

■ List of Models

Standard Switch (EN50041)

Actuator		Conduit size								
		PG13.5 (see note 2)			G1/2			1/2-14NPT		
		1NC/1NO (Snap-action)	1NC/1NO (Slow-action)	2NC (Slow-action)	1NC/1NO (Snap-action)	1NC/1NO (Slow-action)	2NC (Slow-action)	1NC/1NO (Snap-action)	1NC/1NO (Slow-action)	2NC (Slow-action)
Side rotary	Roller lever (form A)	D4B-1111N	D4B-1511N	D4B-1A11N	D4B-2111N	D4B-2511N	D4B-2A11N	D4B-3111N	D4B-3511N	D4B-3A11N
	Adjustable roller lever (see note 1)	D4B-1116N	D4B-1516N	D4B-1A16N	D4B-2116N	D4B-2516N	D4B-2A16N	D4B-3116N	D4B-3516N	D4B-3A16N
	Adjustable rod lever (form D) (see note 1)	D4B-1117N	D4B-1517N	D4B-1A17N	D4B-2117N	D4B-2517N	D4B-2A17N	D4B-3117N	D4B-3517N	D4B-3A17N
Top plunger	Plain (form B)	D4B-1170N	D4B-1570N	D4B-1A70N	D4B-2170N	D4B-2570N	D4B-2A70N	D4B-3170N	D4B-3570N	D4B-3A70N
	Roller (form C)	D4B-1171N	D4B-1571N	D4B-1A71N	D4B-2171N	D4B-2571N	D4B-2A71N	D4B-3171N	D4B-3571N	D4B-3A71N
Wobble lever (see note 3)	Coil spring	D4B-1181N	---	D4B-1A81N	D4B-2181N	---	D4B-2A81N	D4B-3181N	---	D4B-3A81N
	Plastic rod	D4B-1187N	---	D4B-1A87N	D4B-2187N	---	D4B-2A87N	D4B-3187N	---	D4B-3A87N
Standards		EN60947-5-1 			EN60947-5-1 			EN60947-5-1 		

- Note:**
- The slow-action models with adjustable roller levers or adjustable rod levers are approved under the Forced Opening Certificate (TÜV) of the EN standard, but they do not conform to the GS-ET-15 Standard (BIA) and SUVA.
The snap-action models with adjustable roller levers or adjustable rod levers are not approved under the Forced Opening Certificate (TÜV) of the EN standard.
 - The D4B-□N is a Limit Switch conforming to European standards, and PG13.5 is commonly used in Europe.
 - The wobble lever models are ordinary limit switches and are not approved under EN, GS, and SUVA's Forced Opening Certificate.

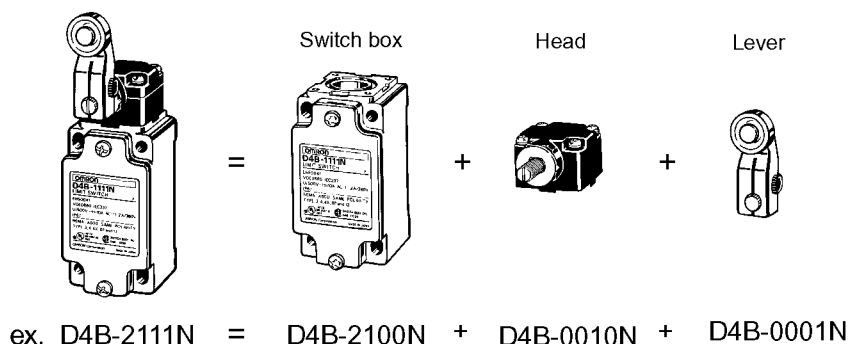
3-conduit Switch

Actuator		Conduit size								
		PG13.5 (see note 2)			G1/2			1/2-14NPT		
		1NC/1NO (Snap-action)	1NC/1NO (Slow-action)	2NC (Slow-action)	1NC/1NO (Snap-action)	1NC/1NO (Slow-action)	2NC (Slow-action)	1NC/1NO (Snap-action)	1NC/1NO (Slow-action)	2NC (Slow-action)
Side rotary	Roller lever (form A)	D4B-5111N	D4B-5511N	D4B-5A11N	D4B-6111N	D4B-6511N	D4B-6A11N	D4B-7111N	D4B-7511N	D4B-7A11N
	Adjustable roller lever (see note 1)	D4B-5116N	D4B-5516N	D4B-5A16N	D4B-6116N	D4B-6516N	D4B-6A16N	D4B-7116N	D4B-7516N	D4B-7A16N
	Adjustable rod lever (form D) (see note 1)	D4B-5117N	D4B-5517N	D4B-5A17N	D4B-6117N	D4B-6517N	D4B-6A17N	D4B-7117N	D4B-7517N	D4B-7A17N
Top plunger	Plain (form B)	D4B-5170N	D4B-5570N	D4B-5A70N	D4B-6170N	D4B-6570N	D4B-6A70N	D4B-7170N	D4B-7570N	D4B-7A70N
	Roller (form C)	D4B-5171N	D4B-5571N	D4B-5A71N	D4B-6171N	D4B-6571N	D4B-6A71N	D4B-7171N	D4B-7571N	D4B-7A71N
Wobble lever (see note 3)	Coil spring	D4B-5181N	---	D4B-5A81N	D4B-6181N	---	D4B-6A81N	D4B-7181N	---	D4B-7A81N
	Plastic rod	D4B-5187N	---	D4B-5A87N	D4B-6187N	---	D4B-6A87N	D4B-7187N	---	D4B-7A87N
Standards		EN60947-5-1 			EN60947-5-1 			EN60947-5-1 		

- Note:**
- The slow-action models with adjustable roller levers or adjustable rod levers are approved under the Forced Opening Certificate (TÜV) of the EN standard, but they do not conform to the GS-ET-15 Standard (BIA) and SUVA.
The snap-action models with adjustable roller levers or adjustable rod levers are not approved under the Forced Opening Certificate (TÜV) of the EN standard.
 - The D4B-□N is a Limit Switch conforming to European standards, and PG13.5 is commonly used in Europe.
 - The wobble lever models are ordinary limit switches and are not approved under EN, GS, and SUVA's Forced Opening Certificate.

■ Replacement Part

Because the D4B-□N employs a block mounting construction, the switch box, operating head, and lever (side rotary type only) may be ordered as a complete assembly or individually as replacement parts. (Replacement parts are not available as a switch box and head assembly or as a head and lever assembly.)



Switch Box

		EN50041			3-conduit type		
		PG13.5	G1/2	1/2-14NPT	PG13.5	G1/2	1/2-14NPT
1NC/1NO (Snap-action)		D4B-1100N	D4B-2100N	D4B-3100N	D4B-5100N	D4B-6100N	D4B-7100N
1NC/1NO (Slow-action)		D4B-1500N	D4B-2500N	D4B-3500N	D4B-5500N	D4B-6500N	D4B-7500N
2NC (Slow-action)		D4B-1A00N	D4B-2A00N	D4B-3A00N	D4B-5A00N	D4B-6A00N	D4B-7A00N

Operating Heads

Actuator	Type	Model
Side rotary	Standard	D4B-0010N
Top plunger	Plain	D4B-0070N
	Roller	D4B-0071N
Wobble lever	Coil spring	D4B-0081N
	Plastic rod	D4B-0087N

Levers (for Side Rotary Switches)

Actuator	Length	Diameter of roller	Model
Standard	31.5	17.5 dia.	D4B-0001N
Adjustable roller lever	25 to 89	19 dia.	D4B-0006N
Adjustable rod lever	145 max.	---	D4B-0007N
Interchangeable with D4B-0001	33.7	19 dia.	D4B-000RN

Specifications

■ Approved Standard Ratings

TÜV Rheinland: EN60947-5-1

Utilization category	AC-15
Rated operating current (I_{θ})	2 A
Rated operating voltage (U_{θ})	400 V

Note: As protection against short-circuiting, use either a gI-type or gG-type 10-A fuse that conforms to IEC269.

UL/CSA: (UL508, CSA C22.2 No. 14)

A600

Rated voltage	Carry current	Current		Volt-amperes	
		Make	Break	Make	Break
120 VAC 240 VAC 480 VAC 600 VAC	10 A	60 A 30 A 15 A 12 A	6 A 3 A 1.5 A 1.2 A	7,200 VA	720 VA

■ Characteristics

Item	Snap-action	Slow-action
Operating speed	1 mm/s to 0.5 m/s	
Operating frequency	Mechanical: 120 operations/min Electrical: 30 operations/min	
Rated frequency	50/60 Hz	
Insulation resistance	100 MΩ min. (at 500 VDC) between terminals of the same polarity and between each terminal and non-current-carrying part	
Contact resistance	25 mΩ max. (initial value)	
Dielectric strength		
Between terminals of same polarity	U _{imp} 2.5 kV	U _{imp} 4 kV
Between terminals of different polarity	---	U _{imp} 4 kV
Between current-carrying metal parts and ground	U _{imp} 4 kV	U _{imp} 4 kV
Between each terminal and non-current-carrying parts	U _{imp} 4 kV	U _{imp} 4 kV
Rated insulation voltage (U _i)	600 VAC (EN60947-5-1)	
Counter electromotive voltage at switching	1,500 VAC max. (EN60947-5-1)	
Operating environmental pollution level	3 (EN60947-5-1)	
Short-circuit protective device	10-A fuse (type gI or gG) (IEC269)	
Conditional short-circuit current	100 A (EN60947-5-1)	
Conventional enclosed thermal current (I _{the})	20 A (EN60947-5-1)	
Electric shock protection class	Class I (with grounding terminal)	
Vibration resistance	Malfunction: 10 to 55 Hz, 0.75 mm single amplitude	
Shock resistance	Destruction: 1,000 m/s ² min. Malfunction: 300 m/s ² min.	
Life expectancy (see note 2)	Mechanical: 30,000,000 operations min. Electrical: 500,000 operations min.	Mechanical: 10,000,000 operations min. Electrical: 500,000 operations min.
Ambient temperature	Operating: −40°C to 80°C (with no icing) (see note 4)	
Ambient humidity	Operating: 95% max.	
Degree of protection	IP67 (EN60947-5-1)	
Weight	Approx. 250 g	

- Note:**
1. The above values are for initial operation.
 2. The life expectancy is for an ambient temperature of 5°C to 35°C and ambient humidity of 40% to 70%. For further conditions, consult your OMRON sales representative.
 3. The values in this table are for an ambient temperature of 5°C to 35°C and ambient humidity of 40% to 70%. For further conditions, consult your OMRON sales representative.
 4. -25°C to 80°C for the flexible-rod type.

■ Operating Characteristics

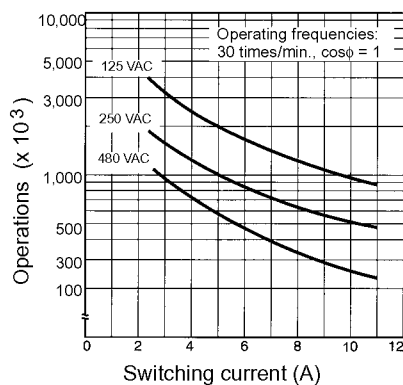
Model	D4B-□□11N	D4B-□□16N (see note 1)	D4B-□□17N (see note 2)	D4B-□□70N	D4B-□□71N	D4B-□□81N	D4B-□□87N
OF max.	9.41 N		2.12 N	18.63 N		1.47 N	
RF min.	1.47 N		0.29 N	1.96 N		---	
PT	21±3°			2.0 mm max.		15° max.	
PT (2nd) (see note 3)	(45°)			(3.0 mm)		---	
OT min.	50°			5.0 mm		---	
MD max. (see note 4)	12°			1.0 mm		---	
POT min.	35° (Slow-action models)			3.2 mm		---	
	55° (Snap-action models)						
POF min.	19.61 N			49.03 N		---	
TT	(75°)			7.0 mm		---	
FP max.	---			38 mm	51 mm	---	
OP	---			35±1 mm	48±1 mm	---	

- Note:**
1. The operating characteristics of these Switches were measured with the roller lever set at 31.5 mm.
 2. The operating characteristics of these Switches were measured with the rod lever set at 140 mm.
 3. Only for slow-action models.
 4. Only for snap-action models.

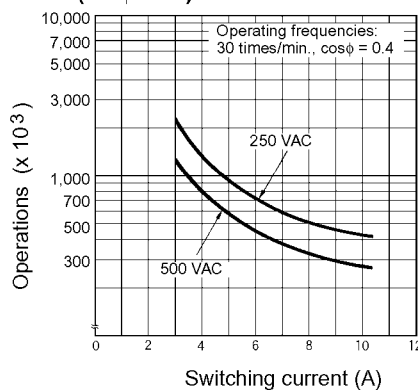
Engineering Data

Electrical Life Expectancy (Snap-action)

($\cos\phi = 1$)



($\cos\phi = 0.4$)



Nomenclature

Head

With Roller Lever Switches, the direction of the switch head can be varied to any of the four directions by loosening the roller lever switch screws at the four corners of the head.

Operating Position Mark
(arrow)

Push and rotate

Switch Box Material
Aluminum die-cast

Conduit Opening

Available in three different types of conduit threads:
Pg 13.5, G1/2 or 1/2-14NPT

Safety-oriented Lever Setting

Grooves which engage the lever every 90° are cut in the operation indicator disk to prevent the lever from slipping against the rotary shaft.

Equipped with Operation Display Plate

An optimum overtravel (OT) value may be secured by setting a desired OT value with a projection

Shearing Force Contact Separating Mechanism (NC Contact Section Only)

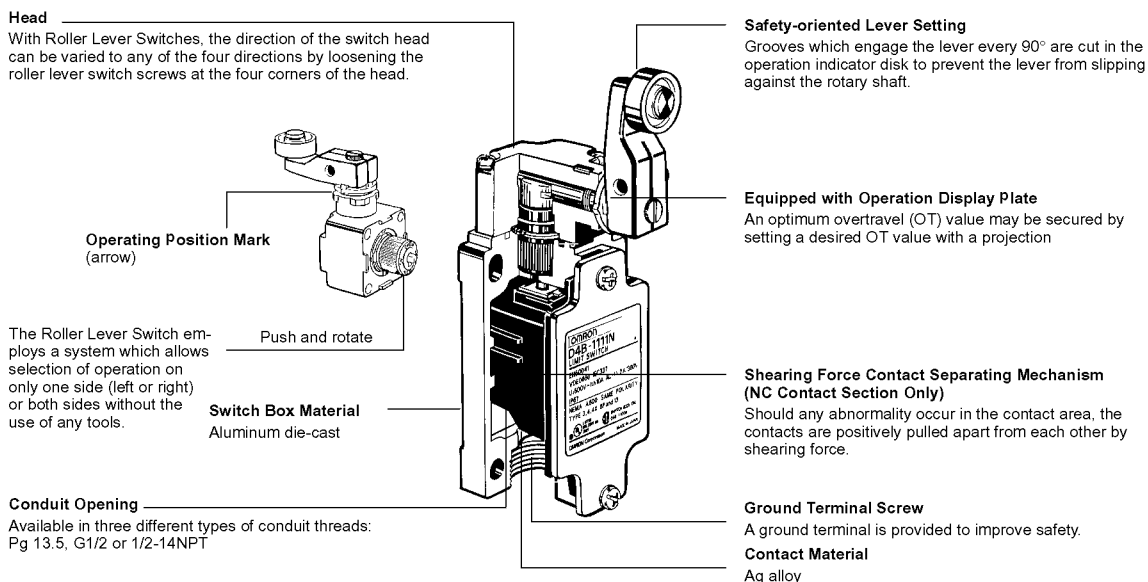
Should any abnormality occur in the contact area, the contacts are positively pulled apart from each other by shearing force.

Ground Terminal Screw

A ground terminal is provided to improve safety.

Contact Material

Ag alloy



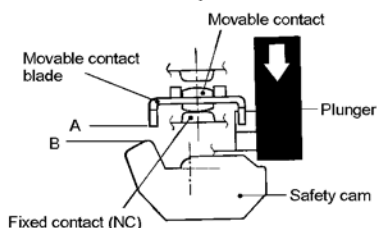
Operation

■ Positive Contact Opening Mechanism

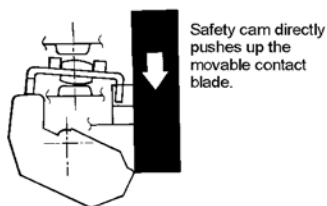
1NO/1NC Contact (Snap-action)

If metal deposition between mating contacts occurs on the NC contact side, they can be pulled apart by the shearing force and tensile force generated when part B of the safety cam or plunger engages part A of the movable contact blade. When the safety cam or plunger is moved in the direction of the arrow, the Limit Switch releases.

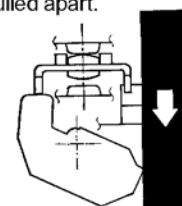
1. When metal deposition occurs.



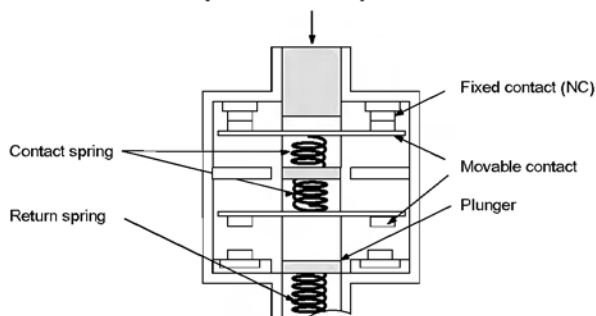
2. When contacts are being pulled apart.



3. When contacts are completely pulled apart.



1NC/1NO Contact (Slow-action)

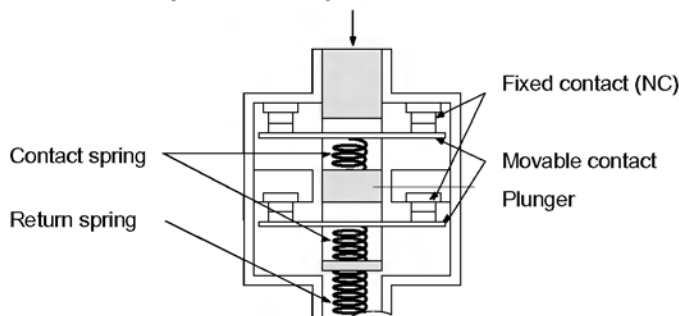


Conforms to IEC 947-5-1 Positive Opening



When metal deposition occurs, the contacts are separated from each other by the plunger being pushed in.

2NC Contact (Slow-action)



Conforms to EN60947-5-1



When metal deposition occurs, the contacts are separated from each other by the plunger being pushed in.

⊞ is marked on the product to indicate approval of positive opening.

Contact Form (EN50013)

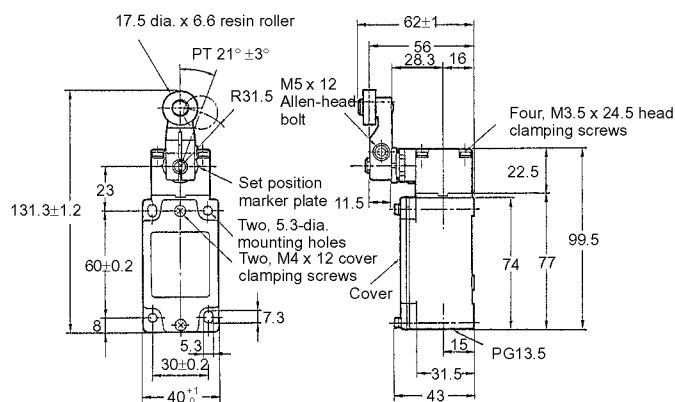
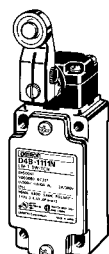
Model	Contact	Diagrams	Explanation
D4B-□1□N	1NC/1NO (Snap-action)	 	Only NC contact 11-12 has an approved positive opening mechanism. ⊞ Terminal numbers 11-12 and 13-14 cannot be used as unlike poles.
D4B-□5□N	1NC/1NO (Slow-action)	 	Only NC contact 11-12 has an approved positive opening mechanism. ⊞ Terminal numbers 11-12 or 23-24 can be used as unlike poles.
D4B-□A□N	2NC (Slow-action)	 	Both NC contacts 11-12 and 21-22 have an approved positive opening mechanism. ⊞ Terminal numbers 11-12 and 21-22 can be used as unlike poles.

