

(mm)

Compliance with RoHS Directive

FEATURES

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

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

3. High contact reliability to support low level switching loads

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

4. Highly effective sealing for resistance against adverse environments

Immersion protection type

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

D2

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

IP67

- IEC529 (rating for outer shell protection)

5. Silent operation

With sliding contact construction there is no operation noise.

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

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

TYPICAL APPLICATIONS

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

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

ORDERING INFORMATION

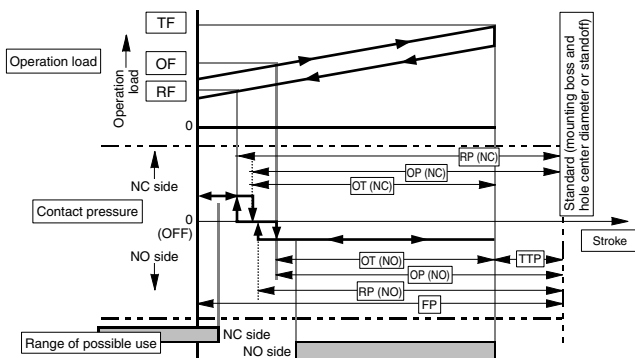
Ex. ASQ1

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

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

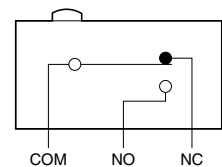
OPERATION CONCEPT DIAGRAM (reference)

Contact form: terminal type

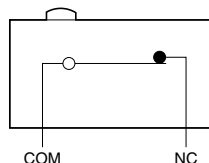


CONTACT ARRANGEMENT

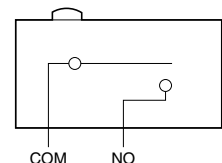
1. SPDT



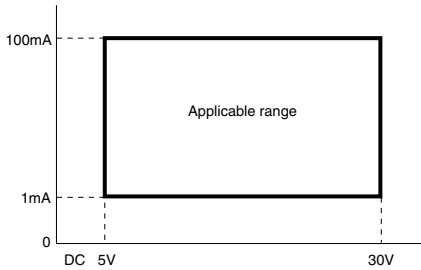
2. SPST-NC (Wire leads type only)



3. SPST-NO (Wire leads type only)



APPLICABLE CURRENT RANGE (reference)



PRODUCT TYPES

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

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

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

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

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

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

RATING

1. Rating

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

Note: Please consult us regarding 42 V DC rating.

2. Operation environment and conditions

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

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

3. Electrical characteristics

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

ASQ1

4. Characteristics

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

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

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

5. Protective structure

1) JIS C0920: Waterproof type

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

2) IEC 529: IP67 (waterproof type)

