch so that the plunger will operate in a straight vertical line. If the plunger is pressed off-center or from an angle it may cause deformation or damage to some parts. This may result in deterioration of life expectancy or malfunction.



## Electrical Operation

Use the Switch within the rated voltage and current ranges, otherwise the Switch may have a shortened life expectancy, radiate heat, or burn out. This particularly applies to the instantaneous voltages and currents when switching.

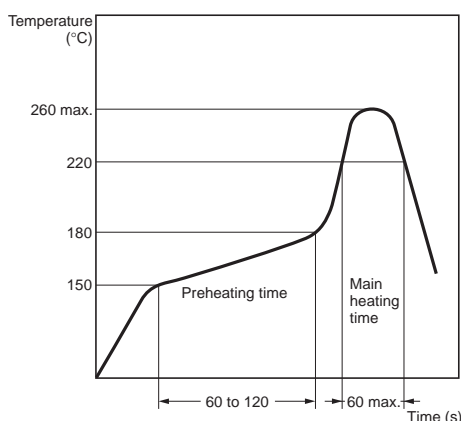
## Soldering

### Soldering Precautions

1. Before any kind of soldering, test to confirm that soldering can be performed properly. Otherwise the Switch may be deformed by the soldering heat depending on the type of PCB, pattern, or lands of the PCB.
2. Do not solder the Switch more than twice, including rectification soldering. Wait for at least five minutes between the first and second soldering to allow the temperature to return to normal. Continuous soldering may cause the casing to melt or deteriorate the Switch characteristics.

### Reflow Soldering Conditions

Firmly attach a thermocouple to the surface of the terminals with solder that has a high melting point and set the reflow oven so that the peak temperature of the terminals is 260°C or less. The following figure shows the temperature profile.



### Manual Soldering

1. Soldering temperature: 350°C max. at the tip of the soldering iron
2. Soldering time: 3 s max. for a 1.6-mm thick, single-side PCB

## Washing

Standard Switches are not sealed, and cannot be washed.

Doing so will cause the washing agent, together with flux or dust particles on the PCB, to enter the Switch, resulting in malfunction.

## Applicable Printed Circuit Board

The Switch is designed for a 1.6-mm thick, single-side PCB.

Using PCBs with a different thickness or using double-sided, through-hole PCBs may result in loose mounting, improper insertion, or poor heat resistance in soldering. These effects will occur, depending on the type of holes and patterns of the PCB. Therefore, it is recommended that a verification test is conducted before use.

## RoHS Compliant

The "RoHS Compliant" designation indicates that the listed models do not contain the six hazardous substances covered by the RoHS Directive.

### Reference:

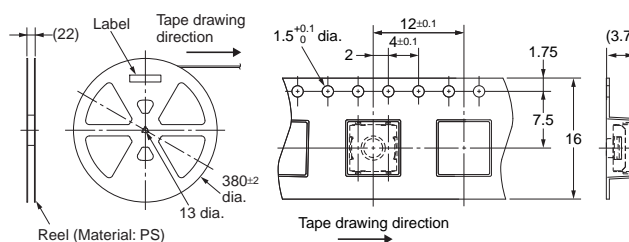
The following standards are used to determine compliance for the six substances.

Lead:	1,000 ppm max.
Mercury:	1,000 ppm max.
Cadmium:	100 ppm max.
Hexavalent chromium:	1,000 ppm max.
PBB:	1,000 ppm max.
PBDE:	1,000 ppm max.

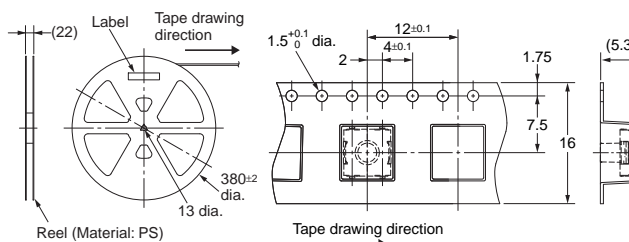
## Packaging Specifications

The packaging specifications for B3SL Switches in embossed taping are given below.

### B3SL-1002P



### B3SL-1022P



<b>Standards</b>	Conforms to JIS.
<b>Package</b>	2,000 Switches (B3SL-1002P) 1,400 Switches (B3SL-1022P)
<b>Heat resistance</b>	60°C for 24 hours (without deformation)

## Common Precautions

Be sure to read the precautions common to all Tactile Switches, contained in the Technical User's Guide, "Tactile Switches, Technical Information" for correct use.



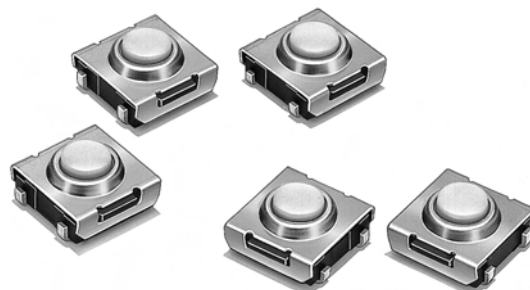


# Tactile Switch (SMD)

## B3SN

### Compact Surface Mount Tactile Switch with Sealed Construction

- Sealed construction conforming to IP67 (IEC-60529) provides high reliability in locations exposed to dust or water.
- Available with ground terminals for protection against static electricity.
- Use of a stainless-steel spring provides a crisp clicking action.
- Gold plated version enables stable contact and insulation over long periods of time.
- Available in embossed tapping package for automatic insertion.
- RoHS Compliant



## Ordering Information

Switch height	Operating force	Model			
		Without ground terminal		With ground terminal	
		Bags (100 per bag)	Embossed Tape (3,000 per reel)	Bags (100 per bag)	Embossed Tape (3,000 per reel)
3.1 mm	Standard 160g	<b>B3SN-3012</b>	<b>B3SN-3012P</b>	<b>B3SN-3112</b>	<b>B3SN-3112P</b>
	Gold-plated 180g	- - -	<b>B3SN-3012P-G</b>	- - -	- - -

**Note:** Order in multiples of the quantities given for each package

**Important Note:** Switches cannot be water-washed.

## Specifications

### ■ Characteristics

<b>Contact form</b>	SPST-NO
<b>Switching capacity</b>	1 to 50 mA, 5 to 24 VDC (resistive load)
<b>Contact resistance</b>	100 mΩ max. (rated: 1 mA, 5 VDC)
<b>Insulation resistance</b>	100 MΩ min. (at 250 VDC)
<b>Dielectric strength</b>	250 VAC, 50/60 Hz for 1 min.
<b>Bounce time</b>	5 ms max.
<b>Vibration resistance</b>	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
<b>Shock resistance</b>	Destruction: 1,000 m/s <sup>2</sup> (approx. 100 G) max.
<b>Ambient operating temperature</b>	-25° to 70°C (at 60% RH max.) with no icing or condensation
<b>Ambient operating humidity</b>	35% to 85% (at 5 to 35°C)
<b>Service life</b>	100,000 operations min.
<b>Weight</b>	Approx. 0.20 g

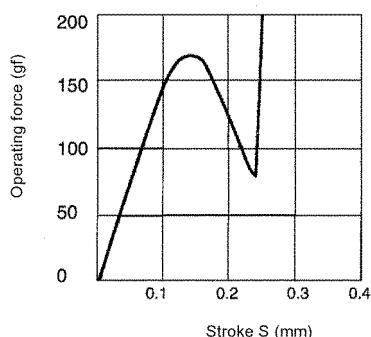
**Note:** Data shown are of initial value.

### ■ Operating Characteristics

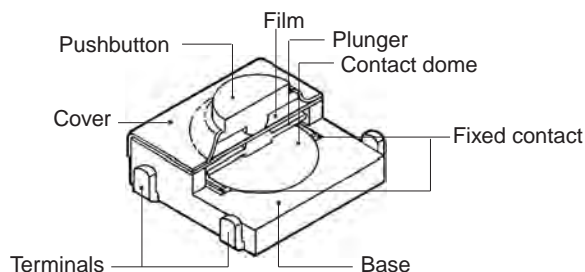
Characteristics	Standard (B3SN)	Gold-plated (B3SN-G)
Operating force (OF)	160 ± 50 g	180 ± 60 g
Release force (RF) min.	30 g	
Pretravel (PT)	0.25 ± 0.15 mm	

# Engineering Data

## ■ Operating Force vs. Stroke (typical example)



## ■ Construction



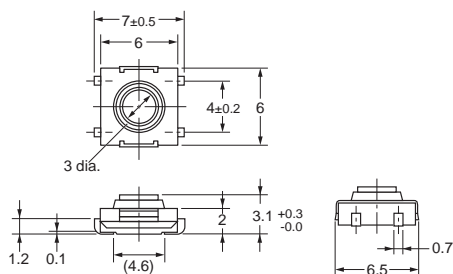
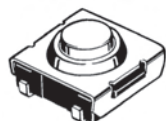
## Dimensions

**Note:** 1. Unless otherwise specified, all units are in millimeters and a tolerance of  $\pm 0.4$  mm applies to all dimensions.

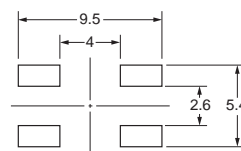
2. Terminal numbers are not indicated on this switch. With the switch turned over so that the logo mark "OMRON" is visible on the upper part of the rear side of the switch base, the terminal on the right of the logo mark is numbered "1" and that on the bottom right is "3." Accordingly, two terminals on the left side are numbered "2" and "4" respectively.

### Without Ground Terminal

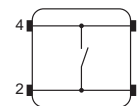
B3SN-3012  
B3SN-3012P  
B3SN-3012G



### PCB Pad (Top View)

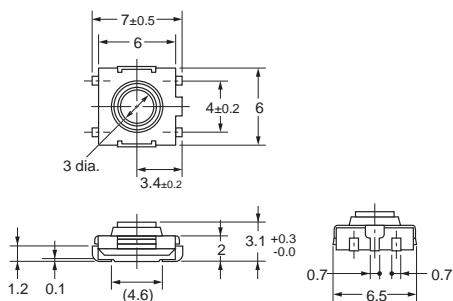
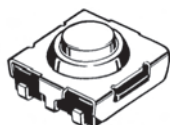


### Terminal Arrangement /Internal Connections (Top View)

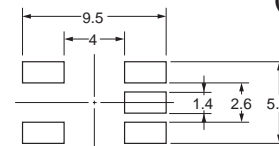


### With Ground Terminal

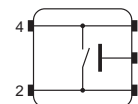
B3SN-3112  
B3SN-3112P



### PCB Pad (Top View)



### Terminal Arrangement /Internal Connections (Top View)



## Precautions

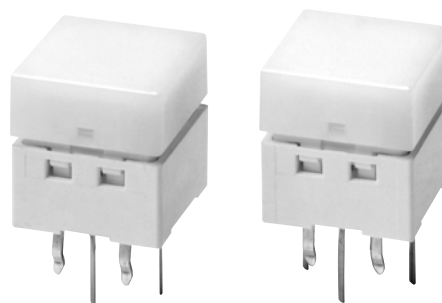
Be sure to read the precautions common to all Tactile Switches, contained in the Technical User's Guide, "Tactile Switches, Technical Information" for correct use.

# Illuminated Tactile Switches

## B3W-9

### Compact Illuminated Tactile Switch with 2 LEDs

- Compact construction (10 x 10 mm and 12 x 12 mm with 11 mm height) with bright and uniform illumination.
- Three-color illumination (red LED + green LED = orange).
- Standard force (160 gf) and high-force (230 gf) models.
- RoHS Compliant



**NEW**

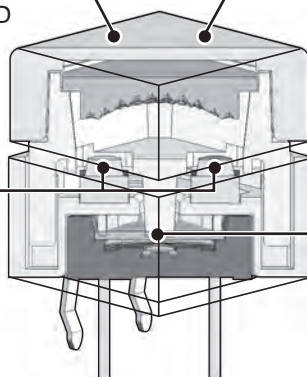
## Features

### Bright and uniform illumination

- Compact construction 10 × 10 × 11 mm (W × D × H) and 12 × 12 × 11 mm (W × D × H) equipped with 2 LEDs.
- Uniquely constructed diffusion panel.

### Three-color illumination

- Simultaneous use of red and green LEDs create a third color (orange).



### Snap-action contact construction for a positive click action.

- Models available with two different operating forces, standard force (160 gf) and high-force (230 gf).

### High contact reliability

- Sealed construction provides high contact reliability.

## Model Number Structure

**B3W-90**     -        

1 2 3 4 5

#### 1. Cap width

- 0: 10 x 10 mm  
1: 12 x 12 mm

#### 2. Operating force

- 0: Standard (OF = 160 gf)  
2: High-force (OF = 230 gf)

#### 3. LED color

- R: Red  
G: Green  
HG: Green (high brightness)  
Y: Yellow  
B: Blue  
RG: Red + Green (Combination of LED colors)  
RB: Red + Blue (Combination of LED colors)

#### 4. No. of LEDs

- 1: 1  
2: 2

#### 5. Cap

- R: Red  
G: Green  
Y: Yellow  
B: Blue  
C: Transparent  
N: Milky white

**Note: 1.** Switches with two LEDs are only available with Transparent or Milky White caps.

**2.** If a tricolour operation is required, use the Red+Green (RG) combination with the milky white cap. Simultaneous illumination of these two LEDs will produce Orange.

# Ordering Information

## ■ 10 x 10 mm Switches

### Standard force

Force	LED Colour	No. of LEDs	Cap color	Model
Standard force (OF = 160 gf)	Blue	1	Blue	<b>B3W-9000-B1B</b>
			Transparent	<b>B3W-9000-B1C</b>
			Milky white	<b>B3W-9000-B1N</b>
		2	Blue	<b>B3W-9000-B2B</b>
			Transparent	<b>B3W-9000-B2C</b>
			Milky white	<b>B3W-9000-B2N</b>
	Green	1	Green	<b>B3W-9000-G1G</b>
			Transparent	<b>B3W-9000-G1C</b>
			Milky white	<b>B3W-9000-G1N</b>
		2	Green	<b>B3W-9000-G2G</b>
			Transparent	<b>B3W-9000-G2C</b>
			Milky white	<b>B3W-9000-G2N</b>
	Green (High brightness)	1	Green	<b>B3W-9000-HG1G</b>
			Transparent	<b>B3W-9000-HG1C</b>
			Milky white	<b>B3W-9000-HG1N</b>
		2	Green	<b>B3W-9000-HG2G</b>
			Transparent	<b>B3W-9000-HG2C</b>
			Milky white	<b>B3W-9000-HG2N</b>
	Red	1	Red	<b>B3W-9000-R1R</b>
			Transparent	<b>B3W-9000-R1C</b>
			Milky white	<b>B3W-9000-R1N</b>
		2	Red	<b>B3W-9000-R2R</b>
			Transparent	<b>B3W-9000-R2C</b>
			Milky white	<b>B3W-9000-R2N</b>
	Yellow	1	Yellow	<b>B3W-9000-Y1Y</b>
			Transparent	<b>B3W-9000-Y1C</b>
			Milky white	<b>B3W-9000-Y1N</b>
		2	Yellow	<b>B3W-9000-Y2Y</b>
			Transparent	<b>B3W-9000-Y2C</b>
			Milky white	<b>B3W-9000-Y2N</b>
	Red + Blue	2	Transparent	<b>B3W-9000-RB2C</b>
	Red+ Green	2	Transparent	<b>B3W-9000-RG2C</b>
			Milky white	<b>B3W-9000-RG2N</b>
	Red+High Brightness Green	2	Transparent	<b>B3W-9000-RHG2C</b>

### High-force

Force	LED Colour	No. of LEDs	Cap color	Model
High-force (OF = 230 gf)	Blue	1	Blue	<b>B3W-9002-B1B</b>
			Transparent	<b>B3W-9002-B1C</b>
			Milky white	<b>B3W-9002-B1N</b>
		2	Blue	<b>B3W-9002-B2B</b>
			Transparent	<b>B3W-9002-B2C</b>
			Milky white	<b>B3W-9002-B2N</b>
	Green	1	Green	<b>B3W-9002-G1G</b>
			Transparent	<b>B3W-9002-G1C</b>
			Milky white	<b>B3W-9002-G1N</b>
		2	Green	<b>B3W-9002-G2G</b>
			Transparent	<b>B3W-9002-G2C</b>
			Milky white	<b>B3W-9002-G2N</b>
	Green (High brightness)	1	Green	<b>B3W-9002-HG1G</b>
			Transparent	<b>B3W-9002-HG1C</b>
			Milky white	<b>B3W-9002-HG1N</b>
		2	Green	<b>B3W-9002-HG2G</b>
			Transparent	<b>B3W-9002-HG2C</b>
			Milky white	<b>B3W-9002-HG2N</b>
	Red	1	Red	<b>B3W-9002-R1R</b>
			Transparent	<b>B3W-9002-R1C</b>
			Milky white	<b>B3W-9002-R1N</b>
		2	Red	<b>B3W-9002-R2R</b>
			Transparent	<b>B3W-9002-R2C</b>
			Milky white	<b>B3W-9002-R2N</b>
	Yellow	1	Yellow	<b>B3W-9002-Y1Y</b>
			Transparent	<b>B3W-9002-Y1C</b>
			Milky white	<b>B3W-9002-Y1N</b>
		2	Yellow	<b>B3W-9002-Y2Y</b>
			Transparent	<b>B3W-9002-Y2C</b>
			Milky white	<b>B3W-9002-Y2N</b>
	Red + Blue	2	Transparent	<b>B3W-9002-RB2C</b>
	Red + Green	2	Transparent	<b>B3W-9002-RG2C</b>
			Milky white	<b>B3W-9002-RG2N</b>
	Red+High Brightness Green	2	Transparent	<b>B3W-9000-RHG2C</b>

## ■ 12 × 12-mm Switches

### Standard force

Force	LED Colour	No. of LEDs	Cap color	Model
Standard force (OF = 160 gf)	Blue	1	Blue	B3W-9010-B1B
		1	Milky white	B3W-9010-B1N
		2	Blue	B3W-9010-B2B
		2	Milky white	B3W-9010-B2N
	Green	1	Green	B3W-9010-G1G
		1	Milky white	B3W-9010-G1N
		2	Green	B3W-9010-G2G
		2	Milky white	B3W-9010-G2N
	Green (High brightness)	1	Green	B3W-9010-HG1G
		1	Milky white	B3W-9010-HG1N
		2	Green	B3W-9010-HG2G
		2	Milky white	B3W-9010-HG2N
	Red	1	Red	B3W-9010-R1R
		1	Milky white	B3W-9010-R1N
		2	Red	B3W-9010-R2R
		2	Milky white	B3W-9010-R2N
	Yellow	1	Yellow	B3W-9010-Y1Y
		1	Milky white	B3W-9010-Y1N
		2	Yellow	B3W-9010-Y2Y
		2	Milky white	B3W-9010-Y2N
	Red+Blue	2	Milky white	B3W-9010-RB2N
	Red+Green	2	Milky white	B3W-9010-RG2N
	Red+High Brightness Green	2	Milky white	B3W-9010-RHG2N

### High-force

Force	LED Colour	No. of LEDs	Cap color	Model
High-force (OF = 230 gf)	Blue	1	Blue	B3W-9012-B1B
		1	Milky white	B3W-9012-B1N
		2	Blue	B3W-9012-B2B
		2	Milky white	B3W-9012-B2N
	Green	1	Green	B3W-9012-G1G
		1	Milky white	B3W-9012-G1N
		2	Green	B3W-9012-G2G
		2	Milky white	B3W-9012-G2N
	Green (High brightness)	1	Green	B3W-9012-HG1G
		1	Milky white	B3W-9012-HG1N
		2	Green	B3W-9012-HG2G
		2	Milky white	B3W-9012-HG2N
	Red	1	Red	B3W-9012-R1R
		1	Milky white	B3W-9012-R1N
		2	Red	B3W-9012-R2R
		2	Milky white	B3W-9012-R2N
	Yellow	1	Yellow	B3W-9012-Y1Y
		1	Milky white	B3W-9012-Y1N
		2	Yellow	B3W-9012-Y2Y
		2	Milky white	B3W-9012-Y2N
	Red+Blue	2	Milky white	B3W-9012-RB2N
	Red+Green	2	Milky white	B3W-9012-RG2N
	Red+High Brightness Green	2	Milky white	B3W-9012-RHG2N

## Specifications

### ■ Characteristics - initial (Same for Both Standard and High-force Switches)

Contact form	SPST-NO Momentary
Switching capacity	1 to 50 mA, 5 to 24 VDC (resistive load)
Contact resistance	100 mΩ max. (initial value) (rated: 1 mA, 5 VDC)
Insulation resistance	100 MΩ min. (at 250 VDC)
Dielectric strength	500 VAC, 50/60 Hz for 1 min
Bounce time	5 ms max.
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5 mm double amplitude
Shock resistance	Destruction: 1,000 m/s <sup>2</sup> (approx. 100 G) max. Malfunction: 100 m/s <sup>2</sup> (approx. 10 G) max.
Ambient operating temperature	-25°C to 70°C (at 60% RH max.) with no icing or condensation
Ambient operating humidity	35% to 85% (at 5° to 35°C)
Life expectancy	Switch section      160 gf (standard force): 1,000,000 operations min. 230 gf (high-force): 300,000 operations min.

### ■ Operating Characteristics

Item	Standard-force (B3W-90□0)	High-force (B3W-90□2)
Operating force (OF) max.	160 gf	230 gf
Releasing force (RF) min.	20 gf	50 gf
Pretravel (PT)	0.25+0.2/-0.1 mm	

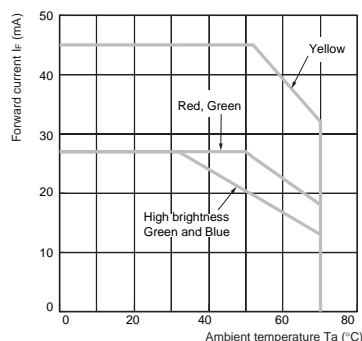
# LED Specifications

LED color	Red	Green	Green (high brightness)	Yellow	Blue
Maximum Forward current $I_{FM}$	27 mA	27 mA	27 mA	45 mA	27 mA
Recommended operating current $I_F$	20 mA	20 mA	10 mA	20 mA	10 mA
Forward voltage (typical value) $V_F$	1.8 V	2.1 V	3.7 V	2.4 V	3.7 V
Maximum reverse voltage $V_R$	5 V	5 V	5 V	5 V	5 V
Ambient operating temperature	-25°C to 70°C				

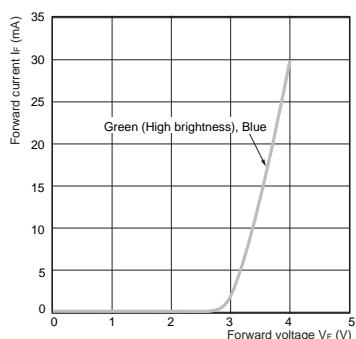
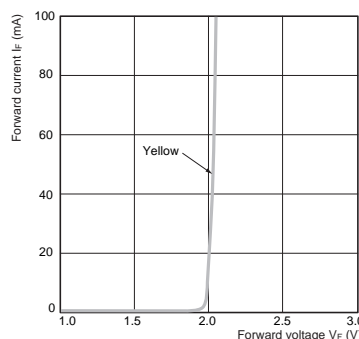
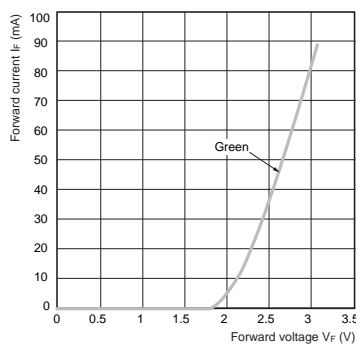
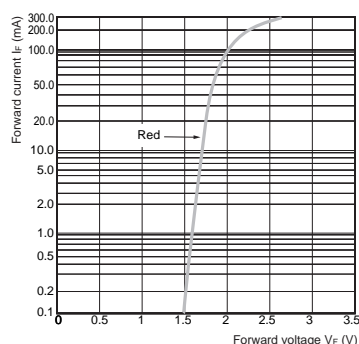
**Note:** For Switches with two LEDs, red and green, the recommended operating current is 12 mA for the red and 20 mA for the green LED for application with three-color illumination.