Dimensions

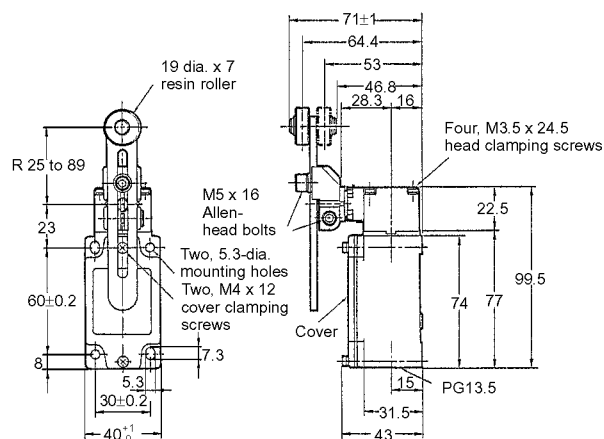
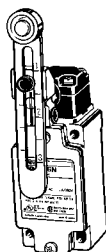
- Note:**
1. All units are in millimeters unless otherwise indicated.
 2. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.
 3. When placing your order, specify the conduit type by adding a code from the list below to the blank box of the following model numbers as shown below.
- | | |
|-------------------|--------------------|
| Standard Switches | 3-conduit Switches |
| 1: PG 13.5 | 5: PG 13.5 |
| 2: G 1/2 | 6: G 1/2 |
| 3: 1/2-14NPT | 7: 1/2-14NPT |

■ Standard Switches

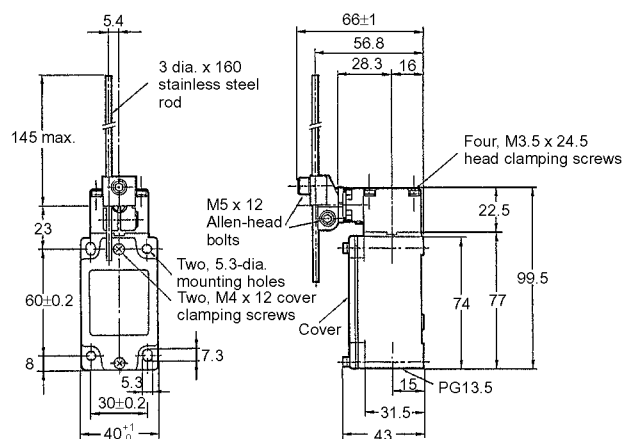
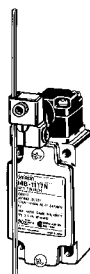
Roller Lever D4B-□□11N

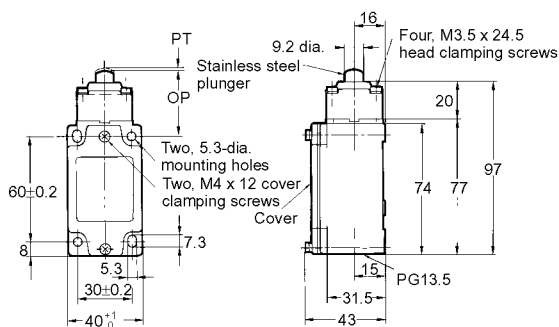
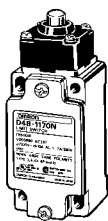
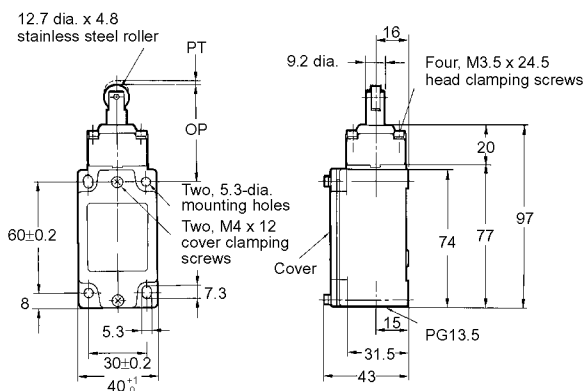
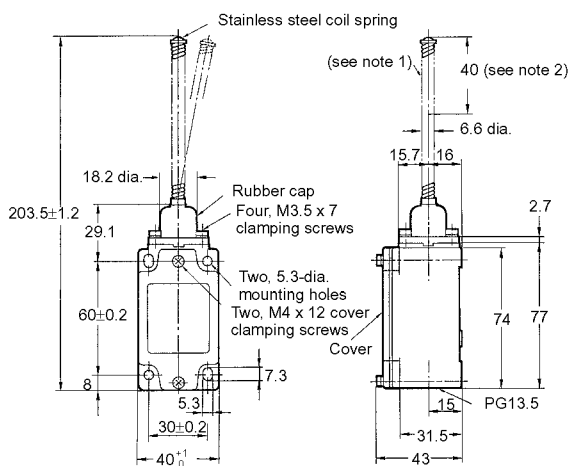
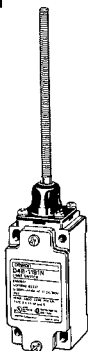


Adjustable Roller Lever D4B-□□16N

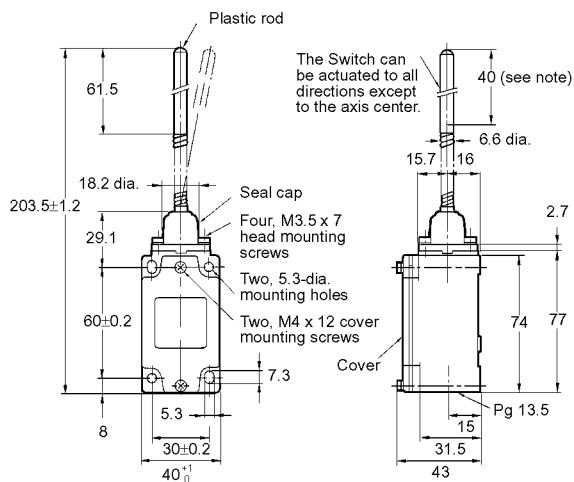


Adjustable Rod Lever D4B-□□17N



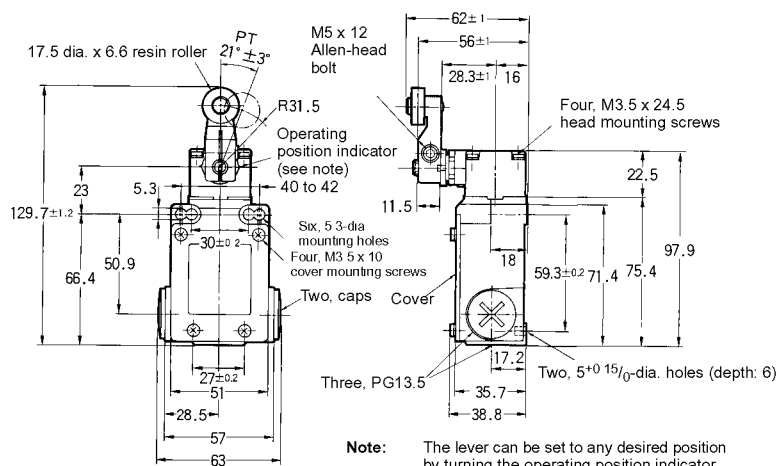
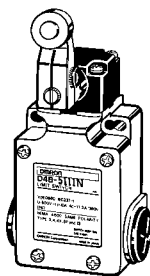
Top Plunger
D4B-□□70N

Top Roller Plunger
D4B-□□71N

Coil Spring
D4B-□□81N

Note:

1. The coil spring may be operated from any directions except axial directions (↓).
2. Be sure to adjust the dog to within 40 mm from the top end of the coil spring.

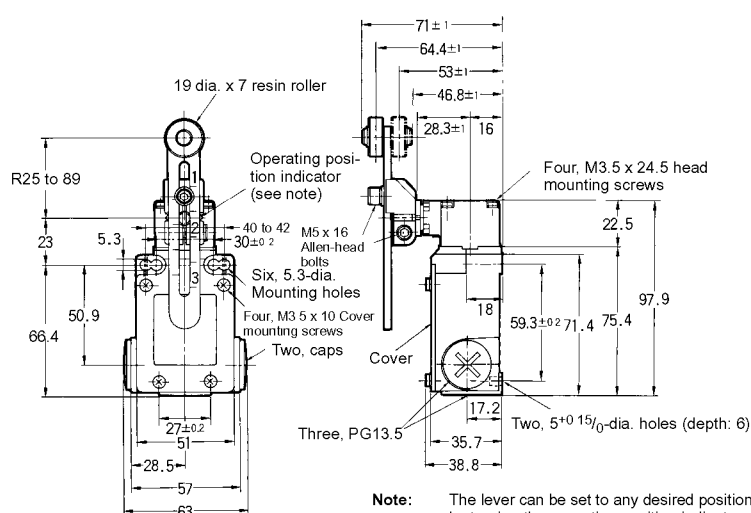
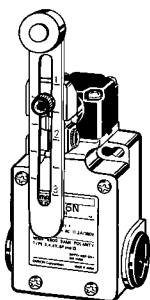
Plastic Rod
D4B-□□87N

Note:

- Be sure to adjust the dog to within 40 mm from the top end of the plastic rod.

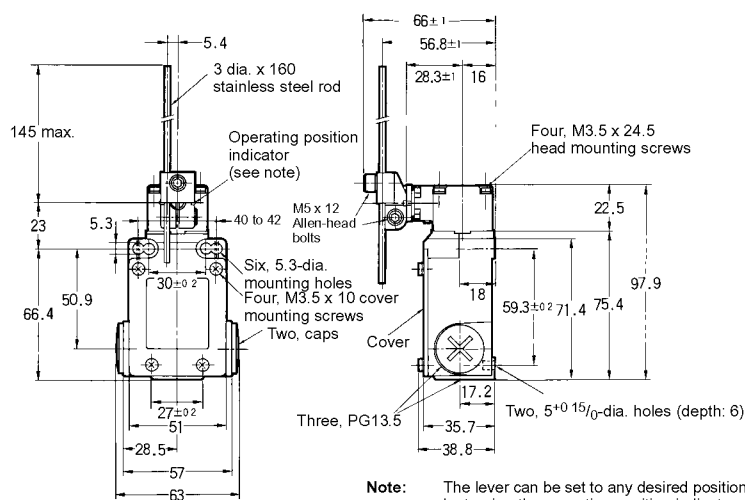
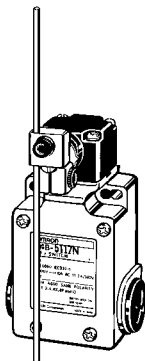
3-conduit Switches

Roller Lever
D4B-□□11N

Note: The lever can be set to any desired position by turning the operating position indicator.

Adjustable Roller Lever
D4B-□□16N

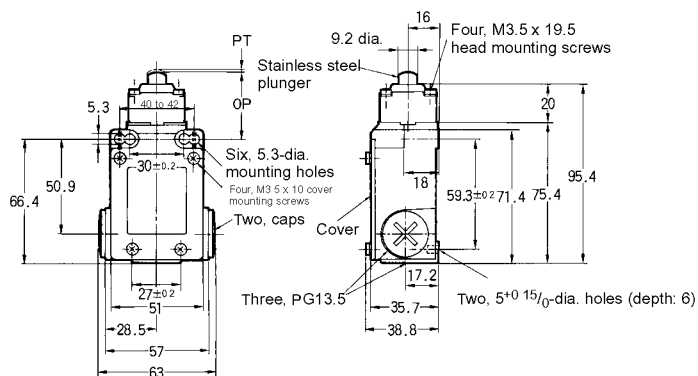
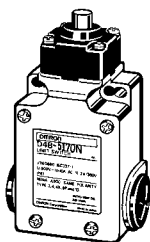
Note: The lever can be set to any desired position by turning the operating position indicator.

Adjustable Rod Lever
D4B-□□17N

Note: The lever can be set to any desired position by turning the operating position indicator.

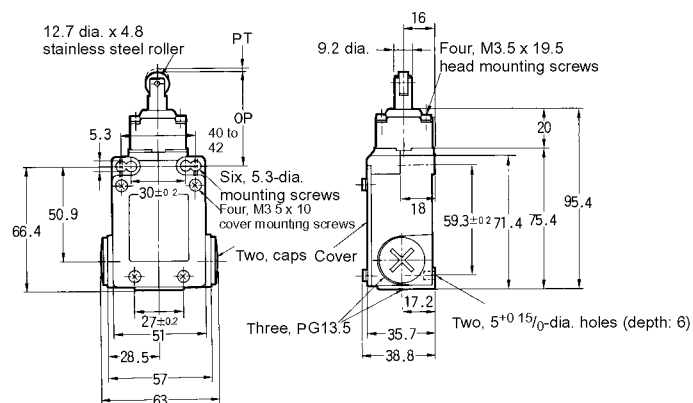
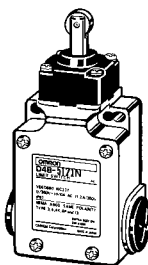
Top Plunger

D4B-□□70N



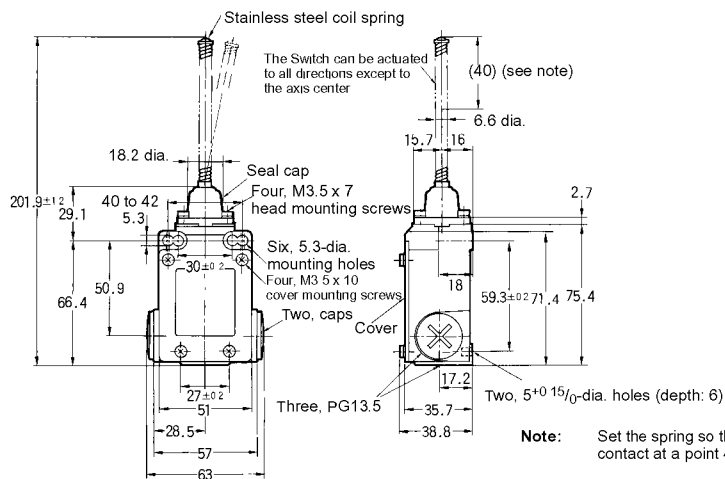
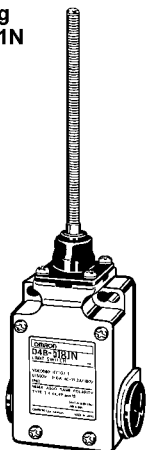
Top Roller Plunger

D4B-□□71N



Coil Spring

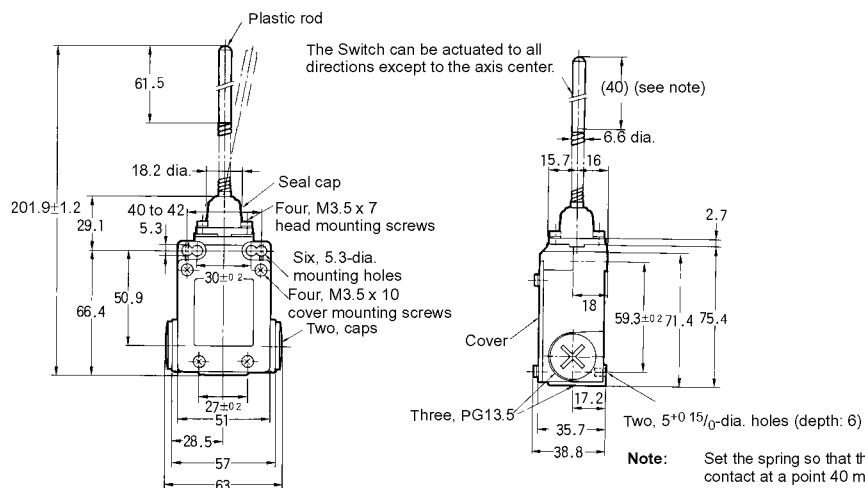
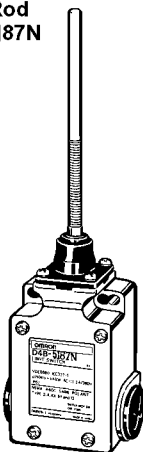
D4B-□□81N



Note: Set the spring so that the dog comes in contact at a point 40 mm from the tip.

Plastic Rod

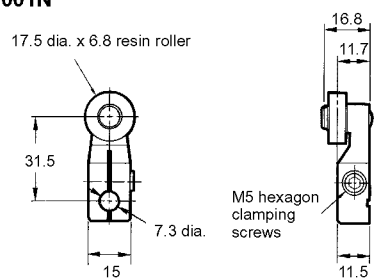
D4B-□□87N



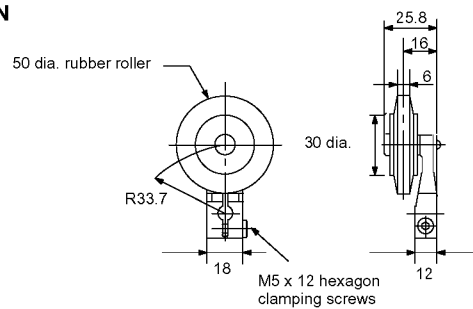
Note: Set the spring so that the dog comes in contact at a point 40 mm from the tip.

■ Roller Levers

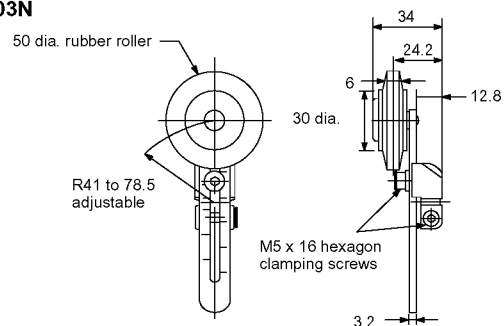
D4B-0001N



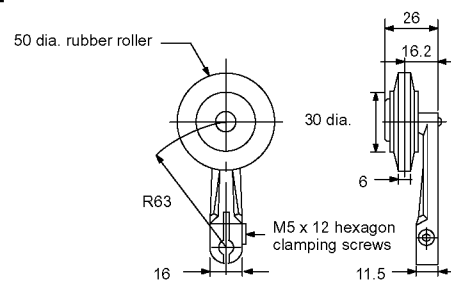
D4B-0002N



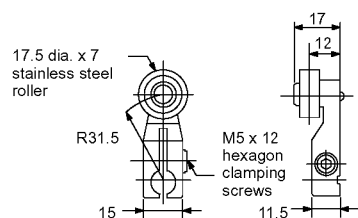
D4B-0003N



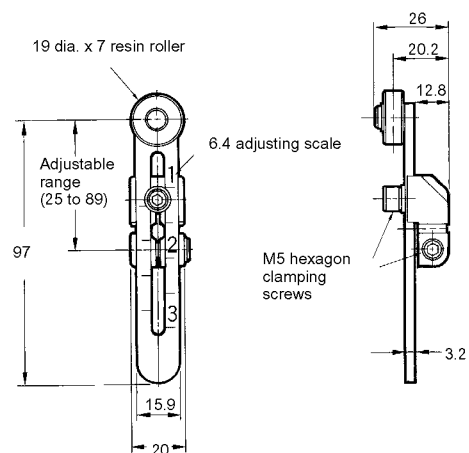
D4B-0004N



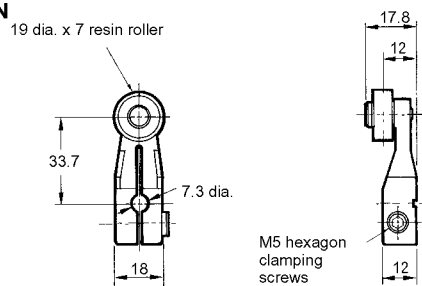
D4B-0005N



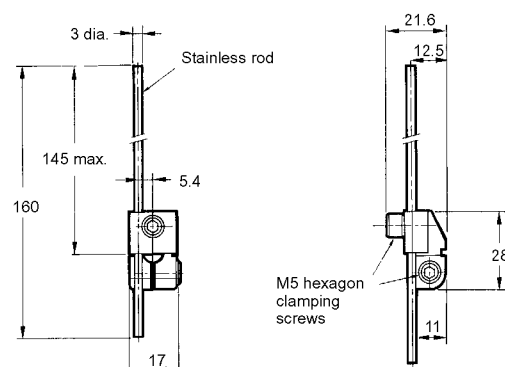
D4B-0006N



D4B-000RN

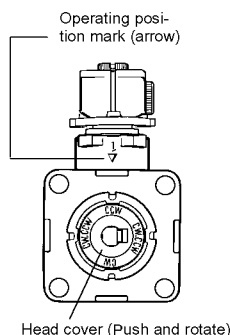


D4B-0007N



CW, CCW or Two-way Operation

The head of Side Rotary Switches can be converted in seconds to CW, CCW, or two-way operation. The conversion procedure follows.



Procedure

1. Dismount the head by loosening the four screws that secure it.
2. Turn over the head to set the desired operation (CW, CCW, or both). The desired operation can be selected by setting the mode selector knob shown in the figure. This knob is factory set to the "CW + CCW" (two-way operation) position.
3. Set the CW hole on the head at the operation position mark (arrow) for clockwise operation or set the CCW hole right at the arrow for counterclockwise operation. In either case, be sure to set the hole position exactly at the arrow point.

Precautions

If the D4B-□N is applied to an emergency stop circuit or safety circuit for prevention of injury, use the D4B-□N model that has an NC contact equipped with a force-separation mechanism, and make sure that the D4B-□N operates in the positive mode. Furthermore, secure the D4B-□N with screws or equivalent parts that are tightened in a single direction so that the D4B-□N cannot be easily removed. Then provide a protection cover for the D4B-□N and post a warning label near the D4B-□N.

In order to protect the D4B-□N from damage due to short-circuiting, connect a fuse breaking a current 1.5 to 2 times higher than the rated current in parallel with the D4B-□N.

If an application satisfying EN standards is to employ the D4BL, apply the 10-A gI or gG fuse approved by IEC269.

Do not apply the D4B-□N to the door without applying a stopper to the door.

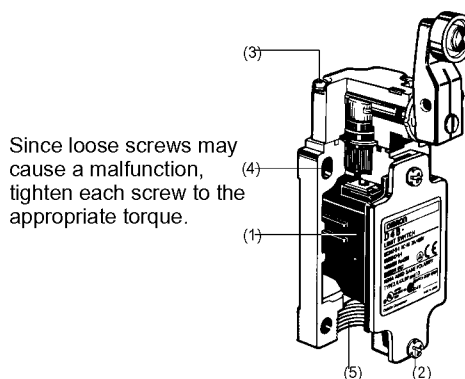
If the D4B-□N is used with the actuator normally pressed, the D4B-□N may malfunction or may soon have reset failures. Be sure to check and replace the D4B-□N regularly.

■ Correct Use

Operating Environment

- The D4B-□N is for indoor use. The D4B-□N may malfunction if the D4B-□N is used outdoors. Be sure to use a model with a lever-type actuator for outdoor use instead.
- Do not use the D4B-□N in the following places.
 - Places with radical temperature changes.
 - Places with excessive humidity that may cause condensation.
 - Places with excessive vibration.
 - Places where metal dust, oil, or chemical may be sprayed to the D4B-□N.

Tightening Torque



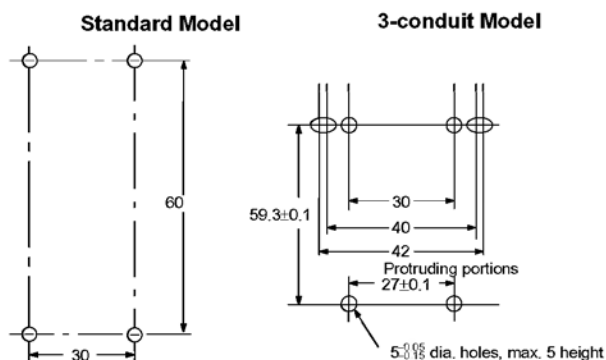
	Type	Proper tightening torque
1	Terminal screw	0.59 to 0.78 N • m
2	Cover-mounting screw	1.18 to 1.37 N • m
3	Head-mounting screw	0.78 to 0.98 N • m
4	Switch-mounting screw (M5)	4.90 to 5.88 N • m
5	Connector	1.77 to 2.16 N • m
6	Cap screw (for three-conduit models)	1.27 to 1.67 N • m

Note: Apply a tightening torque of 0.78 to 0.88 N • m to conduit models.

Mounting

Use four M5 screws with washers to mount the standard model. Be sure to apply the proper torque to tighten each screw. The D4B-□N can be mounted more securely by using the four screws plus two $5^{-0.05}/_{-0.15}$ -mm protruding parts, each of which has a maximum height of 4.8 mm as shown below.

Mounting Dimensions (M5)



Changes in Actuator Mounting Position

To change the angle of the lever, loosen the Allen-head bolts on the side of the lever.

The operation indicator plate has protruding parts which engage with the lever, thus allowing changes to the lever position by 90°.

The back of the operation indicator plate has no protruding parts. The lever can be set at any angle by attaching the operation indicator plate to the Switch so that this side will face the lever. In this case, however, the D4B-□N will not be approved by SUVA or BIA. Make sure that the lever engages with the operation indicator plate securely so that the lever will not slip.

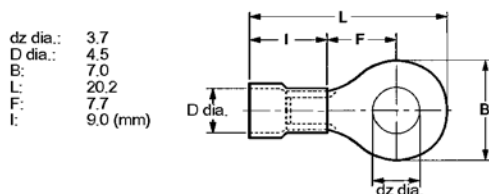
Changes in Head Mounting Position

By removing the screws on the four corners of the head, the head can be reset in any of four directions. Make sure that no foreign materials will penetrate through the head.

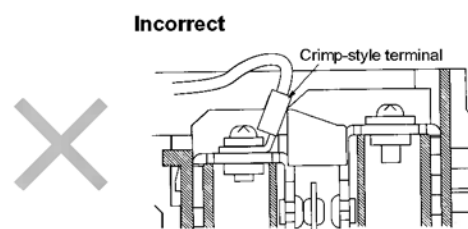
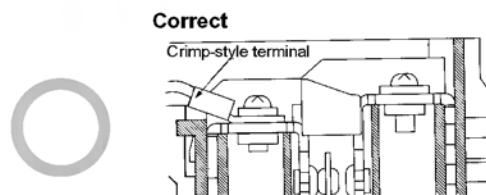
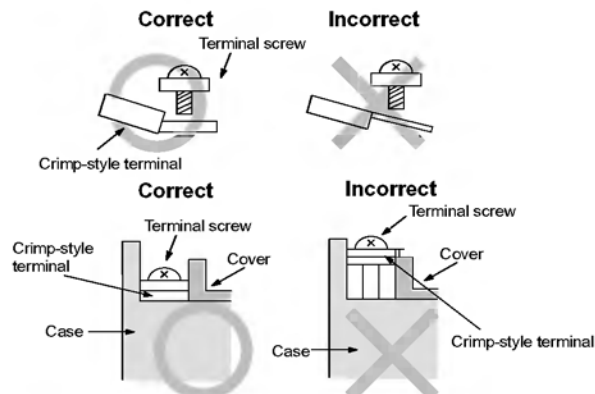
Wiring

Do not connect the bare lead wires directly to the terminals but be sure to connect each of them by using an insulation tube and M3.5 round solderless terminals and tighten each terminal screw within the specified torque range.