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

3) JIS D0203: Equivalent of D2

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

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

6. Operating characteristics

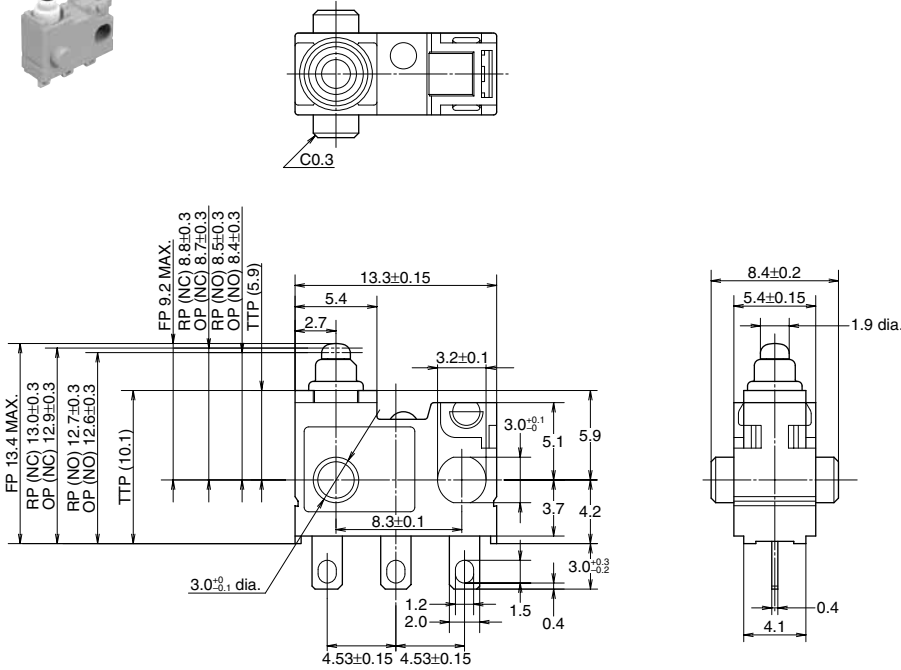
Actuator		Pin plunger	Leaf lever	Simulated leaf lever
Operating Force (max. O.F.) *Note 2		1.5N	1.7N	1.5N
Total travel Force (max. T.F.) (reference value)		(2.0N)	(3.1N)	(2.8N)
Free Position (max. F.P.)	From mounting boss and hole center line	9.2mm	11.5mm	14.4mm
	From standoff	13.4mm	15.7mm	18.6mm
Operating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