## LEDs

### Ambient Temperature vs Maximum Forward Current

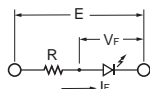


### Forward Current and Forward Voltage Curves (Condition: $T_a=25^\circ\text{C}$ )



- Note:**
1. Pay attention to the polarity of each LED. The anode and cathode can be identified by finding the cathode mark, as indicated on the Dimensions page.
  2. Connect limiting resistors to the LEDs. The Switch does not have built-in limiting resistors, so satisfy the LED characteristics by obtaining the limiting resistance according to the following formula based on the voltage to be used.

$$\text{Limiting resistance (R)} = \frac{(\text{Voltage used (E)} - \text{LED forward voltage (V}_F\text{)})}{\text{LED forward current (I}_F\text{)}} (\Omega)$$



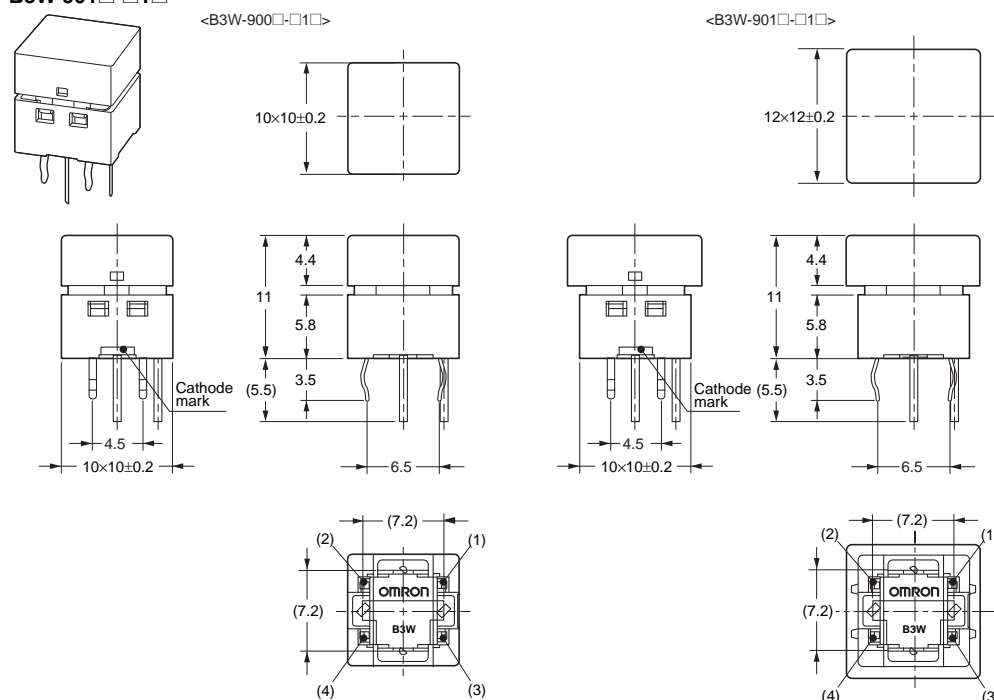
# Dimensions

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

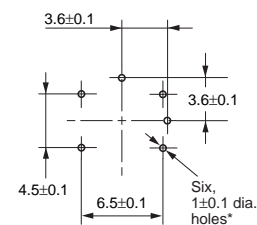
## 1 LED Types

B3W-900□-□1□

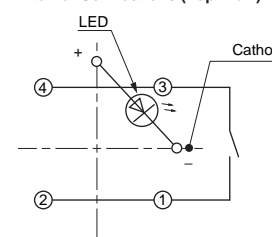
B3W-901□-□1□



PCB Mounting (Top View)



Terminal Arrangement/ Internal Connections (Top View)



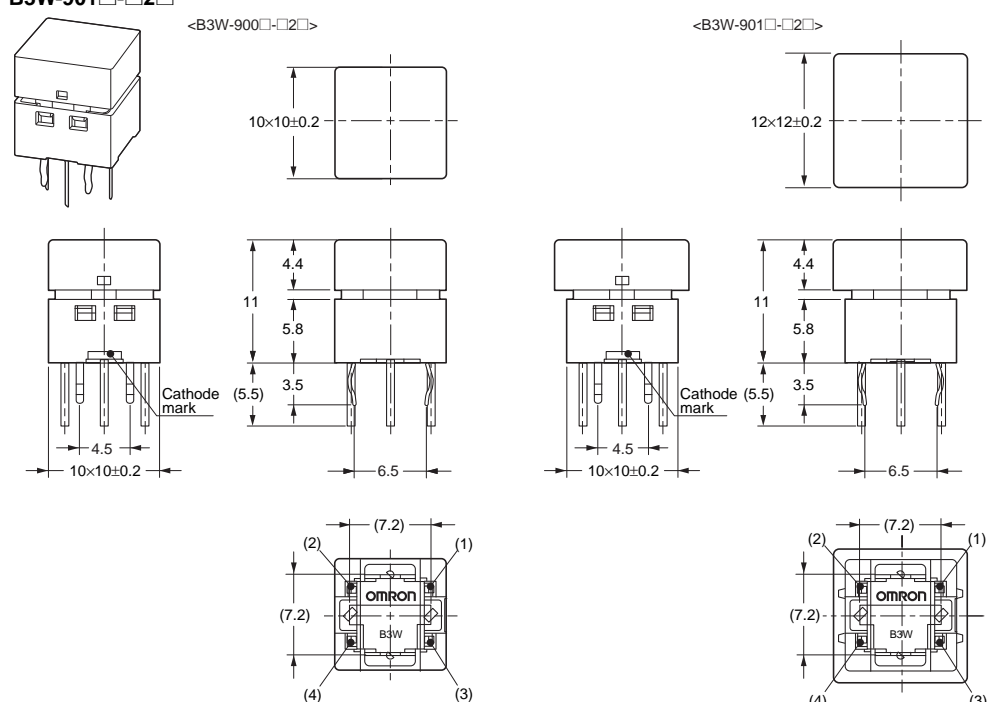
**Note:** If the poles of the LED are set into it may result in malfunction.

**Note:** Terminal numbers are not printed on the Switch itself.

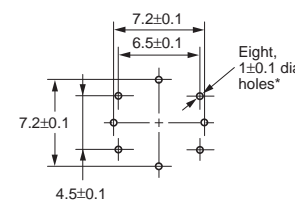
## 2 LED Types

B3W-900□-□2□

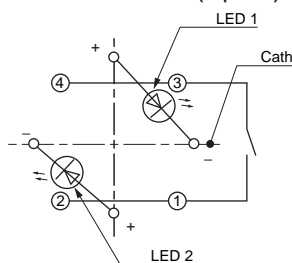
B3W-901□-□2□



PCB Mounting (Top View)



Terminal Arrangement/ Internal Connections (Top View)



**Note 1:** If the poles of the LED are set into it may result in malfunction.

**2:** For models with two-color LEDs, th of LED 1 is at position LED 1. The color of LED 2 is at the position B3W-90□-RG2□

**Note:** Terminal numbers are not printed on the Switch itself.



## Accessories - Text Combination Films for B3W-9

### Text Combination Films for B3W-9 Illuminated Tactile Switches

- Display two different labels in combination with a single 2-LED B3W-9 Switch.
- Color combinations: Red/Green or Red/Blue



## Model Number Structure

**B3W-9**       - **F**  

1   2   3

#### 1. Color

R: Red

#### 2. Color

B: Blue

G: Green

#### 3. Color and text combination

F1: Red      OFF  
Blue or green      ON

F4: Red      ×  
Blue or green      ○

F5: Red      ▼  
Blue or green      ▲

**Note: 1.** Three 'text combinations' are available.

**2.** Films can also be customized with other text for 50 sheets (1,250 films) per lot. Delivery time is approximately five weeks. (Ask your OMRON representative for details.)

Text Combinations	LED colors	Model
"OFF" and "ON"	Red/Blue	<b>B3W-9RB-F1</b>
	Red/Green	<b>B3W-9RG-F1</b>
"×" and "○"	Red/Blue	<b>B3W-9RB-F4</b>
	Red/Green	<b>B3W-9RG-F4</b>
"▼" and "▲"	Red/Blue	<b>B3W-9RB-F5</b>
	Red/Green	<b>B3W-9RG-F5</b>

**Note:** Minimum Order = 25 films/sheet (B3W-9 Films are sold in units of 25 films. Orders must be made in multiples of 25, the quantity per sheet.)

## Recommended B3W-9 Switches

**Note:** Use the following 2 LED versions of the B3W-9's with the above mentioned films for best results

Operating force	2-LED Switches	Red/Blue	Red/Bright green
Standard-force Switches		B3W-9000-RB2C	B3W-9000-RHG2C
High-force Switches		B3W-9002-RB2C	B3W-9002-RHG2C

**Note:** Text Combination Films are sold without the Switches. Order one of the above models of B3W-9 Illuminated Tactile Switches separately.

# Safety Precautions

## ■ Precautions for Correct Use

### Electrical Standards

All Use the Switch within the rated voltage and current ranges, otherwise the Switch may have a shortened life expectancy, radiate heat, or burn out. This particularly applies to the instantaneous voltages and currents when switching.

### Soldering

#### 1. Soldering Precautions

- Before any kind of soldering, test to confirm that soldering can be performed properly. Otherwise the Switch may be deformed by the soldering heat depending on the type of PCB, pattern, or lands of the PCB.
- Do not solder the Switch more than twice, including rectification soldering. Wait for at least five minutes between the first and second soldering to allow the temperature to return to normal. Continuous soldering may cause the casing to melt or deteriorate the Switch characteristics.

#### 2. Automatic Soldering Baths (Wave Soldering)

- Soldering temperature: 260°C max.
- Soldering time: 5 s max. for a 1.6-mm thick single-side PCB
- Preheating temperature: 100°C max. (ambient temperature)
- Preheating time: Within 60 s
- Precautions  
Make sure that no flux will rise above the level of the PCB. Also make sure that flux is not applied to the switch terminals or to the mounting surface of the PCB. If flux overflows onto the mounting surface of the PCB, it may enter the Switch and cause a malfunction.

#### 3. Manual Soldering

- Soldering temperature: 350°C max. at the tip of the soldering iron
- Soldering time: 3 s max. for a 1.6-mm thick, single-side PCB
- Precautions: Before soldering the Switch on a PCB, make sure that there is no unnecessary space between the Switch and the PCB.

### Washing

Since Illumination part and actuation part are not sealed, switch cannot be washed. Doing so will cause the washing agent, together with flux or dust particles on the PCB, to enter the Switch, resulting in malfunction.

### PCBs

The Switch is designed for a 1.6-mm thick, single-side PCB. Using PCBs with a different thickness or using double-sided, through-hole PCBs may result in loose mounting, improper insertion, or poor heat resistance in soldering. These effects will occur, depending on the type of holes and patterns of the PCB.

Therefore, it is recommended that a verification test is conducted

### Handling

#### 1. Usage Environment

Before installing the Switch, make sure that the area of installation is not subject to corrosive gases emitted from surrounding parts.

Do not use in areas subject to high temperatures, high humidity, or toxic gases such as sulfuric gas (H<sub>2</sub>S, SO<sub>2</sub>), ammonia gas (NH<sub>3</sub>), nitric gas (HNO<sub>3</sub>), or chlorine gas (Cl<sub>2</sub>). It can cause

corrosive damage to the contacts and result in malfunction. If there is silicon in the atmosphere, it may stop the contacts from functioning properly.

If silicon products, such as silicon oil, silicon filler, or silicon wires, are used in the surrounding area, install a contact protection circuit to prevent arching or remove the silicon source.

The following situations may cause water to enter inside the Switch, resulting in a malfunction due to contact failure or corrosion.

- Using the Switch in an outdoor environment where it is exposed to water drops for an extended period of time.
- Using the Switch in an underwater setting where it is subject to strong water pressure.

Do not use Switches that have been dropped. The mating section or other internal parts may be damaged, resulting in malfunction.

### Operation

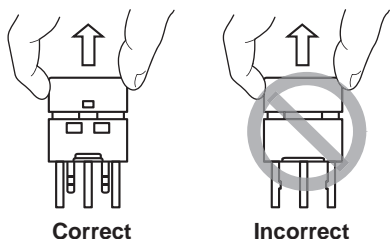
Do not repeatedly operate the Switch with excessive force. Applying excessive pressure or applying additional force after the plunger has stopped may deform the disk spring of the Switch, resulting in malfunction.

Be sure to set up the Switch so that the plunger will operate in a straight vertical line.

If the plunger is pressed off-center or from an angle it may cause deformation or damage to some parts. This may result in deterioration of durability or malfunction.

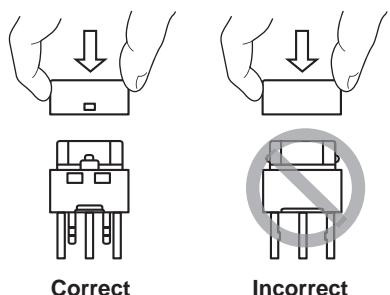
## Removing the Cap - Text Film Installation

1. Hold the cap at the side away from the mating section. Pull straight up.
2. Do not remove the cap while the Switch is mounted. Doing so will apply force to the soldered section and LEDs, resulting in malfunction.



## Placing the Cap on the Switch

Hold the Cap at the side away from the mating section. Push straight down until the mating section meets.

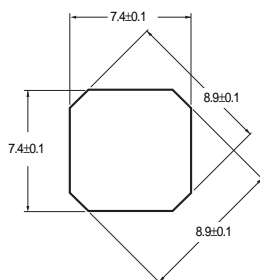


## Removing the Cap

The Cap can be removed up to two times. Excessively removing the Cap will cause the mating section to become weak, resulting the operating section not mating completely or the Cap may fall off.

## Film Dimensions

Dimensions of the film are shown below. The thickness is 0.2 mm.



## Dust Protection

Although the switching mechanism is a sealed structure (IP64), illumination part and actuation part is not sealed. Ensure you have the correct environmental conditions for installation. Use a protective sheet or take other measures to protect against dust.

## Sensitivity to Static Electricity

Switches with high-brightness green (HG) or blue (B) LEDs are susceptible to static electricity. Take care when handling switches with these LEDs as the LEDs may be damaged.

## Storage Precautions

### Storage Environment

To prevent degradation, such as discoloration, of the terminals during storage, do not store the Switch in locations that are subject to the following conditions.

1. High temperature or humidity
2. Corrosive gases
3. Direct sunlight

### Storage condition

Store the Switches in the packaging box.

After the packaging box is opened, use the contents as quickly as possible. When storing leftover parts, make sure that appropriate measures are taken against humidity and corrosive gases.

## Agreement of Product Use

Comply with the usage, storage, and disposal conditions specified by OMRON as outlined in the precautions in the product datasheet and specifications.

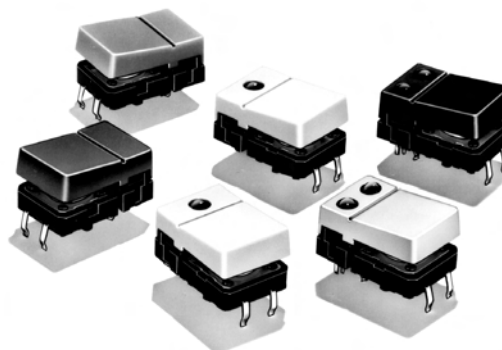
Be sure to read the precautions common to all Tactile Switches, contained in the Technical User's Guide, "Tactile Switches, Technical Information" for correct use

# Tactile Switch (Hinged Type)

## B3J

### Hinged Design Developed through Ergonomics

- Quick, superior snap action through hook-type hinge construction.
- Available with 1 or 2 LEDs or without LEDs.
- The hinge button is available in a wide variety of colors (five standard colors).
- RoHS Compliant.



## Ordering Information

Color of hinged button	No LED	One LED			Two LEDs (left and right)		
		Red	Yellow	Green	Red/Yellow	Red/Green	Yellow/Green
Light gray	B3J-1000	B3J-2000	B3J-3000	B3J-4000	B3J-5000	B3J-6000	B3J-7000
Black	B3J-1100	B3J-2100	B3J-3100	B3J-4100	B3J-5100	B3J-6100	B3J-7100
Orange	B3J-1200	B3J-2200	B3J-3200	B3J-4200	B3J-5200	B3J-6200	B3J-7200
Yellow	B3J-1300	B3J-2300	B3J-3300	B3J-4300	B3J-5300	B3J-6300	B3J-7300
Blue	B3J-1400	B3J-2400	B3J-3400	B3J-4400	B3J-5400	B3J-6400	B3J-7400

## Specifications

### ■ Ratings/Characteristics

Contact form	SPST-NO
Switching capacity	1 to 50 mA, 5 to 24 VDC (resistive load)
Contact resistance	100 mΩ max. (rated: 1 mA, 5 VDC)
Insulation resistance	100 MΩ min. (at 250 VDC)
Dielectric strength	500 VAC, 50/60 Hz for 1 min.
Bounce time	5 ms max.
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s <sup>2</sup> (approx. 100 G) max. Malfunction: 100 m/s <sup>2</sup> (approx. 10 G) max.
Life expectancy	3,000,000 operations min.
Ambient operating temperature	–25°C to 70°C (at 60% RH max.) with no icing or condensation
Ambient operating humidity	35% to 85% (at 5 to 35°C)
Weight	Approx. 1.5 to 1.7 g

### ■ Operating Characteristics

Operating force (OF)	1.27±0.49 N (130 ± 50 gf)
Releasing force (RF)	0.29 N (30 gf) min.
Pretravel (PT)	0.3 <sup>+0.2</sup> / <sub>–0.1</sub> mm

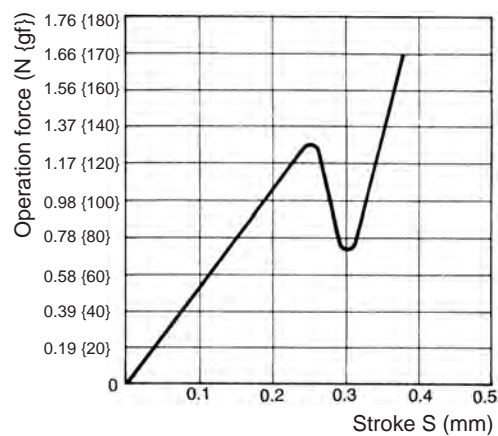
## ■ Built-in LED Performance

Item		Red	Yellow	Green
Forward voltage $V_F$	Standard value (V)	2.0	2.0	2.1
Forward current $I_F$	Standard value (mA)	20	20	20
Permissible loss P	Absolute maximum value (mW)	84	84	84
Reverse voltage $V_R$	Absolute maximum value (V)	5	5	5

**Note:** Since the built-in LED does not contain any limiting resistors, externally connect limiting resistors within the limits shown in the above table.

## Engineering Data

**Operating Force vs. Stroke  
(Typical)**

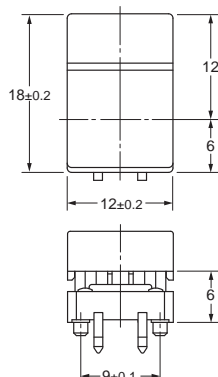
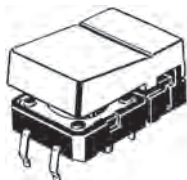


# Dimensions

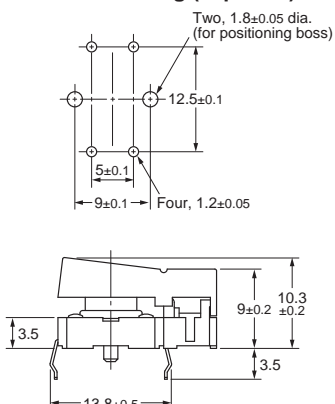
All units are in millimeters unless otherwise indicated. Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## Types with no LED

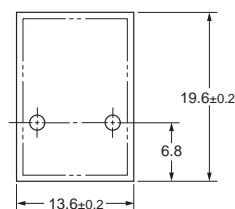
B3J-1□00



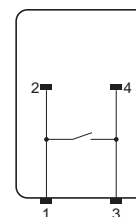
## PCB Mounting (Top View)



## Panel Cutout



## Terminal Arrangement /Internal Connections (Top View)

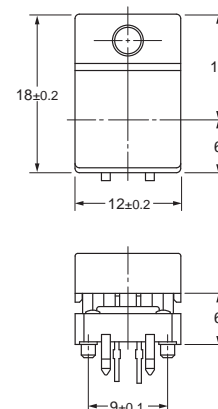
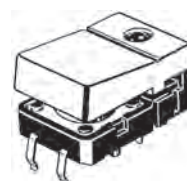


## 1 LED Types

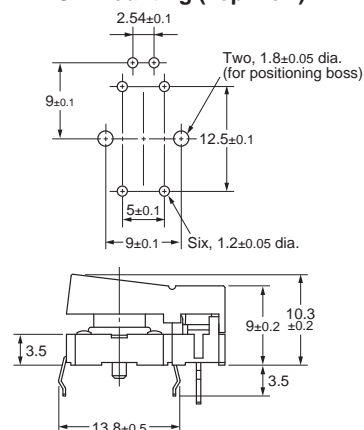
B3J-2□00

B3J-3□00

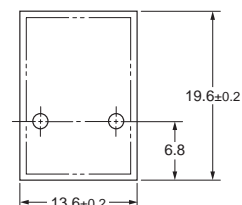
B3J-4□00



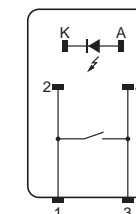
## PCB Mounting (Top View)



## Panel Cutout



## Terminal Arrangement /Internal Connections (Top View)

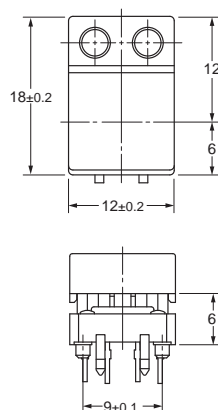
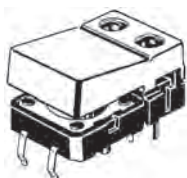


## 2 LED Types

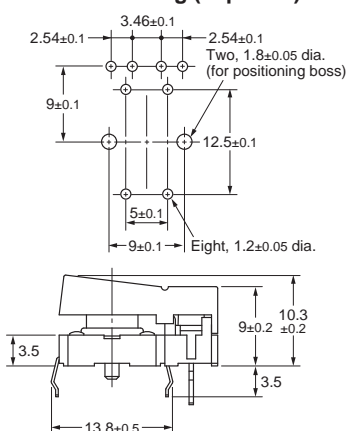
B3J-5□00

B3J-6□00

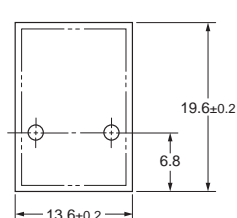
B3J-7□00



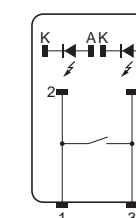
## PCB Mounting (Top View)



## Panel Cutout



## Terminal Arrangement /Internal Connections (Top View)



# Precautions

Be sure to read the precautions common to all Tactile Switches, contained in the Technical User's Guide, "Tactile Switches, Technical Information" for correct use.