The proper lead wire is 20 to 14 AWG (0.5 to 2.5 mm²) in size.



Make sure that all solderless terminals come into contact with the casing or cover as shown below, otherwise the cover may not be mounted properly or the D4B-□N may malfunction.



Connector

Make sure that each connector is tightened within the specified torque range. The casing may be damaged if the connector is tightened excessively.

If the 1/2-14NPT is used, cover the cable and conduit end with sealing tape in order to ensure IP67.

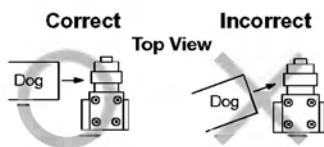
The Pg13.5 connector must be Nippon Flex's ABS-08Pg13.5 or ABS-12 Pg13.5.

Use OMRON's SC-series connector which is suited to the cable in diameter.

Properly attach the provided conduit cap to the unused conduit opening and securely tighten the cap screw within the specified torque when wiring the D4B-□N.

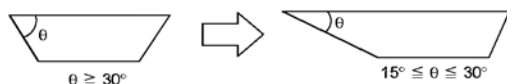
Others

The load for the actuator (roller) of the Switch must be imposed on the actuator in the horizontal direction, otherwise the actuator or the rotating axis may be deformed or damaged.



When using a long lever model like the D4B-□□16N or D4B-□□17N, the Switch may telegraph. To avoid telegraphing, take the following precautions.

1. Set the lever to operate in one direction. For details, see page 126, *CW, CCW or Two-way Operation*.
2. Modify the rear end of the dog to an angle of 15° to 30° as shown below or to a secondary-degree curve.



3. Modify the circuit so as not to detect the wrong operating signals.

Correct Selection and Usage of Switches

Snap-action switch

A snap-action switch takes only a short time to switch electric current, which reduces contact arcing and prevents contacts from wear and tear. Therefore, a snap-action switch is more ideal than a slow-action switch for applications that require high repeat accuracy, high operation frequency, and slow operating speed.

Slow-action Switch

The electric current switching time of a slow-action switch differs in proportion to the operating speed of the switch. A slow-action switch operates safely via direct drive positive contact opening even after metal deposition between mating contacts and provides insulation capability after contact separation. Opposite polarity ensures high contact reliability, even when voltages and currents are small and allows switching of voltages of different potential by contacts blocks with several contacts. For example, it is possible to perform a control function with 220 VAC and signalling function with 60 VDC using only one device.

Safety Switch

The NC contact section of the D4B-□N's built-in switch incorporates a shearing force contact separating mechanism. Therefore, based on the above mentioned switching features, the snap-action switch can be mainly applied to positioning control purposes and the slow-action switch can be mainly applied to safety and protection purposes. Both slow- and snap-action switches conform to BS5304, IEC 204-1, and VDE 0113 safety standard.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Limit Switch

D4D-□N

Small, Economical Switch Featuring a Positive Opening Mechanism and Conforming to the CE Mark

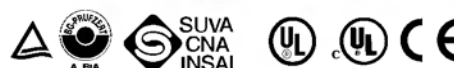
- Features positive opening mechanism (NC contacts only) that opens contacts, thus preventing faulty operation due to factors such as metal deposition. (Slow-action type has received positive opening approval.)
- Double insulation makes ground terminal unnecessary. (Bears □ marking.)
- Conforms to EN (TÜV) standards corresponding to the CE mark.
- Wide standard operating temperature range: -30°C to 70°C.
- Series expanded to include 2-conduit type and 4 actuator types: cat whisker, plastic rod, metal lever, and fork lever lock.
- Safety Standards:
 - Conformity:
 - Machinery Directive
 - Low Voltage Directive
 - EN50047
 - EN1088

Approved Standards

Snap-action Models

Agency	Standard	File No.
TÜV Rheinland	EN60947-5-1	J9950233 (Positive opening approved.)
UL	UL508 CSA C22.2 No. 14	E76675

Note: CSA C22.2 No. 14 compliance was verified and approved by UL (Marked with .



Slow-action Models

Agency	Standard	File No.
TÜV Rheinland	EN60947-5-1 EN81 EN115	R9451184 (Positive opening approved.)
UL	UL508 CSA C22.2 No. 14	E76675
BIA*	GS-ET-15	1-conduit type: 9407070 2-conduit type: 9601732
SUVA*	SUVA	1-conduit type: E6192.d 2-conduit type: E6193.d

Note: *Not including variable roller lever, cat whisker, or plastic rod types.

Ordering Information

■ Model Number Legend

D4D-□□□□N
1 2 3

1. Conduit

- 1: Pg13.5 (1-conduit)
- 2: G1/2 (1-conduit)
- 3: 1/2-14NPT (1-conduit)
- 5: Pg13.5 (2-conduit)
- 6: G1/2 (2-conduit)

2. Built-in Switch

- 1: 1NC/1NO (Snap-action)
- 5: 1NC/1NO (Slow-action)
- A: 2NC (Slow-action)

3. Head and Actuator

- 20: Roller lever (standard, resin lever)
- 21: Adjustable roller lever
- 22: Roller lever (metal lever)
- 27: Adjustable roller lever (with 50 dia. rubber roller)
- 31: Top plunger
- 32: Top roller plunger
- 62: One-way roller arm lever (horizontal)
- 72: One-way roller arm lever (vertical)
- 80: Cat whisker
- 87: Plastic rod
- RE: Fork lever lock (right operation)
- LE: Fork lever lock (left operation)

■ List of Models

Standard Switch

Actuator	Conduit size (see note 1)		Built-in switch mechanism					
			1NC/1NO (Snap-action)		1NC/1NO (Slow-action)		2NC (Slow-action)	
			Positive opening	Model (see note 2)	Positive opening	Model	Positive opening	Model
Roller lever (resin lever) 	1-conduit	Pg13.5		D4D-1120N		D4D-1520N		D4D-1A20N
		G1/2		D4D-2120N		D4D-2520N		D4D-2A20N
		1/2-14NPT		D4D-3120N		D4D-3520N		D4D-3A20N
	2-conduit	Pg13.5		D4D-5120N		D4D-5520N		D4D-5A20N
		G1/2		D4D-6120N		D4D-6520N		D4D-6A20N
Roller lever (metal lever) 	1-conduit	Pg13.5		D4D-1122N		D4D-1522N		D4D-1A22N
		G1/2		D4D-2122N		D4D-2522N		D4D-2A22N
		1/2-14NPT		D4D-3122N		D4D-3522N		D4D-3A22N
	2-conduit	Pg13.5		D4D-5122N		D4D-5522N		D4D-5A22N
		G1/2		D4D-6122N		D4D-6522N		D4D-6A22N
Adjustable roller lever 	1-conduit	Pg13.5	---	D4D-1121N	 (See note 3)	D4D-1521N	 (See note 3)	D4D-1A21N
		G1/2		D4D-2121N		D4D-2521N		D4D-2A21N
		1/2-14NPT		D4D-3121N		D4D-3521N		D4D-3A21N
	2-conduit	Pg13.5		D4D-5121N		D4D-5521N		D4D-5A21N
		G1/2		D4D-6121N		D4D-6521N		D4D-6A21N
Adjustable roller lever (with rubber roller) 	1-conduit	Pg13.5	 (See note 3)	D4D-1127N	 (See note 3)	D4D-1527N	 (See note 3)	D4D-1A27N
		G1/2		D4D-2127N		D4D-2527N		D4D-2A27N
		1/2-14NPT		D4D-3127N		D4D-3527N		D4D-3A27N
	2-conduit	Pg13.5		D4D-5127N		D4D-5527N		D4D-5A27N
		G1/2		D4D-6127N		D4D-6527N		D4D-6A27N
Plunger 	1-conduit	Pg13.5		D4D-1131N		D4D-1531N		D4D-1A31N
		G1/2		D4D-2131N		D4D-2531N		D4D-2A31N
		1/2-14NPT		D4D-3131N		D4D-3531N		D4D-3A31N
	2-conduit	Pg13.5		D4D-5131N		D4D-5531N		D4D-5A31N
		G1/2		D4D-6131N		D4D-6531N		D4D-6A31N
Roller plunger 	1-conduit	Pg13.5		D4D-1132N		D4D-1532N		D4D-1A32N
		G1/2		D4D-2132N		D4D-2532N		D4D-2A32N
		1/2-14NPT		D4D-3132N		D4D-3532N		D4D-3A32N
	2-conduit	Pg13.5		D4D-5132N		D4D-5532N		D4D-5A32N
		G1/2		D4D-6132N		D4D-6532N		D4D-6A32N

Actuator	Conduit size (see note 1)		Built-in switch mechanism					
			1NC/1NO (Snap-action)		1NC/1NO (Slow-action)		2NC (Slow-action)	
			Positive opening	Model (see note 2)	Positive opening	Model	Positive opening	Model
One-way roller arm lever (horizontal) 	1-conduit	Pg13.5		D4D-1162N		D4D-1562N		D4D-1A62N
		G1/2		D4D-2162N		D4D-2562N		D4D-2A62N
		1/2-14NPT		D4D-3162N		D4D-3562N		D4D-3A62N
	2-conduit	Pg13.5		D4D-5162N		D4D-5562N		D4D-5A62N
		G1/2		D4D-6162N		D4D-6562N		D4D-6A62N
One-way roller arm lever (vertical) 	1-conduit	Pg13.5		D4D-1172N		D4D-1572N		D4D-1A72N
		G1/2		D4D-2172N		D4D-2572N		D4D-2A72N
		1/2-14NPT		D4D-3172N		D4D-3572N		D4D-3A72N
	2-conduit	Pg13.5		D4D-5172N		D4D-5572N		D4D-5A72N
		G1/2		D4D-6172N		D4D-6572N		D4D-6A72N
Fork lever lock (right operation) (See note 4) 	1-conduit	Pg13.5	---	---	 (See note 3)	D4D-15REN	 (See note 3)	D4D-1AREN
		G1/2				D4D-25REN		D4D-2AREN
		1/2-14NPT				D4D-35REN		D4D-3AREN
	2-conduit	Pg13.5				D4D-55REN		D4D-5AREN
		G1/2				D4D-65REN		D4D-6AREN
Fork lever lock (left operation) (See note 4) 	1-conduit	Pg13.5	---	---	 (See note 3)	D4D-15LEN	 (See note 3)	D4D-1ALEN
		G1/2				D4D-25LEN		D4D-2ALEN
		1/2-14NPT				D4D-35LEN		D4D-3ALEN
	2-conduit	Pg13.5				D4D-55LEN		D4D-5ALEN
		G1/2				D4D-65LEN		D4D-6ALEN
Cat whisker 	1-conduit	Pg13.5	---	D4D-1180N	---	---	---	D4D-1A80N
		G1/2		D4D-2180N		---		D4D-2A80N
		1/2-14NPT		D4D-3180N		---		D4D-3A80N
	2-conduit	Pg13.5		D4D-5180N		---		D4D-5A80N
		G1/2		D4D-6180N		---		D4D-6A80N
Plastic rod 	1-conduit	Pg13.5	---	D4D-1187N	---	---	---	D4D-1A87N
		G1/2		D4D-2187N		---		D4D-2A87N
		1/2-14NPT		D4D-3187N		---		D4D-3A87N
	2-conduit	Pg13.5		D4D-5187N		---		D4D-5A87N
		G1/2		D4D-6187N		---		D4D-6A87N

- Note:**
1. It is recommended that Pg13.5 be used for Switches to be exported to Europe and 1/2-14NPT be used for Switches to be exported to North American countries.
 2. Adjustable rod lever actuators for snap-action models (model number: D4D-□□29N) are available separately.
 3. The switches are marked with "⊙" indicating approval by TÜV Rheinland for the positive opening mechanism. Adjustable roller lever and fork lever lock models are approved by TÜV Rheinland for the positive opening mechanism, but not by the GS-ET-15 standard (BIA) nor by SUVA.
 4. Right operation: Contact 11-12 is positively opened, when the lever on the right is lowered.
Left operation: Contact 11-12 is positively opened, when the lever on the left is lowered.

Specifications

■ Approved Standard Ratings TÜV (EN60947-5-1)

Utilization category	AC-15
Rated operating current (I_a)	2 A
Rated operating voltage (U_e)	400 V

Note: As protection against short-circuiting, use either a gI-type or gG-type 10-A fuse that conforms to IEC269.

UL/CSA (UL508/CSA C22.2 No. 14)
A600 (D4D-□5□□N, D4D-□A□□N)

Type	Rated voltage	Carry current	Current		Volt-amperes	
			Make	Break	Make	Break
Slow-action	120 VAC 240 VAC 480 VAC 600 VAC	10 A	60 A 30 A 15 A 7.5 A 12 A	6 A 3 A 1.5 A 1.2 A	7,200 VA	720 VA

B600 (D4D-□1□□N)

Type	Rated voltage	Carry current	Current		Volt-amperes	
			Make	Break	Make	Break
Snap-action	120 VAC 240 VAC 480 VAC 600 VAC	5 A	30 A 15 A 7.5 A 6 A	3 A 1.5 A 0.75 A 0.6 A	3,600 VA	360 VA

■ Characteristics

Degree of protection	IP65 (EN60947-5-1)
Life expectancy (see note 2)	Mechanical: 15,000,000 operations min. (see note 3) Electrical: 150,000 operations min. (Refer to <i>Operating Characteristics</i> for snap-action.)
Operating speed	1 mm/s to 0.5 m/s (with D4D-1120N)
Contact gap	Snap-action: 2 x 0.5 mm min. Slow-action: 2 x 2 mm min.
Operating frequency	Mechanical: 120 operations/min min. Electrical: 30 operations/min min.
Rated frequency	50/60 Hz
Insulation resistance	100 MΩ min. (at 500 VDC) between terminals of the same polarity and between each terminal and non-current-carrying metal parts
Contact resistance	25 mΩ max. (initial value)
Dielectric strength	Snap-action U _{imp} 2.5 kV between terminals of the same polarity U _{imp} 4 kV between each terminal and non-current-carrying metal parts Slow-action U _{imp} 4 kV between terminals of the same polarity, between terminals of different polarity, and between each terminal and non-current-carrying metal parts
Rated insulation voltage (U _i)	400 V (EN60947-5-1)
Switching overvoltage	1,500 V max. (EN60947-5-1)
Pollution degree (operating environment)	3 (EN60947-5-1)
Short-circuit protective device (SCPD)	10 A, fuse type gI or gG (IEC269)
Conditional short-circuit current	100 A (EN60947-5-1)
Conventional enclosed thermal current (I _{the})	10 A (EN60947-5-1)
Protection against electric shock	Class II (double insulation)
Vibration resistance	Malfunction: 10 to 55 Hz, 0.75-mm single amplitude
Shock resistance	Destruction: 1,000 m/s ² min. Malfunction: 300 m/s ² min.
Ambient temperature	Operating: -30°C to 70°C (with no icing)
Ambient humidity	Operating: 95% max.
Weight	Approx. 70 g (for D4D-1120N) Approx. 86 g (for D4D-5120N)

- Note:**
- The above figures are initial values.
 - Life expectancy values are calculated at an operating temperature of 5 to 35°C, and an operating humidity of 40 to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.
 - The mechanical life expectancy of the fork lever lock model is 10,000,000 operations min.

■ Operating Characteristics

Snap-action (1NC/1NO), Slow-action (2NC)

1-conduit and 2-conduit Models

Model	D4D-□120N D4D-□A20N	D4D-□121N D4D-□A21N (see note 1)	D4D-□122N D4D-□A22N	D4D-□127N D4D-□A27N (see note 2)	D4D-□131N D4D-□A31N	D4D-□132N D4D-□A32N	D4D-□162N D4D-□A62N	D4D-□172N D4D-□A72N	D4D-□180N D4D-□A80N	D4D-□187N D4D-□A87N
OF max.	4.90 N	4.22 N	4.90 N	4.22 N	6.37 N		3.92 N	4.41 N	1.47 N	
RF min.	0.49 N	0.42 N	0.49 N	0.42 N	1.47 N		0.78 N	0.88 N	---	
PT	18° to 27°				2 mm max.		4 mm max.		15° max.	
OT min.	40°				4 mm		5 mm		---	
MD max. (see note 3)	14°				1 mm	1 mm	1.5 mm		---	
OP	---				18.2±0.5 mm	28.2±0.8 mm	37±0.8 mm	27±0.8 mm	---	
TT (see note 4)	(70°)				(6 mm)		(9 mm)		---	
POT min. (see note 5)	50°				3.2 mm		5.8 mm	4.8 mm	---	
POF min. (see note 5)	19.61 N				19.61 N				---	

- Note:**
1. The operating characteristics of these switches were measured with the roller lever set at 30 mm.
 2. The operating characteristics of these switches were measured with the roller lever set at 31 mm.
 3. Only for snap-action models.
 4. Nominal value.
 5. Only for slow-action models. POT (positive opening travel) and POF (positive opening force) are required values for positive opening.

Slow-action (1NC/1NO)

1-conduit and 2-conduit Models

Model	D4D-□520N	D4D-□521N (see note 1)	D4D-□522N	D4D-□527N (see note 2)	D4D-□531N	D4D-□532N	D4D-□562N	D4D-□572N
OF max.	4.90 N	4.22 N	4.90 N	4.22 N	6.37 N		3.92 N	4.41 N
RF min.	0.49 N	0.42 N	0.49 N	0.42 N	1.47 N		0.78 N	0.88 N
PT (see note 3)	18° to 27°				2 mm max.		4 mm max.	
PT (2nd) (see note 4)	(44°)				(2.9 mm)		(5.2 mm)	(4.3 mm)
OT min.	40°				4 mm		5 mm	
OP	---				18±0.5 mm	28.2±0.8 mm	37±0.8 mm	27±0.8 mm
TT (see note 5)	(70°)				(6 mm)		(9 mm)	
POT min. (see note 6)	50°				3.2 mm		5.8 mm	4.8 mm
POF min. (see note 6)	19.61 N				19.61 N			

- Note:**
1. The operating characteristics of these Switches were measured with the roller lever set at 30 mm.
 2. The operating characteristics of these Switches were measured with the roller lever set at 31 mm.
 3. Measured with NC side in the OFF state.
 4. PT (2nd) is the distance required before NO contact occurs.
PT (2nd) is the reference value.
 5. Nominal value.
 6. POT (positive opening travel) and POF (positive opening force) are required values for positive opening.

Slow-action (1NC/1NO), Slow-action (2NC)

1-conduit and 2-conduit Models

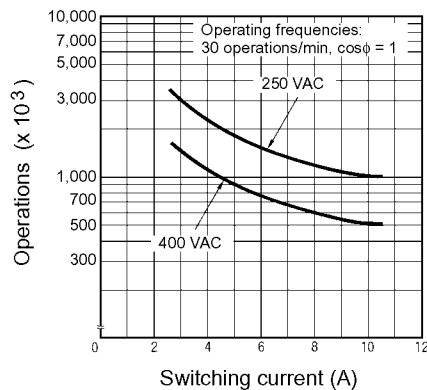
Model	D4D-□□REN	D4D-□□LEN
Force necessary to reverse the direction of the lever: max.	6.37 N	
Movement until the lever reverses	45° to 65°	
Movement until switch operation (NC)	(6.5°)	
Movement until switch operation (NO)	(18.5°)	
POT min.	30°	
POF min.	19.61 N	

- Note:** POT (positive opening travel) and POF (positive opening force) are required values for positive opening.

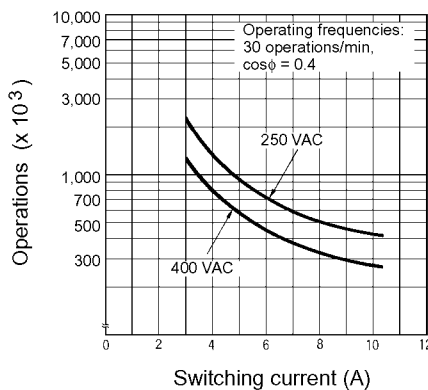
Engineering Data

Electrical Life Expectancy (1NC/1NO Contact, Snap-action)

($\cos\phi = 1$)



($\cos\phi = 0.4$)



Nomenclature

Head

With Roller Lever Switches, the direction of the switch head can be varied to any of the four directions by loosening the roller lever switch screws at the four corners of the head.

Built-in Switch

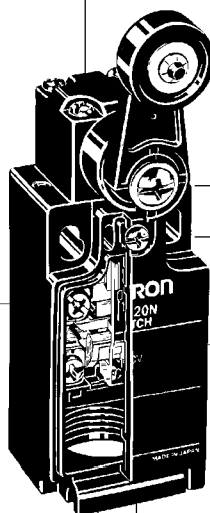
Wide switch variations.
Snap-action: 1NC/1NO
Slow-action: 1NC/1NO
2NC

Conduit Opening

Available in two different types of conduit threads:
Pg 13.5: European standard (1-conduit, 2-conduit)
G 1/2: Japanese standard (1-conduit, 2-conduit)
1/2-14NPT: US standard (1-conduit)

Conduit Cap

Can be used as a simple connector under good environmental conditions.



Safety-oriented Lever Setting

Grooves which engage the lever every 90° are cut in the operation indicator disk to prevent the lever from slipping against the rotary shaft. There are resin-lever and metal-lever types.

Cover

Easy to open and wire. (One mounting screw and opposite side is for hinge mounting.)

Contact Material

Ag alloy

Operation

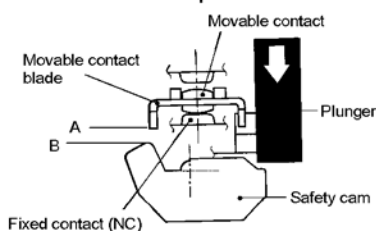
■ Positive Opening Mechanism

1NC/1NO Contact (Snap-action)

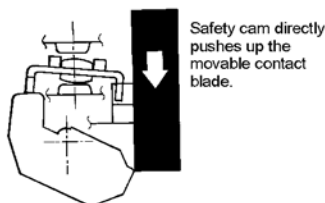
Conforms to EN60947-5-1 Positive Opening 

If metal deposition between mating contacts occurs on the NC contact side, they can be pulled apart by the shearing force and tensile force generated when part B of the safety cam or plunger engages part A of the movable contact blade. When the safety cam or plunger is moved in the direction of the black arrow, the Limit Switch releases.

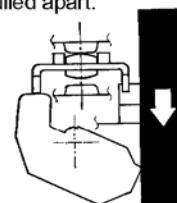
1. When metal deposition occurs.



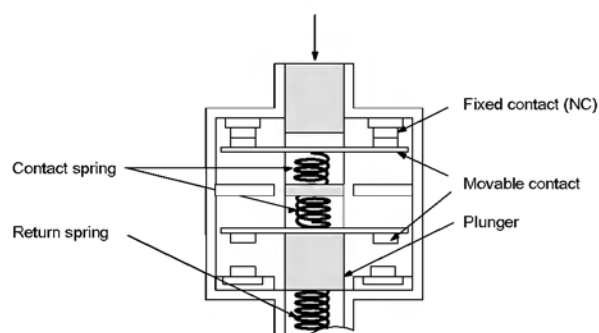
2. When contacts are being pulled apart.