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

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

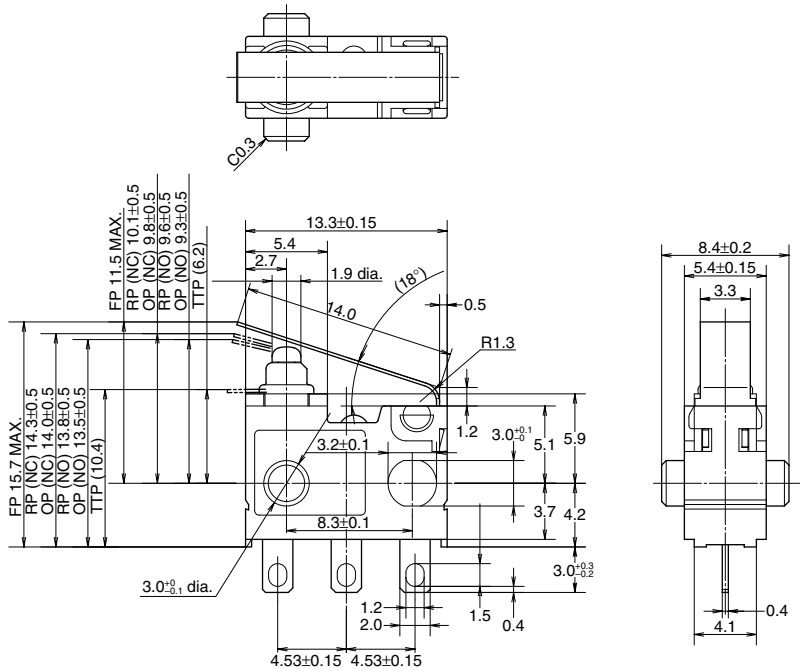
DIMENSIONS

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



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

Leaf lever



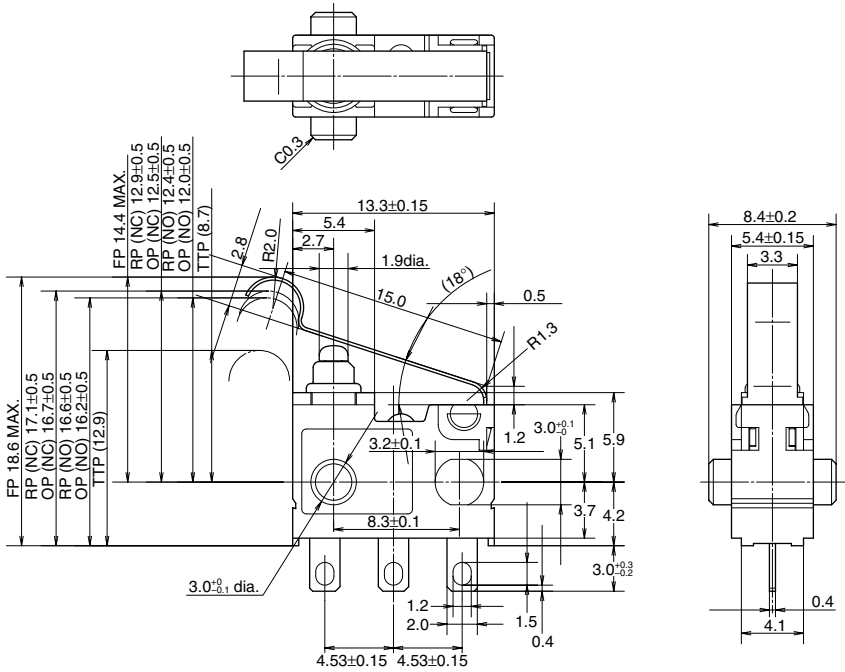
Operating Force (max. O.F.)		1.7N
Free Position (max. F.P.)	From mounting boss and hole center line	11.5mm
	From standoff	15.7mm
Operating Position on NC side O.P. (N.C.)	From mounting boss and hole center line	9.8±0.5mm
	From standoff	14.0±0.5mm
Operating Position on NO side O.P. (N.O.)	From mounting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

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

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Simulated leaf lever

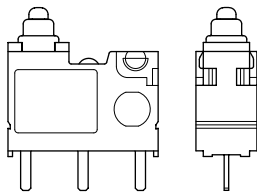
mm General tolerance: ± 0.25



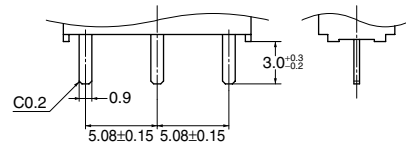
Operating Force (max. O.F.)		1.5N
Free Position (max. F.P.)	From mounting boss and hole center line	14.4mm
	From standoff	18.6mm
Operating Position on NC side O.P. (N.C.)	From mounting boss and hole center line	12.5±0.5mm
	From standoff	16.7±0.5mm
Operating Position on NO side O.P. (N.O.)	From mounting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