# Ultra-low Profile Dome Key B3D

## Single-key Type Added to Series of B3DA Ultra-low Profile Dome Arrays

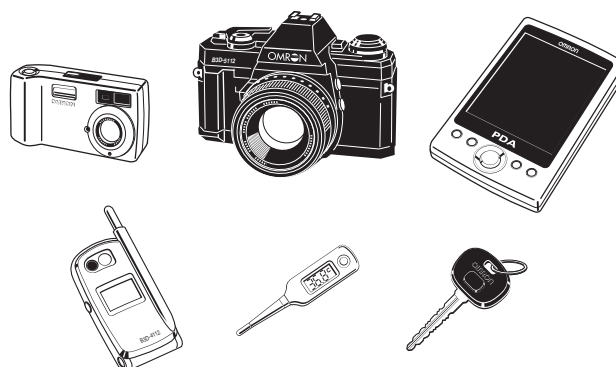
- No soldering required. Attach directly to PCB to make an ultra-low profile tactile switch. Construction provides strong resistance to static electricity by having no soldered terminals.
- Matrix adhesive used to create highly dust-proof construction with good ventilation.
- Lower profile, lighter weight, and crisp clicking action.
- Omron's unique circular contact action ensures a high level of resistance to foreign matter.
- RoHS Compliant.



## Application Examples

Use Dome Keys for the operating parts on various electronic devices that require low-profile controls, as follows:

- Operating switches with few mounted parts above PCBs.  
(Example: Camera operating buttons)
- Small orders, where initial investment in Dome Arrays is not feasible.  
(Example: Trial applications, commercial equipment, etc.)
- Applications requiring a single key only.  
(Example: Reset buttons)



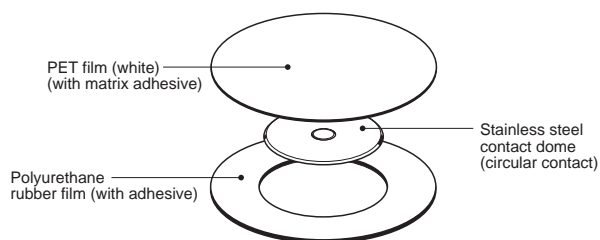
## Specifications

Item	Model	
	B3D-4112	B3D-5112
Diameter of contact dome	4-mm dia.	5-mm dia.
Operating force (OF)	approx. 170 ± 50 gf (1.67 ± 0.49 N)	
Releasing force (RF)	20 gf min. (0.2 N min.)	
Pretravel (PT)	0.2 ± 0.1 mm	
Height	0.3 ± 0.1 mm	
Life expectancy	500,000 operations min.	1,000,000 operations min.
Switching capacity	10 mA at 12 VDC (resistive)	
Minimum permissible load	1 mA at 3 VDC (resistive)	
Ambient operating temperature	-40 to 80°C (at 60% RH max.) with no icing or condensation.	
Ambient storage humidity	10% to 90% (at 40°C max.)	
Contact - base material	Stainless steel	
Plating	Silver	

**Note:** The Dome Keys are sold in units of 500 (20 sheets, with 25 Dome Keys per sheet). Orders must be made in multiples of 500 Dome Keys.



# Structure

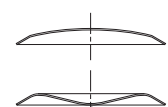
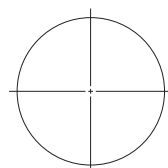


## ■ Circular Contact

When contact dome keys are attached to the PCB, any PCB dust or foreign particles will tend to collect in the center of the key when it is pressed. Therefore, poor contact occurs easily in keys that provide contact at the center point only.

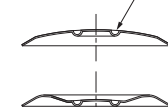
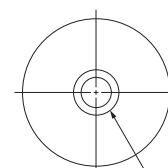
The circular contact construction provides contact along the circumference of a circle, thus preventing poor contact by avoiding the center point.

Conventional models



Contact at center point

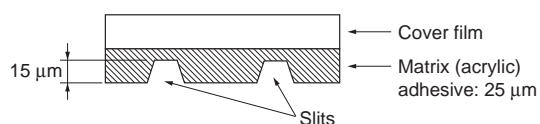
Contact dome resistant to foreign matter (circular contact)



Contact along circle circumference (circular contact)

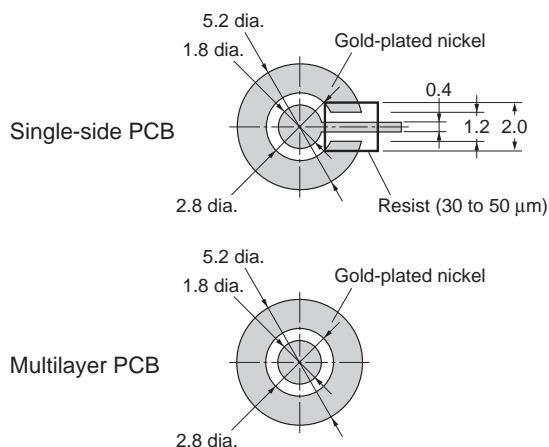
## ■ Matrix Adhesive

The surface structure of this adhesive has grid-shaped slits, as shown in the following cross-sectional diagram. These slits provide both ventilation and dust-proofing, which is required for contact dome operation.

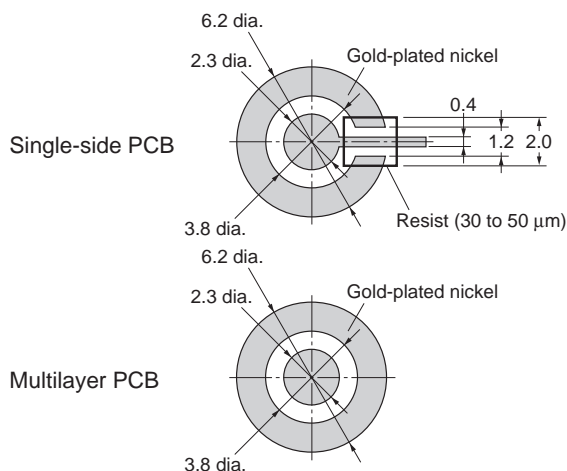


## Recommended Contact Form

### 4 mm Diameter Contact Dome (B3D-4112)



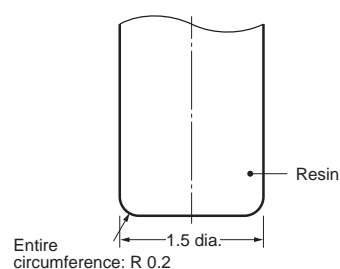
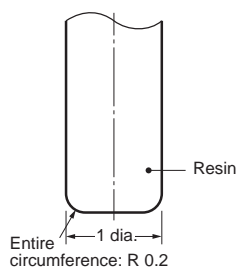
### 5 mm Diameter Contact Dome (B3D-5112)



# Recommended Operating Part Form

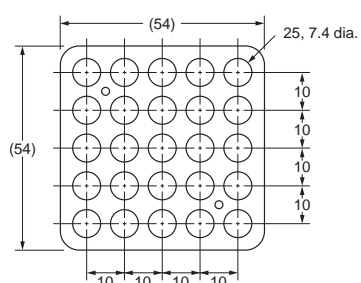
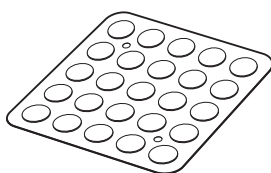
## 4 mm Diameter Contact Dome (B3D-4112)

## 5 mm Diameter Contact Dome (B3D-5112)

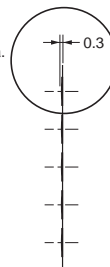


## Dimensions

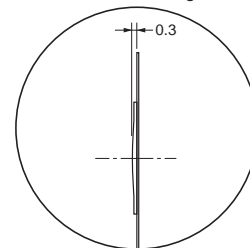
### B3D-4112



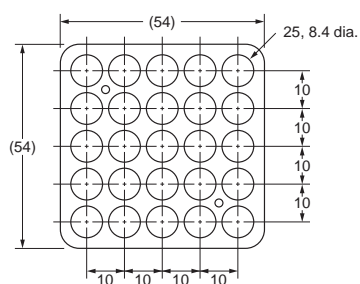
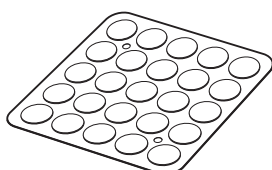
Section A



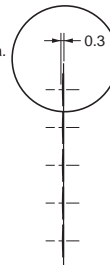
Section A enlarged



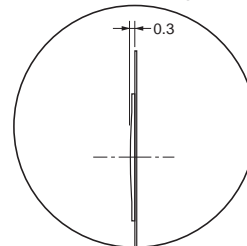
### B3D-5112



Section A

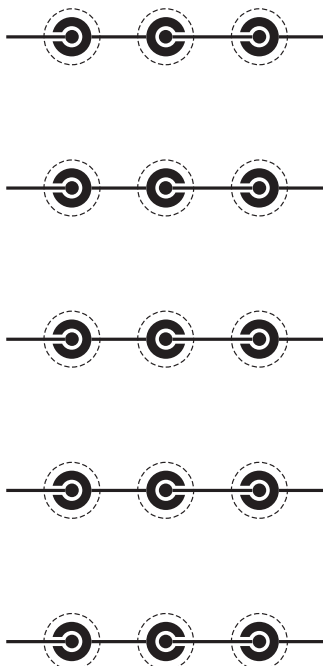


Section A enlarged

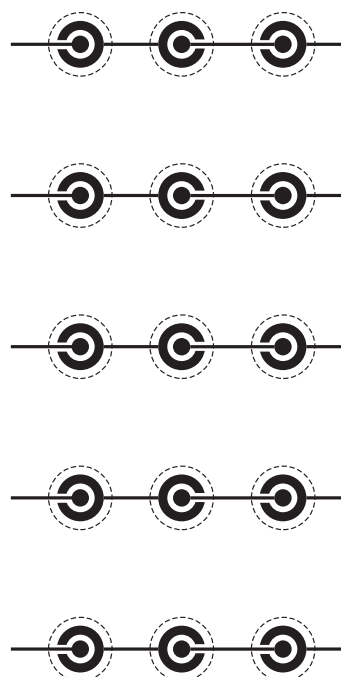


# PCB Pattern Diagrams

B3D-4112



B3D-5112



## Precautions

### ■ Attaching to the PCB

Remove the Dome Key from the sheet using tweezers or a vacuum pick-up tool, and attach it above the contact on the PCB surface, which has been wiped clean in advance. Press down on the top surface using an elastic material, such as urethane rubber, and a force of 2.94 to 4.9 N. Place a positioning mark (circle) on the PCB for easy positioning.

Make sure that the position of the Dome Key is aligned correctly before use. Significant misalignment may result in short-circuits or reduced sensitivity.

**Note:** The recommended vacuum pick-up tool is the Hozan P-835 Vacuum Pick with an M suction pad (7-mm dia.).

Do not reuse a B3D Dome Key that has been detached from the PCB. Attach a new Dome Key to the PCB.

Do not touch the contact dome with bare hands, or with unclean gloves. Doing so may damage the contact dome, which is the part that comes in contact with the PCB.

### ■ Reflow Soldering

The Dome Key cannot withstand heat from reflow soldering. Always perform reflow soldering before attaching the Dome Key to the PCB.

### ■ Washing

Do not wash the Dome Key. The Dome Key is not water-resistant and must not be exposed to water or other liquids.

### ■ Common Precautions

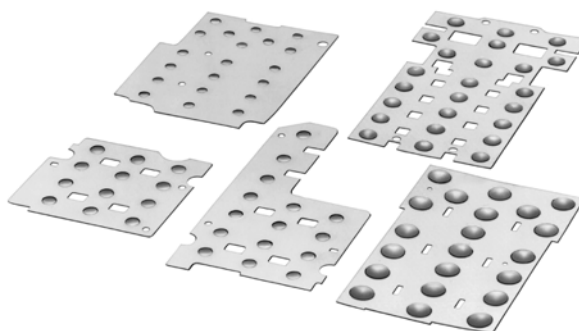
Be sure to read the precautions common to all Tactile Switches, contained in the Technical User's Guide, "Tactile Switches, Technical Information" for correct use.

# Ultra-low Profile Dome Array

## B3DA

### Ultra-low Profile Dome Array With Dust-Proof Construction and Crisp Clicking Action

- No soldering required. Attach directly to PCB to make an ultra-low profile tactile switch.
- Matrix adhesive used to create highly dust-proof construction with good ventilation. Omron's unique circular contact action ensures a high level of resistance to foreign matter.
- Lower profile, lighter weight, and crisp clicking action.
- Customization of Dome Array available upon request (i.e., silver plating, number of contacts, shape, etc.).
- RoHS Compliant.



## Ordering Information

Item	Model (see note)
4 mm dome array	B3DA-0010-A
5 mm dome array	B3DA-0000-A

**Note:** Representative versions for engineering evaluation.

## Specifications

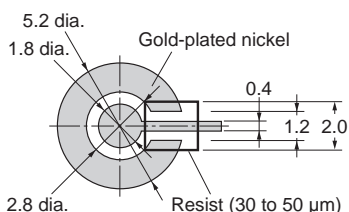
Item	Model	
	B3DA-0010-A and custom 4 mm dia. versions	B3DA-0000-A and custom 5 mm dia. versions
Diameter of contact dome	4-mm dia.	5-mm dia.
Operating force (OF)	approx. 160 ± 50 gf (1.57 ± 0.49 N)	
Releasing force (RF)	20 gf min. (0.2 N min.)	
Pretravel (PT)	0.2 ± 0.1 mm	
Height	0.25 ± 0.1 mm	
Life expectancy	500,000 operations min.	1,000,000 operations min.
Switching capacity	10 mA at 12 VDC (resistive)	
Minimum permissible load	1 mA at 3 VDC (resistive)	
Ambient operating temperature	-40 to 80°C (at 60% RH max.) with no icing or condensation.	
Ambient storage humidity	10% to 90% (at 40°C max.)	
Contact - base material	Stainless steel	
Plating	Unplated. (Silver plating available for custom models.)	

**Note:** Contact dome specifications not shown in this table are also available. Consult Omron for customization requirements.

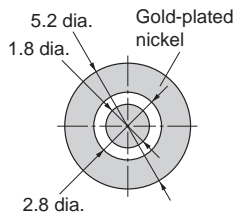
## Recommended Contact Form on PCB

### 4-mm Diameter Contact Dome

Single-side PCB

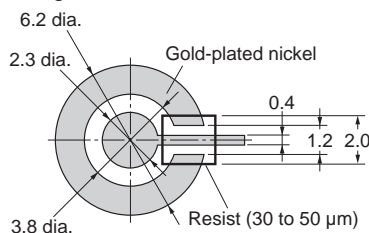


Multilayer PCB

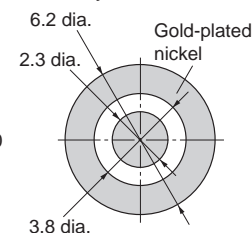


### 5-mm Diameter Contact Dome

Single-side PCB



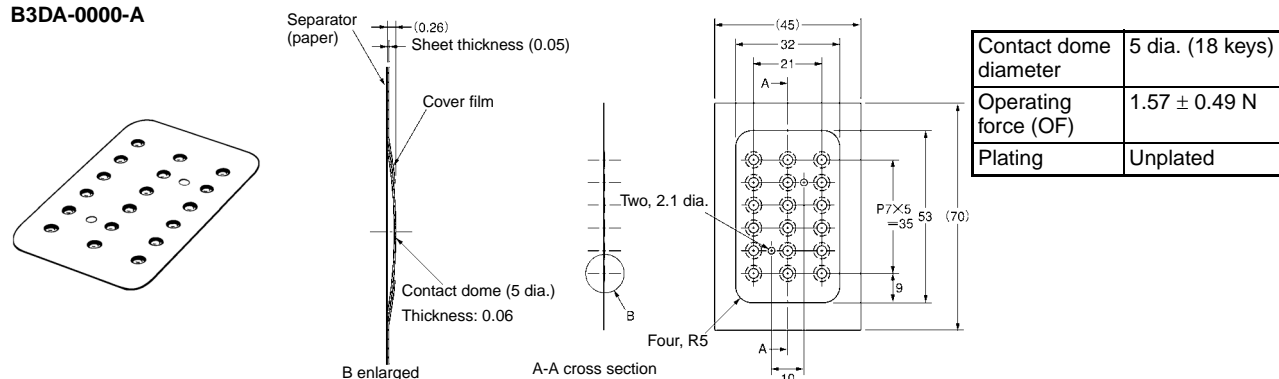
Multilayer PCB



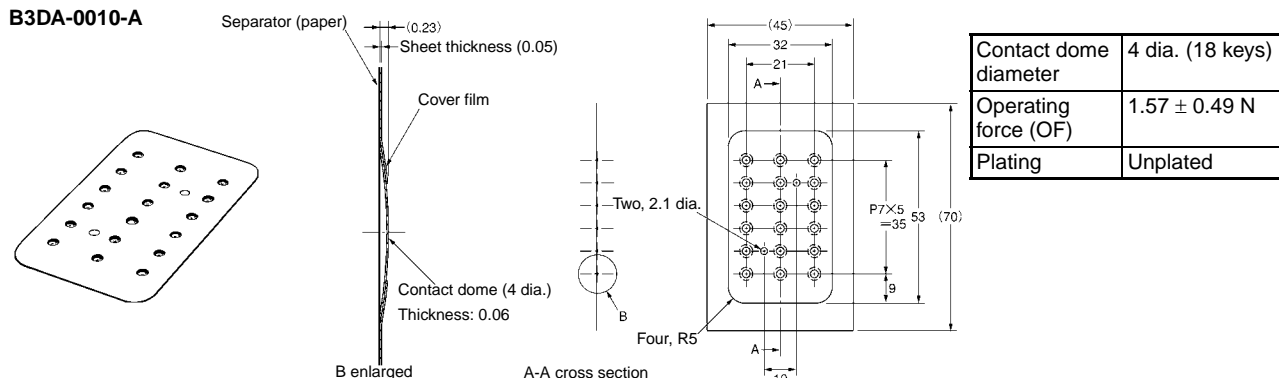
# Dimensions

Unit: mm

## B3DA-0000-A



## B3DA-0010-A

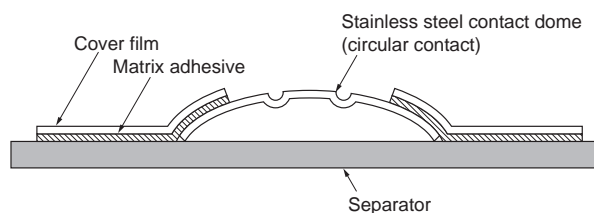


# Construction

## Circular Contact

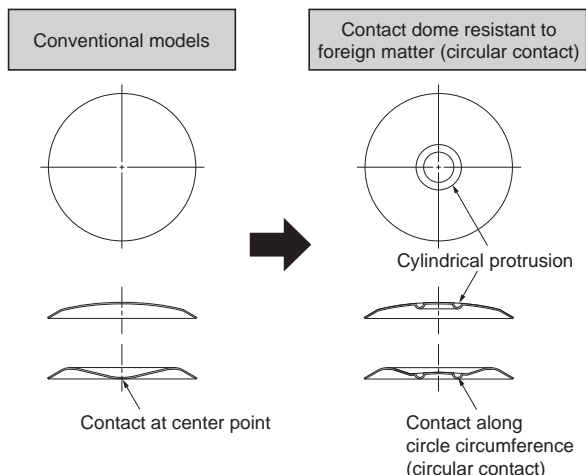
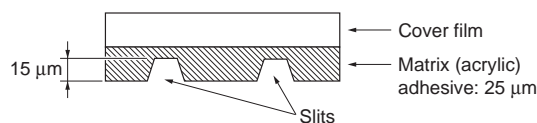
When Dome Arrays are attached to the PCB, any PCB dust or foreign particles will tend to collect in the center of the key when it is pressed. Therefore, poor contact occurs easily in Dome Arrays that provide contact at the center point only.

The circular contact construction provides contact along the circumference of a circle, thus preventing poor contact by avoiding the center point.



## Matrix Adhesive

The surface structure of this adhesive has grid-shaped slits, as shown in the following cross-sectional diagram. These slits provide both ventilation and dust-proofing, which is required for contact dome operation.



# Precautions

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## ■ Attaching to the PCB

Remove the Dome Array from the sheet using tweezers or a vacuum pick-up tool, and attach it above the contact on the PCB surface, which has been wiped clean in advance.

Do not reuse a Dome Array that has been detached from the PCB. Attach a new Dome Array to the PCB.

Do not touch the Dome Array with bare hands, or with unclean gloves. Doing so may damage the Dome Array, which is the part that comes in contact with the PCB.

## ■ Reflow Soldering

The Dome Array cannot withstand heat from reflow soldering. Always perform reflow soldering before attaching the Dome Array to the PCB.

## ■ Washing

Do not wash the Dome Array. The Dome Array is not water-resistant and must not be exposed to water or other liquids.

## ■ Common Precautions

Be sure to read the precautions common to all Tactile Switches, contained in the Technical User's Guide, "Tactile Switches, Technical Information" for correct use.

# MEMO

A large grid of small, faint, repeating geometric patterns, likely a decorative background or a placeholder for a complex image. The patterns are arranged in a regular, repeating fashion across the entire page, creating a textured, grid-like appearance. The patterns themselves are small, intricate, and appear to be composed of various geometric shapes and lines, possibly representing a complex mathematical or architectural design. The overall effect is a dense, uniform field of these small, repeating motifs.

## DIP Switches

# Technical Information

## Cautions

Use the DIP Switch within the rated voltage and current ranges, otherwise the DIP Switch may have a shortened life expectancy, radiate heat, or burn out. This particularly applies to the instantaneous voltages and currents when switching.

## Correct Use

### ■ Mounting

Normally the default striker setting is OFF for slide-type DIP Switches and the default rotor setting is 0 for Rotary DIP Switches. Do not change these settings when mounting, soldering, washing or drying Switches. In rare cases, the striker may be deformed by heat generated during soldering.

### Automatic Insertion Machine

Use a body stopper system for the chute stopper of automatic insertion machines. When mounting Switches using an insertion machine incorporating a half-lead stopper, make sure the machine will not deform the terminals of the Switch, or improper insertion may result. Check actual mounting conditions prior to using a half-lead stopper system.

A printed circuit board that is 1.2 to 1.6 mm thick is recommended.

Holes on the PCB should be at least 0.9 mm in diameter for automatic insertion.

### Manual or IC Socket Insertion

Commercially available insertion tools are recommended for mounting ICs on PCBs.

Terminal pitch, dimensions and other features are identical to that of standard ICs for IC socket compatibility (except surface-mount DIP switches).

Align the terminals so they slide in simultaneously when the Switch is inserted into socket holes or into mounting holes pre-drilled at the specified dimensions. Apply downward force on the Switch until the terminals are properly seated on the PCB.

Do not try to remove a Switch by inserting a screwdriver between it and the PCB, and then twisting the screwdriver to peel the Switch off. Use a commercially available inserter/remover to remove the Switch.

### ■ Soldering

Observe the following conditions when soldering the DIP Switch.

<b>Models for automatic soldering baths</b>	A6T, A6TR, A6E, A6E, A6ER, A6D, A6DR, A6R, A6RV, A6K, A6KV, A6A, A6C, A6CV	Manual soldering is possible
<b>Models for reflow soldering</b>	A6H, A6S-H, A6SR, A6RS, A6KS, A6KSV	Manual soldering is not possible.

### General Precautions for Soldering

Make sure that the striker of slide-type DIP Switches is set fully to either ON or OFF. (For A6E and A6ER models, however, set the Switch to OFF before soldering.) Make sure that Rotary DIP Switches are correctly set to 0. Misalignment may result in reduced sensitivity due to the soldering heat.

Before soldering the Switch on a PCB, make sure there is no unnecessary space between the Switch and the PCB.

Before soldering the Switch on a multilayer PCB, conduct a test to make sure the Switch will not be deformed by soldering heat on the pattern or land of the multilayer PCB.

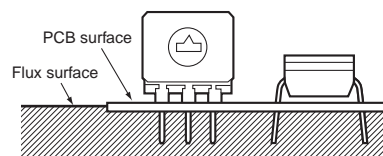
### Automatic Soldering Bath

(Except A6S-H/A6H)

Soldering temperature: 260°C max.

Soldering time: 5 s max. for a 1.6-mm thick, single-side PCB

Confirm in advance that flux will not bubble up onto the side of the PCB to which the Switch is mounted. Depending on the type of Switch, the flux may have an adverse effect if it enters the Switch.