3. When contacts are completely pulled apart.



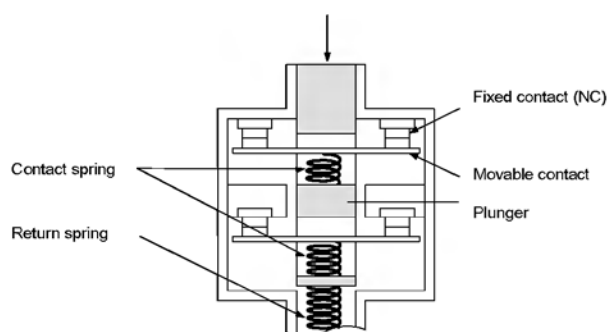
1NC/1NO Contact (Slow-action)



Conforms to EN60947-5-1 Positive Opening 

When metal deposition occurs, the contacts are separated from each other by the plunger being pushed in.

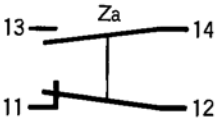
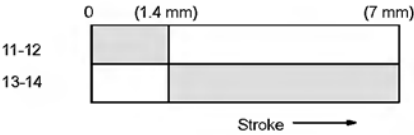
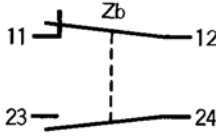
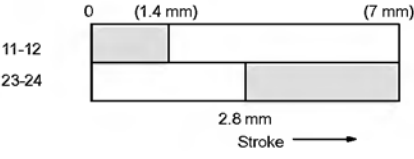
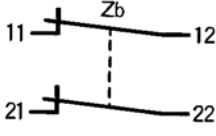
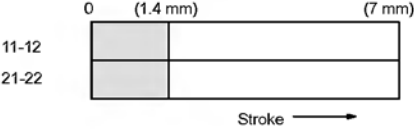
2NC Contact (Slow-action)



Conforms to EN60947-5-1 Positive Opening 

When metal deposition occurs, the contacts are separated from each other by the plunger being pushed in.

■ Contact Form (EN60947-5-1, EN50013)

Model	Contact type	Contact	Diagrams (see note)	Remarks
D4D-□1□N	1NC/1NO (snap-action)			Only NC contact 11-12 has an approved positive opening mechanism. → Terminal numbers 11-12 and 13-14 cannot be used as unlike poles.
D4D-□5□N	1NC/1NO (slow-action)			Only NC contact 11-12 has an approved positive opening mechanism. → Terminal numbers 11-12 and 23-24 can be used as unlike poles.
D4D-□A□N	2NC (slow-action)			Both NC contacts 11-12 and 23-24 have an approved positive opening mechanism. → Terminal numbers 11-12 and 21-22 can be used as unlike poles.

Note: 1. Contact operation

 Closed
  Open

2. Terminal numbers are assigned according to EN50013 and the contact symbols are assigned according to the IEC947-5-1.

Dimensions

■ 1-conduit Models

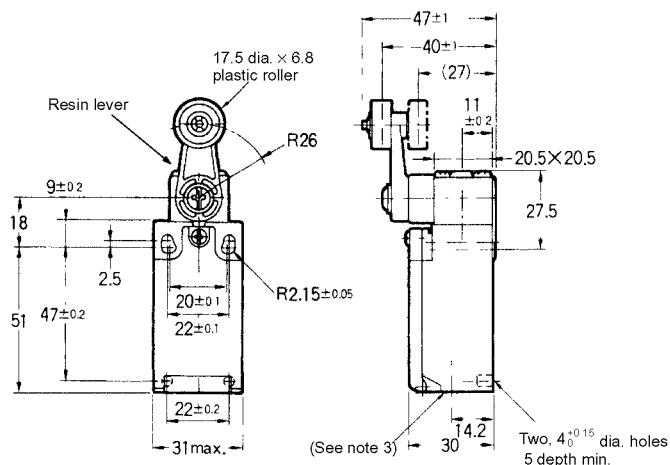
- Note:**
1. All units are in millimeters unless otherwise indicated.
 2. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.
 3. When placing your order, specify the conduit type by adding a code from the list below to the blank box of the following model numbers as shown below.
 - 1: PG 13.5
 - 2: G 1/2
 - 3: 1/2-14NPT

Roller Lever (Resin Lever)

D4D-□120N

D4D-□520N

D4D-□A20N

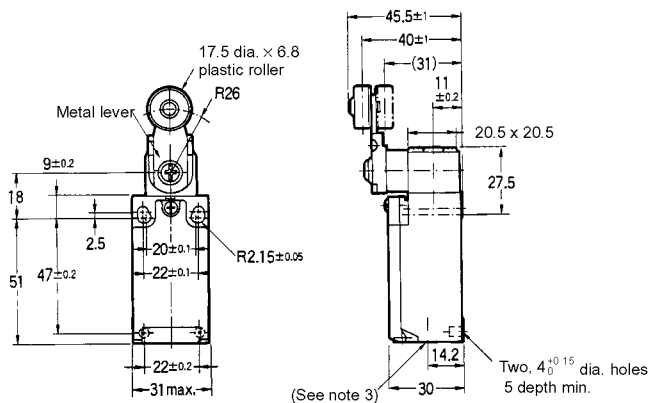


Roller Lever (Metal Lever)

D4D-□122N

D4D-□522N

D4D-□A22N

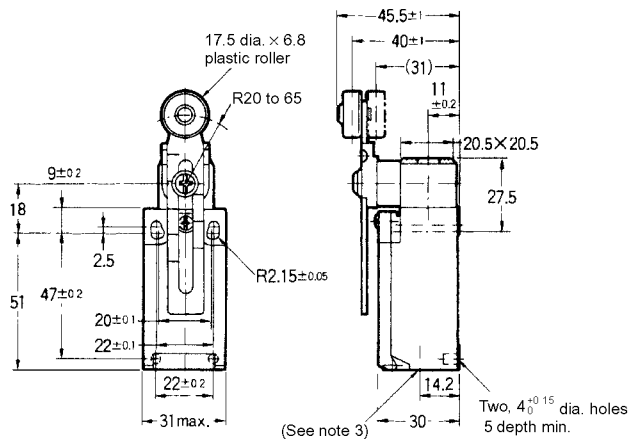
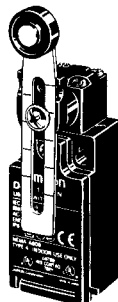


Adjustable Roller Lever

D4D-□121N

D4D-□521N

D4D-□A21N

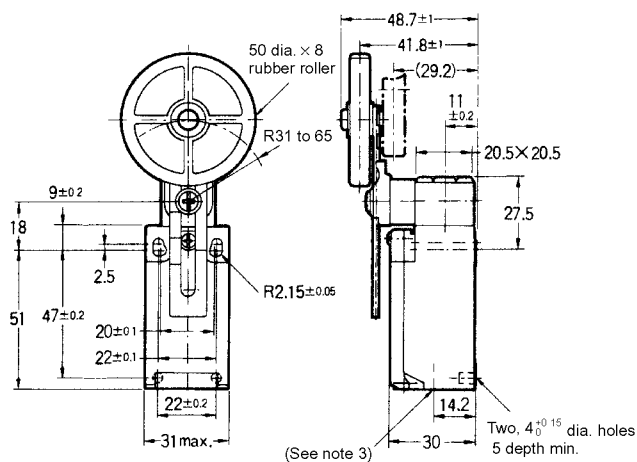
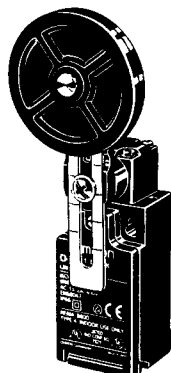


Adjustable Roller Lever (with Rubber Roller)

D4D-□127N

D4D-□527N

D4D-□A27N

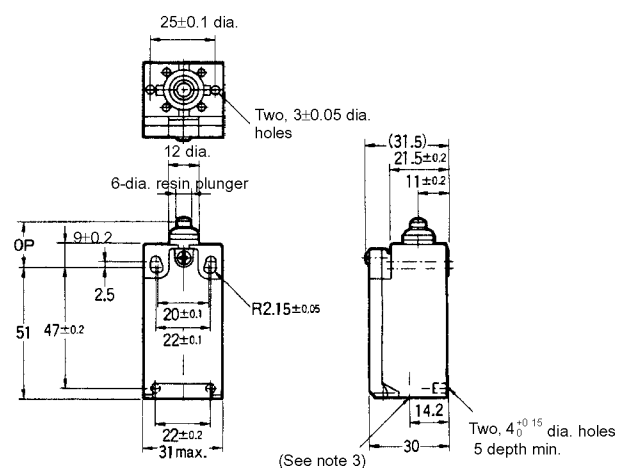


Plunger

D4D-□131N

D4D-□531N

D4D-□A31N

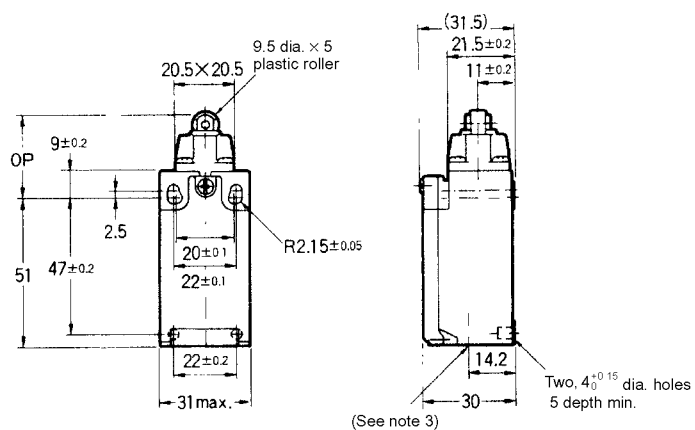


Roller Plunger

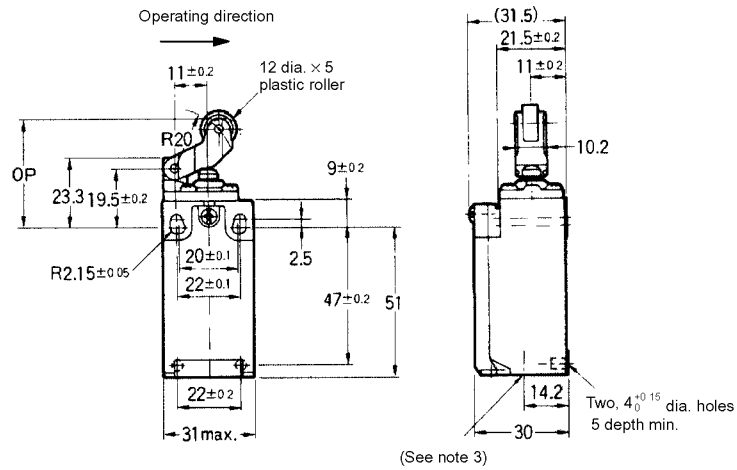
D4D-□132N

D4D-□532N

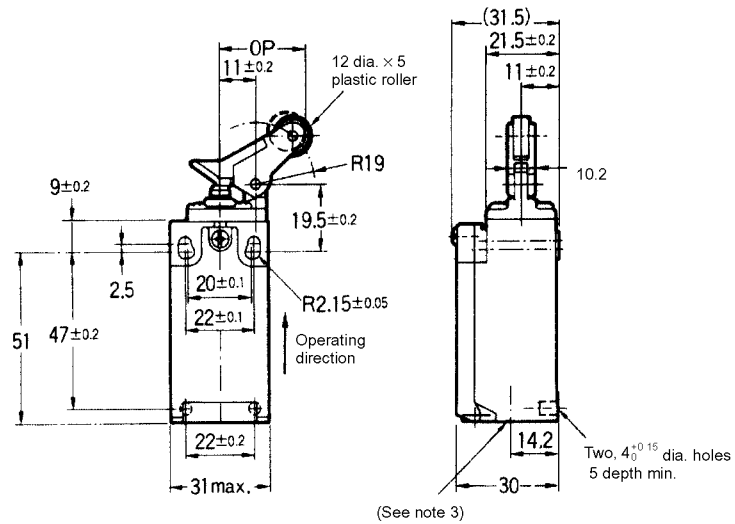
D4D-□A32N



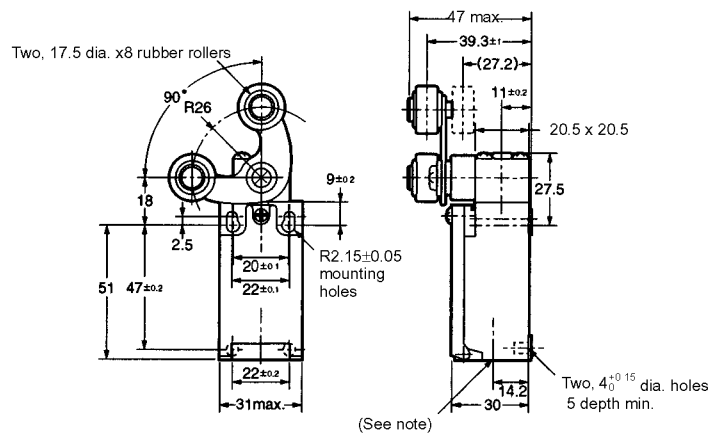
**One-way Roller Arm Lever
(Horizontal)**
D4D-□162N
D4D-□562N
D4D-□A62N



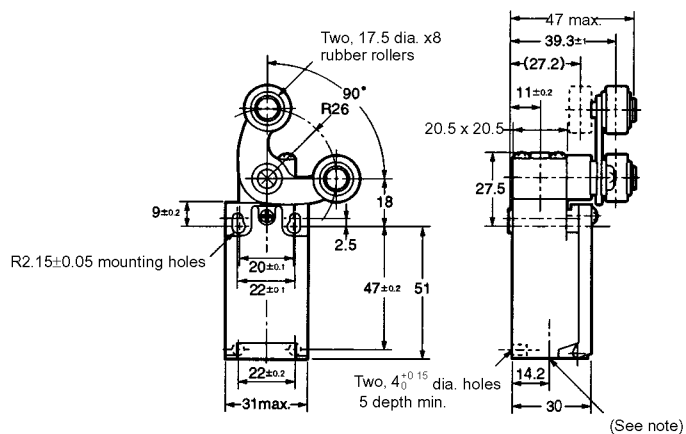
**One-way Roller Arm Lever
(Vertical)**
D4D-□172N
D4D-□572N
D4D-□A72N



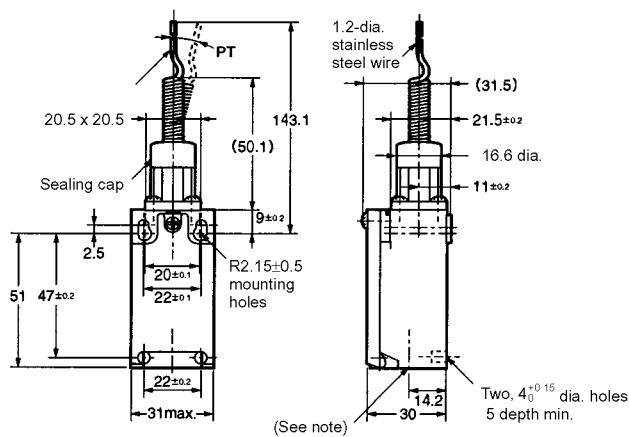
**Fork Lever Lock
(Right Operation)**
D4D-15REN



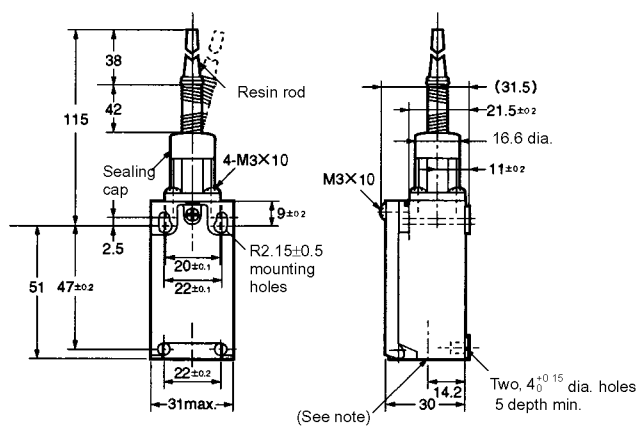
Fork Lever Lock (Left Operation) D4D-15LEN



Cat Whisker D4D-□□80N



Plastic Rod D4D-□□87N



■ 2-conduit Models

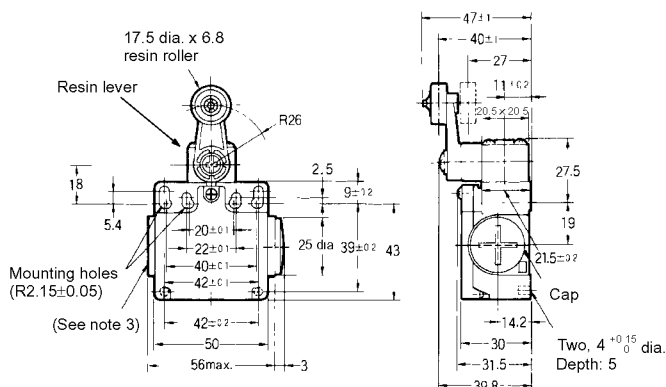
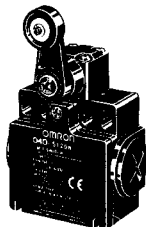
- Note:**
1. All units are in millimeters unless otherwise indicated.
 2. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.
 3. When placing your order, specify the conduit type by adding a code from the list below to the blank box of the following model numbers as shown below.
5: PG 13.5
6: G 1/2
 4. The minimum number of screw threads is five when the Pg13.5 conduit is used and four when the G1/2 conduit is used.

Roller Lever (Resin Lever)

D4D-□120N

D4D-□520N

D4D-□A20N

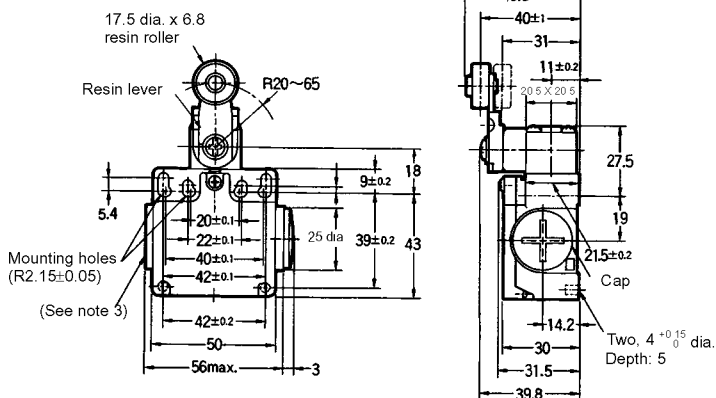


Roller Lever (Metal Lever)

D4D-□122N

D4D-□522N

D4D-□A22N

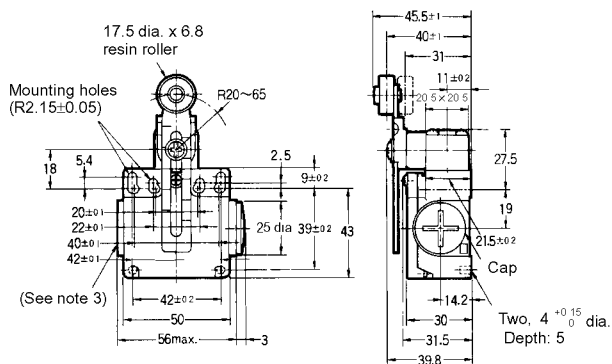
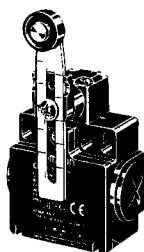


Adjustable Roller Lever

D4D-□121N

D4D-□521N

D4D-□A21N

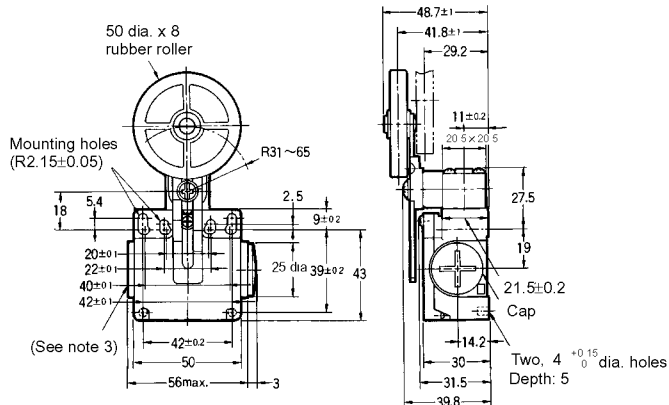
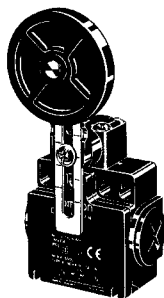


Adjustable Roller Lever (Rubber Roller Lever)

D4D-□127N

D4D-□527N

D4D-□A27N

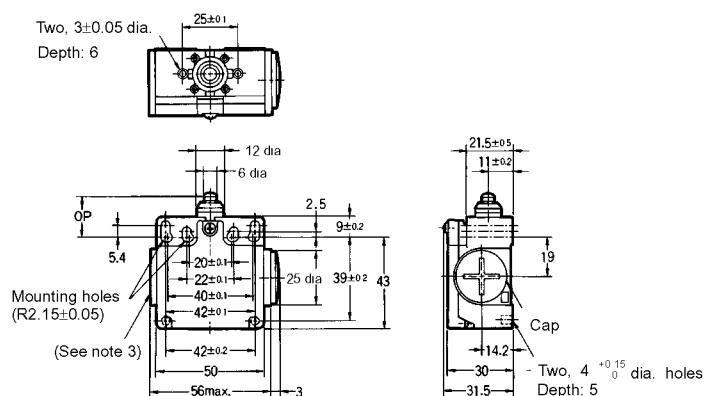
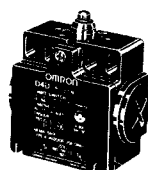


Plunger

D4D-□131N

D4D-□531N

D4D-□A31N

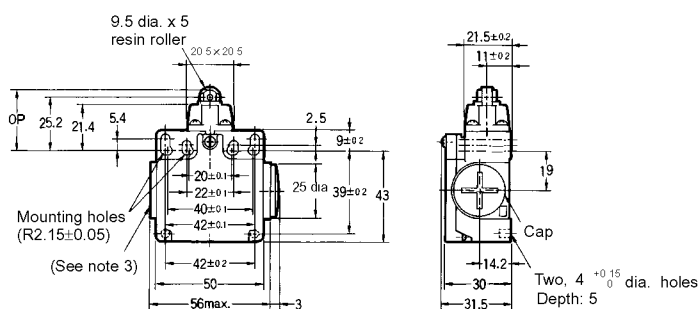
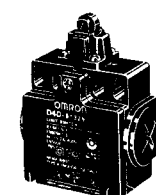


Roller Plunger

D4D-□132N

D4D-□532N

D4D-□A32N

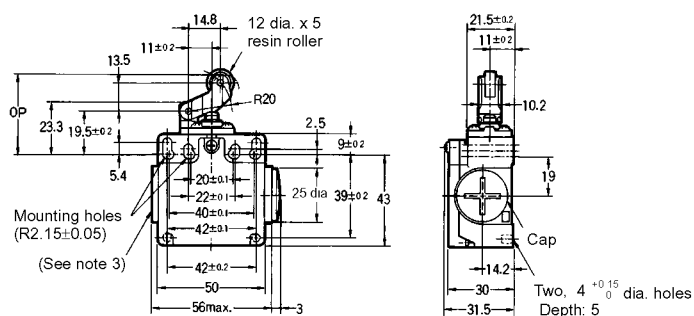
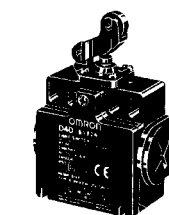


One-way Roller Arm Lever (Horizontal)