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

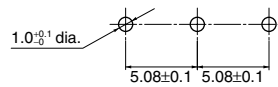
Mounting hole: 3 mm without boss type



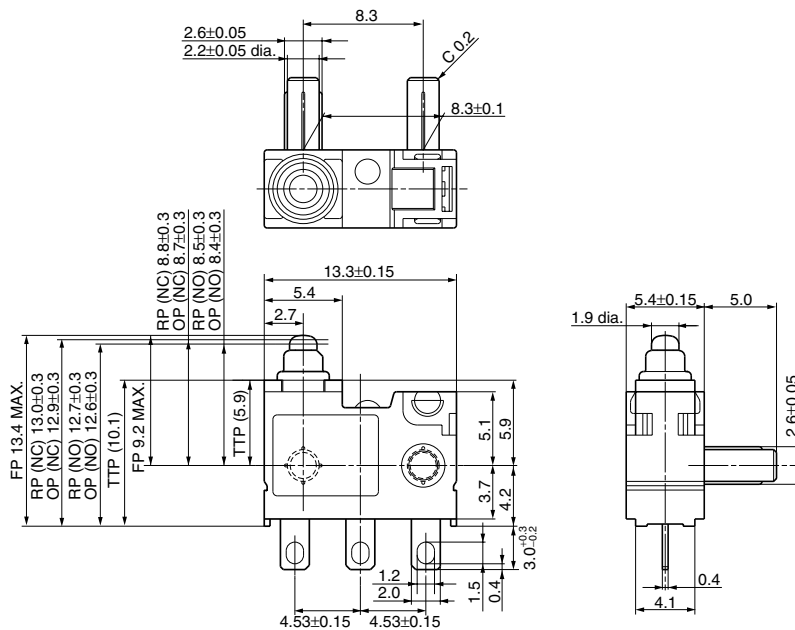
PC board terminal



PC board pattern

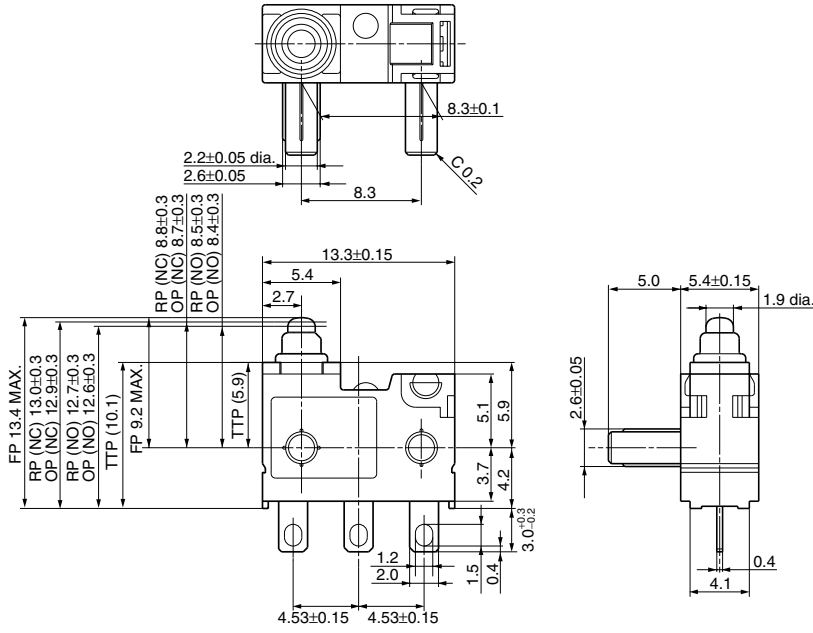


2. Right side pin type (Solder terminal only)

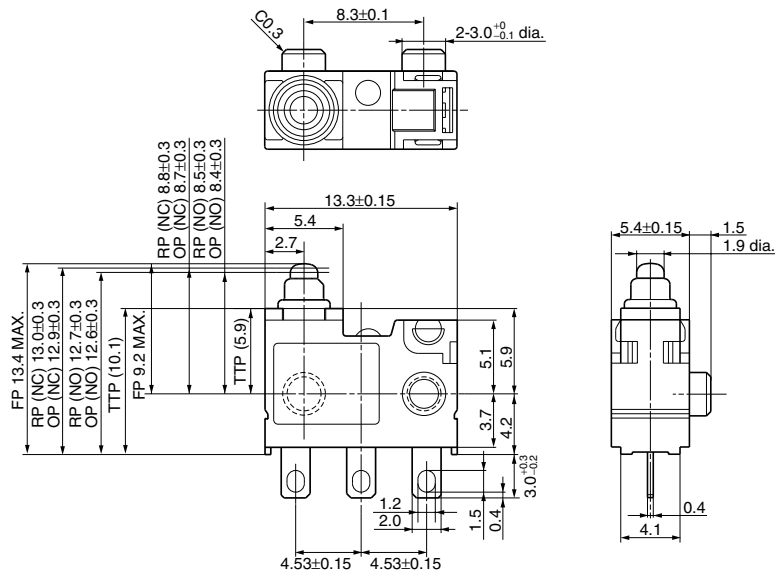


Left side pin type (Solder terminal only)