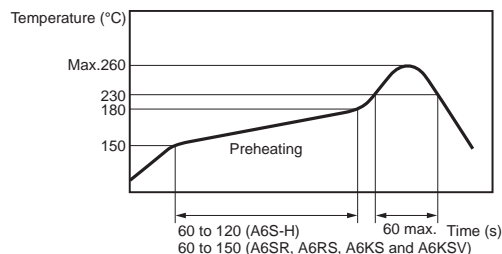




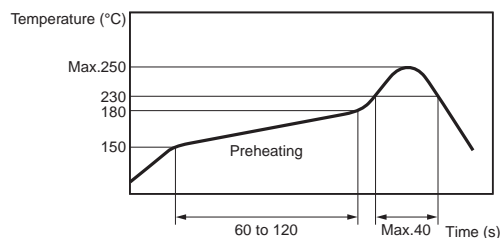
## Reflow Soldering

Observe the following conditions for reflow soldering.  
(Measurement Location: Top of Switch)

### A6S-H, A6SR, A6RS, A6KS, and A6KSV Soldering Conditions



### A6H Soldering Conditions



Do not use reflow soldering for any models other than the models indicated. Otherwise the plastic case may melt or deform.

The soldering conditions and the temperature around the Switch may vary with the type of reflow bath. Check the temperature profile and confirm soldering conditions as well as the amount of heat applied to the Switch prior to soldering.

## Manual Soldering

### (Except Surface-mounting DIP Switch)

Soldering temperature: 350°C at the tip of the soldering iron.  
Soldering time: 3 s max. for a 1.6-mm thick, single-side PCB

Do not solder the Switch more than twice including any rectification soldering. An interval of five minutes is required between the first and second soldering.

## Using Flux

Making mistakes in the type of flux or in the amount or method in which it is applied can cause flux to enter the interior of the Switch, with adverse effects on Switch performance. Assess the proper flux, conditions, and methods prior to using it.

## ■ Washing

### Washable and Non-washable Models

The models for which washing is possible are shown in the following table.

<b>Washable</b>	A6A, A6C, A6CV, A6D, A6DR, A6T (with seal tape), A6S-H (with seal tape), A6H (with seal tape)
<b>Non-washable</b>	A6R, A6RV, A6RS, A6K, A6KV, A6KS, A6KSV, A6T (standard/raised actuator), A6TR, A6SR, A6S-H (standard/raised actuator), A6E, A6ER

### Washing Procedure

Ultrasonic cleaning is not available for slide-type DIP Switches with seal tape. These models may be wiped or dipped into washing agents for one minute maximum.

Slide-type DIP Switches with seal tape can be washed as long as the seal tape is not removed or pasted before washing. Non-compliance here will cause the quality of the seal to decline.

Washing equipment incorporating more than one washing bath can be used to clean washable models, provided that the washable models are cleaned for one minute maximum per bath and the total cleaning time does not exceed three minutes.

### Washing Agents

Apply alcohol-based solvents to clean washable models. Do not apply water or any other agents to clean any washable models, as such agents may degrade the materials or performance of the Switch.

### Washing Precautions

Do not impose any external force on washable models while washing.

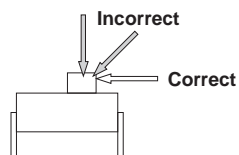
Do not clean washable models immediately after soldering. The cleaning agent may be absorbed into the incomplete seal through respiration as the Switch cools. Wait for at least three minutes after soldering before cleaning.

Do not use washable Switches submerged in water or in locations exposed to water.

# ■ Handling

## Slide-type DIP Switch operation

Do not apply excessive operating force to the Switch. Otherwise the Switch may be damaged or deformed, and the switch mechanism may malfunction as a result. Apply an operating force not exceeding 9.8 N. (Actuators may break if they are operated from the tip. Operate the actuators one at a time so that pressure is not concentrated at the tip. (Use a force of 7.8 N or less for the A6TR and A6SR.)) Apply the operating load from the side of the striker. Do not apply a load from an angle or from above the striker. Doing so may deform the Switch contact.



Set slide-type DIP Switches with a tiny, rounded object, such as the tip of a ball-point pen or a small screwdriver. Do not set the DIP Switch using tweezers or any other sharp object that may damage it. Do not set the DIP Switch using the point of a mechanical pencil, or lead powder or fragments may fall into the Switch and internal circuit board, causing the DIP Switch to malfunction and reducing the dielectric strength of the circuit board.

Although raised-type and piano-type strikers can be operated by fingertip, do not push too hard or too fast because this will deform or damage the striker.

When setting or operating the A6H, use narrow-headed tweezers or similar implement (without a sharp end), to enable smooth, horizontal operation. Pushing the striker at an angle, or applying excessive load from above may damage or deform the striker and thereby prevent operation.

## Rotary DIP Switch Operation

Set rotary-type DIP Switches with a flat-blade screwdriver that fits into the screwdriver groove. Using a screwdriver of inappropriate dimensions, or using a tool other than a flat-blade screwdriver may cause damage to the groove that may make the Switch impossible to operate.

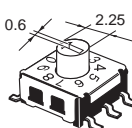
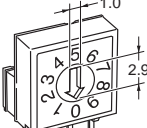
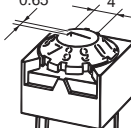
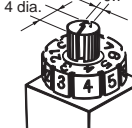
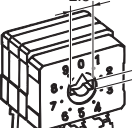
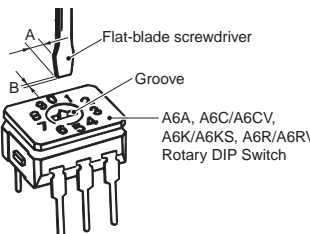
Insert the flat-blade screwdriver vertically to operate the Switch. The Switch may be damaged if the screwdriver is inserted at an angle.

Do not use excessive force to operate the Switch, or it may damage or deform the Switch

## Setting

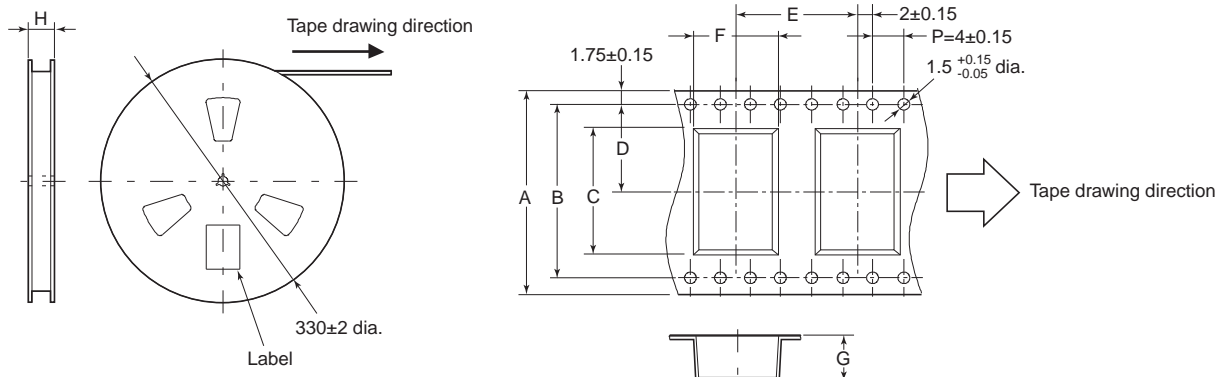
Set the Switch to the correct position before use. An incorrectly aligned position may result in incorrect signals.

### Rotary DIP Switch Operation

Models	A6K/A6KS	A6R/A6RV	A6A		A6C/A6CV
Item	Top/Side operation, flat type	Top/Side operation, flat type	Cone type, flat type	Shaft type, wheel type	Top/Side operation type
Screwdriver groove	 Depth: 0.7	 Depth: 1.0	 Depth: 0.9	 Depth: 0.9	 Depth: 1.0
Applicable screwdriver: A	1.8 to 2.1	1.8 to 2.1	3.5 to 3.8		2.0 to 2.4
Applicable screwdriver: B	0.3 to 0.45	0.7 to 0.8	0.4 to 0.5		0.5 to 0.6
Part names					

**Note:** All units are in millimeters unless otherwise indicated.

# Packing Specifications



## A6S-H Series

No. of poles	1		2		3		4		5		6		7		8		9		10	
	Flat	Raise	Flat	Raise	Flat	Raise	Flat	Raise	Flat	Raise	Flat	Raise	Flat	Raise	Flat	Raise	Flat	Raise	Flat	Raise
A <sup>+0.4/-0.2</sup>	16		16		24	16	24		24		24		32		32		44		44	
B $\pm 0.15$	---		---		---		---		---		---		28.4		28.4		40.4		40.4	
C	3.78		6.5	6.4	9.07	8.9	11.56		14.2	14	16.6		19.2		21.7	21.5	24.26		26.8	
D	7.5		7.5		11.5	7.5	11.5		11.5		11.5		14.2		14.2		20.2		20.2	
E	16																			
F	10.2		10.2		10.2		10.2		10.2	10.3	10.2		10.2	10.1	10.2	10.1	10.2		10.2	
G	4.65		4.4	5.9	4.9	5.9	4.4	5.9	4.9	5	4.4	5.9	4.9	5	4.4	5.9	4.9	6	4.9	6
H	(22)		(22)		(30)	(22)	(30)		(30)		(30)		(38)		(38)		(50)		(50)	
Standard reel	800		900	700	900	700	900	700	900	800	900	700	900	800	900	700	900	700	900	800
Small reel	400																			

## A6SR Series

No. of poles	2		4		6		8		10	
	Short	Long	Short	Long	Short	Long	Short	Long	Short	Long
A <sup>+0.4/-0.2</sup>	16		24		24		32		44	
B $\pm 0.15$	---		---		---		28.4		40.4	
C	5.4		10.5		15.6		20.7		25.7	
D	7.5		11.5		11.5		14.2		20.2	
E	16									
F	10.3									
G	5.8									
H	(22)		(30)		(30)		(38)		(50)	
Standard reel	700									

## A6RS Series

No. of poles	4×1 Terminal		3×3 Terminal	
	Flat	Shaft	Flat	Shaft
A <sup>+0.4/-0.2</sup>	24		32	
B $\pm 0.15$	---		28.4	
C	14.5		14.3	
D	11.5		14.2	
E	16		16	
F	10.3		10	
G	5.45		12	
H	(30)		(38)	
Standard reel	750		250	

## A6H Series




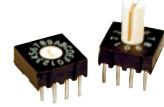

No. of poles	2		4		6		8		10	
	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
A <sup>+0.4/-0.2</sup>	12		12		24		24		24	
B $\pm 0.15$	---		---		---		---		---	
C	4.2		6.6		9.7		11.7		14.4	
D	5.5		5.5		11.5		11.5		11.5	
E	8									
F	7									
G	1.96									
H	(18)		(18)		(30)		(30)		(30)	
Standard reel	4000									
Small reel	500									

## A6KS Series

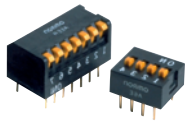


No. of poles	3×3 Terminal		5×2 Terminal			
	Top operation		Top operation		Side operation	
	Flat	Shaft	Flat	Shaft	Flat	Shaft
	24				16	
C	7.5				13	
D	11.5				7.5	
E	12					
F	7.7				6.6	8.1
G	3.7	6.7	3.7	6.7	7.64	
H	(30)				(22)	
Standard reel	1450	850	1450	850	750	

## DIP Switch




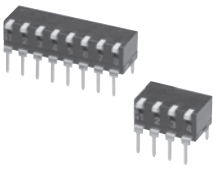
## Selection Guide

<b>General Attributes</b>	 Page 285	 Page 289	 Page 297	 Page 303	 Page 307
	<b>A6A</b>	<b>A6C/A6CV</b>	<b>A6K/A6KS</b>	<b>A6R/A6RV</b>	<b>A6RS</b>
<b>Dimensions (mm)</b>	Varies by type	Varies by type	Varies by type	Varies by type	Varies by type
<b>Features</b>	<ul style="list-style-type: none"> <li>Subminiature Rotary DIP Switch</li> <li>Small housing for high-density mounting &amp; sealed construction for immersion cleaning</li> </ul>	<ul style="list-style-type: none"> <li>Subminiature Rotary DIP Switch</li> <li>Internal sealed construction eliminates the need for tape sealing, &amp; automatic, high-density mounting is possible</li> </ul>	<ul style="list-style-type: none"> <li>Mounting space reduced by 50% (compared to conventional models).</li> <li>Through-hole or Surface Mount versions</li> <li>Gold-plated Contacts</li> </ul>	<ul style="list-style-type: none"> <li>Economical rotary DIP switch</li> <li>Top, side and extended shaft models</li> <li>O-ring sealed construction to prevent ingress of dust and dirt</li> </ul>	<ul style="list-style-type: none"> <li>Temperature-resistant resin allows peak reflow of 260°C</li> <li>Flat and extended-shaft models</li> <li>Two different terminal arrangements for maximum design flexibility</li> <li>-25°C to 80 °C operating temperature</li> </ul>
<b>Contact Rating(s) Resistive load</b>	1~100mA @ 5~28VDC	100mA @ 30VDC	25mA @ 24VDC	25mA @ 24VDC	25mA @ 24VDC
<b>Switching positions</b>	10-BCD 16-Hexadecimal	10-BCD 16-Hexadecimal	10-BCD 16-Hexadecimal	10-BCD 16-Hexadecimal	10-BCD 16-Hexadecimal
<b>Number of poles</b>	—	—	—	—	—
<b>Operating force (Torque, Rotary Models)</b>	120 to 250 g-cm	15 to 100 g-cm	200 g-cm max.	200 g-cm max.	200 g-cm max.
<b>Mechanical service life</b>	10,000 detent operations min	10,000 operations min.	—	5,000 detent operations min.	—
<b>Electrical service life</b>	2,000 detent operations min.	2,000 operations min.	20,000 steps min.	5,000 detent operations min.	5,000 detent operations min.
<b>Actuator types</b>	Rotary: Standard, Extended-shaft and "Thumbwheel"	Rotary: Top and Side actuated models	Rotary: Standard and Extended-shaft, with Top and Side actuated options	Rotary: Standard and Extended-shaft, with Top and Side actuated options	Rotary: Standard and Extended-shaft.
<b>Terminal choices</b>	Through-hole PCB terminal	Through-hole PCB terminal	Through-hole or Surface mount PCB terminal	Through-hole PCB terminal	Surface mount
<b>Washable*</b>	Yes	Yes	No	No	No

\* None of the DIP switches contained in this catalog are water-washable. Be sure to read the precautions and information common to all DIP Switches, contained in the Technical User's Guide, "DIP Switches, Technical Information" for correct use.

	 Page 291	 Page 293	 Page 295
<b>General Attributes</b>	<b>A6D/A6DR</b>	<b>A6E/A6ER</b>	<b>A6H</b>
<b>Dimensions (mm)</b>	Varies by type	Varies by type	Varies by type
<b>Features</b>	<ul style="list-style-type: none"> <li>• IP64, Dust proof construction</li> <li>• Top, raised &amp; side actuators</li> <li>• Smooth switching action with slide-type, self-cleaning mechanism.</li> <li>• Gold-plated twin contacts</li> </ul>	<ul style="list-style-type: none"> <li>• Available in a variety of model types: A6E: Flat/Raised actuator A6ER: Side actuator</li> <li>• Gold-plated contacts</li> <li>• Sealed bottom helps prevent flux penetration during soldering</li> </ul>	<ul style="list-style-type: none"> <li>• Half-pitch Surface Mount DIP Switch</li> <li>• Low profile of 1.55mm</li> <li>• Seal tape models available</li> <li>• Available in embossed tape packaging.</li> </ul>
<b>Contact Rating(s) Resistive load</b>	30mA @ 30VDC	25mA @ 24VDC	25mA @ 24VDC
<b>Switching positions</b>	—	—	—
<b>Number of poles</b>	2, 4, 6, 8, 10	2, 3, 4, 5, 6, 7, 8, 9, 10	2, 4, 6, 8, 10
<b>Operating force (Torque, Rotary Models)</b>	30 to 500 gf	30 to 1,000 gf	30 to 500 gf
<b>Mechanical service life</b>	5,000 operations min	1,000 operations min.	1,000 operations min.
<b>Electrical service life</b>	2,000 operations min.	1,000 operations min.	1,000 operations min.
<b>Actuator types</b>	Top actuated: flat and raised Side actuated	Top actuated: flat and raised Side actuated	Top actuated
<b>Terminal choices</b>	Through-hole PCB terminal	Through-hole PCB terminal	Surface mount PCB (Half-pitch)
<b>Washable*</b>	Yes	No	Yes (versions with seal tape)

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<b>General Attributes</b>	 Page 309	 Page 313	 Page 315	 Page 317
	<b>A6S-H</b>	<b>A6SR</b>	<b>A6T</b>	<b>A6TR</b>
<b>Dimensions (mm)</b>	Varies by type	Varies by type	Varies by type	Varies by type
<b>Features</b>	<ul style="list-style-type: none"> <li>Improved solder heat resistance; replaces the older A6S surface mount models. (Peak solder temperature=260°C)</li> <li>Gold-plated twin contacts and slide-type, self-cleaning mechanism</li> <li>Top actuated DIP with flat or raised actuators</li> <li>Washable models with seal tape available</li> <li>Available in tubes or embossed tape packaging</li> </ul>	<ul style="list-style-type: none"> <li>Side-actuated version of the A6S-H</li> <li>Low-profile design with standard terminal pitch of 2.54mm facilitates end-to-end PCB mounting.</li> <li>Gold-plated twin contacts and slide-type, self-cleaning mechanism</li> <li>Available in tubes or embossed tape packaging</li> </ul>	<ul style="list-style-type: none"> <li>Top actuated DIP with through-hole PCB terminals</li> <li>Choose from flat or raised actuators</li> <li>Gold-plated twin contacts and slide-type, self-cleaning mechanism</li> <li>Washable models with seal tape available</li> <li>Available in tubes or embossed tape packaging</li> </ul>	<ul style="list-style-type: none"> <li>Side-actuated version of the A6T</li> <li>Low-profile design with standard terminal pitch of 2.54mm facilitates end-to-end PCB mounting.</li> <li>Gold-plated twin contacts and slide-type, self-cleaning mechanism</li> <li>Available in tube packaging</li> </ul>
<b>Contact Rating(s) Resistive load</b>	25 mA @ 24 VDC	24 mA @ 24 VDC	25 mA @ 24 VDC	24 mA @ 24 VDC
<b>Switching positions</b>	—	—	—	—
<b>Number of poles</b>	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	2, 4, 6, 8, 10	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	2, 4, 6, 8, 10
<b>Operating force (Torque, Rotary Models)</b>	30 to 1,000 gf	30.5 to 795 gf	30 to 1,000 gf	30.5 to 795 gf
<b>Mechanical service life</b>	1,000 operations, min.	—	1,000 operations, min	—
<b>Electrical service life</b>	1,000 operations, min.	1,000 operations, min.	1,000 operations, min	1,000 operations, min.
<b>Actuator types</b>	Top actuated: Flat and raised actuators	Side actuated: Short and long levers.	Top actuated: Flat and raised actuators	Side actuated: Short and long levers.
<b>Terminal choices</b>	Surface mount PCB	Surface mount PCB	Through-hole PCB	Through-hole PCB
<b>Washable*</b>	Yes (versions with seal tape)	No	Yes (versions with seal tape)	No

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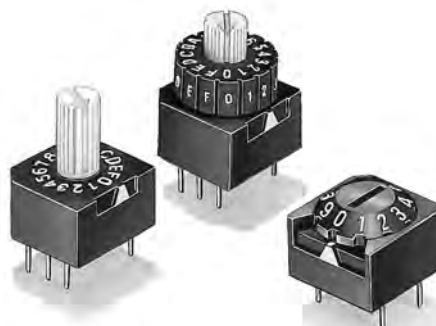
A large grid of 1000 small squares, each containing a unique combination of symbols (plus, minus, multiplication, division, equals, less than, greater than, and percent) and numbers (0-9). The symbols and numbers are arranged in a way that they are not easily recognizable as a standard mathematical expression, but rather as a random sequence of characters. The grid is organized into 10 rows and 100 columns. The symbols used are: +, -, \*, /, =, <, >, and %. The numbers used are: 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. The symbols and numbers are arranged in a way that they are not easily recognizable as a standard mathematical expression, but rather as a random sequence of characters. The grid is organized into 10 rows and 100 columns. The symbols used are: +, -, \*, /, =, <, >, and %. The numbers used are: 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9.

# Sealed Rotary DIP Switch

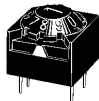

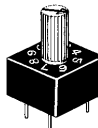
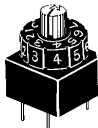
## A6A

### Subminiature DIP Switch for High-Density Packaging

- Series includes a Cone type that can be operated from the top or side, an extended shaft type that can be operated while mounted on a panel, and a flat type.
- A slider lock and rotating PCB system achieve stable contact reliability.
- Sealed construction equivalent to IP64 (IEC 60529) prevents flux penetration and provides high contact reliability even in dusty locations and locations where water is used
- RoHS Compliant



### Ordering Information

		Part Numbers			
		Standard (Cone)	Flat	Extended shaft	Thumbwheel
					
Output code	No. of positions				
BCD 1-2-4-8	10	<b>A6A-10R</b>	<b>A6A-10RF</b>	<b>A6A-10RS</b>	<b>A6A-10RW</b>
BCD 1-2-4-8 complement		<b>A6A-10C</b>	<b>A6A-10CF</b>	<b>A6A-10CS</b>	<b>A6A-10CW</b>
BCD Hexadecimal 1-2-4-8	16	<b>A6A-16R</b>	<b>A6A-16RF</b>	<b>A6A-16RS</b>	<b>A6A-16RW</b>
BCD Hexadecimal 1-2-4-8 complement		<b>A6A-16C</b>	<b>A6A-16CF</b>	<b>A6A-16CS</b>	<b>A6A-16CW</b>

**Important Note:** Switches cannot be water-washed.

### Specifications

#### ■ Characteristics

<b>Switching capacity</b>		100 mA at 28 VDC, 1 mA at 5 VDC (minimum load)
<b>Contact resistance</b>		200 MΩ max.
<b>Insulation resistance</b>		10 MΩ min. (at 250 VDC)
<b>Dielectric strength</b>		500 VAC for 1 minute between current-carrying metal part and ground 250 VAC for 1 minute between terminals
<b>Operating torque</b>		120 to 250 g·cm (1.18 to 2.45 x 10 <sup>-2</sup> N·m) max.
<b>Vibration resistance</b>	<b>Malfunction durability</b>	10 to 55 Hz, 1.5 mm double amplitude
<b>Shock resistance</b>	<b>Malfunction durability</b>	300 m/s <sup>2</sup> (30 G) min.
<b>Ambient operating temperature</b>		-10° to 70°C at 60% RH max. (with no icing or condensation)
<b>Ambient operating humidity</b>		45% to 85% RH (at 5 to 35°C)
<b>Service life</b>	<b>Mechanical</b>	10,000 detent operations min.
	<b>Electrical</b>	2,000 detent operations min.
<b>Weight</b>		Cone: Approx. 0.8 g Flat: Approx. 0.7 g Extended shaft: Approx. 0.8g Thumbwheel: Approx. 1.0g

**Note:** Data shown are of initial value.



# Output Codes

## 10-position Models

Type Terminal No. Position	BCD 1-2-4-8				BCD 1-2-4-8 complement			
	1	2	4	8	$\bar{1}$	$\bar{2}$	$\bar{4}$	$\bar{8}$
0					●	●	●	●
1	●					●	●	●
2		●			●		●	●
3	●	●					●	●
4			●		●	●		●
5	●		●			●		●
6		●	●		●			●
7	●	●	●					●
8				●	●	●	●	
9	●			●		●	●	

Note: "●" indicates that the internal switch is ON.