D4D-□162N

D4D-□562N

D4D-□A62N

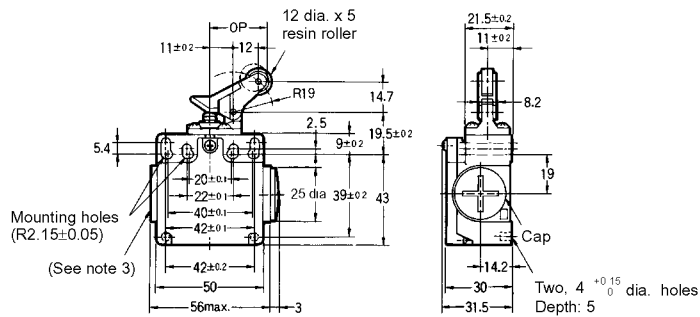


One-way Roller Arm Lever (Vertical)

D4D-□172N

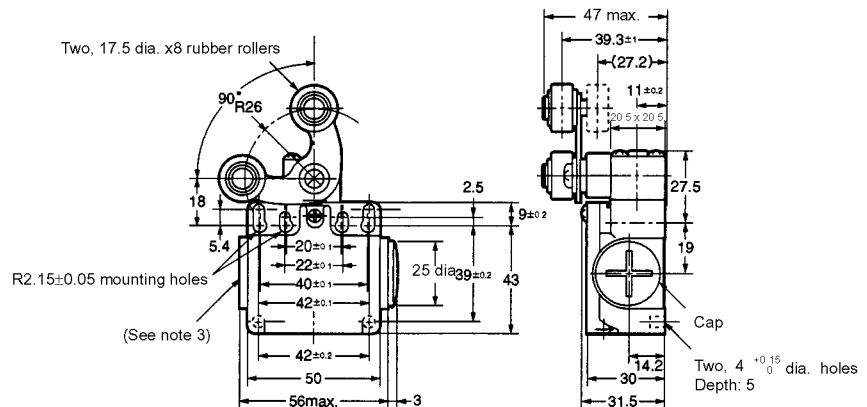
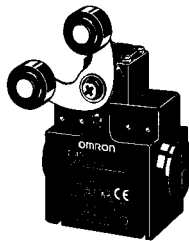
D4D-□572N

D4D-□A72N



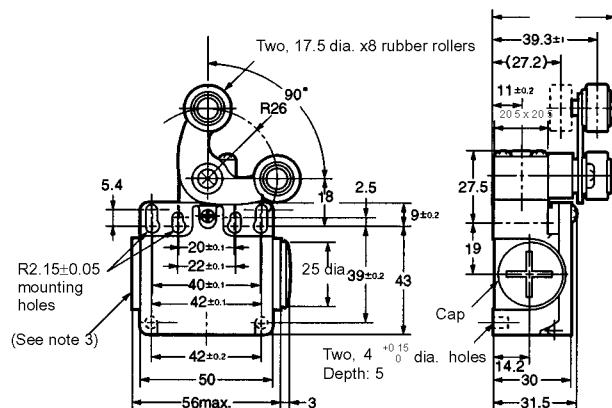
Fork Lever Lock (Right Operation)

D4D-55REN



Fork Lever Lock (Left Operation)

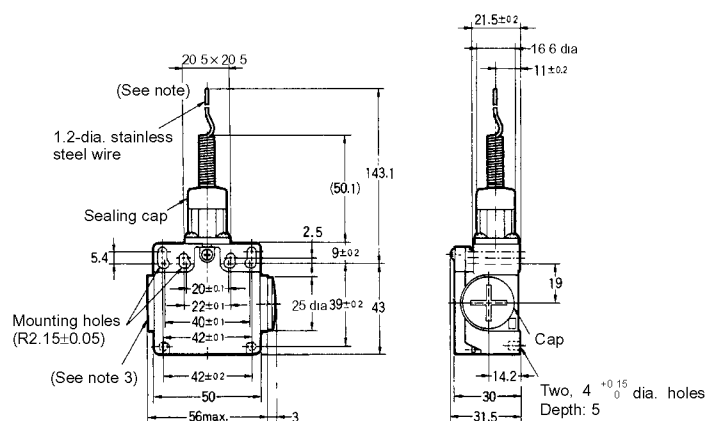
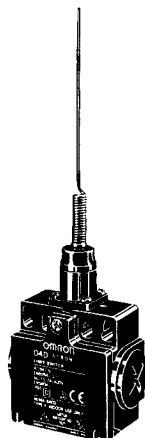
D4D-55LEN



Cat Whisker

D4D-□180N

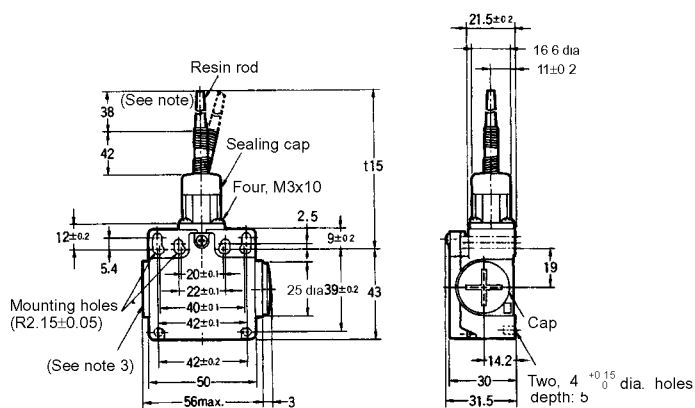
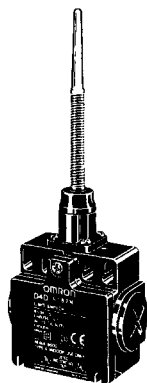
D4D-□A80N



Plastic Rod

D4D-□187N

D4D-□A87N

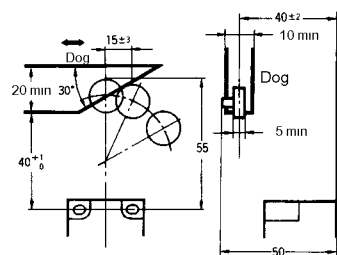


Levers

Refer to the following for the angles and positions of the watchdogs.

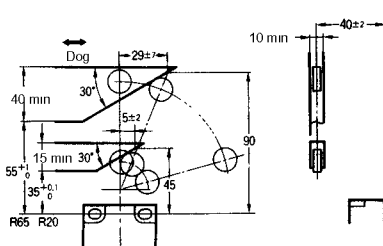
Roller Lever

(D4D-□□20N, D4D-□□22N)

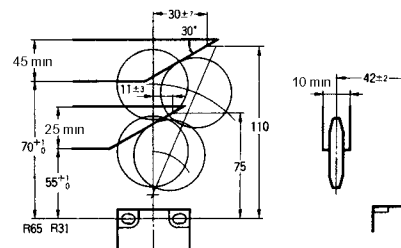


Adjustable Roller Lever

(D4D-□□21N) (Reference Value)

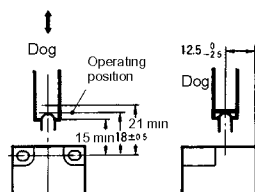
Adjustable Roller Lever
(Rubber Roller Lever)

(D4D-□□27N) (Reference Value)



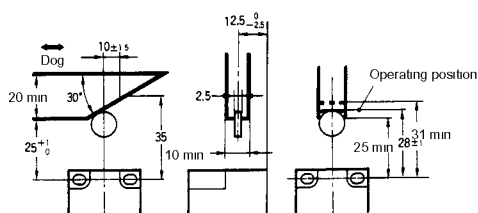
Sealed Plunger

(D4D-□□31N)

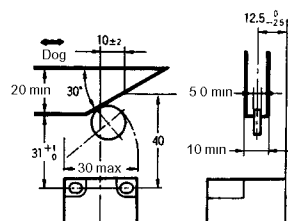


Roller Plunger

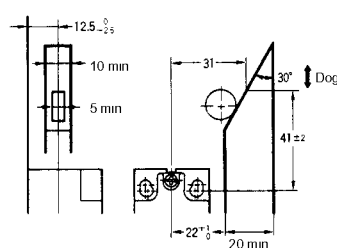
(D4D-□□32N)

One-way Roller Arm Lever
(Horizontal)

(D4D-□□62N)

One-way Roller Arm Lever
(Vertical)

(D4D-□□72N)



Precautions



CAUTION

Do not use metal connectors or conduits to wire the Limit Switch, otherwise the conduit of the Limit Switch may break and an electric shock may be received.

- If the D4D-□N is applied to an emergency stop circuit or safety circuit for prevention of injury, use a D4D-□N model that has an NC contact equipped with a force-separation mechanism, and make sure that the D4D-□N operates in the positive mode. Furthermore, secure the D4D-□N with screws or equivalent parts that are tightened in a single direction so that the D4D-□N cannot be easily removed. Then provide a protection cover for the D4D-□N and post a warning label near the D4D-□N.
- Be sure to connect a fuse with a breaking current 1.5 to 2 times larger than the rated current to the Limit Switch in parallel in order to protect the Limit Switch from damage due to short-circuiting.
- When using the Limit Switch for the EN ratings, use the gI or gG 10-A fuse.

Operating Environment

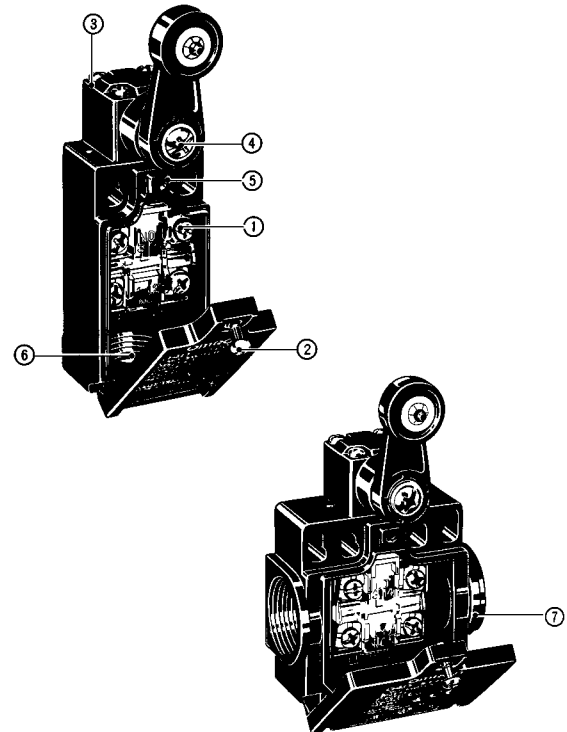
The Limit Switch is intended for indoor use only. Using the Limit Switch outdoors may result in a malfunction.

Correct Tightening Torque

A loose screw may result in a malfunction. Be sure to tighten each screw to the proper tightening torque as shown below.

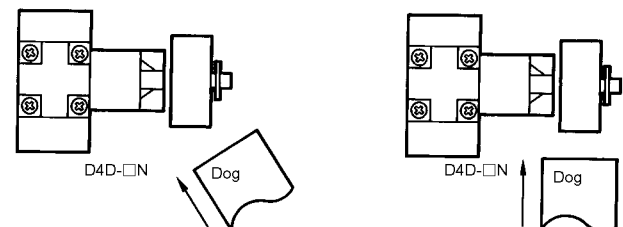
No.	Type	Torque
1	Terminal screw	0.59 to 0.78 N • m
2	Cover mounting screw	0.78 to 0.88 N • m
3	Head mounting screw	0.78 to 0.88 N • m
4	Lever mounting screw	1.57 to 1.77 N • m
5	Switch mounting screw (M4)	0.49 to 0.69 N • m
6	Connector	1.8 to 2.2 N • m 1.37 to 1.77 N • m (see note)
7	Cap screw	1.27 to 1.67 N • m

Note: This applies to the 1/2-14NPT connector.



Operating Method

Use of the Limit Switch at an improper dog angle, operating speed, or operating direction will eventually cause a failure in Limit Switch. Make sure that the dog angle, operating speed, and operating direction are within the specified ranges. Do not set the dog angle to 90°.

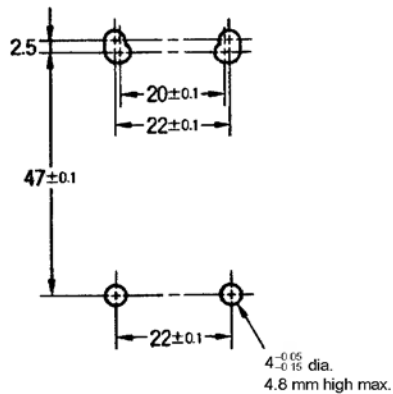


Mounting

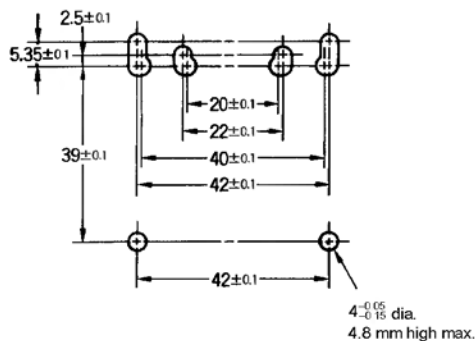
Fasten the Switch with two M4 Allen-head bolts and washers. Provide a stud with a diameter of $4^{-0.05}_{-0.15}$ and a height of 4.8 mm max. at two places as shown below so that the Switch is firmly fixed at four points.

Mounting Holes/Studs

1-conduit Models



2-conduit Models



Changing the Lever Angle

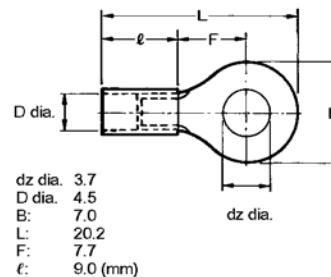
- To change the angle of the lever, loosen the lever mounting screw. Then the lever can be set at any angle in 7.5° increments.
- The length of a variable roller lever can be changed by loosening the lever mounting screw.
- The lever mounting position may be inside out after removing the lever mounting screw. Make sure that the lever will not touch the Switch when the lever is mounted inside out.

Changing the Head Direction

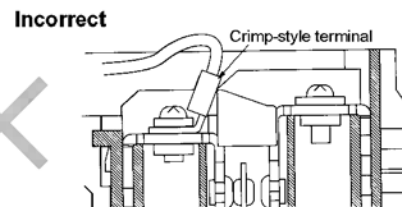
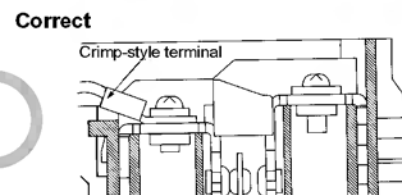
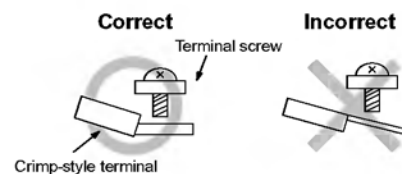
If the head direction has been changed, check the torque of each screw and make sure that the screws are free of foreign substances, and that each screw is tightened to the proper torque.

Wiring

- Do not connect the bare lead wires directly to the terminals but be sure to connect each of them by using an insulation tube and M3.5 round solderless terminals and tighten each terminal screw within the specified torque range.
- The proper lead wire is 20 to 14 AWG (0.5 to 2.5 mm²) in size.



Perform wiring for the crimp terminals in the orientation shown below, so that they are not resting on the case or the cover.



Processing the Conduit Opening

Tighten the connector to a torque of 1.8 to 2.2 N · m (1.37 to 1.77 N · m if it is a 1/2-14NPT). Excessive tightening torque may damage the casing. To satisfy IP65, apply sealing tape to the connector conduit.

The diameter of the cable must be suited to the corresponding connector.

When performing wiring, close conduit openings in any places that will not be used using the cap screws provided as accessories. Tighten the screws to the applicable torque.

Recommended Connector

Conduit size	Manufacturer	Model	Applicable cable diameter
G1/2	OMRON	SC-6	7.5 to 9.0 mm
	LAPP (see note 1)	ST-PF1/2 5380-1002	6.0 to 12.0 mm
	Ohm Denki (see note 2)	OA-W1609	7.0 to 9.0 mm
Pg13.5	LAPP (see note 1)	ST13.5 5301-5030	5.0 to 12.0 mm
1/2-14NPT	LAPP (see note 1)	ST-NPT1/2 5301-6030	6.0 to 12.0 mm

Note: 1. LAPP is a German manufacturer.
2. Ohm Denki is a Japanese manufacturer.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Safety-door Switch

D4DS

**Compact Safety Switch Saves Space
and is Ideal for a Variety of Doors**

- Positive opening mechanism  and double insulation  approved by TÜV and BIA.
- Five-direction Operation Key.
- Approved by UL and CSA standards.
- Switzerland's SUVA approval pending.
- Degree of protection: IP65 (EN60529), Type 4 (UL/CSA) (indoor use only).
- Safety Standards:
 - Conformity:
 - Machinery directive
 - Low voltage directive
 - EN50047
 - EN1088



■ Approved Standards

Agency	Standard	File No.
TÜV Rheinland	EN60947-5-1 	R9551708
UL (see note)	UL508 CSA C22.2 No.14	E76675
BIA	GS-ET-15	1-conduit: 9509915 2-conduit: 9509913
SUVA	SUVA	1-conduit: 6010Z 2-conduit: 6011Z

Note: CSA C22.2 No. 14 compliance was verified and approved by UL (Marked with .

Ordering Information

■ Model Number Legend

Limit Switch
D4DS- S
1 2 3

1. **Conduit**
 - 1: Pg13.5 (1-conduit)
 - 2: G1/2 (1-conduit)
 - 3: 1/2-14NPT (1-conduit)
 - 5: Pg13.5 (2-conduit)
 - 6: G1/2 (2-conduit)
2. **Built-in Switch**
 - 5: 1NC/1NO (Slow-action)
 - A: 2NC (Slow-action)

3. **Head Mounting Direction**
 - F: Four mounting directions possible (Front-side mounting at shipping)

Operation Key
D4DS-K
1

1. **Operation Key Type**
 - 1: Horizontal mounting
 - 2: Vertical mounting
 - 3: Horizontal-adjustable vertical mounting
 - 5: Vertical/Horizontal-adjustable vertical mounting

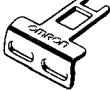
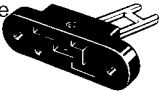
Note: An order for the head part or the switch part alone cannot be accepted. The Operation Key is sold separately.

■ List of Models

Type		Conduit size	1NC/1NO (Slow-action)	2NC (Slow-action)
			Model	Model
1-conduit		Pg13.5	D4DS-15FS	D4DS-1AFS
		G1/2	D4DS-25FS	D4DS-2AFS
		1/2-14NPT	D4DS-35FS	D4DS-3AFS
2-conduit		Pg13.5	D4DS-55FS	D4DS-5AFS
		G1/2	D4DS-65FS	D4DS-6AFS

■ Accessories (Order Separately)

Operation Keys

Type	Model
Horizontal mounting 	D4DS-K1
Vertical mounting 	D4DS-K2
Horizontal-adjustable vertical mounting 	D4DS-K3
Vertical/Horizontal adjustable vertical mounting 	D4DS-K5

Specifications

■ Approved Standard Ratings

TÜV and BIA (EN60947-5-1)

Utilization category	AC-15
Rated operating current (I_e)	2 A
Rated operating voltage (U_e)	400 V

Note: Use a 10-A fuse type gI or gG as a short-circuit protection device that conforms to IEC269.

UL (UL508/CSA C22.2 No.14)

A600

Rated voltage	Carry current	Current		Volt-amperes	
		Make	Break	Make	Break
120 VAC	10 A	60 A	6 A	7,200 VA	720 VA
240 VAC		30 A	3 A		
480 VAC		15 A	1.5 A		
600 VAC		12 A	1.2 A		

■ Characteristics

Degree of protection (see note 1)	IP65 (EN60947-5-1)
Life expectancy (see note 2)	Mechanical: 1,000,000 operations min. Electrical: 150,000 operations min.
Operating speed	0.1 m/s to 0.5 m/s
Contact gap	2 x 2.0 mm min.
Operating frequency	30 operations/minute min.
Positive opening force (see note 3)	58.84 N min.
Positive opening travel (see note 3)	10 mm min.
Insulation resistance	100 M Ω min. (at 500 VDC) between terminals of same polarity, between terminals of different polarity, between each terminal and ground, and between each terminal and non-current-carrying metal part
Contact resistance	25 m Ω max. (initial value)
Dielectric strength	U_{imp} 4 kV between terminals of same polarity, between terminals of different polarity, and between each terminal and non-current-carrying metal part (EN60947-5-1)
Rated insulation voltage (U_i)	400 V (EN60947-5-1)
Conditional short-circuit current	100 A (EN60947-5-1)
Short-circuit protective device (SCPD)	10 A, fuse type gI or gG (IEC269)
Switching overvoltage	1,500 V max. (EN60947-5-1)
Pollution degree (operating environment)	3 (EN60947-5-1)
Conventional enclosed thermal current (I_{the})	10 A (EN60947-5-1)
Protection against electric shock	Class II (double insulation)
Vibration resistance	Malfunction: 10 to 500 Hz, 0.65-mm single amplitude with an imposed acceleration of 100 m/s ² max.
Shock resistance	Destruction: 1,000 m/s ² min. Malfunction: 300 m/s ² min.
Ambient temperature	Operating: -30°C to 70°C (with no icing)
Ambient humidity	Operating: 95% max.
Weight	Approx. 76 g (for D4DS-15FS)

- Note:**
- Although the Switch casing resists dust, oil, and water, make sure that the keyhole on the head is free from dust, oil, water, and chemical, otherwise the D4DS may wear out, break, or malfunction.
 - Life expectancy values are calculated at an operating temperature of 5°C to 35°C, and an operating humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.
 - These figures are minimum requirements for safe operation.

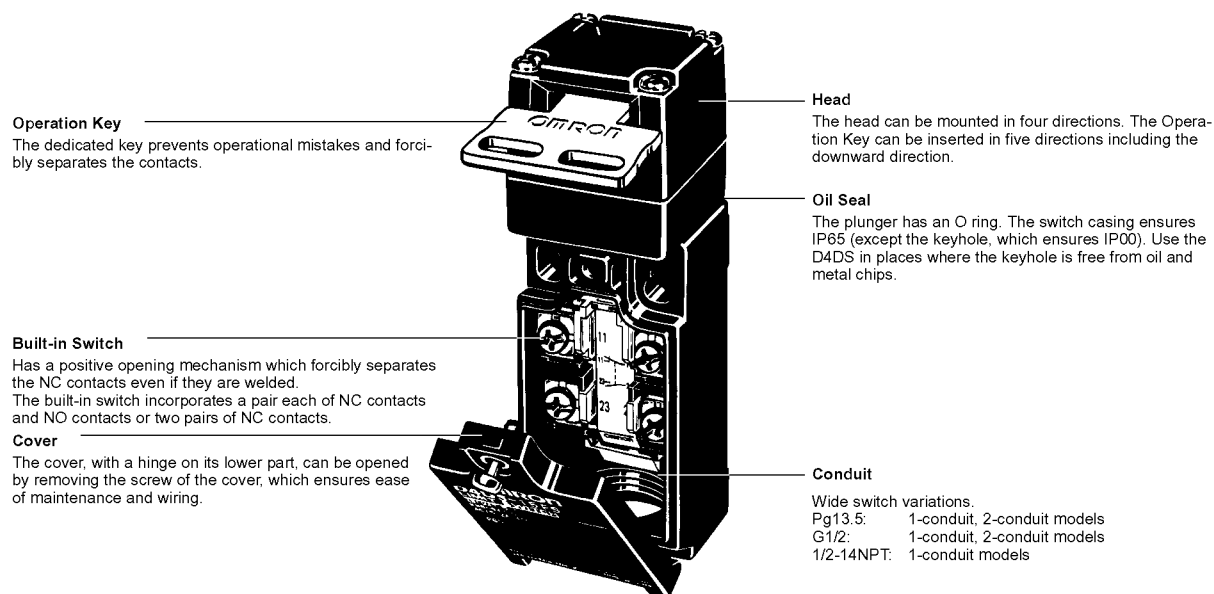
■ Operating Characteristics

1-conduit/2-conduit Models

Model	D4DS-1□□S/D4DS-2□□S/D4DS-3□□S	D4DS-5□□S/D4DS-6□□S/D4DS-7□□S
Operating force (extraction)	14.71 N	
Release force (insertion)	29.42 N	
Pretravel	6±3 mm	
Total travel (reference value)	28 mm	
Min. positive opening force (see note)	58.84 N	
Min. positive opening stroke (see note)	10 mm	

Note: Make sure that the positive opening stroke is at least 16 mm in order to use the D4DS safely.