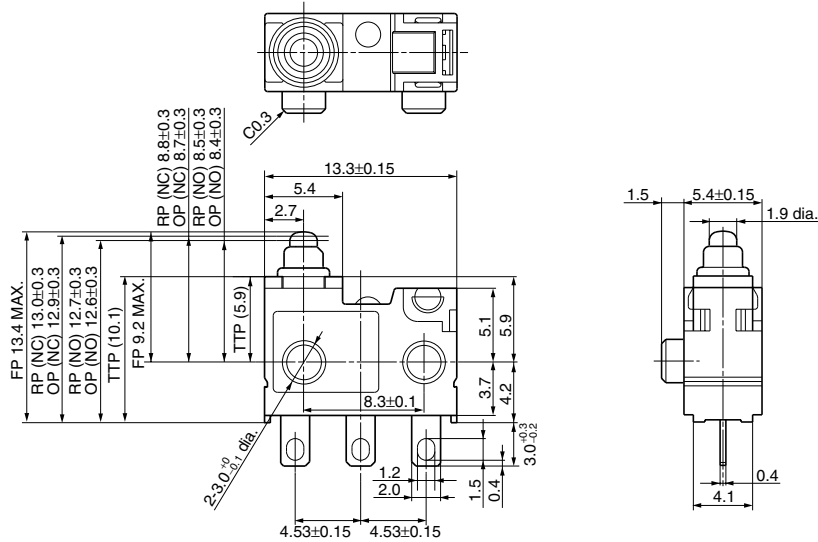
mm General tolerance: ± 0.25



Right 2 boss type (Solder terminal only)



Left 2 boss type (Solder terminal only)

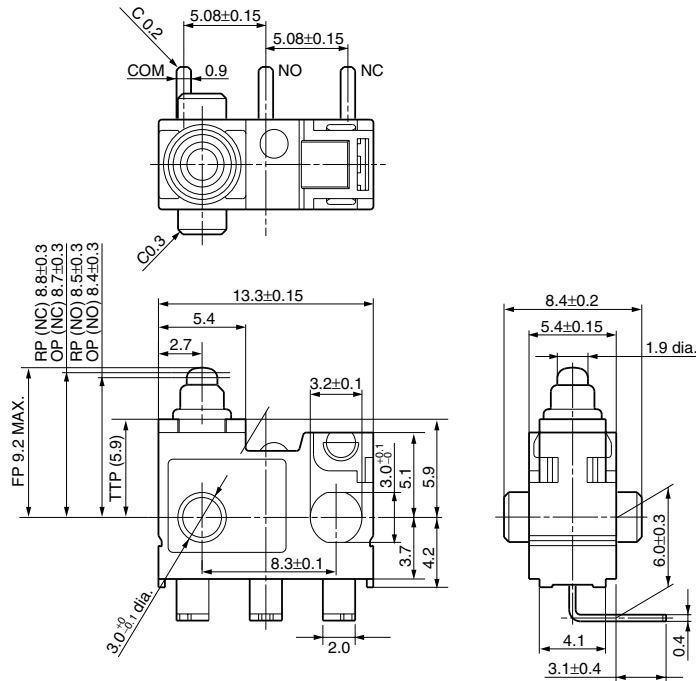


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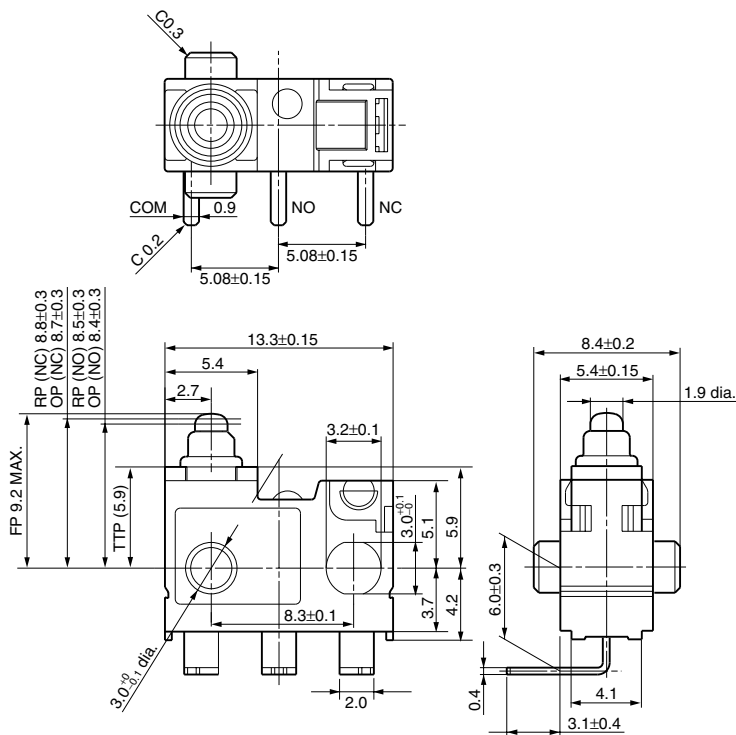
3. Angle terminal type (3 mm standard type only)