## 16-position Models

Type Terminal No. Position	BCD/hexadecimal 1-2-4-8				BCD/hexadecimal 1-2-4-8 complement			
	1	2	4	8	$\bar{1}$	$\bar{2}$	$\bar{4}$	$\bar{8}$
0					●	●	●	●
1	●					●	●	●
2		●			●		●	●
3	●	●					●	●
4			●		●	●		●
5	●		●			●		●
6		●	●		●			●
7	●	●	●					●
8				●	●	●	●	
9	●			●		●	●	
A		●		●	●		●	
B	●	●		●			●	
C			●	●	●	●		
D	●		●	●		●		
E		●	●	●	●			
F	●	●	●	●				

Note: "●" indicates that the internal switch is ON.

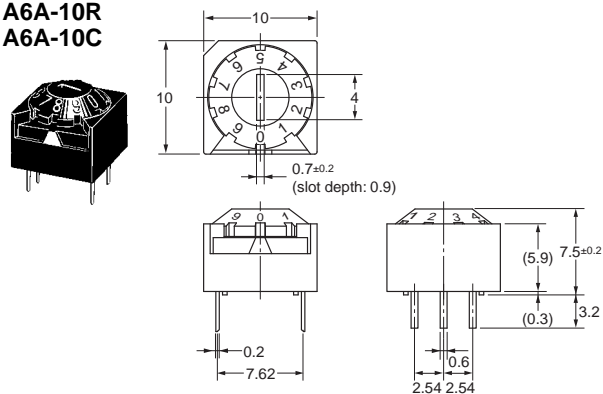
# Dimensions

Note: 1. All units are in millimeters unless otherwise indicated.

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

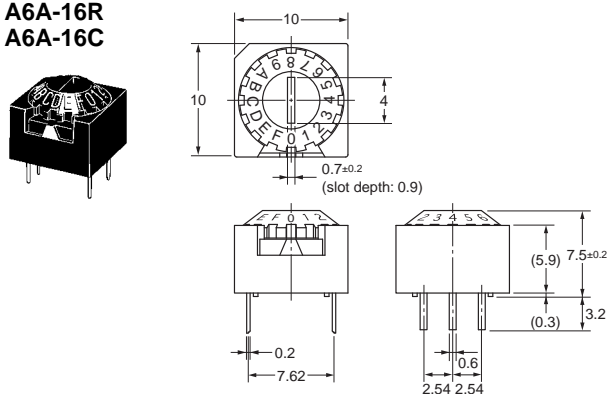
## Standard (Cone) Type, 10 Positions

A6A-10R  
A6A-10C



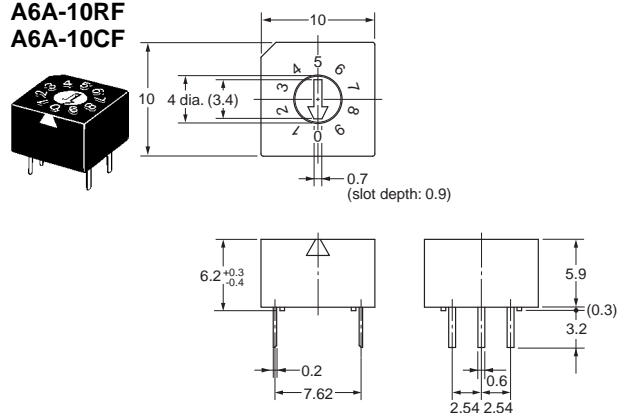
## Standard (Cone) Type, 16 Positions

A6A-16R  
A6A-16C



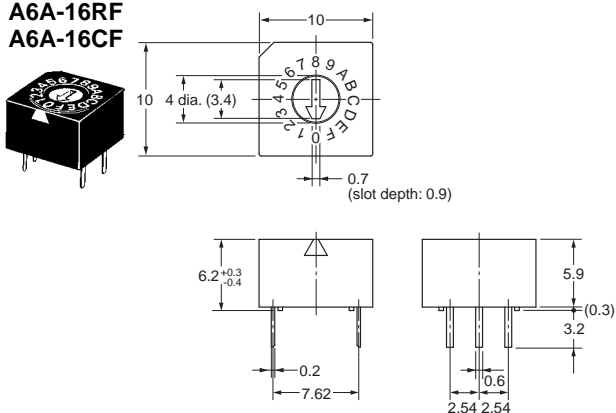
## Flat Type, 10 Positions

A6A-10RF  
A6A-10CF



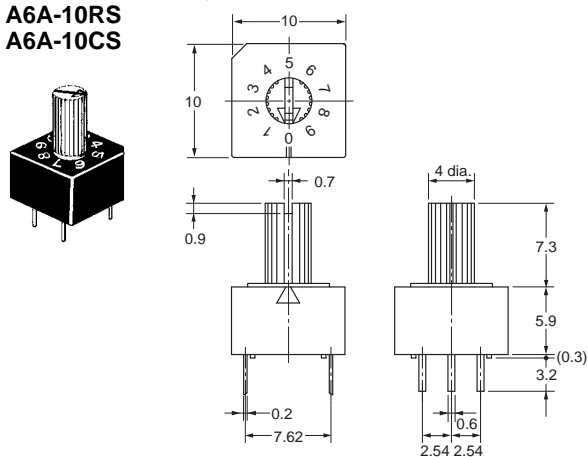
## Flat Type, 16 Positions

A6A-16RF  
A6A-16CF



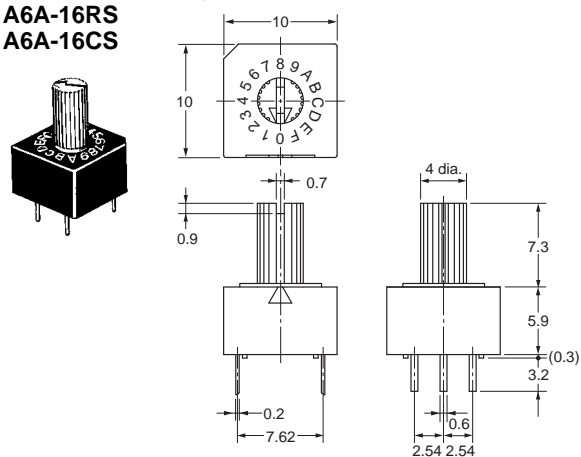
■ Extended Shaft Type, 10 Positions

A6A-10RS  
A6A-10CS



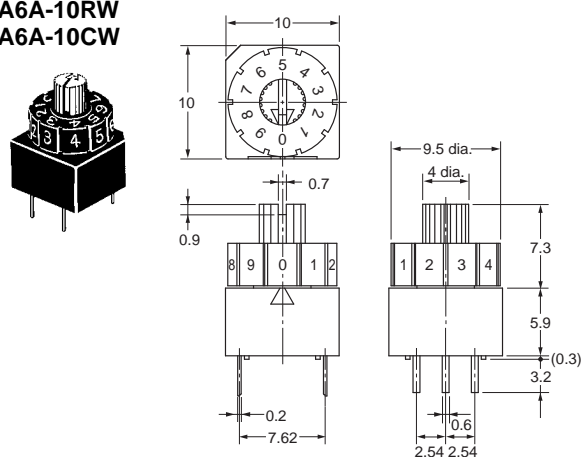
■ Extended Shaft Type, 16 Positions

A6A-16RS  
A6A-16CS



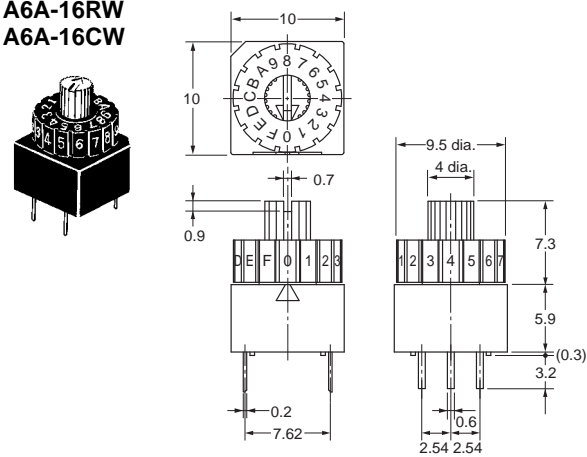
■ Thumbwheel Type, 10 Positions

A6A-10RW  
A6A-10CW

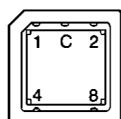


■ Thumbwheel Type, 16 Positions

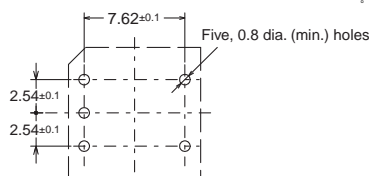
A6A-16RW  
A6A-16CW



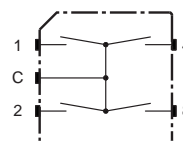
Terminal arrangement  
(bottom view)



Mounting holes  
(Top view)



Internal connections  
(top view)



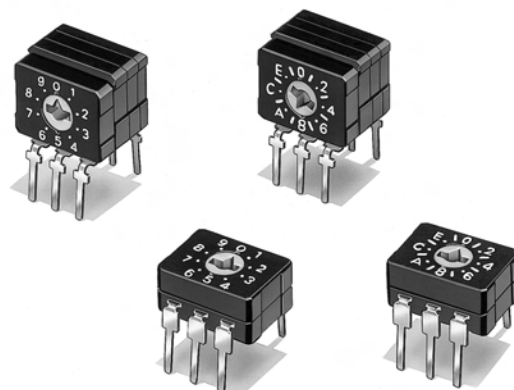
# MEMO

The image displays a 10x10 grid of 100 small squares. Each square contains a unique 4x4 arrangement of symbols. The symbols used are dots (.), horizontal lines (—), vertical lines (|), and crosses (x). The patterns within each square are complex and varied, with some squares featuring more symbols than others. The overall effect is a dense, textured field of geometric shapes.

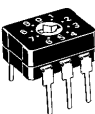
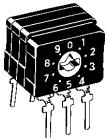
# Sealed Rotary DIP Switch A6C/A6CV

## Highly Reliable Subminiature DIP Switch

- A precise rotary cam and contact driving mechanism achieve compactness for high-precision mounting.
- Top-actuated and side-actuated models included in series.
- Insert-molded terminals and an O-ring sealed rotor combine to form a sealed construction equivalent to IP64 (IEC 60529) that prevents flux penetration and provides high contact reliability even in dusty locations and locations where water is used.
- Offset between terminal pins and side of case allows simple circuit inspection
- RoHS Compliant



## Ordering Information

		Part numbers	
		Top actuated	Side actuated
			
Output code	No. of positions		
BCD 1-2-4-8	10	A6C-10R(N)	A6CV-10R
BCD Hexadecimal 1-2-4-8	16	A6C-16R(N)	A6CV-16R

**Important Note:** Switches cannot be water-washed.

## Specifications

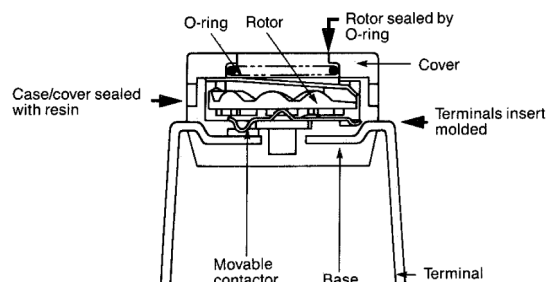
### ■ Characteristics

Switching capacity		100 mA at 30 VDC
Minimum Permissible load		10 $\mu$ A at 3.5 VDC min.
Contact resistance		200 M $\Omega$ max.
Insulation resistance		100 M $\Omega$ min. (at 250 VDC)
Dielectric strength		250 VAC for 1 minute between terminals
Operating torque		100 g-cm (0.98 x 10 <sup>-2</sup> N-m) max.
Vibration resistance	Malfunction durability	10 to 55 Hz, 1.5 mm double amplitude
Shock resistance	Malfunction durability	300 m/s <sup>2</sup> (30 G) min.
Ambient operating temperature		-20° to 70°C at 60% RH max. (with no icing or condensation)
Ambient operating humidity		35% to 95% RH (at 5 to 35°C)
Service life	Mechanical	10,000 detent operations min.
	Electrical	2,000 detent operations min.
Weight		Top-actuated: Approx. 0.4 g Side-actuated: Approx. 0.8 g

**Note:** Data shown are of initial value.

## Construction

The movable contactor is moved as the rotor rotates. The terminals are insert molded into the base. The rotor is secured by an O-ring and the case and the cover are made of plastic resin. Therefore, the internal mechanism is effectively sealed.



## Output Codes

### 10-position Models

Type	BCD 1-2-4-8			
	1	2	4	8
0				
1	●			
2		●		
3	●	●		
4			●	
5	●		●	
6		●	●	
7	●	●	●	
8				●
9	●			●

### 16-position Models

Type	BCD/hexadecimal 1-2-4-8			
	1	2	4	8
0				
1	●			
2		●		
3	●	●		
4			●	
5	●		●	
6		●	●	
7	●	●	●	
8				●
9	●			●
A		●		●
B	●	●		●
C			●	●
D	●		●	●
E		●	●	●
F	●	●	●	●

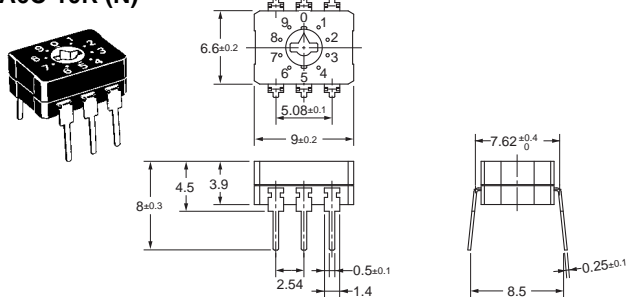
Note: "●" indicates that the internal switch is ON.

## Dimensions

- Note: 1. All units are in millimeters unless otherwise indicated.  
2. Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

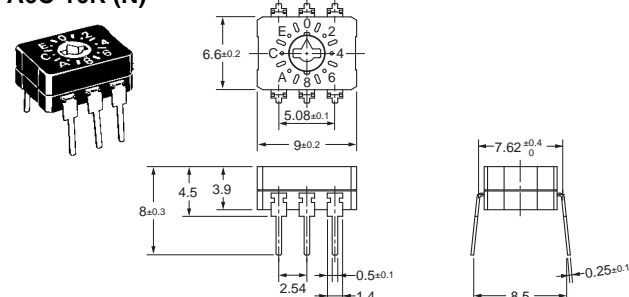
### Top Actuated, 10 Positions

#### A6C-10R (N)



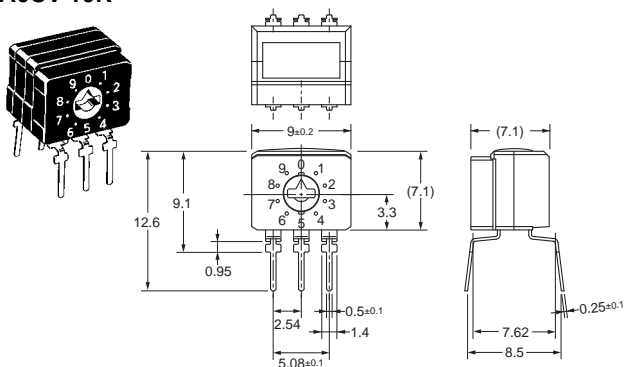
### Top Actuated, 16 Positions

#### A6C-16R (N)



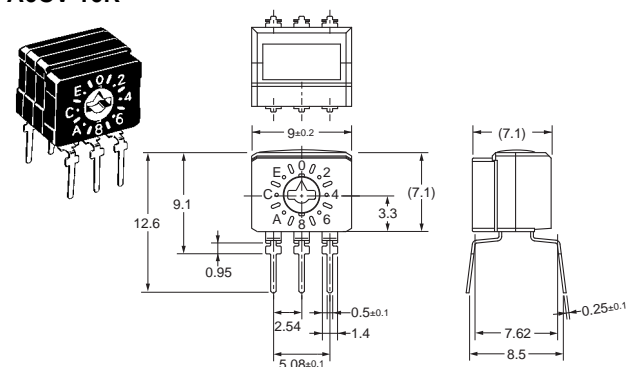
### Side Actuated, 10 Positions

#### A6CV-10R

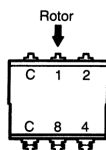


### Side Actuated, 16 Positions

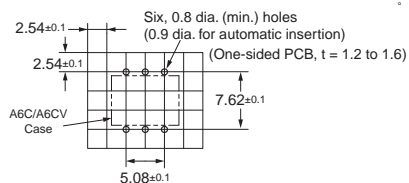
#### A6CV-16R



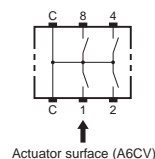
Terminal arrangement  
(bottom view)



Mounting holes  
(Top view)



Internal connections  
(top view)

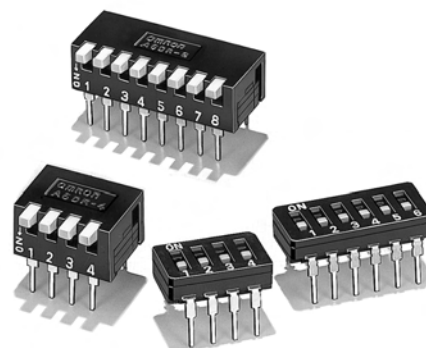


# DIP Switch

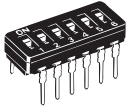
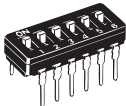
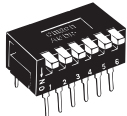
## A6D/A6DR

### Space-saving, Subminiature DIP Switch Offers Both Sealed and Unsealed Construction

- Sealed construction equivalent to IP64 (IEC 60529) prevents flux penetration and provides high contact reliability even in dusty locations and locations where water is used.
- Smooth, sure switching action enables comfortable operation. Designed to standards of DIL-IC; top actuated types are auto insertable
- Gold-plated twin contacts and a slide-type, self-cleaning mechanism ensure high reliability.
- RoHS Compliant



## Ordering Information

Type		Part numbers					
		Top actuated		Raised actuator		Side actuated	
							
	No. of poles		Quantity per tube		Quantity per tube		Quantity per box
Sealed	2	A6D-2100	73	A6D-2103	73	A6DR-2100	100
	4	A6D-4100	43	A6D-4103	43	A6DR-4100	50
	6	A6D-6100	30	A6D-6103	30	A6DR-6100	
	8	A6D-8100	23	A6D-8103	23	A6DR-8100	
	10	A6D-0100	19	A6D-0103	19	A6DR-0100	

**Important Note:** Switches cannot be water-washed.

## Specifications

### ■ Characteristics

Switching capacity		30 mA at 30 VDC
Minimum permissible load		10 $\mu$ A at 3.5 VDC min.
Contact resistance		100 M $\Omega$ max.
Insulation resistance		10 M $\Omega$ min. (at 250 VDC)
Dielectric strength		500 VAC for 1 minute between terminals
Operating force		30 to 500 gf (0.3 to 4.9 N)
Vibration resistance	Malfunction durability	10 to 55 Hz, 1.5 mm double amplitude
Shock resistance	Malfunction durability	300 m/s <sup>2</sup> (30 G) min.
Ambient operating temperature		-20° to 70°C at 60% RH max. (with no icing or condensation)
Ambient operating humidity		35% to 95% RH (at 5 to 35°C)
Service life	Mechanical	5,000 operations min.
	Electrical	2,000 operations min.
Weight		Flat and raised actuators: 0.28g (2 poles), 0.45 g (4 poles), 0.65 g (6 poles), 0.80 g (8 poles), 1.0 g (10 poles) Side actuated: 0.53g (2 poles), 0.8 g (4 poles), 1.2 g (6 poles), 1.7 g (8 poles), 2.2 g (10 poles)

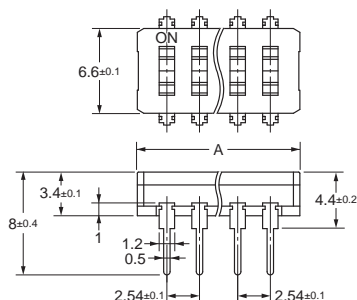
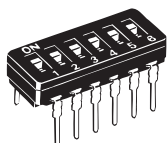
**Note:** Data shown are of initial value.

# Dimensions

**Note:** 1. All units are in millimeters unless otherwise indicated.  
2. Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

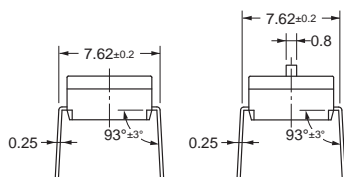
## ■ Flat Actuator

A6D-□100



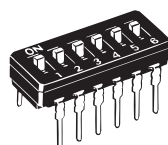
Flat Actuator

Raised Actuator



## ■ Raised Actuator

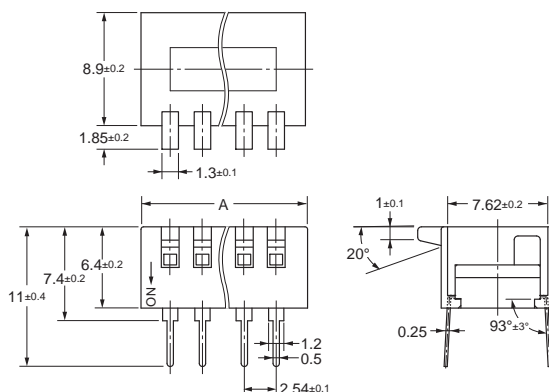
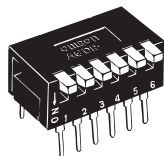
A6D-□103



No. of poles	Model		Dimension A $\pm 0.2$
	Flat Actuator	Raised Actuator	
2	A6D-2100	A6D-2103	7.1
4	A6D-4100	A6D-4103	12.2
6	A6D-6100	A6D-6103	17.3
8	A6D-8100	A6D-8103	22.4
10	A6D-0100	A6D-0103	27.4

## ■ Piano type

A6DR-□100

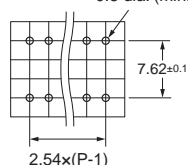


No. of poles	Model	Dimension A $\pm 0.2$
2	A6DR-2100	7.1
4	A6DR-4100	12.2
6	A6DR-6100	17.3
8	A6DR-8100	22.4
10	A6DR-0100	27.4

## Mounting Holes (Top View)

(Single-sided PCB,  $t=1.2$  to  $1.6$ )

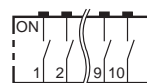
0.8 dia. (min.) holes \*



P: Pole numbers

\* 0.9 dia. for automatic insertion.