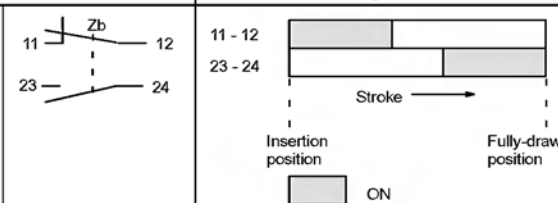
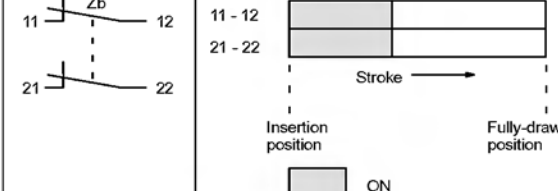
Nomenclature



Note: The housing and head of the D4DS are made of synthetic resin. If high mechanical durability is required, use the D4BS Safety Door Switch.

Operation

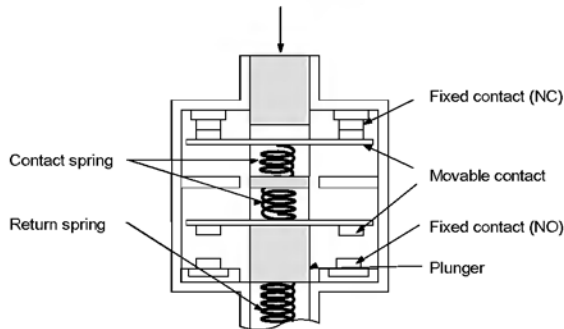
■ Contact Form

Model	Contact	Diagrams	Remarks
D4DS-□5□S	1NC/1NO		Only NC contact 11-12 has an approved positive opening mechanism. The terminals 11-12 and 23-24 can be used as opposing poles. ⊕
D4DS-□A□S	2NC		NC contacts 11-12 and 21-22 have an approved positive opening mechanism. The terminals 11-12 and 23-24 can be used as opposing poles. ⊕

Note: Terminals are numbered according to EN50013 and contacts are marked according to EN60947-5-1.

■ Positive Opening Mechanism

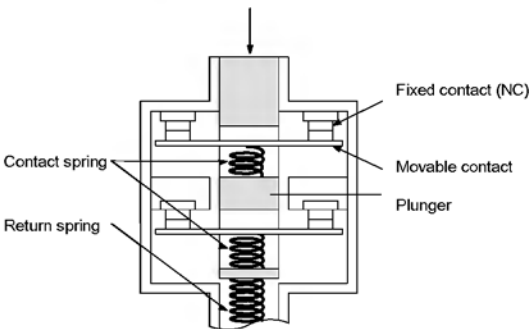
1NC/1NO Contact (Slow-action)



Only the NC contacts have a positive opening function. When metal deposition occurs, the contacts are separated from each other by pushing in the plunger.

Conforms to EN60947-5-1 Positive Opening ⊕

2NC Contact (Slow-action)



Both NC contacts incorporate a positive opening function. When metal deposition occurs, the contacts are separated from each other by pushing in the plunger.

Conforms to EN60947-5-1 Positive Opening ⊕

Note: The switches are marked with “⊕” indicating approval for the positive opening mechanism.

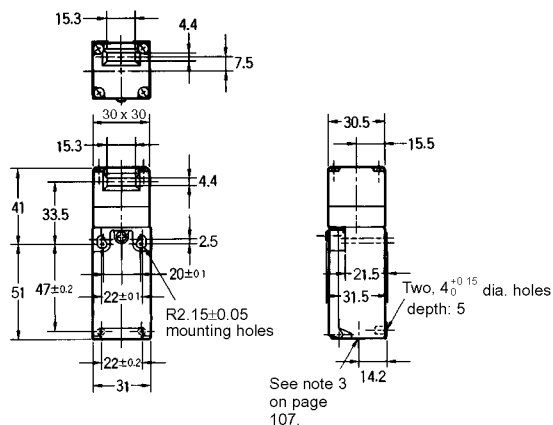
Dimensions

- Note:**
1. All units are in millimeters unless otherwise indicated.
 2. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.
 3. The conduit thread varies with the model as follows:

Conduit thread	Model
Pg13.5	D4DS-1□□S/-5□□S
G1/2	D4DS-2□□S/-6□□S
1/2-14NPT	D4DS-3□□S

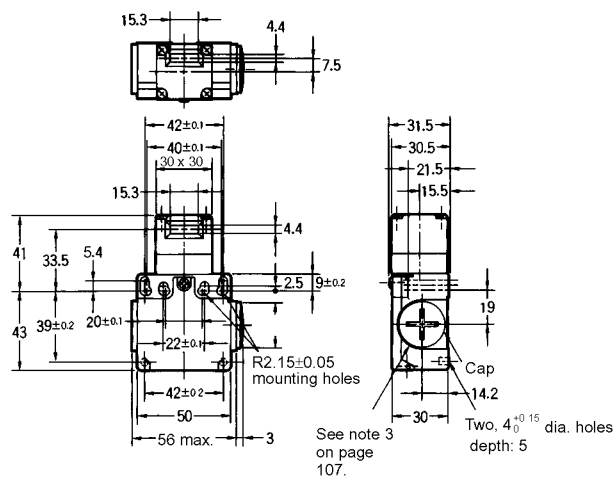
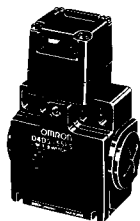
1-conduit Models

D4DS-1□□S
D4DS-2□□S
D4DS-3□□S

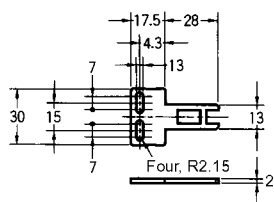
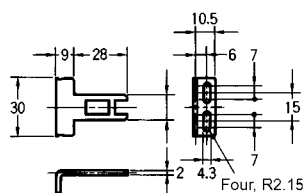
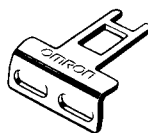
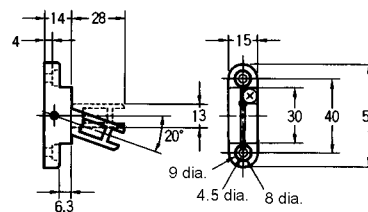
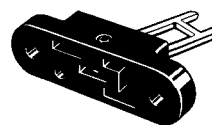


2-conduit Models

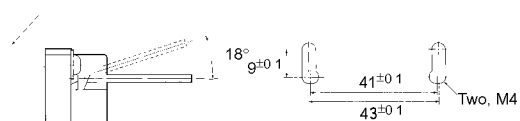
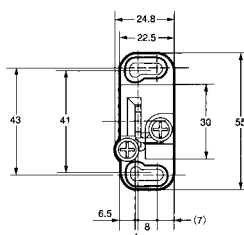
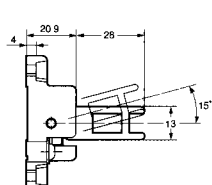
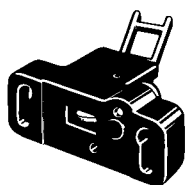
D4DS-5□□S
D4DS-6□□S



Operation Keys

D4DS-K1
Horizontal MountingD4DS-K2
Vertical MountingD4DS-K3
Horizontal-adjustable Vertical Mounting

Note: Each dimension has a tolerance of ± 0.4 mm unless otherwise specified.

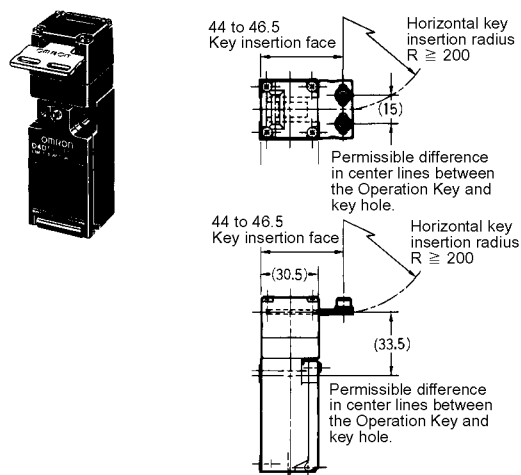
D4DS-K5
Horizontal/Vertical-adjustable Vertical Mounting

Mounting Holes

With Operation Key Inserted

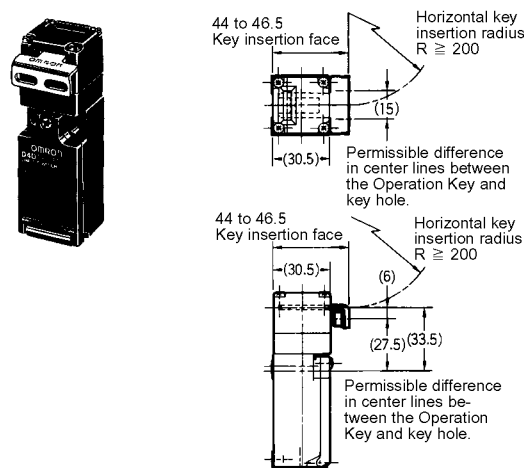
Horizontal Mounting

D4DS-1□□S + D4DS-K1
 D4DS-2□□S + D4DS-K1
 D4DS-3□□S + D4DS-K1
 D4DS-5□□S + D4DS-K1
 D4DS-6□□S + D4DS-K1



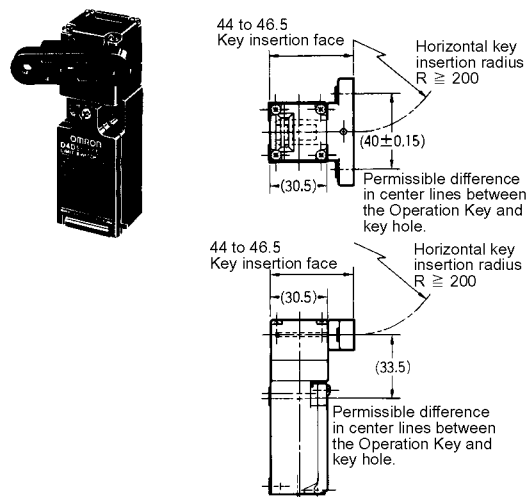
Vertical Mounting

D4DS-1□□S + D4DS-K2
 D4DS-2□□S + D4DS-K2
 D4DS-3□□S + D4DS-K2
 D4DS-5□□S + D4DS-K2
 D4DS-6□□S + D4DS-K2



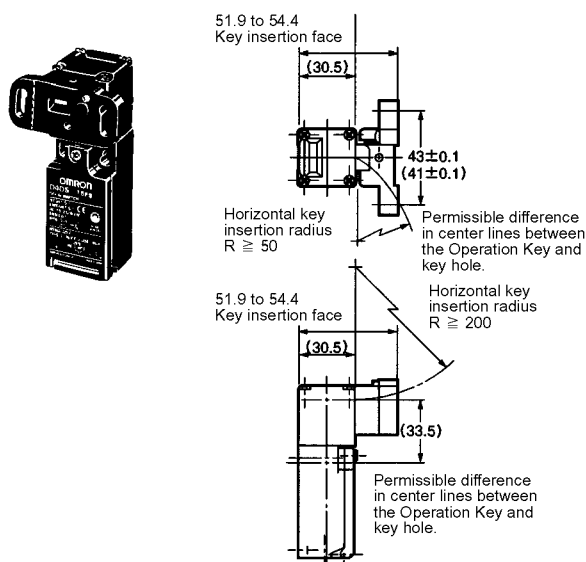
Horizontal-adjustable Vertical Mounting

D4DS-1□□S + D4DS-K3
 D4DS-2□□S + D4DS-K3
 D4DS-3□□S + D4DS-K3
 D4DS-5□□S + D4DS-K3
 D4DS-6□□S + D4DS-K3



Horizontal/Vertical-adjustable Vertical Mounting

D4DS-1□□S + D4DS-K5
 D4DS-2□□S + D4DS-K5
 D4DS-3□□S + D4DS-K5
 D4DS-5□□S + D4DS-K5
 D4DS-6□□S + D4DS-K5



Precautions



CAUTION

Do not dismount the operation key from the door intentionally and insert it to the switch with the door open. Machine may start operating and injury or death may be caused.

Do not use metal connectors or conduits with this switch. Rigid connectors and conduits may damage the switch. The broken conduit hole may cause an electrical shock hazard.

Install the operation key so that it will not hit the operator when the door is open.

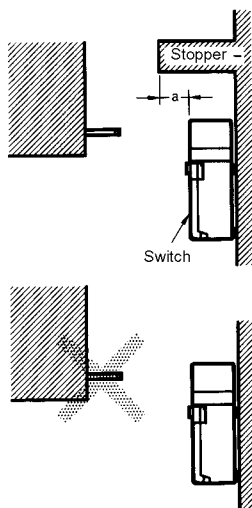
If the D4DS is to be used as a switch in an emergency stop circuit or in a safety circuit for preventing accidents resulting in injuries or deaths, use NC contacts with a forced release mechanism and set the D4DS so that it will operate in positive opening mode. For safety, install the Switch and the Operation Key using one-way rotational screws or other similar means to prevent them from easily coming off. Protect the D4DS with an appropriate cover and post a warning sign near the D4DS in order to ensure the safety of the door.

To prevent the D4DS from damage due to circuit short-circuiting, connect a fuse with a breaking current 1.5 to 2 times larger than the rated current of the D4DS in series to the D4DS.

If the D4DS is used under EN-approved conditions, use a gI or gG 10-A fuse approved by IEC269.

Mounting

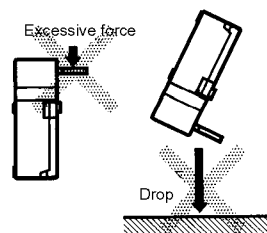
Be sure to mount the D4DS with a stopper as shown in the following illustration. Do not use the casing of the D4DS as a stopper. Be sure to install the stopper so that the space "a" will be a maximum of 3 mm.



Operation Key

Be sure to use a special Operation Key only. Do not operate the D4DS with anything other than the special Operation Key, otherwise the D4DS may break or the safety of the system may not be maintained.

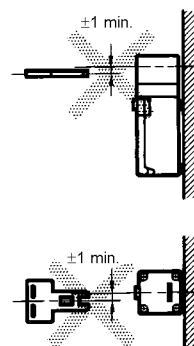
Do not impose excessive force on the Operation Key inserted into the D4DS or drop the D4DS with the Operation Key inserted, otherwise the Operation Key may deform or break.



Secure the Operation Key with screws so that the Operation Key cannot be removed with ease.

Refer to *Dimensions* for the mounting dimensions of the Operation Key and properly mount and the Operation Key correctly so that the position and angle will be correct.

Make sure that the Operation Key can be inserted properly with a tolerance of ± 0.5 mm in the upward, downward, left, or right direction, otherwise the D4DS may soon become damaged.



■ Correct Use

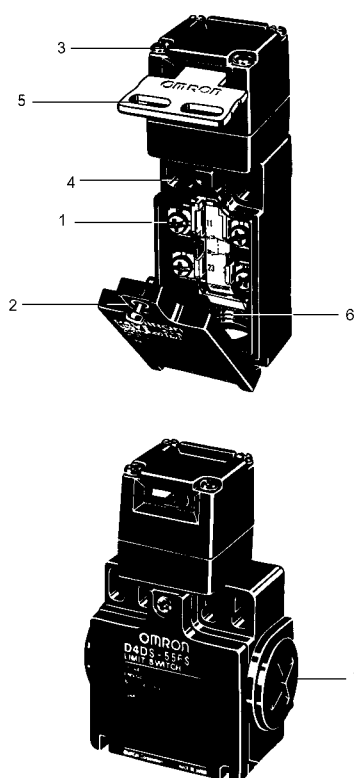
Operating Environment

Do not use the D4DS in the following environments, otherwise the D4DS may malfunction.

- Locations subject to significant temperature fluctuations
- Humid locations where there is a risk of condensation
- Locations subject to significant vibrations
- Locations subject to metal chips, oils, and chemicals inside a protective door

Tightening Torque

Be sure to tighten each screw to the appropriate tightening torque as shown below.



No.	Type	Torque
1	Terminal screw	0.59 to 0.78 N • m
2	Cover mounting screw	0.78 to 0.88 N • m
3	Head mounting screw	0.78 to 0.88 N • m
4	M4 switch mounting bolt (see note 1)	0.49 to 0.69 N • m
5	Operation Key mounting screw	2.35 to 2.75 N • m
6	Connector	1.8 to 2.2 N • m 1.37 to 1.77 N • m (see note 2)
7	Cap screw	1.27 to 1.67 N • m

Note: 1. Tighten each screw with a washer and use the appropriate tightening torque.
2. This force range applies to 1/2-14NPT.

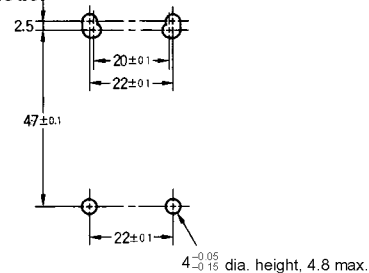
Mounting

Switch

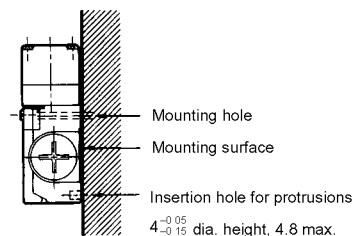
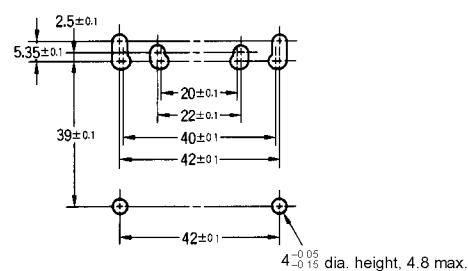
Two, M4 Allen-head bolts with washers must be used in order to mount the D4DS securely. To mount the D4DS more securely, prepare two, $4 \begin{smallmatrix} -0.05 \\ -0.15 \end{smallmatrix}$ dia. protruding portions with 4.8 mm maximum in height each as shown below and support the D4DS at a total of four points.

Mounting Dimensions with Protruding Portions

Standard Model



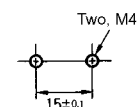
Two-conduit Model



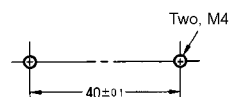
Operation Key

Mounting Dimensions

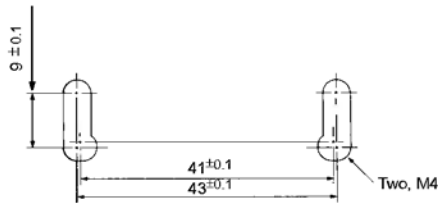
- Horizontal/Vertical Mounting
D4DS-K1 or D4DS-K2



- Horizontal-adjustable Vertical Mounting
D4DS-K3

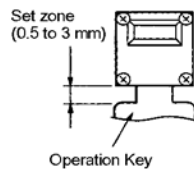


• Horizontal/Vertical-adjustable Vertical Mounting D4DS-K5



Securing the Door

When the door is closed (with the Operation Key inserted), the door (or the Operation Key) may be pushed back across the set zone due to the door's weight, the door cushion rubber, etc. If load is applied to the Operation Key, the door may fail to unlock. Secure the door with hooks so that it will remain within in the set zone.



Changes in Head Mounting Direction

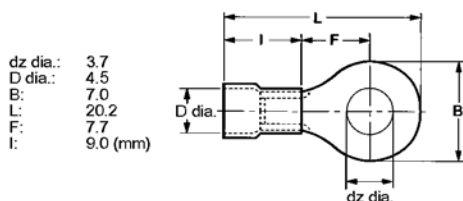
By removing the screws on the four corners of the head, the head can be reset in any of four directions.

When changing the head mounting direction, make sure that the Operation Key is in the head.

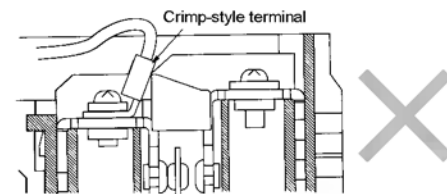
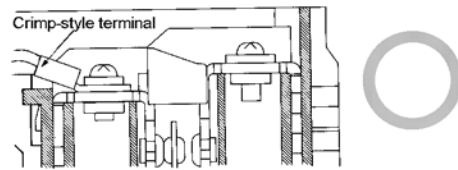
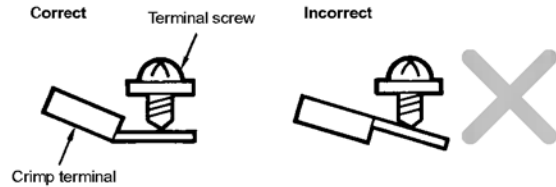
Make sure that no foreign materials penetrate through the mounting holes of the head. Internal screws of the head must not be removed, otherwise the internal parts of the head may be lost or deformed.

Wiring

Do not connect lead wires directly to the terminals. Be sure to connect the lead wires through insulation tubes and crimp terminals., and tighten each terminal screw within an optimum torque range. The lead wires must be an AWG20 to AWG14 type (i.e., 0.5 to 25 mm² thick).



Wire the crimp terminal as shown in the following diagram so that it will not come in contact with the case or cover.



Conduit Opening

Tighten the connector to a torque of 1.8 to 2.2 N • m (1.37 to 1.77 N • m if it is a 1/2-14NPT). Excessive tightening torque may damage the casing. In order to continue satisfying IP65, apply sealing tape to the connector conduit.

The diameter of the cable must be suited to the corresponding connector.

Properly attach the provided conduit cap to the unused conduit opening and securely tighten the cap screw within a torque range between 1.27 and 1.67 N • m when wiring the D4DS two-conduit model.

Recommended Connector

Size	Manufacturer	Model	Suitable cable dia.
G1/2	OMRON	SC-6	7.5 to 9.0 mm
	LAPP (see note 1)	ST-PF1/2 5360-1002	6.0 to 12.0 mm
	Ohm Electric	OA-W1609	7.0 to 9.0 mm
Pg13.5	LAPP (see note 1)	ST13.5 5301-5030	5.0 to 12.0 mm
1/2-14NPT	LAPP (see note 1)	ST-NPT1/2 5301-6030	6.0 to 12.0 mm

Note: 1. LAPP is a German manufacturer.

2. Ohm Denki is a Japanese manufacturer.

Maintenance and Repairs

The user must not maintain or repair equipment incorporating any D4DS model. Contact the manufacturer of the equipment for any maintenance or repairs required.

The user must not maintain or repair equipment incorporating any D4DS model. Contact the manufacturer of the equipment for any maintenance or repairs required.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Economical, High Utility Enclosed Switch

- High precision and long life (10,000,000 mechanical operations) through employment of the moving spring used in OMRON Z Basic Switch.
- Sealed with gasket diaphragm to provide high sealing property without use of any adhesive or pin.
- Suitable for applications demanding higher mechanical strength, dustproof and drip-proof properties than those on basic switches.
- Panel mount versions have the same operating position as Z Basic Switch.
- Resin molded terminal versions are available.