mm General tolerance: ± 0.25

Right type

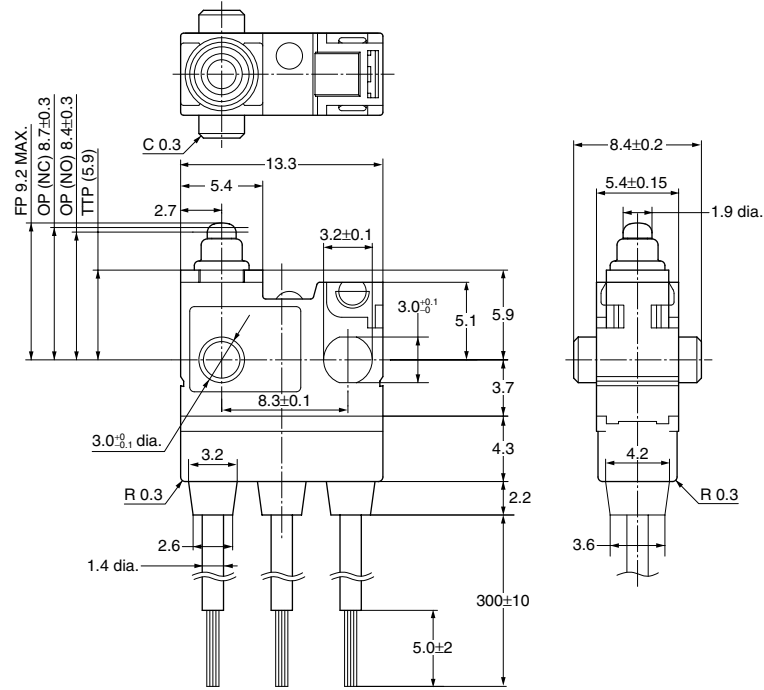


Left type (3 mm standard type only)



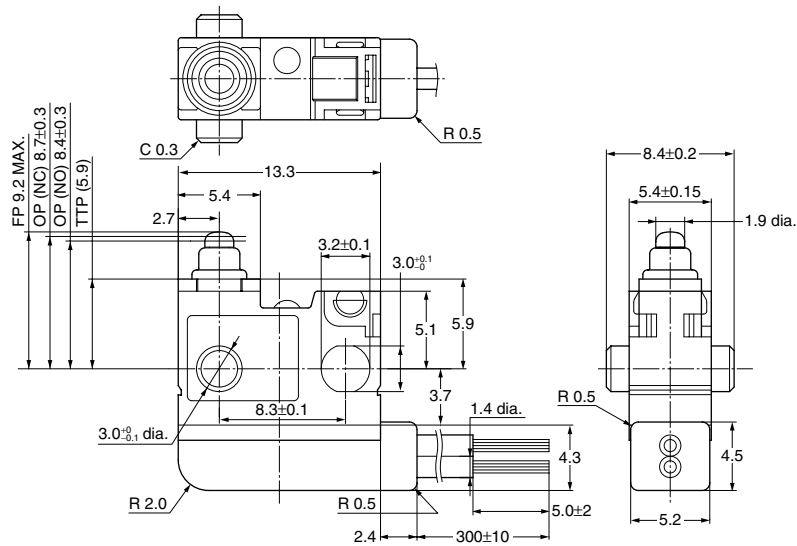
4. Wire leads bottom type: Mounting hole 3mm, standard type