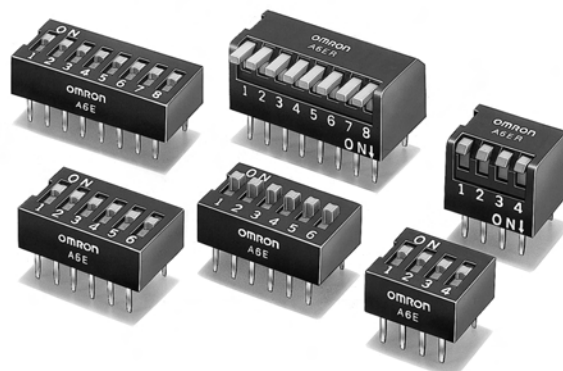
## Internal connections (Top View)



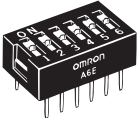
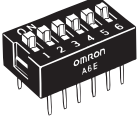
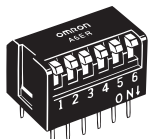
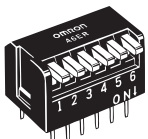
# DIP Switch A6E/A6ER

## Box-shaped DIP Switch with Through hole Terminals

- The bottom is sealed with resin to prevent flux penetration.
- Side actuated models feature short or long actuators (levers).
- Gold-plated contacts ensure high reliability.
- RoHS Compliant



## Ordering Information

No. of poles	Quantity per Tube	Flat actuated	Raised actuator	Quantity per Tube	Side actuated (short-lever)	Side actuated (long-lever)
						
2	73	A6E-2101	A6E-2104	70	A6ER-2101	A6ER-2104
3	52	A6E-3101	A6E-3104	50	A6ER-3101	A6ER-3104
4	40	A6E-4101	A6E-4104	39	A6ER-4101	A6ER-4104
5	33	A6E-5101	A6E-5104	32	A6ER-5101	A6ER-5104
6	28	A6E-6101	A6E-6104	27	A6ER-6101	A6ER-6104
7	24	A6E-7101	A6E-7104	24	A6ER-7101	A6ER-7104
8	21	A6E-8101	A6E-8104	21	A6ER-8101	A6ER-8104
9	19	A6E-9101	A6E-9104	19	A6ER-9101	A6ER-9104
10	17	A6E-0101	A6E-0104	17	A6ER-0101	A6ER-0104

**Important Note:** Switches cannot be water-washed.

## Specifications

### ■ Characteristics

Switching capacity		25 mA at 24 VDC
Minimum permissible load		10 $\mu$ A at 3.5 VDC
Contact resistance		200 m $\Omega$ max.
Insulation resistance		100 M $\Omega$ min. (at 250 VDC)
Dielectric strength		500 VAC for 1 min between terminals
Operating force		30 to 1,000 gf (0.3 to 9.8 N)
Vibration resistance	Malfunction durability	10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Malfunction durability	300 m/s <sup>2</sup> min. (approx. 30G min.)
Life expectancy	Mechanical	1,000 operations min.
	Electrical	1,000 operations min.
Ambient operating temperature		-20°C to 70°C at 60% RH max. (with no icing or condensation)
Ambient operating humidity		35% to 95% (at 5 to 35°C)
Weight		A6E: 0.66 g (2 poles), 1.00 g (4 poles), 1.32 g (6 poles), 1.65 g (8 poles), 1.98 g (10 poles) A6ER: 1.01 g (2 poles), 1.51 g (4 poles), 2.00 g (6 poles), 2.51 g (8 poles), 3.02 g (10 poles)

**Note:** Data shown are of initial value.

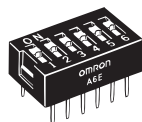


# Dimensions

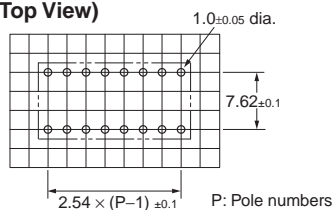
- Note:** 1. All units are in millimeters unless otherwise indicated.  
2. Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## Flat Actuator

A6E-□101



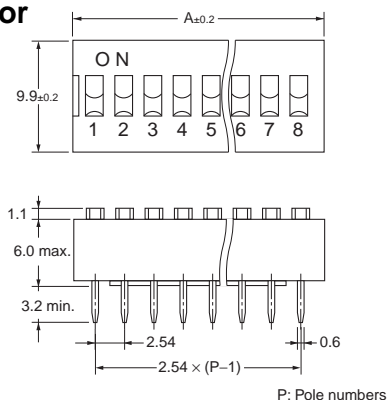
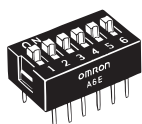
PCB Dimensions  
(Top View)



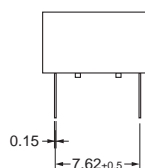
No. of poles	Model		Dimension A
	Flat Actuator	Raised Actuator	
2	A6E-2101	A6E-2104	6.64
3	A6E-3101	A6E-3104	9.18
4	A6E-4101	A6E-4104	11.72
5	A6E-5101	A6E-5104	14.26
6	A6E-6101	A6E-6104	16.80
7	A6E-7101	A6E-7104	19.34
8	A6E-8101	A6E-8104	21.88
9	A6E-9101	A6E-9104	24.42
10	A6E-0101	A6E-0104	26.96

## Raised Actuator

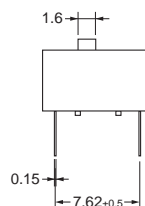
A6E-□104



Flat Actuator

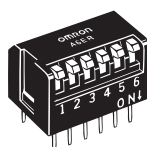


Raised Actuator

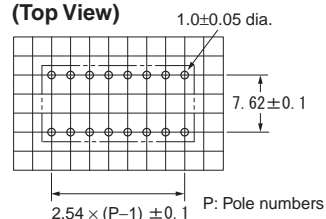


## Side Actuated (short-lever)

A6ER-□102



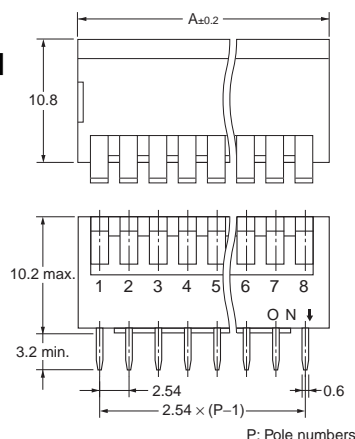
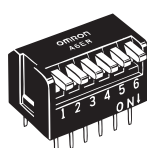
PCB Dimensions  
(Top View)



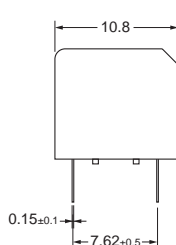
No. of poles	Model		Dimension A
	Side actuated (short-lever)	Side actuated (long-lever)	
2	A6ER-2101	A6ER-2104	6.64
3	A6ER-3101	A6ER-3104	9.18
4	A6ER-4101	A6ER-4104	11.72
5	A6ER-5101	A6ER-5104	14.26
6	A6ER-6101	A6ER-6104	16.80
7	A6ER-7101	A6ER-7104	19.34
8	A6ER-8101	A6ER-8104	21.88
9	A6ER-9101	A6ER-9104	24.42
10	A6ER-0101	A6ER-0104	26.96

## Side Actuated (long-lever)

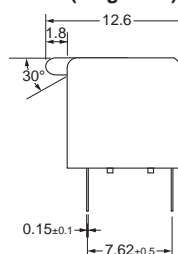
A6ER-□104



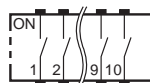
Side Actuator (short-lever)



Side Actuator (long-lever)



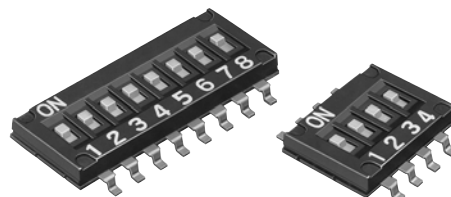
Internal connections  
(top view)



# Half-pitch DIP Switch A6H

## Ultra-low Profile, Half-pitch, Surface-mounting DIP Switch

- Very low profile of 1.55 mm
- Half-pitch (1.27-mm) design allows greater compactness and reduces mounting space by 63%. (compared with conventional models)
- Washable, seal tape models available
- Embossed taping models available
- RoHS Compliant



## Ordering Information

Number of poles	Part numbers							
	Standard models				Models with seal tape			
	Tube packaging		Embossed taping packaging		Tube packaging		Embossed taping packaging	
	Quantity per tube		Quantity per reel		Quantity per tube		Quantity per reel	
2	A6H-2101	125	A6H-2101-P	4,000	A6H-2102	125	A6H-2102-P	4,000
4	A6H-4101	75	A6H-4101-P		A6H-4102	75	A6H-4102-P	
6	A6H-6101	54	A6H-6101-P		A6H-6102	54	A6H-6102-P	
8	A6H-8101	40	A6H-8101-P		A6H-8102	40	A6H-8102-P	
10	A6H-0101	33	A6H-0101-P		A6H-0102	33	A6H-0102-P	

**Note:** 1. Small reels of 500 pieces are also available. Order "-PM" version instead of "-P".  
2. Switches cannot be water washed.

## Specifications

### ■ Characteristics

Switching capacity		25 mA at 24 VDC
Minimum permissible load		10 $\mu$ A at 3.5 VDC
Contact resistance		200 m $\Omega$ max.
Insulation resistance		100 M $\Omega$ min. (at 100 VDC)
Dielectric strength		300 VAC for 1 min between terminals
Operating force		30 to 500 gf ( 0.3 to 4.9 N)
Vibration resistance	Malfunction durability	10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Malfunction durability	300 m/s <sup>2</sup> min.
Service life	Mechanical	1,000 operations min.
	Electrical	1,000 operations min.
Ambient operating temperature		-20 to 70°C at 60% RH max. (with no icing or condensation)
Ambient operating humidity		35% to 95% (at 5 to 35°C)
Weight		0.06 g (2 poles), 0.09 g (4 poles), 0.12 g (6 poles), 0.15 g (8 poles), 0.18 g (10 poles)

**Note:** Data shown are of initial value.

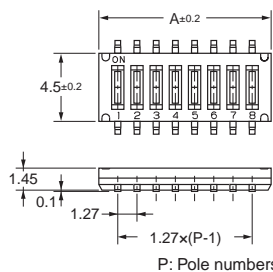
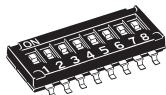
# Dimensions

**Note:** 1. All units are in millimeters unless otherwise indicated.  
2. Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## ■ Standard

A6H-□101

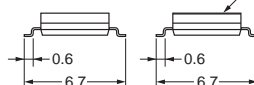
A6H-□101-P



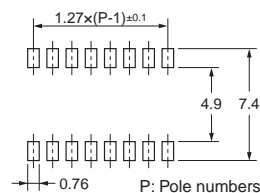
Standard

With seal tape

Seal tape (t=0.05)



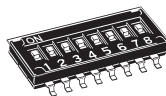
## Dimensions of PCB Pad (Top View)



## ■ With Seal Tape

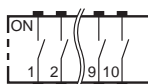
A6H-□102

A6H-□102-P



No. of poles	Model		Dimension A
	Standard	With seal tape	
2	A6H-2101	A6H-2102	3.77
4	A6H-4101	A6H-4102	6.31
6	A6H-6101	A6H-6102	8.85
8	A6H-8101	A6H-8102	11.39
10	A6H-0101	A6H-0102	13.93

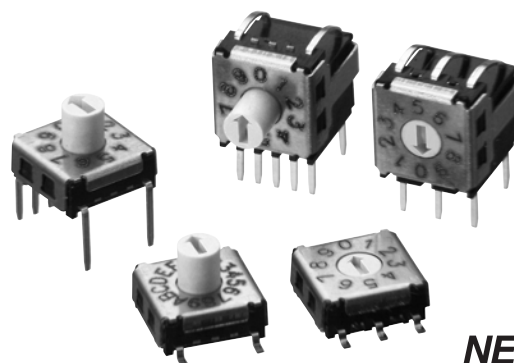
## Internal connections (top view)



# Miniature Rotary DIP Switch A6K/A6KS

## Miniature (7.2 × 7.2mm size) Rotary DIP Switch

- Mounting space reduced by 50%.  
(compared with conventional models)
- SMT and through hole type Available.  
Side-actuated type available.
- Gold-plated contacts ensure high reliability.
- RoHS Compliant



## Ordering Information

### ■ Through hole type

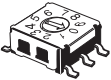
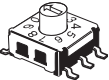
3 × 3 Terminal, tube packaging			Top-actuated flat	Top-actuated extended shaft	Side-actuated flat	Side-actuated extended shaft
Output code	No. of positions	Quantity per tube				
BCD 1-2-4-8	10	Top: 63 Side: 60	A6K-102RF	A6K-102RS	A6KV-102RF	A6KV-102RS
BCD Hexadecimal 1-2-4-8	16		A6K-162RF	A6K-162RS	A6KV-162RF	A6KV-162RS

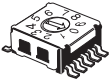
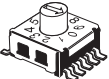


5 × 2 Terminal, tube packaging			Top-actuated flat	Top-actuated extended shaft	Side-actuated flat	Side-actuated extended shaft
Output code	No. of positions	Quantity per tube				
BCD 1-2-4-8	10	Top: 63 Side: 60	A6K-104RF	A6K-104RS	A6KV-104RF	A6KV-104RS
BCD Hexadecimal 1-2-4-8	16		A6K-164RF	A6K-164RS	A6KV-164RF	A6KV-164RS

### ■ SMT type

3 × 3 Terminal, tube packaging			Top-actuated flat	Top-actuated extended shaft
Output code	No. of positions	Quantity per tube		
BCD 1-2-4-8	10	63	A6KS-102RF	A6KS-102RS
BCD Hexadecimal 1-2-4-8	16		A6KS-162RF	A6KS-162RS

5 × 2 Terminal, tube packaging			Top-actuated flat	Top-actuated extended shaft	Side-actuated flat	Side-actuated extended shaft
Output code	No. of positions	Quantity per tube				
BCD 1-2-4-8	10	63	A6KS-104RF	A6KS-104RS	A6KSV-104RF	A6KSV-104RS
BCD Hexadecimal 1-2-4-8	16		A6KS-164RF	A6KS-164RS	A6KSV-164RF	A6KSV-164RS

3 × 3 Terminal Embossed taping Packages		Top-actuated flat		Top-actuated extended shaft	
Output code	No. of positions	Quantity per reel		Quantity per reel	
BCD 1-2-4-8	10	1450	A6KS-102RF-P	850	A6KS-102RS-P
BCD Hexadecimal 1-2-4-8	16		A6KS-162RF-P		A6KS-162RS-P

5 × 2 Terminal Embossed taping Packages		Top-actuated flat		Top-actuated extended shaft		Side-actuated flat		Side-actuated extended shaft	
Output code	No. of positions	Quantity per reel		Quantity per reel		Quantity per reel		Quantity per reel	
BCD 1-2-4-8	10	1450	A6KS-104RF-P	850	A6KS-104RS-P	750	A6KSV-104RF-P	750	A6KSV-104RS-P
BCD Hexadecimal 1-2-4-8	16		A6KS-164RF-P		A6KS-164RS-P		A6KSV-164RF-P		A6KSV-164RS-P

## Specifications

### ■ Characteristics

Switching capacity		25 mA at 24 VDC
Minimum permissible load		10 μA at 3.5 VDC
Contact resistance		200 mΩ max.
Insulation resistance		100 MΩ min. (at 250 VDC)
Dielectric strength		250 VAC for 1 min between terminals
Operating torque		200 g·cm max. (1.96 × 10 <sup>-2</sup> N·m max.)
Vibration resistance	Malfunction durability	10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Malfunction durability	300 m/s <sup>2</sup> min.
Ambient operating temperature		-30 to 80°C at 60% max. (with no icing or condensation)
Ambient operating humidity		35% to 95% (at 5 to 35°C)
Electrical service life		20,000 steps min.
Weight (See note 2.)	Through hole terminal	Top-actuated, flat: Approx. 0.4 g, Side-actuated, flat: Approx. 0.7 g
	SMT terminal	Top-actuated, flat: Approx. 0.4 g, Side-actuated, flat: Approx. 0.4 g

Note: 1. Data shown are of initial value.  
2. Add 0.03 g for the extended-shaft version of each model.

### ■ Output Codes

10-position Models

Type	BCD 1-2-4-8			
	1	2	4	8
0				
1	●			
2		●		
3	●	●		
4			●	
5	●		●	
6		●	●	
7	●	●	●	
8				●
9	●			●

16-position Models

Type	BCD/hexadecimal 1-2-4-8			
	1	2	4	8
0				
1	●			
2		●		
3	●	●		
4			●	
5	●		●	
6		●	●	
7	●	●	●	
8				●
9	●			●
A		●		●
B	●	●		●
C			●	●
D	●		●	●
E		●	●	●
F	●	●	●	●

Note: "●" indicates that the internal switch is ON.

# Dimensions

**Note:** 1. All units are in millimeters unless otherwise indicated.

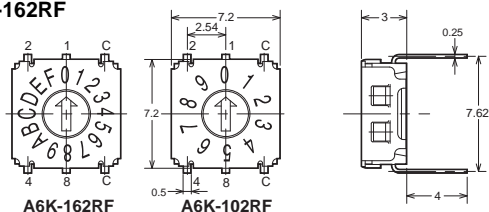
2. Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## Through hole type

### Top-actuated Flat Models with 3x3 Terminal Arrangement

A6K-102RF

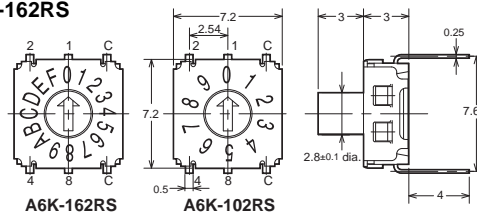
A6K-162RF



### Top-actuated Extended shaft Models with 3x3 Terminal Arrangement

A6K-102RS

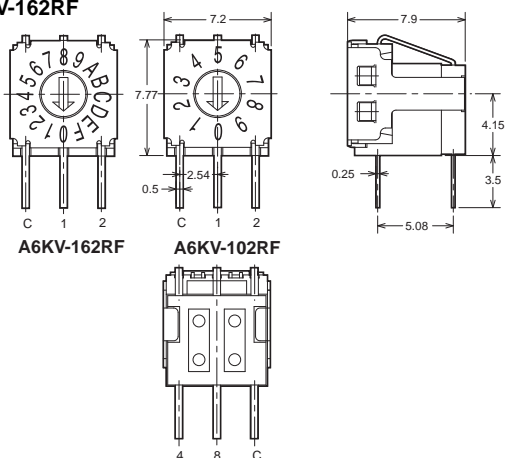
A6K-162RS



### Side-actuated Flat Models with 3x3 Terminal Arrangement

A6KV-102RF

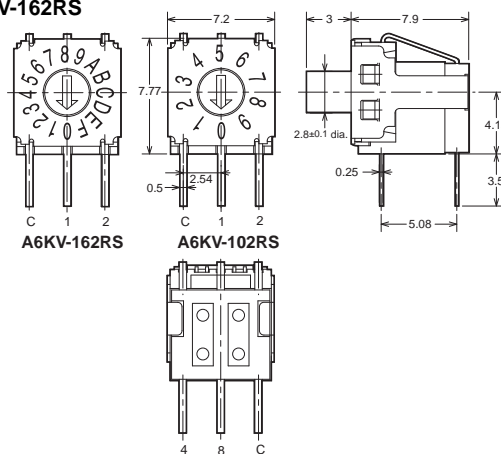
A6KV-162RF



### Side-actuated Extended-shaft Models with 3x3 Terminal Arrangement

A6KV-102RS

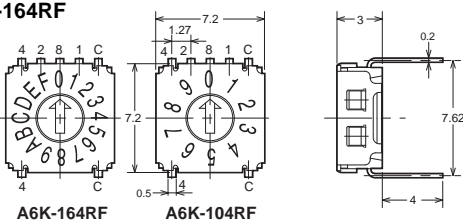
A6KV-162RS



### Top-actuated Flat Models with 5x2 Terminal Arrangement

A6K-104RF

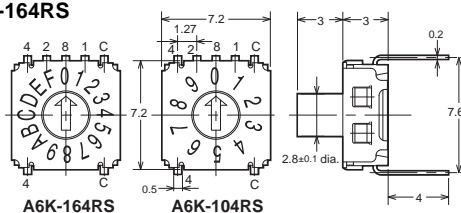
A6K-164RF



### Top-actuated Extended shaft Models with 5x2 Terminal Arrangement

A6K-104RS

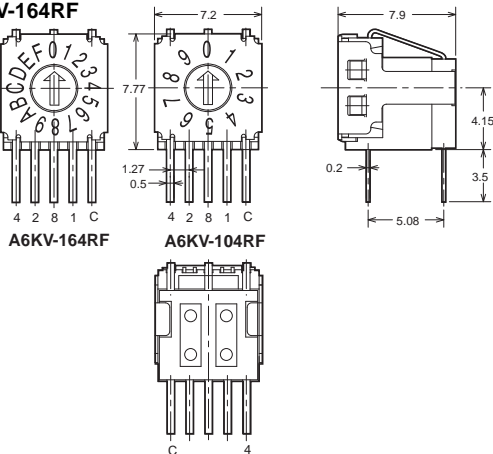
A6K-164RS



### Side-actuated Flat Models with 5x2 Terminal Arrangement

A6KV-104RF

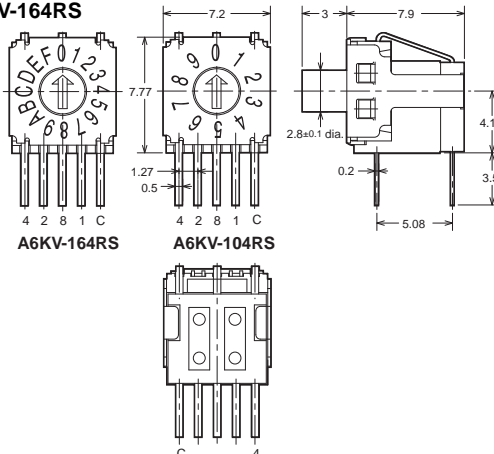
A6KV-164RF



### Side-actuated Extended-shaft Models with 5x2 Terminal Arrangement

A6KV-104RS

A6KV-164RS

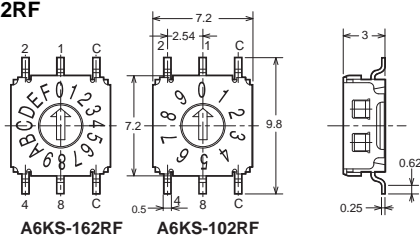


### ■ SMT type

### Top-actuated Flat Models with 3x3 Terminal Arrangement

**A6KS-102RF**

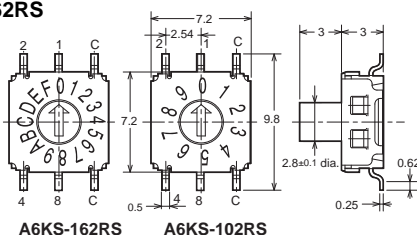
**A6KS-162RF**



### Top-actuated Extended shaft Models with 3x3 Terminal Arrangement

**A6KS-102RS**

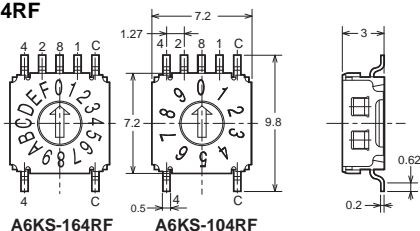
**A6KS-162RS**



### Top-actuated Flat Models With 5x2 Terminal Arrangement

**A6KS-104RF**

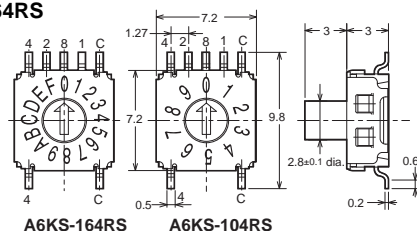
**A6KS-164RF**



### Top-actuated Extended shaft Models with 5x2 Terminal Arrangement

**A6KS-104RS**

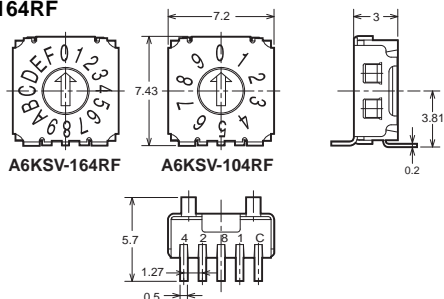
**A6KS-164RS**



### Side-actuated Flat Models with 5x2 Terminal Arrangement

**A6KSV-104RF**

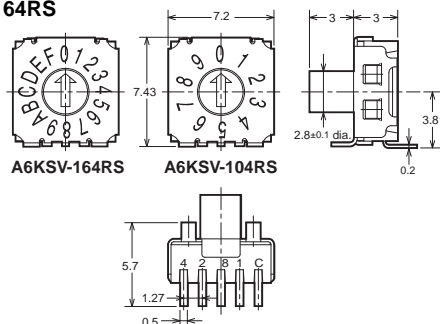
**A6KSV-164RF**



### Side-actuated Extended-shaft Models with 5x2 Terminal Arrangement

**A6KSV-104RS**

**A6KSV-164RS**



## Internal Connections

### Top-actuated

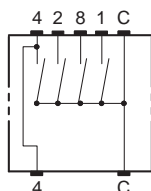
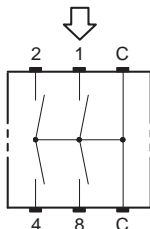
### 3x3 Terminal Arrangement