CE RC

Ordering Information

Model Number Legend

D4MC-

1

1. Actuator

- 5000: Panel mount plunger
- 5020: Panel mount roller plunger
- 5040: Panel mount crossroller plunger
- 1020: Short hinge lever
- 1000: Hinge lever
- 2000: Hinge roller lever
- 2020: Short hinge roller lever
- 3030: One-way action short hinge roller lever

List of Models

Actuator		Model
Panel mount plunger		D4MC-5000
Panel mount roller plunger		D4MC-5020
Panel mount crossroller plunger		D4MC-5040
Short hinge lever		D4MC-1020
Hinge lever		D4MC-1000
Hinge roller lever		D4MC-2000
Short hinge roller lever		D4MC-2020
One-way action short hinge roller lever		D4MC-3030

- Note:**
1. Use molded terminal models (refer to page 6) when using the Switch under one of the following conditions:
 - a) dusty, b) high amount of dripping oil, or c) high humidity
 2. Micro-load models are available.

e.g. <u>Standard model</u>	<u>Micro-load model</u>
D4MC-5020	D4MC-5020-C

Specifications

■ Ratings

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	10 A		3 A	1.5 A	10 A		5 A	2.5 A
250 VAC	10 A		2.5 A	1.25 A	10 A		3 A	1.5 A
480 VAC	3 A		1.5 A	0.75 A	2.5 A		1.5 A	0.75 A
8 VDC	10 A		3 A	1.5 A	6 A		5 A	2.5 A
14 VDC	10 A		3 A	1.5 A	6 A		5 A	2.5 A
30 VDC	6 A		3 A	1.5 A	5 A		5 A	2.5 A
125 VDC	0.5 A		0.4 A		0.05 A		0.05 A	
250 VDC	0.25 A		0.2 A		0.03 A		0.03 A	

Inrush current	NC	30 A max.
	NO	15 A max.

- Note:**
1. The above figures are for steady-state currents.
 2. Inductive loads have 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 above ratings were tested under the following conditions according to JIS C4508.
 Ambient temperature: 20±2°C
 Ambient humidity: 65±5%
 Operating frequency: 20 operations/min

■ Approved Standard Ratings

UL/CSA

A300

Rated voltage	Carry current	Current		Volt-amperes	
		Make	Break	Make	Break
120 VAC	10 A	60 A	6 A	7,200 VA	720 VA
240 VAC		30 A	3 A		

Micro load: 0.1 A, 125 VAC
 0.1 A, 30 VDC

EN60947-1 and EN60947-5-1

250 V, 10 A (AC-12)

■ Characteristics

Degree of protection	IP67 (NEMA250: 6.6P)
Life expectancy	Mechanical: 10,000,000 operations min. Electrical: 500,000 operations min.
Operating speed	0.05 mm/s to 0.5 m/s (at panel mount plunger)
Operating frequency	Mechanical: 120 operations/min Electrical: 20 operations/min
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	15 mΩ max. (initial value)
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 current-carrying metal parts and ground, and between each terminal and non-current-carrying part
Rated insulation voltage (U _i)	1,000 VAC
Pollution degree (operating environment)	3 (IEC947-5-1)
Protection against electric shock	Class II
PTI (tracking characteristics)	175
Switch category	D (IEC335)
Rated operating current (I _e)	10 A
Rated operating voltage (U _e)	250 VAC
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note)
Shock resistance	Destruction: 1,000 m/s ² min. Malfunction: 100 m/s ² min. (in case of plunger) (see note)
Ambient temperature	Operating: -10°C to 80°C (with no icing)
Ambient humidity	Operating: 35% to 95%
Weight	Approx. 71 g (at panel mount plunger)

Note: Less than 1 ms under a free state at the operating limits.

■ Approved Standards (Except Molded Terminal Models)

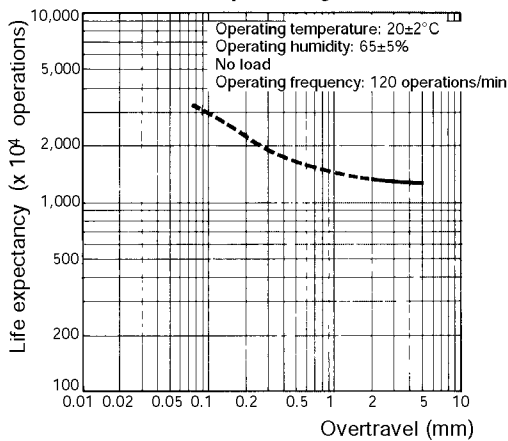
UL (File No. E76675)/CSA (File No. E45258)

■ Operating Characteristics

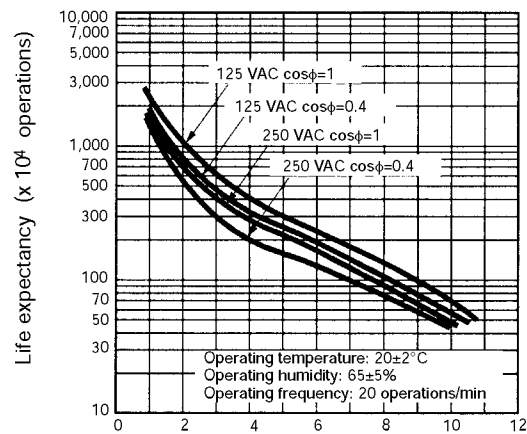
Model	D4MC-5000	D4MC-5020	D4MC-5040	D4MC-1020	D4MC-1000	D4MC-2000	D4MC-2020	D4MC-3030
OF max.	5.88 N	5.88 N		2.55 N	1.67 N	1.96 N	2.94 N	2.94 N
RF min.	0.98 N	0.98 N		0.34 N	0.25 N	0.39 N	0.39 N	0.39 N
PT max.	1.6 mm	1.6 mm		---	---	---	---	---
OT min.	5 mm	5 mm		2.5 mm	4 mm	5 mm	2 mm	2 mm
MD max.	0.2 mm	0.2 mm		1.7 mm	3 mm	3 mm	1.5 mm	1.5 mm
OP	21.8±1.2 mm	33.4±1.2 mm		25±1 mm	25±1 mm	40±1 mm	40±1 mm	50±1 mm
FP max.	---	---		33 mm	36 mm	51 mm	47 mm	57.2 mm

Engineering Data (Reference Data)

Mechanical Life Expectancy (D4MC-5000)

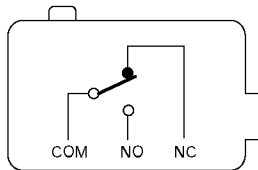


Electrical Life Expectancy



Operation

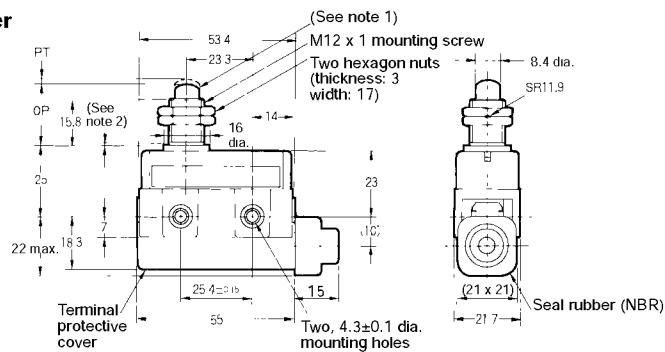
■ Contact Form



Dimensions

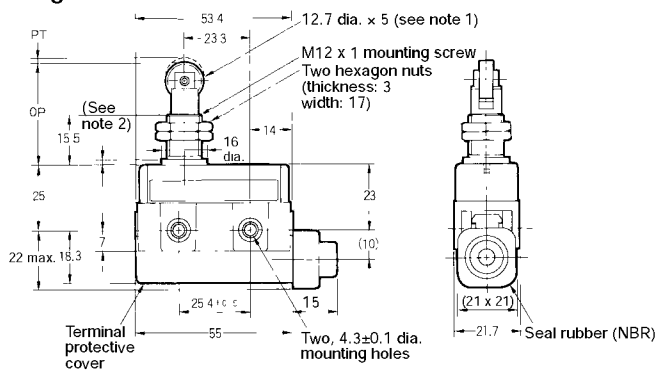
- Note:**
1. All units are in millimeters unless otherwise indicated.
 2. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.

Panel Mount Plunger D4MC-5000



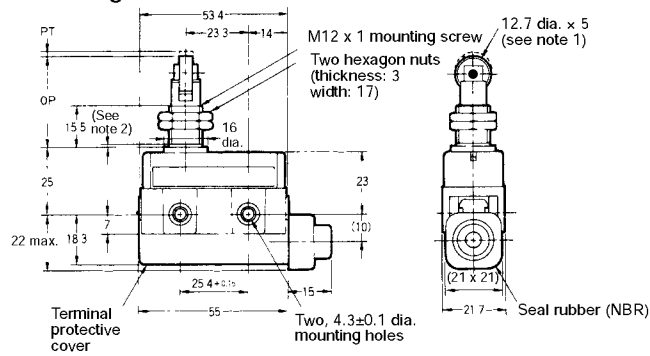
- Note:**
1. Stainless steel plunger
 2. The length of the imperfect threads is 1.5 mm maximum.

Panel Mount Roller Plunger D4MC-5020



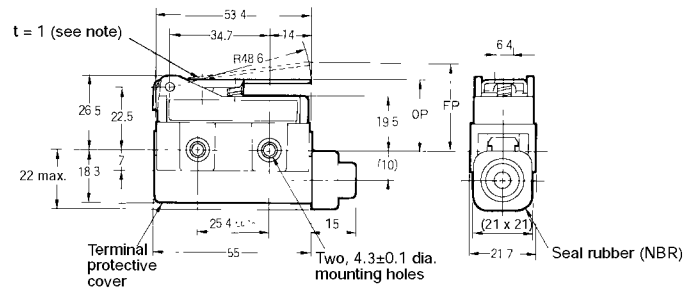
- Note:**
1. Stainless steel roller
 2. The length of the imperfect threads is 1.5 mm maximum.

Panel Mount Crossroller Plunger D4MC-5040



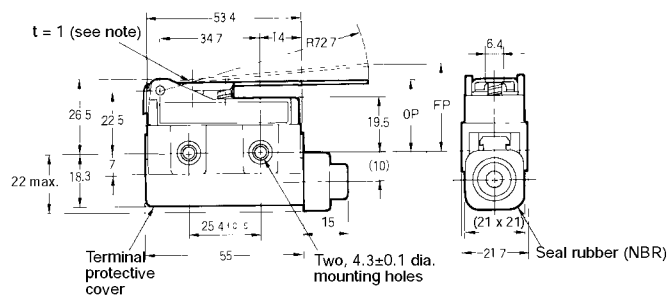
- Note:
1. Stainless steel roller
 2. The length of the imperfect threads is 1.5 mm maximum.

Short Hinge Lever D4MC-1020



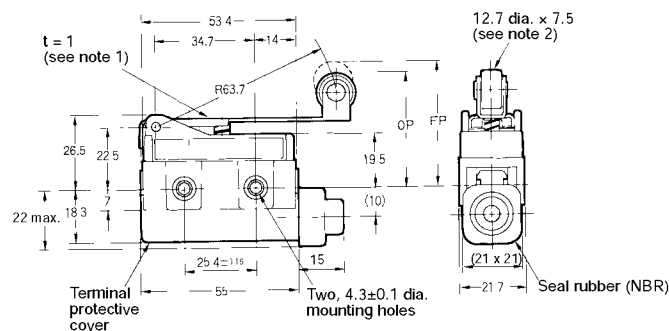
Note: Stainless steel lever

Hinge Lever D4MC-1000



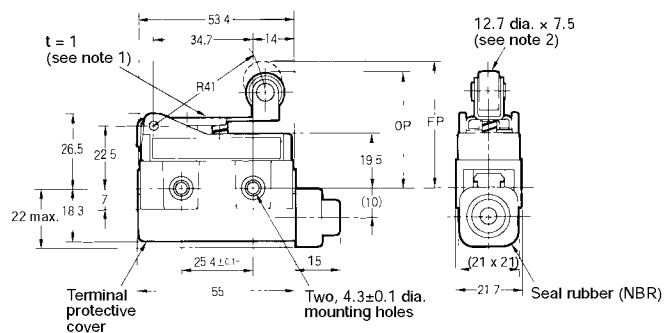
Note: Stainless steel lever

Hinge Roller Lever D4MC-2000



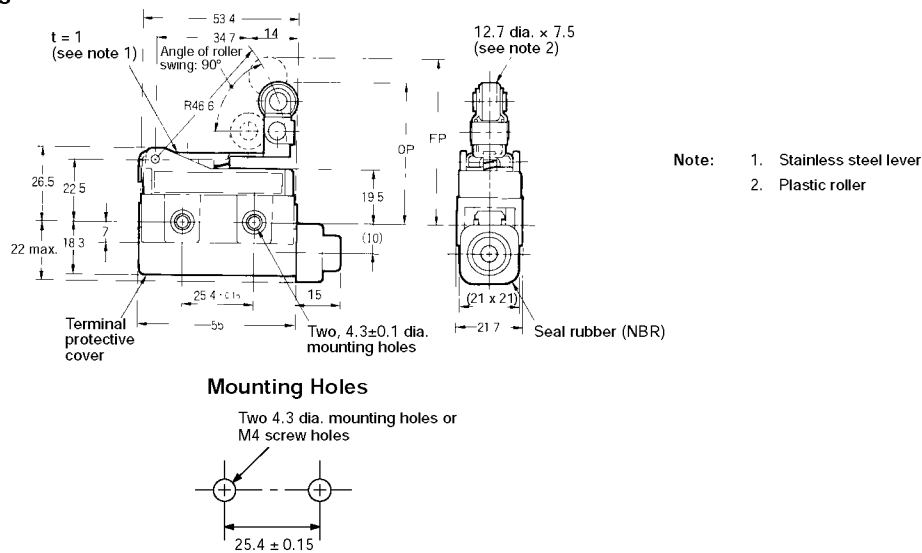
- Note:
1. Stainless steel lever
 2. Plastic roller

Short Hinge Roller Lever D4MC-2020



- Note:
1. Stainless steel lever
 2. Plastic roller

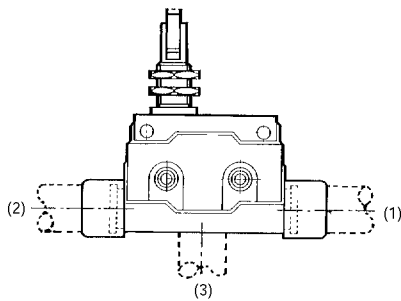
One-way Action Short Hinge Roller Lever
D4MC-3030



Molded Terminal Models

Molded Terminal Models

The molded terminal model is available with right-hand, left-hand and underside leads and is recommended for use where the Switch is exposed to dust, oil, or moisture.



When placing your order for the Switch specify the required length of V.C.T. cable in addition to the model number of the Switch

Example:
Standard type: D4MC-5040
Location of lead outlet: Underside
Length of lead: 1 m (V.C.T. lead)
When placing your order for the above Switch specify the model number as D4MC-5043 (V.C.T 1 m)

Suffix by Location of Lead Outlet

Location of lead outlet	Model
	COM, NC, and NO
Right-hand	D4MC-j j j 1
Left-hand	D4MC-j j j 2
Underside	D4MC-j j j 3

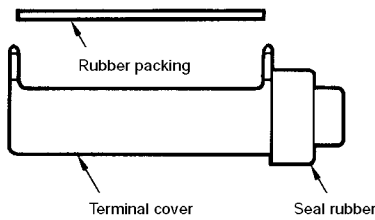
Leads Supplied

Leads	Nominal cross-sectional area	Finished outside diameter	Terminal connections	Standard length
V.C.T. (Vinyl cabtire cable)	1.25 mm ²	Triple conductor: 10.5 mm dia.	Black: COM White: NO Red: NC	1, 3, 5 m

Terminal Protective Cover

ZC55 Terminal Cover (ZC55-0002H):
The following three parts are supplied as a set.

ZC Seal Rubber (SC-1404C)



Precautions

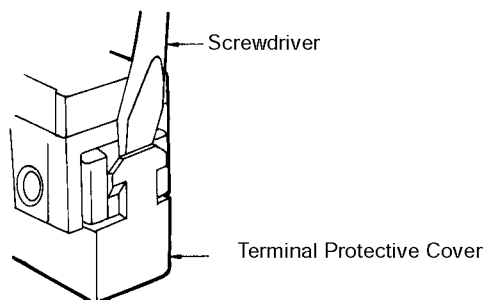
■ Correct Use

Operating Method

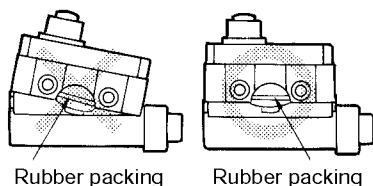
Excessive dog angle, operating speed, or overtravel (OT) may damage the actuator. Check that OT has a sufficient margin. The actual OT should be rated $OT \times 0.7$ to 1.

Handling

- Do not expose the Switch to water exceeding 60°C or use it in steam.
- Do not use the Switch in oil or water.
- An 8.5- to 10.5-dia. cable can be applied as seal rubber for the lead wire outlet. (Use two- or three-core cable of VCT1.25 mm².)
- When detaching the Terminal Protective Cover, insert a screwdriver and apply a force in the opening direction. Do not use excess force to remove the cover. Doing so may cause deformation in the fitting section and reduce the holding force.



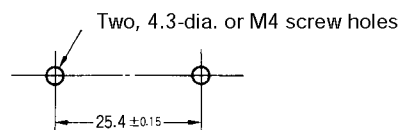
When mounting the Terminal Protective Cover to the case, align the cover on the case and then press the cover down to mount it firmly. If the cover is pressed down in an inclined position, rubber packing will deform and thus affect the sealing capability.



Mounting

When mounting the Switch with screws on a side surface, fasten the Switch with M4 screws and use washers, spring washers, etc., to ensure secure mounting.

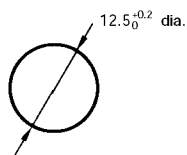
Mounting Holes



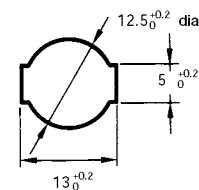
- When mounting the Panel Mount-type Switch (DCMC-5000, D4MC5020, or D4MC5040) with screws on a side surface, remove the hexagonal nuts from the actuator.
- When mounting the panel mount type on a panel, be careful not to tighten to an excessive torque. Tightening the screws to a torque exceeding 4.91 N S m will cause the plunger to fail.

Mounting Hole Dimensions

D4MC-5000



D4MC-5020, D4MC5040



Correct Tightening Torque

A loose screw may cause malfunctions. Be sure to tighten each screw to the proper tightening torque as shown in the table.

No.	Type	Torque
1	Terminal screw	0.78 to 1.18 N S m
2	Panel mounting screw	2.94 to 4.92 N S m
3	Side mounting screw	1.18 to 1.47 N S m

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Enclosed Switch

SHL

Subminiature Enclosed Switch
(Measuring 48 x 17.5 x 45 mm) with High
Sealing Property

- Built-in coil spring type basic switch housed in rigid zinc diecast alloy casting boasts long life and high precision.
- Requires nearly the same operating force as conventional basic precision switches (2.35 to 3.92 N {240 to 400 g}).
- Molded terminal model is available.
- Operation indicator model is also available.

■ Approved Standards

Agency	Standard	File No.
UL	UL508	E76675
CSA	CSA C22.2 No. 14	LR45746
TÜV Rheinland	EN60947-5-1	R9451332



Ordering Information

■ Model Number Legend

Standard Models (See Note)

SHL- 55-

1

2

1. Actuator

- D: Plunger
- Q: Panel mount plunger
- Q22: Panel mount roller plunger
- Q21: Panel mount crossroller plunger
- W: Short hinge lever
- W1: Hinge lever
- W2: Short hinge roller lever
- W21: Hinge roller lever
- W3: One-way action short hinge roller lever
- W31: One-way action hinge roller lever

2. Rated Current

- None: Standard, 10 A at 125 VAC
- 01: Micro Load, 0.1 A at 125 VAC

Note: Refer to Page 190 for *Molded Terminal Models*.

■ List of Models

Actuator		Standard model	Micro voltage/current load model
Plunger		SHL-D55	SHL-D55-01
Panel mount plunger		SHL-Q55	SHL-Q55-01
Panel mount roller plunger		SHL-Q2255	SHL-Q2255-01
Panel mount crossroller plunger		SHL-Q2155	SHL-Q2155-01
Short hinge lever		SHL-W55	SHL-W55-01
Hinge lever		SHL-W155	SHL-W155-01
Short hinge roller lever		SHL-W255	SHL-W255-01
Hinge roller lever		SHL-W2155	SHL-W2155-01
One-way action short hinge roller lever		SHL-W355	SHL-W355-01
One-way action hinge roller lever		SHL-W3155	SHL-W3155-01

Specifications

■ Ratings

Rated voltage	Non-inductive load				Inductive load				Inrush current	
	Resistive load		Lamp load		Inductive load		Motor load			
	NC	NO	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	10 A		1.5 A		3 A		2.5 A		15 A	
250 VAC	10 A		1.5 A		2 A		1.5 A			
480 VAC	2 A		---		---		---			
8 VDC	10 A		2 A		5 A		2 A			
14 VDC	10 A		2 A		5 A		2 A			
30 VDC	5 A		1.5 A		1.5 A		1.5 A			
125 VDC	0.4 A		0.4 A		0.05 A		0.05 A			
250 VDC	0.2 A		0.2 A		0.03 A		0.03 A			

- Note:**
1. The above figures are for steady-state currents.
 2. Inductive loads have 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.

■ Approved Standard Ratings

UL/CSA

A300

Rated voltage	Carry current	Current		Volt-amperes	
		Make	Break	Make	Break
120 VAC	10 A	60 A	6 A	7,200 VA	720 VA
240 VAC		30 A	3 A		

3. TÜV Rheinland Approved Ratings (EN60947-5-1)

Model	Category and rating	I the
SHL-□55	AC-15 2 A/125 V	5 A
	DC-12 2 A/48 V	4 A
SHL-□55-01	AC-14 0.1 A/125 V	0.5 A
	DC-12 0.1 A/48 V	0.5 A
SHL-□55-L	AC-15 2 A/125 V	5 A
SHL-□55-01L	AC-14 0.1 A/125 V	0.5 A
SHL-□55-L2	DC-12 2 A/12 V	4 A
SHL-□55-01L2	DC-12 0.1 A/12 V	0.5 A
SHL-□55-L3	DC-12 2 A/24 V	4 A
SHL-□55-01L3	DC-12 0.1 A/24 V	0.5 A
SHL-□55-L4M□	DC-12 2 A/24 V	4 A
SHL-□55-01L4	DC-12 0.1 A/24 V	0.5 A
SHL-□55-L5	DC-12 2 A/48 V	4 A
SHL-□55-01L5	DC-12 0.1 A/48 V	0.5 A

Note: For details on the above models, refer to *Model Number Legend* under *Molded Terminal Models*.