mm General tolerance: ± 0.25

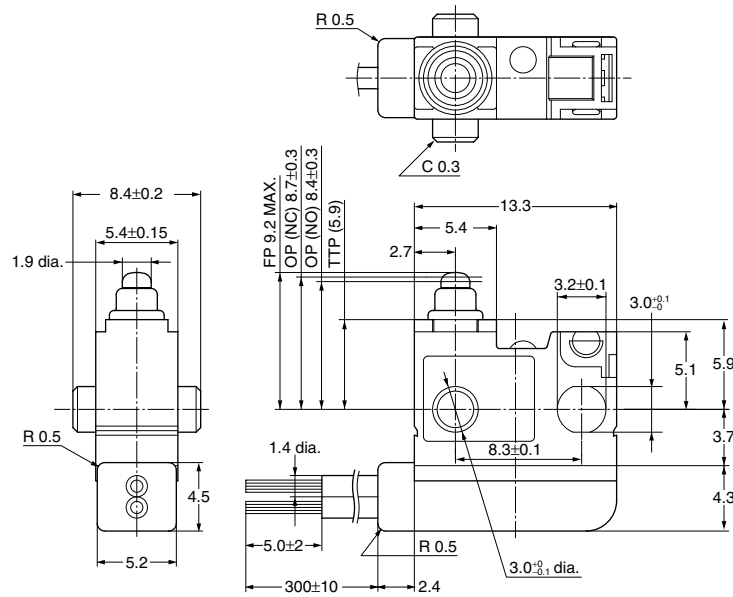


* Wire lead thickness : 0.3mm²
 Wire lead color : COM Black
 : NC Red
 : NO White

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



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



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

NOTES

1. Soldering conditions

The application of excessive heat upon the switch when soldering can cause degradation of switch operation.

Therefore, be sure to keep within the conditions given below.

1) Manual soldering: use soldering irons (max. 350°C, within 3 seconds) capable of temperature adjustment. This is to prevent deterioration due to soldering heat. Care should be taken not to apply force to the terminals during soldering.

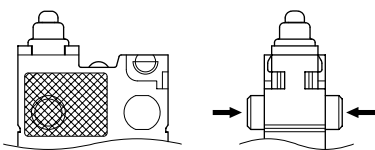
2) Automatic soldering: Soldering must be done as below;

260°C: within 6 seconds

350°C: within 3 seconds

2. Mounting

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



1) To secure the switch, please use an M3 small screw on a flat surface and tighten using a maximum torque of 0.29 N·m. It is recommended that spring washers be used with the screws and adhesive be applied to lock the screws to prevent loosening of the screws. Please make sure not to apply adhesive onto the moving parts.

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

3) Although it is possible to directly operate the pin plunger type from the lateral direction, please consult us if doing so.

4) After mounting please make sure no tensile load will be applied to the switch terminals.

5) Range of possible use: Please set the operation position to within the ranges in the following table so that there is sufficient insulation distance and to maintain contact reliability.

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

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

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

3. Cautions regarding the circuit

1) In order to prevent malfunction in set devices caused by bounce and chattering during the ON-OFF switch operation, please verify the validity of the circuit under actual operating conditions and temperature range.

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

4. Please verify under actual conditions.

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

5. Switch selection

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

6. Oil-proof and chemical-proof characteristics

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

Check with the actual oil or chemicals used.

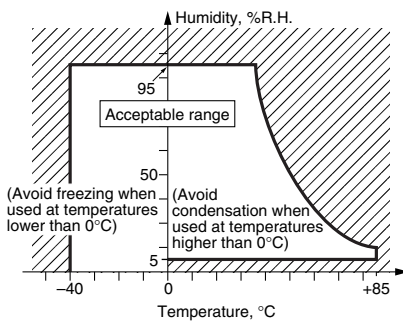
In particular, be aware that solvents such as freon, chlorine, and toluene cannot be used.

7. Environment

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

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

- This humidity range does not guarantee permanent performance.



8. Other

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

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

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

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

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