### 5x2 Terminal Arrangement

### Through hole type and SMT type

### Through hole type and SMT type

Actuator surface



**Note:** 3x3 internal diagram applies to both top and side actuated models

### Side-actuated

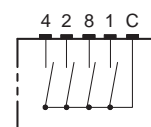
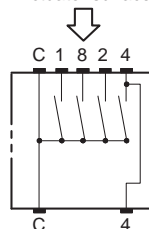
### 5x2 Terminal Arrangement

### 5x2 Terminal Arrangement

### Through hole type

**SMT type**

Actuator surface

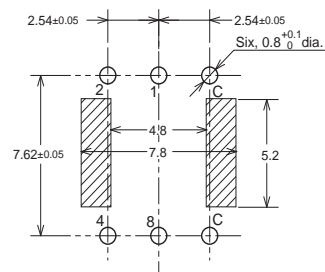


□  
Actuator surface

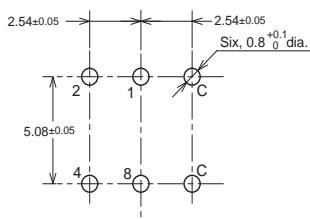
# ■ PCB Cutout Dimensions (Top View)

## 3×3 Terminal Arrangement

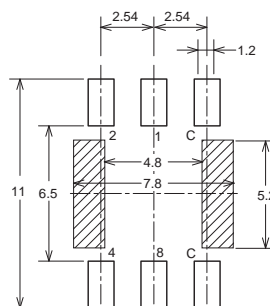
Through hole  
(Top-actuated Models)



Through hole  
(Side-actuated Models)

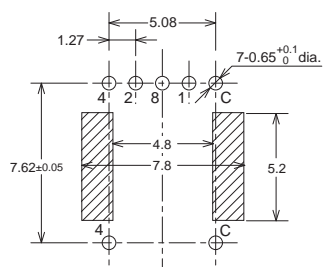


SMT  
(Top-actuated Models)

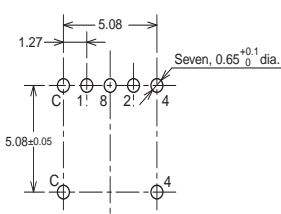


## 5×2 Terminal Arrangement

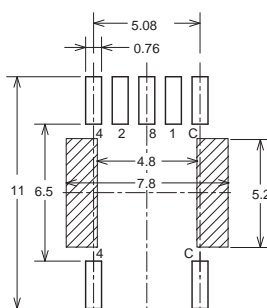
Through hole  
(Top-actuated Models)



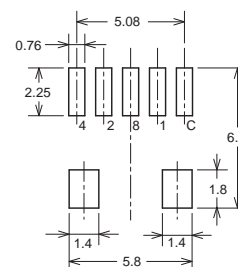
Through hole  
(Side-actuated Models)




SMT  
(Top-actuated Models)



SMT  
(Side-actuated Models)



 Through hole: Pattern prohibited area

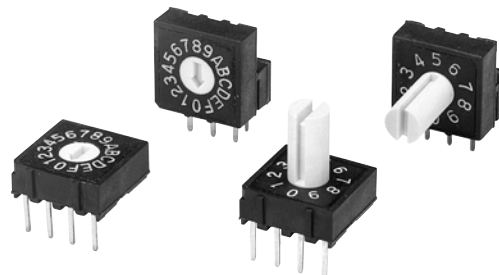




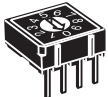
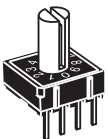
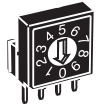

# Rotary DIP Switch A6R/A6RV

## Low-Cost Rotary DIP Switches

- Series includes top-actuated, side-actuated, flat, and extended-shaft models.
- The rotor has an O-ring sealed construction that prevents the ingress of dirt and dust.
- Two different types of terminal arrangements are available for each model to allow flexibility of circuit design.
- RoHS Compliant.



## Ordering Information

Output code	Number of positions	Terminal arrangement	Top-actuated flat	Top-actuated extended shaft	Side-actuated flat	Side-actuated extended shaft
						
BCD 1-2-4-8	10	4 × 1	A6R-101RF	A6R-101RS	A6RV-101RF	A6RV-101RS
		3 × 3	A6R-102RF	A6R-102RS	A6RV-102RF	A6RV-102RS
BCD Hexadecimal 1-2-4-8	16	4 × 1	A6R-161RF	A6R-161RS	A6RV-161RF	A6RV-161RS
		3 × 3	A6R-162RF	A6R-162RS	A6RV-162RF	A6RV-162RS

**Note:** Switches are delivered in units of 48 per tube. Order in multiples of 48.

## Specifications

### ■ Ratings/Characteristics

Switching Capacity	25 mA at 24 VDC	
Min. Permissible Load	10 $\mu$ A at 3.5 VDC	
Contact resistance	200 m $\Omega$ max.	
Insulation resistance	100 M $\Omega$ min. (at 250 VDC)	
Dielectric strength	250 VAC for 1 minute between terminals	
Operating torque	200 g-cm max. (1.96 x 10 <sup>-2</sup> N-m max.)	
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude	
Shock resistance	Malfunction: 300 m/s <sup>2</sup> (30G) min.	
Ambient operating temperature	-25 to 80°C at 60% RH max. (with no icing or condensation)	
Ambient operating humidity	35% to 95% (at 5 to 35°C)	
Electrical service life	5,000 steps min.	
Weight (See note 2)	Top-actuated:	Approx. 0.6 g
	Side-actuated:	Approx. 0.8 g

- Note:** 1. Data shown are of initial value.  
2. Add 0.13 g for the extended-shaft version of each model  
3. Switches cannot be water washed

### ■ Output Codes

#### 10-position Models

Type	BCD 1-2-4-8			
Terminal No. Position	1	2	4	8
0				
1	●			
2		●		
3	●	●		
4			●	
5	●		●	
6		●	●	
7	●	●	●	
8				●
9	●			●

**Note:** "●" indicates that the internal switch is ON.

#### 16-position Models

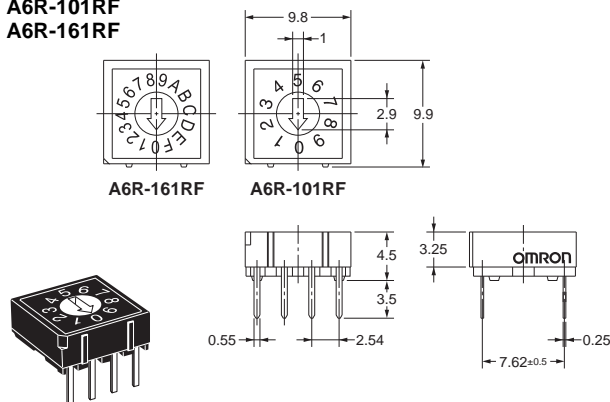
Type	BCD/hexadecimal 1-2-4-8			
Terminal No. Position	1	2	4	8
0				
1	●			
2		●		
3	●	●		
4			●	
5	●		●	
6		●	●	
7	●	●	●	
8				●
9	●			●
A		●		●
B	●	●		●
C			●	●
D	●		●	●
E		●	●	●
F	●	●	●	●

# Dimensions

**Note:** 1. All units are in millimeters unless otherwise indicated.  
2. Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

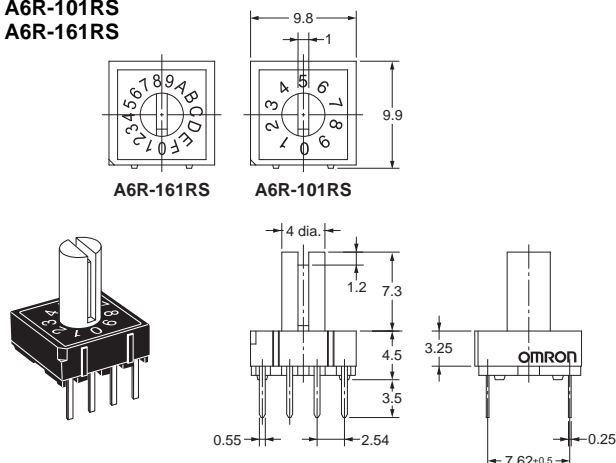
## Top-actuated Flat Models with 4x1 Terminal Arrangement

A6R-101RF  
A6R-161RF



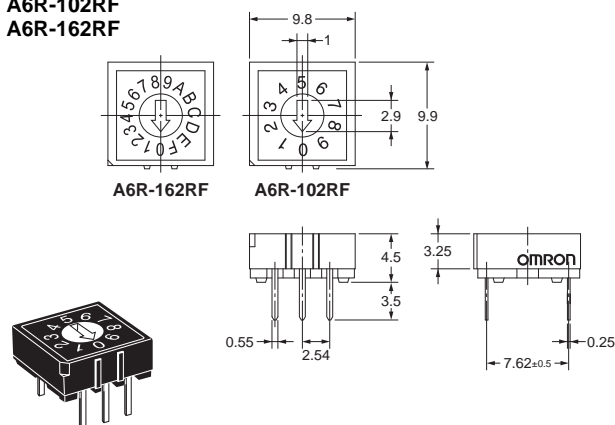
## Top-actuated Extended-shaft Models with 4x1 Terminal Arrangement

A6R-101RS  
A6R-161RS



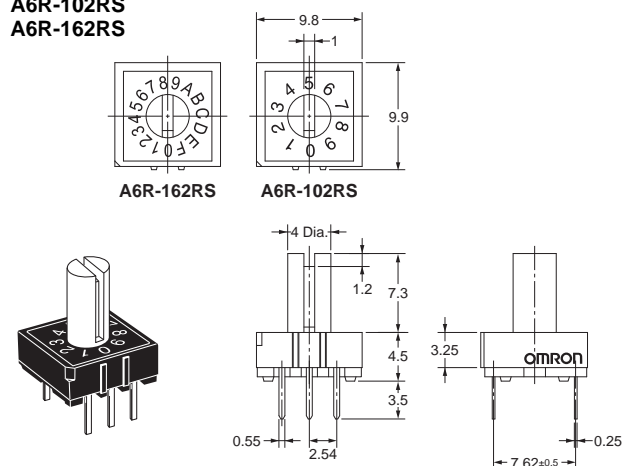
## Top-actuated Flat Models with 3x3 Terminal Arrangement

A6R-102RF  
A6R-162RF



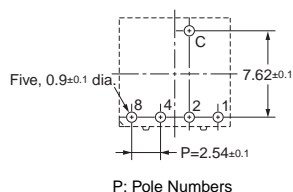
## Top-actuated Extended-shaft Models with 3x3 Terminal Arrangement

A6R-102RS  
A6R-162RS

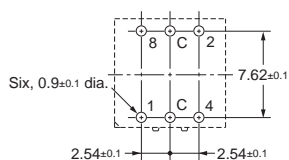


## Mounting holes Top-actuated models

### 4x1 Terminal

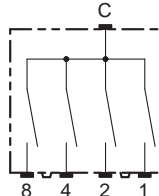


### 3x3 Terminal

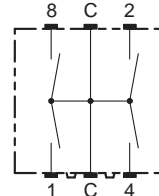


## Internal connections Top-actuated models

### 4x1 Terminal

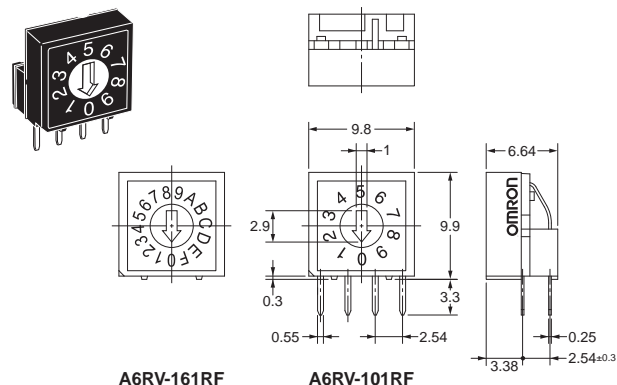


### 3x3 Terminal



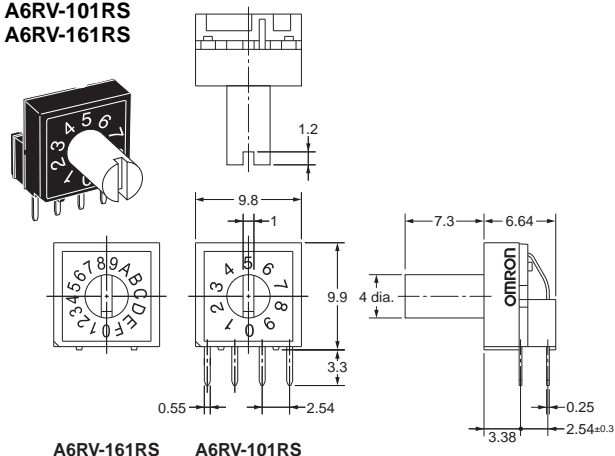
## Side-actuated Flat Models with 4x1 Terminal Arrangement

A6RV-101RF  
A6RV-161RF



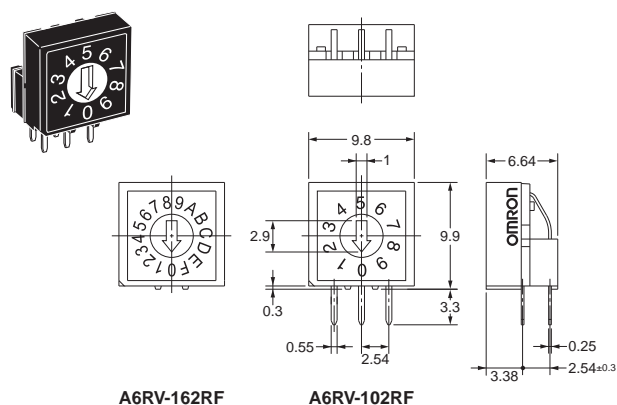
## Side-actuated Extended-shaft Models with 4x1 Terminal Arrangement

A6RV-101RS  
A6RV-161RS



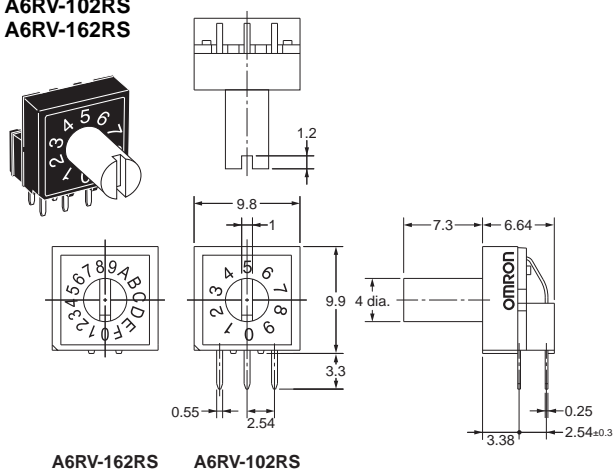
## Side-actuated Flat Models with 3x3 Terminal Arrangement

A6RV-102RF  
A6RV-162RF



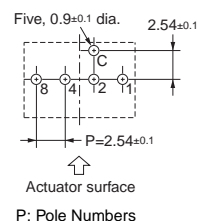
## Side-actuated Extended-shaft Models with 3x3 Terminal Arrangement

A6RV-102RS  
A6RV-162RS

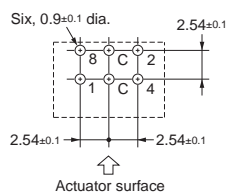


## Mounting holes Side-actuated models

### 4x1 Terminal

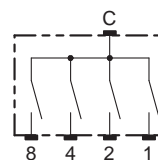


### 3x3 Terminal

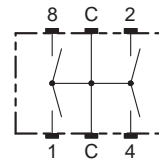


## Internal connections Side-actuated models

### 4x1 Terminal



### 3x3 Terminal

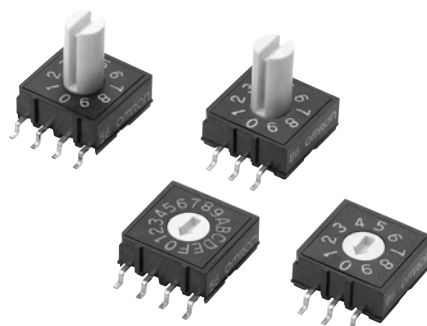


# MEMO



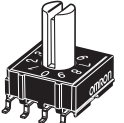
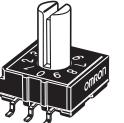
# Surface-mounting Rotary DIP A6RS

## Surface-mounting Rotary DIP Switches

- Temperature-resistant resin allows use in peak reflow temperatures of 260°C.
- Series includes flat and extended-shaft models.
- Two different types of terminal arrangement are available to allow flexibility in the circuit design.
- RoHS Compliant.



## Ordering Information

			Top-actuated, flat				Top-actuated, extended shaft			
			Tube packaging		Embossed tape packaging		Tube packaging		Embossed tape packaging	
				Quantity per tube		Quantity per reel		Quantity per tube		Quantity per reel
Output code	Number of positions	Terminal arrangement								
BCD 1-2-4-8	10	4 × 1	A6RS-101RF	48	A6RS-101RF-P	750	A6RS-101RS	48	A6RS-101RS-P	250
		3 × 3	A6RS-102RF		A6RS-102RS		A6RS-102RS-P			
BCD Hexadecimal 1-2-4-8	16	4 × 1	A6RS-161RF	48	A6RS-161RF-P	750	A6RS-161RS	48	A6RS-161RS-P	250
		3 × 3	A6RS-162RF		A6RS-162RS-P					

**Note:** Order in multiples of the quantities given for each package (tube: 48, embossed taping: 250 or 750).

## Specifications

### ■ Ratings/Characteristics

<b>Switching Capacity</b>	25 mA at 24 VDC
<b>Min. Permissible Load</b>	10 $\mu$ A at 3.5 VDC
<b>Contact resistance</b>	200 m $\Omega$ max.
<b>Insulation resistance</b>	100 M $\Omega$ min. (at 250 VDC)
<b>Dielectric strength</b>	250 VAC for 1 minute between terminals
<b>Operating torque</b>	200 g-cm max. (1.96 x 10 <sup>-2</sup> N-m max.)
<b>Vibration resistance</b>	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
<b>Shock resistance</b>	Malfunction: 300 m/s <sup>2</sup> (30G) min.
<b>Ambient operating temperature</b>	-25 to 80°C at 60% RH max. (with no icing or condensation)
<b>Ambient operating humidity</b>	35% to 95% (at 5 to 35°C)
<b>Electrical service life</b>	5,000 steps min.
<b>Weight (See note 2)</b>	Top-actuated: Approx. 0.6 g

- Note:**
1. Data shown are of initial value.
  2. Add 0.13 g for the extended-shaft version of each model
  3. Switches cannot be water washed

### ■ Output Codes

#### 10-position Models

Type Terminal No. Position	BCD 1-2-4-8			
	1	2	4	8
0				
1	●			
2		●		
3	●	●		
4			●	
5	●		●	
6		●	●	
7	●	●	●	
8				●
9	●			●

**Note:** "●" indicates that the internal switch is ON.

#### 16-position Models

Type Terminal No. Position	BCD/hexadecimal 1-2-4-8			
	1	2	4	8
0				
1	●			
2		●		
3	●	●		
4			●	
5	●		●	
6		●	●	
7	●	●	●	
8				●
9	●			●
A		●		●
B	●	●		●
C			●	●
D	●		●	●
E		●	●	●
F	●	●	●	●

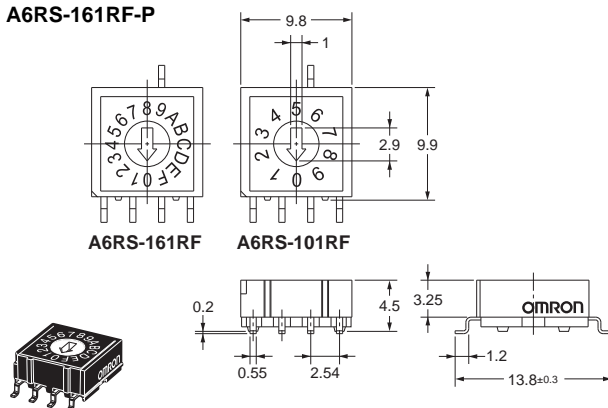
# Dimensions

**Note:** 1. All units are in millimeters unless otherwise indicated.

2. A tolerance of  $\pm 0.4$  mm applies to the above dimensions unless otherwise specified.

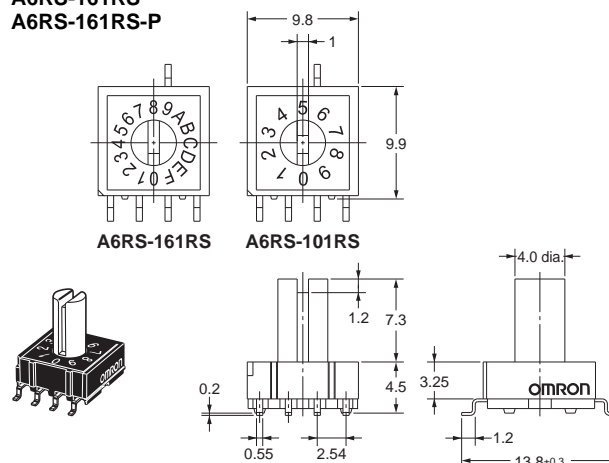
## Top-actuated Flat Models with 4x1 Terminal Arrangement

A6RS-101RF  
A6RS-101RF-P  
A6RS-161RF  
A6RS-161RF-P



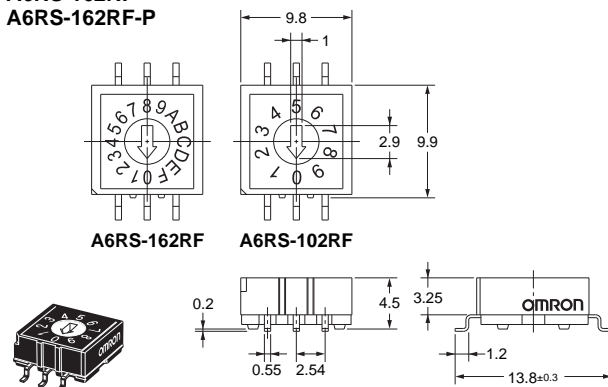
## Top-actuated Extended-shaft Models with 4x1 Terminal Arrangement

A6RS-101RS  
A6RS-101RS-P  
A6RS-161RS  
A6RS-161RS-P



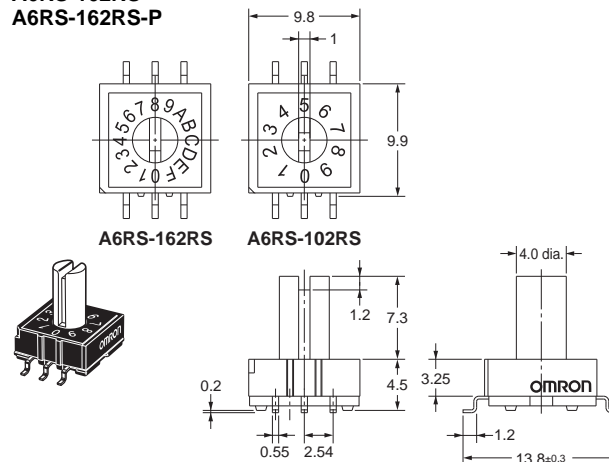
## Top-actuated Flat Models with 3x3 Terminal Arrangement

A6RS-102RF  
A6RS-102RF-P  
A6RS-162RF  
A6RS-162RF-P



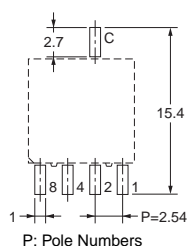
## Top-actuated Extended-shaft Models with 3x3 Terminal Arrangement

A6RS-102RS  
A6RS-102RS-P  
A6RS-162RS  
A6RS-162RS-P

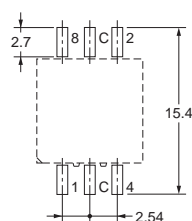


## Mounting pads (Top view)

### 4x1 Terminal

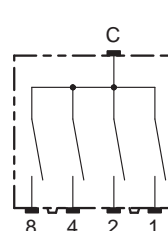


### 3x3 Terminal

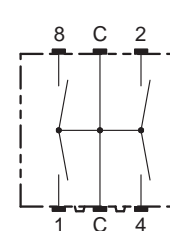


## Internal connections (Top view)

### 4x1 Terminal



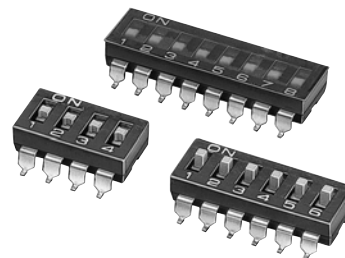
### 3x3 Terminal



# DIP Switch A6S-H

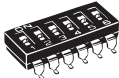
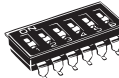
## A6S Model Upgraded to Surface-mounting Type with Increased Solder Heat Resistance

- Designed to enable replacement of previous (A6S) model, featuring the same dimensions and improved solder heat resistance (peak solder temperature: 260°C).
- Gold-plated twin contacts and a slide-type, self-cleaning mechanism ensure high reliability.
- Washable models with seal tape available.
- Embossed taping models available for automatic mounting. SQ reel (small reel) also available.
- RoHS Compliant.



## Ordering Information

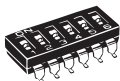
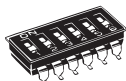
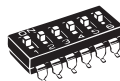
### ■ Models in Stick Packages

No. of poles	Quantity per tube	Flat		Raised
		Standard	With seal tape	
				
1	130	A6S-1101-H	A6S-1102-H	A6S-1104-H
2	76	A6S-2101-H	A6S-2102-H	A6S-2104-H
3	55	A6S-3101-H	A6S-3102-H	A6S-3104-H
4	42	A6S-4101-H	A6S-4102-H	A6S-4104-H
5	35	A6S-5101-H	A6S-5102-H	A6S-5104-H
6	28	A6S-6101-H	A6S-6102-H	A6S-6104-H
7	25	A6S-7101-H	A6S-7102-H	A6S-7104-H
8	22	A6S-8101-H	A6S-8102-H	A6S-8104-H
9	20	A6S-9101-H	A6S-9102-H	A6S-9104-H
10	10	A6S-0101-H	A6S-0102-H	A6S-0104-H

**Note:** 1) Orders must be made in integral multiples of the quantities given for each stick.  
2) Switches cannot be water washed.

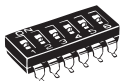
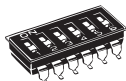
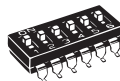


## ■ Models in Embossed Taping Packages (Standard Packing)

No. of poles	Flat				Raised	
	Standard		With seal tape			
		Quantity per reel		Quantity per reel		Quantity per reel
1	A6S-1101-PH	800	A6S-1102-PH	800	A6S-1104-PH	800
2	A6S-2101-PH	900	A6S-2102-PH	900	A6S-2104-PH	700
3	A6S-3101-PH		A6S-3102-PH		---	---
4	A6S-4101-PH		A6S-4102-PH		A6S-4104-PH	700
5	---		A6S-5102-PH		A6S-5104-PH	800
6	---		A6S-6102-PH		A6S-6104-PH	700
7	A6S-7101-PH		A6S-7102-PH		---	---
8	A6S-8101-PH		A6S-8102-PH		A6S-8104-PH	700
9	---		A6S-9102-PH		---	---
10	---		A6S-0102-PH		---	---

**Note:** 1) Orders must be made in integral multiples of the quantities given for each package. Switches are not sold individually.  
2) Switches cannot be water washed.

## ■ Models in Embossed Taping Packages (Small Quantity Reel)

No. of poles	Flat				Raised	
	Standard		With seal tape			
		Quantity per reel		Quantity per reel		Quantity per reel
2	---	400	A6S-2102-PMH	400	---	400
3	A6S-3101-PMH		---		---	
4	A6S-4101-PMH		A6S-4102-PMH		A6S-4104-PMH	
6	A6S-6101-PMH		A6S-6102-PMH		A6S-6104-PMH	
8	A6S-8101-PMH		A6S-8102-PMH		A6S-8104-PMH	
10	A6S-0101-PMH		A6S-0102-PMH		A6S-0104-PMH	

**Note:** 1) Orders must be made in integral multiples of the quantities given for each package. Switches are not sold individually.  
2) Switches cannot be water washed.

## Specifications

### ■ Ratings/Characteristics

Switching capacity		25 mA at 24 VDC
Minimum permissible load		10 $\mu$ A at 3.5 VDC
Contact resistance		200 m $\Omega$ max.
Insulation resistance		100 M $\Omega$ min. (at 250 VDC)
Dielectric strength		500 VAC for 1 min. between terminals
Operating force		30 to 1,000 gf (0.3 to 9.8 N)
Vibration resistance	Malfunction durability	10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Malfunction durability	300 m/s <sup>2</sup> min. (Approx. 30G min.)
Life expectancy	Mechanical	1,000 operations min.
	Electrical	1,000 operations min.
Ambient operating temperature		-20°C to 70°C at 60% R.H. max. (with no icing or condensation)
Ambient operating humidity		35% to 90% (at 5 to 35°C)
Weight		0.25 g (2 poles), 0.41 g (4 poles), 0.58 g (6 poles), 0.73 g (8 poles), 0.87 g (10 poles)

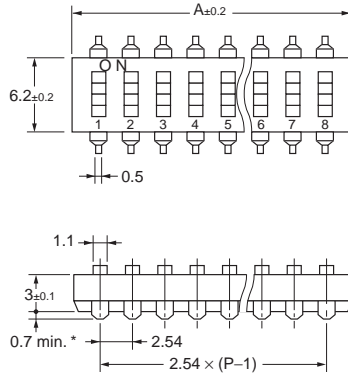
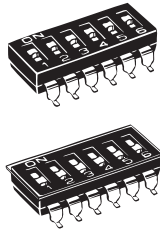
**Note:** Data shown are of initial value

# Dimensions

**Note:** 1. All units are in millimeters unless otherwise indicated.  
2. Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

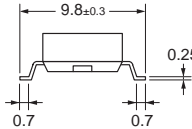
## Flat Actuator with SMT Terminal Standard/With Seal Tape

A6S-□101-H  
A6S-□102-H

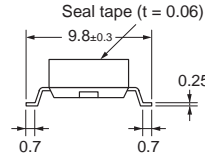


\* One terminal is 0 to 0.15 mm

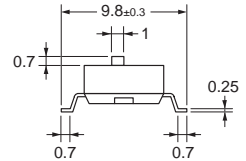
Flat Actuator  
Standard



Flat Actuator  
With Seal Tape

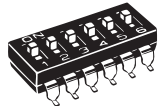


Raised Actuator



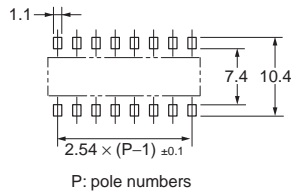
## Raised Actuator with SMT Terminal

A6S-□104-H

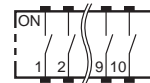


No. of poles	Model			Dimension A
	Flat Actuator		Raised Actuator	
	Standard	With Seal Tape		
1	A6S-1101-H	A6S-1102-H	A6S-1104-H	3.48
2	A6S-2101-H	A6S-2102-H	A6S-2104-H	6.02
3	A6S-3101-H	A6S-3102-H	A6S-3104-H	8.56
4	A6S-4101-H	A6S-4102-H	A6S-4104-H	11.10
5	A6S-5101-H	A6S-5102-H	A6S-5104-H	13.64
6	A6S-6101-H	A6S-6102-H	A6S-6104-H	16.18
7	A6S-7101-H	A6S-7102-H	A6S-7104-H	18.72
8	A6S-8101-H	A6S-8102-H	A6S-8104-H	21.26
9	A6S-9101-H	A6S-9102-H	A6S-9104-H	23.80
10	A6S-0101-H	A6S-0102-H	A6S-0104-H	26.34

Mounting pads  
(top view)



Internal connections  
(top view)



# MEMO

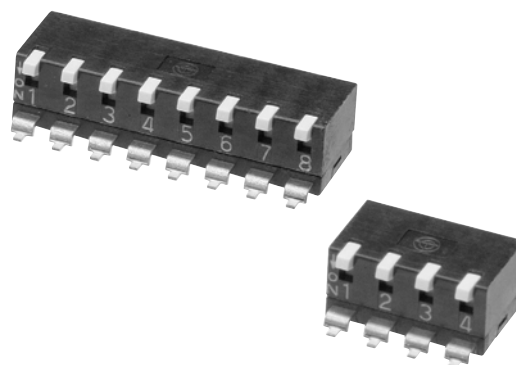
# DIP Switch (Piano Type) A6SR

## Low-profile Piano DIP Switches with a Standard Pitch of 2.54 mm for End-stackable Mounting.

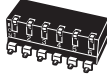

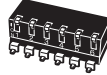

- Low-profile design with a height of only 5 mm and a 2.54-mm pitch.
- Models available with 2, 4, 6, 8, or 10 poles.
- Gold-plated twin contacts with slide-type self-cleaning mechanism for high reliability.
- RoHS Compliant

### Application

Mode setting of MPU  
Modem  
Controller of servo motor  
Coin changer  
Program controller



## Ordering Information

No. of poles	Quantity per tube	Tube packaging		Quantity per reel	Embossed taping packaging	
		Short lever	Long lever		Short lever	Long lever
						
2	95	A6SR-2101	A6SR-2104	700	A6SR-2101-P	A6SR-2104-P
4	47	A6SR-4101	A6SR-4104		A6SR-4101-P	A6SR-4104-P
6	31	A6SR-6101	A6SR-6104		A6SR-6101-P	A6SR-6104-P
8	23	A6SR-8101	A6SR-8104		A6SR-8101-P	A6SR-8104-P
10	18	A6SR-0101	A6SR-0104		A6SR-0101-P	A6SR-0104-P

**Note:** Order in multiples of the quantities given for each package.

## Specifications

### ■ Characteristics

<b>Switching capacity</b>		25 mA at 24 VDC
<b>Minimum permissible load</b>		10 $\mu$ A at 3.5 VDC
<b>Contact resistance</b>		200 m $\Omega$ max.
<b>Insulation resistance</b>		100 M $\Omega$ min. (at 250 VDC)
<b>Dielectric strength</b>		500 VAC for 1 min between terminals
<b>Operating force</b>		30.5 to 795 gf (0.3 to 7.8 N)
<b>Vibration resistance</b>	<b>Malfunction Durability</b>	10 to 55 Hz, 1.5-mm double amplitude
<b>Shock resistance</b>	<b>Malfunction Durability</b>	300 m/s <sup>2</sup> min. (approx. 30G min.)
<b>Service life</b>	<b>Electrical</b>	1,000 operations min.
<b>Ambient operating temperature</b>		-20 to 70°C at 60% RH max. (with no icing or condensation)
<b>Ambient operating humidity</b>		35% to 95% (at 5 to 35°C)
<b>Weight</b>		0.24 g (2 poles), 0.48 g (4 poles), 0.73 g (6 poles), 0.97 g (8 poles), 1.22 g (10 poles)

**Note:** Data shown are of initial value

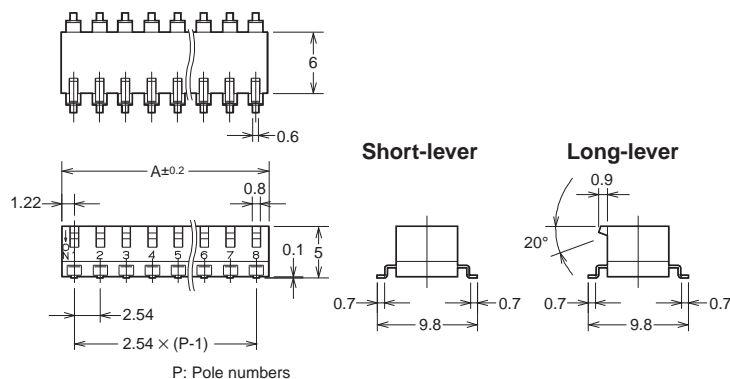
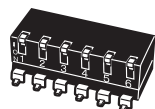
# Dimensions

**Note:** 1. All units are in millimeters unless otherwise indicated.  
2. Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## ■ SMT terminal Short lever / Long lever

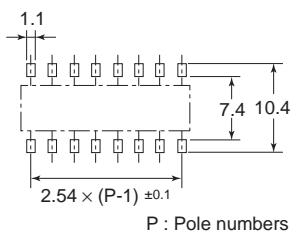
A6SR-□101

A6SR-□104

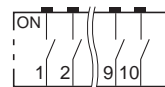


No. of poles	Model		Dimension A
	Short lever	Long lever	
2	A6SR-2101	A6SR-2104	4.98
4	A6SR-4101	A6SR-4104	10.06
6	A6SR-6101	A6SR-6104	15.14
8	A6SR-8101	A6SR-8104	20.22
10	A6SR-0101	A6SR-0104	25.30

## Mounting pads (top view)



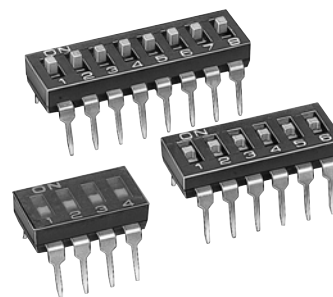
## Internal connections (top view)



# DIP Switch (Slide Type) A6T

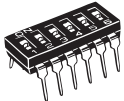
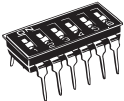
## DIP Switch with Through hole Terminals in a Wide Assortment of Pole Configurations

- Gold-plated twin contacts and a slide-type, self-cleaning mechanism ensure high reliability.
- Washable models with seal tape available.
- The wide product line extends from models with 1 to 10 poles to meet a wide range of needs.
- RoHS Compliant



## Ordering Information

### ■ Models in Stick Packages

No. of poles	Quantity per stick	Flat		Raised
		Standard	With seal tape	
				
1	130	A6T-1101	A6T-1102	A6T-1104
2	76	A6T-2101	A6T-2102	A6T-2104
3	55	A6T-3101	A6T-3102	A6T-3104
4	42	A6T-4101	A6T-4102	A6T-4104
5	35	A6T-5101	A6T-5102	A6T-5104
6	28	A6T-6101	A6T-6102	A6T-6104
7	25	A6T-7101	A6T-7102	A6T-7104
8	22	A6T-8101	A6T-8102	A6T-8104
9	20	A6T-9101	A6T-9102	A6T-9104
10	18	A6T-0101	A6T-0102	A6T-0104

**Note:** 1. Orders must be made in integral multiples of the quantities given for each stick.

2. Switches cannot be water washed.

## Specifications

### ■ Characteristics

<b>Switching capacity</b>		25 mA at 24 VDC
<b>Minimum permissible load</b>		10 $\mu$ A at 3.5 VDC
<b>Contact resistance</b>		200 m $\Omega$ max.
<b>Insulation resistance</b>		100 M $\Omega$ min. (at 250 VDC)
<b>Dielectric strength</b>		500 VAC for 1 min between terminals
<b>Operating force</b>		30 to 1,000 gf (0.3 to 9.8 N)
<b>Vibration resistance</b>	<b>Malfunction durability</b>	10 to 55 Hz, 1.5-mm double amplitude
<b>Shock resistance</b>	<b>Malfunction durability</b>	300 m/s <sup>2</sup> min. (approx. 30G min.)
<b>Ambient operating temperature</b>		-20°C to 70°C at 60% R.H. max. (with no icing or condensation)
<b>Ambient operating humidity</b>		35% to 90% (at 5 to 35°C)
<b>Life expectancy</b>	<b>Mechanical</b>	1,000 operations min.
	<b>Electrical</b>	1,000 operations min.
<b>Weight</b>		0.26 g (2 poles), 0.44 g (4 poles), 0.62 g (6 poles), 0.79 g (8 poles), 0.96 g (10 poles)

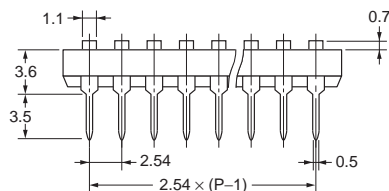
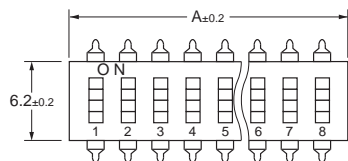
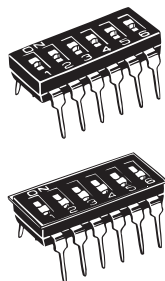
**Note:** Data shown are of initial value

# Dimensions

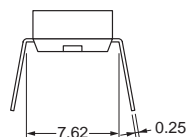
**Note:** 1. All units are in millimeters unless otherwise indicated.  
2. Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## ■ Flat Actuator with DIP Terminal Standard/With Seal Tape

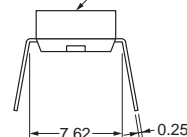
A6T-□101  
A6T-□102



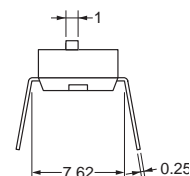
Flat Actuator  
Standard



Flat Actuator  
With Seal Tape  
Seal tape (t = 0.06)

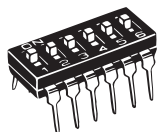


Raised Actuator



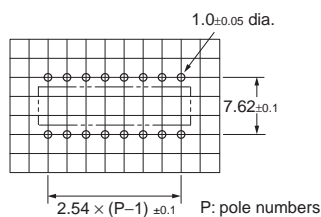
## ■ Raised Actuator with DIP Terminal

A6T-□104

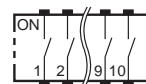


No. of poles	Model			Dimension A
	Flat Actuator		Raised Actuator	
	Standard	With Seal Tape		
1	A6T-1101	A6T-1102	A6T-1104	3.48
2	A6T-2101	A6T-2102	A6T-2104	6.02
3	A6T-3101	A6T-3102	A6T-3104	8.56
4	A6T-4101	A6T-4102	A6T-4104	11.10
5	A6T-5101	A6T-5102	A6T-5104	13.64
6	A6T-6101	A6T-6102	A6T-6104	16.18
7	A6T-7101	A6T-7102	A6T-7104	18.72
8	A6T-8101	A6T-8102	A6T-8104	21.26
9	A6T-9101	A6T-9102	A6T-9104	23.80
10	A6T-0101	A6T-0102	A6T-0104	26.34

Mounting holes  
(top view)



Internal connections  
(top view)



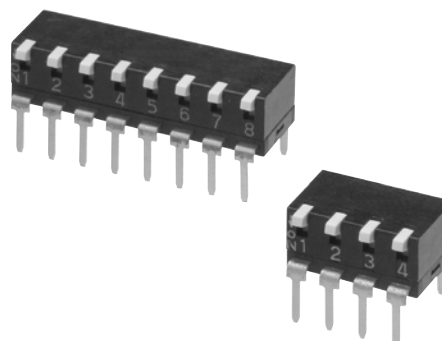
# DIP Switch (Piano Type) A6TR

## Low-profile Piano DIP Switches with a Standard Pitch of 2.54 mm for End-stackable Mounting.

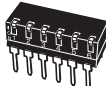
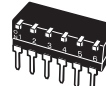
- Low-profile design with a height of only 5 mm and a 2.54-mm pitch.
- Models available with 2, 4, 6, 8, or 10 poles.
- Gold-plated twin contacts with slide-type self-cleaning mechanism for high reliability.
- RoHS Compliant

### Application

Mode setting of MPU  
Modem  
Controller of servo motor  
Coin changer  
Program controller



## Ordering Information

No. of poles	Quantity per tube	Tube packaging	
		Short lever	Long lever
			
2	95	A6TR-2101	A6TR-2104
4	47	A6TR-4101	A6TR-4104
6	31	A6TR-6101	A6TR-6104
8	23	A6TR-8101	A6TR-8104
10	18	A6TR-0101	A6TR-0104

**Note:** Order in multiples of the quantities given for each package.

## Specifications

### ■ Characteristics

Switching capacity		25 mA at 24 VDC
Minimum permissible load		10 $\mu$ A at 3.5 VDC
Contact resistance		200 m $\Omega$ max.
Insulation resistance		100 M $\Omega$ min. (at 250 VDC)
Dielectric strength		500 VAC for 1 min between terminals
Operating force		30.5 to 795 gf (0.3 to 7.8 N)
Vibration resistance	Malfunction Durability	10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Malfunction Durability	300 m/s <sup>2</sup> min. (approx. 30G min.)
Service life	Electrical	1,000 operations min.
Ambient operating temperature		-20 to 70°C at 60% RH max. (with no icing or condensation)
Ambient operating humidity		35% to 95% (at 5 to 35°C)
Weight		0.25 g (2 poles), 0.50 g (4 poles), 0.76 g (6 poles), 1.02 g (8 poles), 1.28 g (10 poles)

**Note:** Data shown are of initial value



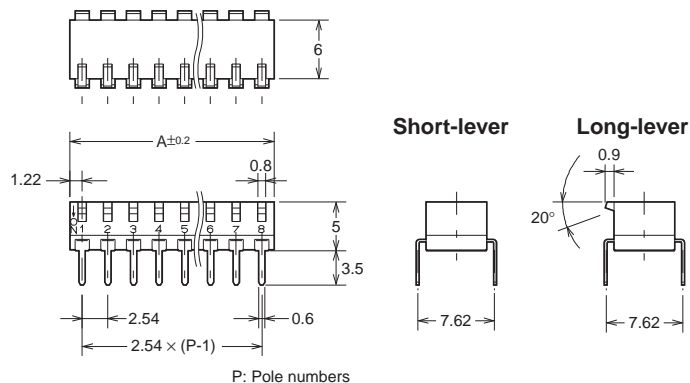
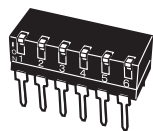
# Dimensions

**Note:** 1. All units are in millimeters unless otherwise indicated.  
2. Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## Through hole terminal Short lever / Long lever

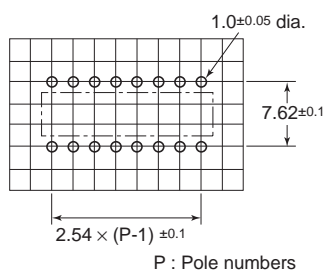
A6TR-□101

A6TR-□104

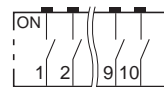


No. of poles	Model		Dimension A
	Short lever	Long lever	
2	A6TR-2101	A6TR-2104	4.98
4	A6TR-4101	A6TR-4104	10.06
6	A6TR-6101	A6TR-6104	15.14
8	A6TR-8101	A6TR-8104	20.22
10	A6TR-0101	A6TR-0104	25.30

### Mounting holes (top view)



### Internal connections (top view)



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# MEMO

A large grid of small, faint, repeating geometric patterns, likely a decorative background or a placeholder for a complex image. The patterns are arranged in a regular, repeating fashion across the entire page, creating a textured, grid-like appearance. The patterns themselves are small, intricate, and appear to be composed of various geometric shapes and lines, possibly representing a complex mathematical or architectural design. The overall effect is a dense, uniform field of these small, repeating motifs.

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Omron's commitment is to offer products that are environmentally warranted (warranted to be free from any banned substances) to customers all over the world. In accordance with this policy, Omron has taken action to completely eliminate all hazardous substances from its control devices as well. To-date, all relays fully comply with the Restriction of Hazardous Substances (RoHS) Directive for their lead and cadmium free construction. Omron strives to be an industry forerunner in regulating the use of chemical substances and working toward the goal of eliminating all hazardous substances in Omron products.

Omron considers addressing environmental issues to be its corporate responsibility and is working to reduce its negative impact on the environment by establishing an environmental action plan that designates six areas of core activities and clarifies the targets of those activities.

- Eco-Management
- Eco-Products
- Eco-Factories/Laboratories/Offices
- Eco-Logistics
- Eco-Communication
- Eco-Mind

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