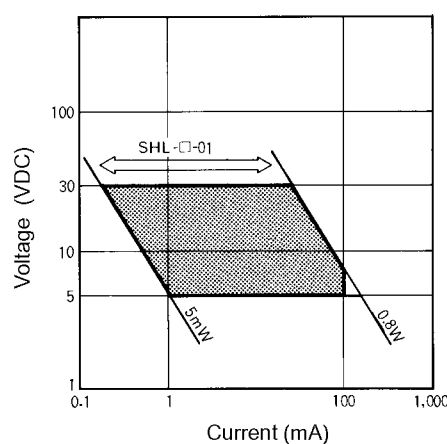
4. Micro Voltage/Current Load Model

Rated voltage	Non-inductive load	
	Resistive load	
	NC	NO
125 VAC	0.1 A	
8 VDC	0.1 A	
14 VDC	0.1 A	
30 VDC	0.1 A	

When using a Limit Switch for opening or closing micro-load circuit (zones 1 through 3), contact failure may occur if a Limit Switch with ordinary contact specifications is used. Therefore, when using Limit Switches in the micro-load range, use ones with contact specifications that are suited to each zone.

Use the SHL-□-01 micro-load models within the zones (1 through 3) shown in the following diagram.

Micro Load Applicable Ranges



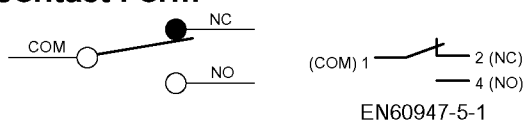
The above diagram is for standard conditions (5°C to 35°C, 40% to 70%). Since the values vary depending on the operating environment conditions, contact your OMRON representative for further details.

■ Characteristics

Degree of protections(see note 3)	IP67 (EN60947-5-1)
Life expectancy (see note 4)	Mechanical: 10,000,000 operations min. Electrical: 500,000 operations min.
Operating speed	0.1 mm to 0.5 m/s (hinge lever models)
Operating frequency (see note 4)	Mechanical: 120 operations/min Electrical: 30 operations/min
Rated frequency	50/60 Hz
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	15 mΩ (initial value)
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/Uimp at 2.5 kV (EN60947-5-1) between current-carrying metal part and ground, and between each terminal and non-current-carrying metal part
Rated insulation voltage (U _i)	150 V (IEC947-5-1)
Switching overvoltage	1,000 VAC max., 300 VDC max. (EN60947-5-1)
Pollution degree (operating environment)	3 (IEC947-5-1)
Short-circuit protective device (SCPD)	10 A fuse type gG (IEC269)
Conditional short-circuit current	100 A (IEC947-5-1)
Conventional enclosed thermal current (I _{the})	5 A (IEC947-5-1)
Protection against electric shock	Class II (grounding not required with double insulation)
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s ² min. Malfunction: 300 m/s ² min.
Ambient temperature (see note)	Operating: -10°C to 80°C (no icing)
Ambient humidity	Operating: 95% max.
Weight	Approx. 62 to 72 g

- Note:**
1. The above figures are for standard currents.
 2. The above ratings may vary depending on the model. Contact your OMRON representative for further details.
 3. The head section of the plunger type SHL-D(Q)□□ is excluded.
 4. Life expectancy values are calculated at an operating temperature of 5°C to 35°C, and an operating humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.
 5. The values are for the plunger-type models.

■ Contact Form



■ Operating Characteristics

Model	SHL-D55 SHL-D55-01	SHL-Q55 SHL-Q55-01	SHL-Q2255 SHL-Q2255-01	SHL-Q2155 SHL-Q2155-01	SHL-W55 SHL-W55-01
OF max.	9.81 N	9.81 N	9.81 N	9.81 N	3.14 N
RF min.	1.96 N	1.96 N	1.96 N	1.96 N	0.78 N
PT max.	1.5 mm	1.5 mm	1.5 mm	1.5 mm	8 mm
OT min.	2 mm	2 mm	2 mm	2 mm	3 mm
MD max.	0.5 mm	0.5 mm	0.5 mm	0.5 mm	2.5 mm
OP	34±0.8 mm	34±0.8 mm	43±0.8 mm	43±0.8 mm	21.5±1 mm
FP max.	---	---	---	---	29.5 mm

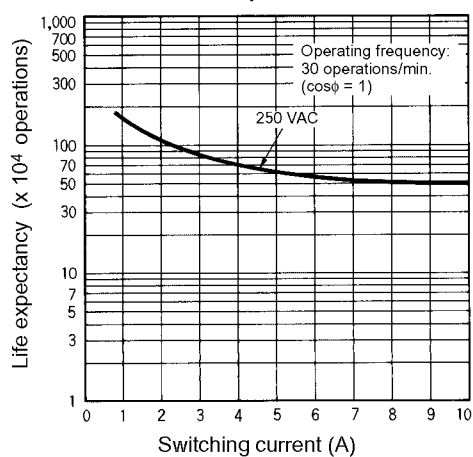
Model	SHL-W155 SHL-W155-01	SHL-W255 SHL-W255-01	SHL-W2155 SHL-W2155-01	SHL-W355 SHL-W355-01	SHL-W3155 SHL-W3155-01
OF max.	2.35 N	3.92 N	2.55 N	3.92 N	2.55 N
RF min.	0.44 N	0.78 N	0.49 N	0.78 N	0.49 N
PT max.	13 mm	8 mm	13 mm	8 mm	13 mm
OT min.	5 mm	3 mm	5.5 mm	3 mm	5.5 mm
MD max.	4 mm	2.5 mm	4 mm	2.5 mm	4 mm
OP	21.5±1 mm	33±1 mm	33.5±1 mm	44.5±1 mm	44.5±1 mm
FP max.	34.5 mm	41 mm	46.5 mm	52.5 mm	57.5 mm

Engineering Data

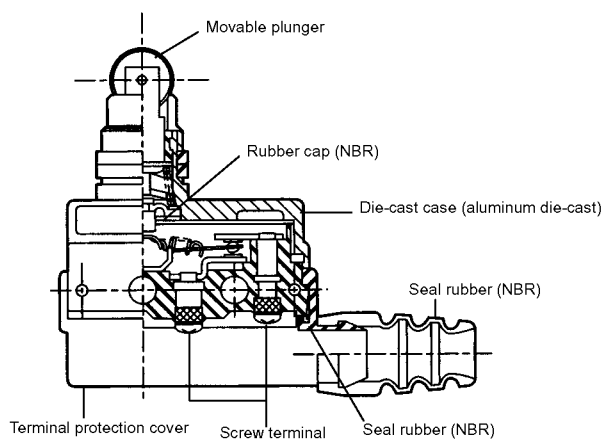
Electrical Life Expectancy

Ambient temperature: 5°C to 35°C

Ambient humidity: 40% to 50%

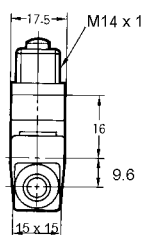
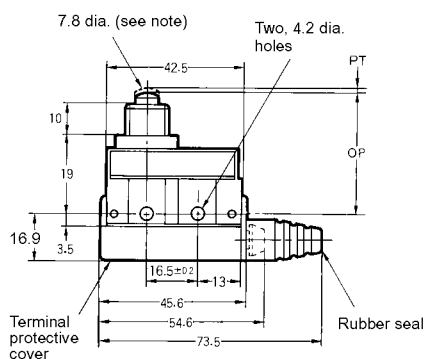


Nomenclature

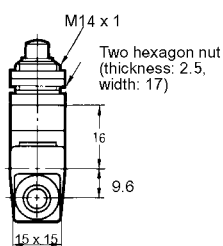


Note: 1. All units are in millimeters unless otherwise indicated.
2. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.

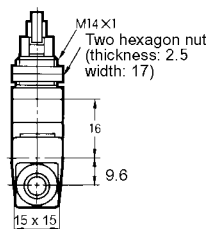
SHL-D55, SHL-D55-01



Note: Stainless steel pin plunger



Note: Stainless steel pin plunger



Note: Sintered stainless alloy roller

11 dia. x 4.7 (see note)

10

19

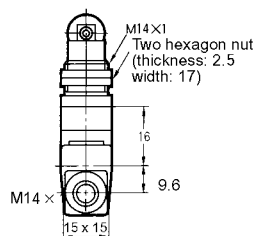
16.9

3.5

16.5 ± 0.2

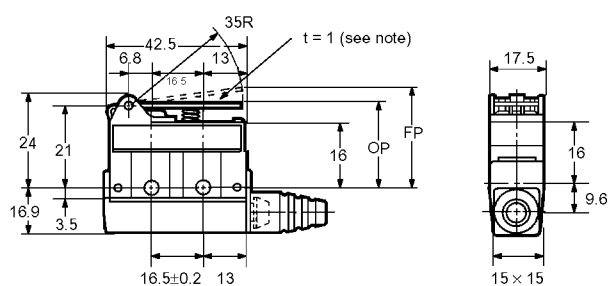
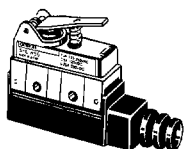
13

1/2" NPT



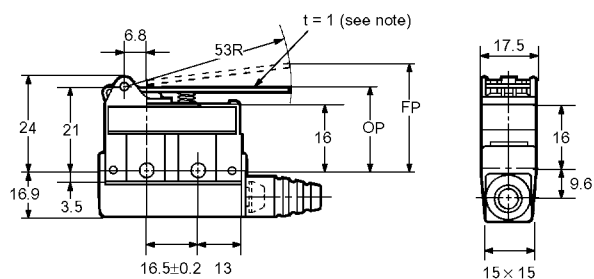
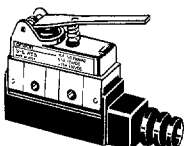
Note: Sintered stainless alloy roller

Short Hinge Lever SHL-W55, SHL-W55-01



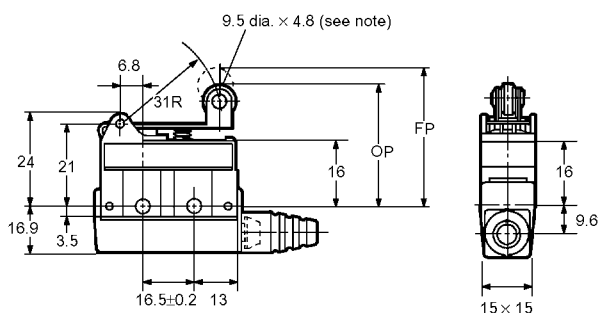
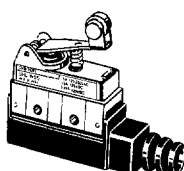
Note: Stainless steel lever

Hinge Lever SHL-W155, SHL-W155-01



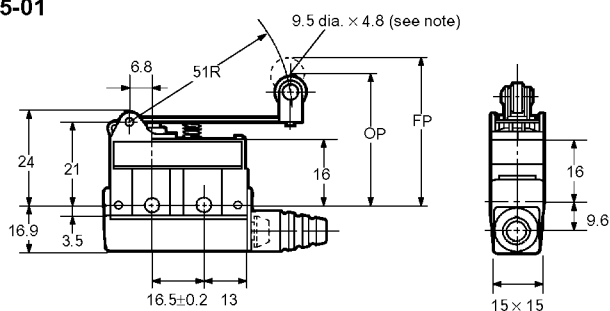
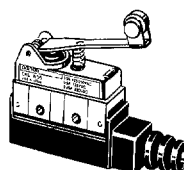
Note: Stainless steel lever

Short Hinge Roller Lever SHL-W255, SHL-W255-01



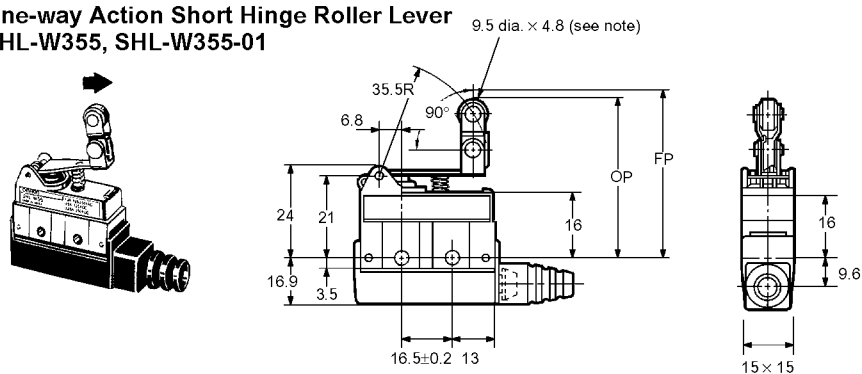
Note: Sintered stainless roller

Hinge Roller Lever SHL-W2155, SHL-W2155-01



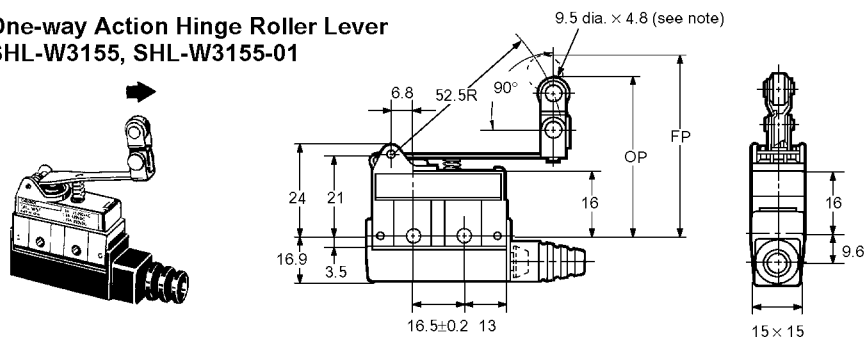
Note: Sintered stainless roller

One-way Action Short Hinge Roller Lever SHL-W355, SHL-W355-01



Note: Sintered stainless roller

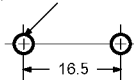
One-way Action Hinge Roller Lever SHL-W3155, SHL-W3155-01



Note: Sintered stainless roller

Mounting Holes

Two, 4.3 dia. or M4 mounting holes



Molded Terminal Models

■ Model Number Legend

SHL-□55-□□M□

1 2 3 4

Items 1 (Actuator) and 2 (Rated Current) are the same as those in *Standard Models*.

3. Operation Indicator

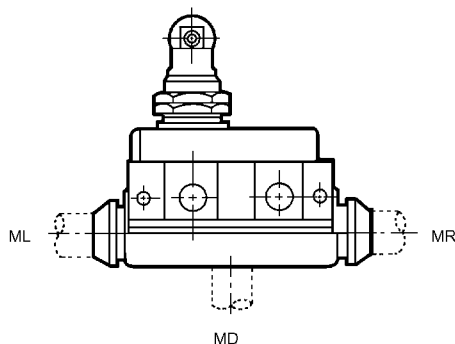
- None: Not provided
- L: Neon Lamp: 90 to 250 VAC
- L2: LED: 12 V
- L3: LED: 24 V
- L4: LED: 24 V
- L5: LED: 48 V

4. Location of Lead Outlet

- R: Right-hand
- L: Left-hand
- D: Underside

Use of the molded terminal model is recommended in locations subject to excessive dust, oil drips, or moisture.

All types of SHL Switches can be fabricated into a molded terminal version. In this case, the molded terminal model will have the same dimensions and operating characteristics as the basic model from which the molded terminal model is fabricated.



Suffix by Location of Lead Outlet

Location of lead outlet	Model
Right-hand	SHL-□-MR
Left-hand	SHL-□-ML
Underside	SHL-□-MD

Note: Three leads (COM, NO, and NC) are provided for terminal connections.

Example:

Basic type: SHL-Q2255

Location of lead outlet: Right-hand

When placing your order for the above Switch specify the model number as SHL-Q2255-MR

Lead Supplies

Leads	Nominal cross-sectional area	No. of conductors/cond. dia.	Finished outside diameter	Terminal connections	Standard length
VCTF (Vinyl cabtire cable)	0.75 mm ²	30/0.18 dia.	3-core 7 dia.	Black: COM White: NO Red: NC	3 m

■ Operation Indicator-equipped Models

UL, CSA and/or EN (IEC) approved models are available.

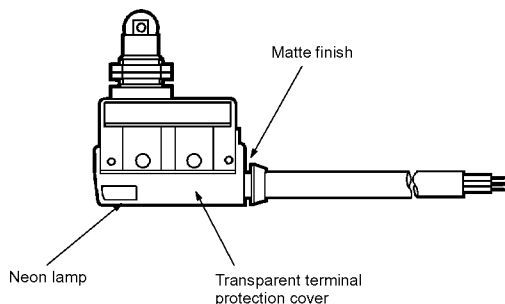
The molded terminal model may be equipped with an operation indicator (neon lamp or LED) upon request to facilitate maintenance and inspection.

The operation indicator is designed to illuminate when the Switch is not operating. (Because of the molded terminal model, any change to the Switch wiring cannot be made.)

AC Operation

A neon lamp indicator is provided.

The operating voltage is 90 to 250 VAC.



Operating characteristics are the same as the basic model from which the operation indicator equipped model is fabricated.

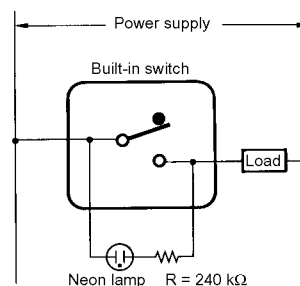
Dimension are the same as the standard model.

Example:

Basic type: SHL-Q2255-01MR

When placing your order for the molded terminal model with an neon lamp operation indicator, specify the model number as SHL-Q2255-01LMR.

Internal Circuit



DC Operation

LED indicator is provided.

As a rectifier stack is incorporated, into the unit and no directionality exists for connection of + and –, this type can also be operated on AC.

Voltage ratings of LED indicators are as shown in the table below.

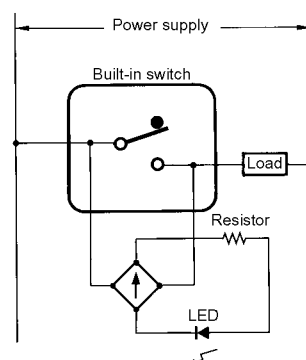
The Switch case has a protrusion to facilitate visual confirmation of LED indicator.

Example:

Basic type: SHL-Q2255-01MR

When placing your order for the molded terminal with an LED indicator rated at 12 V, specify the model number as SHL-Q2255-01L2MR.

Contact Circuit



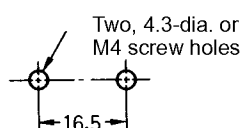
Type	Voltage rating	Lamp current	Internal resistance
L2	12 V	Approx. 2.4 mA	4.3 kΩ
L3	24 V	Approx. 2 mA	10 kΩ
L4	24 V	Approx. 1.2 mA	18 kΩ
L5	48 V	Approx. 2.1 mA	22 kΩ

Precautions

Correct Use

- Be sure to connect a fuse with a breaking current 1.5 to 2 times the rated current to the Limit Switch in series in order to protect the Limit Switch from damage due to short-circuiting. When using the Limit under the EN ratings, use a gI or gG 10-A fuse that conforms to IEC260.
- Secure the Switch with two M4 screws and washers. The tightening torque applied to each terminal must be 1.18 to 1.37 N • m. Tighten the screws to the specified torque. An excessive tightening torque may damage the Switch and cause a malfunction.
- When mounting the panel mount-type Switch with screws on a side surface, remove the hexagonal nuts from the actuator.

Mounting Holes



- When mounting the panel mount type (SHL-Q55, SHL-Q2255, or SHL-Q2155) on a panel, tighten the hexagonal nuts of the actuator to a torque less than 7.84 N • m.

Correct Tightening Torque

A loose screw may result in a malfunction. Be sure to tighten each screw to the proper tightening torque as shown below.

No.	Type	Torque
1	Terminal screw	0.24 to 0.44 N • m
2	Panel mounting screw	1.18 to 1.37 N • m

When wiring, use M3 round solderless terminals and apply insulation shielding to the connections. Tighten the terminals screws to 0.24 to 0.44 N • m.

Others

The standard seal rubber for the lead wire outlet is one that allows 6- to 8-dia. cables. The appropriate nominal cross-section of the lead wire is 0.75 mm². (When the sealing capability is required over a long period of time, use mold specifications.)

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Subminiature Basic Switch

SS

Economical, Subminiature Basic Switch Offers Long Life (30 x 10⁶ Operations)

- Incorporating simple and stable two split springs which ensures a long service life (30,000,000 operations).
- A variety of models with low operating force to high operating force are available.
- Solder, quick-connect terminals (#110) and PCB terminals are available.
- Approval obtained for standards including UL, CSA, and VDE.
- Conforms to EN61058-1.



Ordering Information

■ Model Number Legend

SS-

1 2 3 4 5

1. Ratings

01: 0.1 A
5: 5 A
10: 10 A

2. Actuator

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

3. Operating Force (at Pin Plunger)

None: 1.47 N {150 gf}
-F: 0.49 N {50 gf}
-E: 0.25 N {25 gf}

Note: These values are for the pin plunger model.

4. Contact Form

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

5. Terminals

None: Solder
T: Quick-connect terminals (#110)
D: PCB

Note: The PCB terminal has a right-angle terminal option.
D1: Upward direction
D2: Downward direction
These are UL, CSA, and VDE approved.

Note: When suffix "-T" is placed after the model number, the model withstands high temperatures (-25°C to 125°C) and is UL and CSA approved.

■ List of Models

Rating	Actuator	OF max.	Soldering terminal	Quick-connect terminal (#110)	PCB terminal
0.1 A	Pin plunger 	0.25 N {25 gf}	SS-01-E	SS-01-ET	SS-01-ED
		0.49 N {50 gf}	SS-01-F	SS-01-FT	SS-01-FD
		1.47 N {150 gf}	SS-01	SS-01T	SS-01D
	Hinge lever 	0.08 N {8 gf}	SS-01GL-E	SS-01GL-ET	SS-01GL-ED
		0.16 N {16 gf}	SS-01GL-F	SS-01GL-FT	SS-01GL-FD
		0.49 N {50 gf}	SS-01GL	SS-01GLT	SS-01GLD
	Simulated hinge lever 	0.08 N {8 gf}	SS-01GL13-E	SS-01GL13-ET	SS-01GL13-ED
		0.16 N {16 gf}	SS-01GL13-F	SS-01GL13-FT	SS-01GL13-FD
		0.49 N {50 gf}	SS-01GL13	SS-01GL13T	SS-01GL13D
	Hinge roller lever 	0.08 N {8 gf}	SS-01GL2-E	SS-01GL2-ET	SS-01GL2-ED
		0.16 N {16 gf}	SS-01GL2-F	SS-01GL2-FT	SS-01GL2-FD
		0.49 N {50 gf}	SS-01GL2	SS-01GL2T	SS-01GL2D
5 A (see note 1)	Pin plunger 	0.49 N {50 gf}	SS-5-F	SS-5-FT	SS-5-FD
		1.47 N {150 gf}	SS-5	SS-5T	SS-5D
	Hinge lever 	0.16 N {16 gf}	SS-5GL-F	SS-5GL-FT	SS-5GL-FD
		0.49 N {50 gf}	SS-5GL	SS-5GLT	SS-5GLD
	Simulated hinge lever 	0.16 N {16 gf}	SS-5GL13-F	SS-5GL13-FT	SS-5GL13-FD
		0.49 N {50 gf}	SS-5GL13	SS-5GL13T	SS-5GL13D
	Hinge roller lever 	0.16 N {16 gf}	SS-5GL2-F	SS-5GL2-FT	SS-5GL2-FD
		0.49 N {50 gf}	SS-5GL2	SS-5GL2T	SS-5GL2D
10.1 A (see note 1)	Pin plunger 	1.47 N {150 gf}	SS-10	SS-10T	SS-10D
	Hinge lever 	0.49 N {50 gf}	SS-10GL	SS-10GLT	SS-10GLD
	Simulated hinge lever 	0.49 N {50 gf}	SS-10GL13	SS-10GL13T	SS-10GL13D
	Hinge roller lever 	0.49 N {50 gf}	SS-10GL2	SS-10GL2T	SS-10GL2D

Note: 1. EN61058-1 (IEC601058-1) approved by TÜV Rheinland.
 2. SPST models are also available, but not listed in the above table.

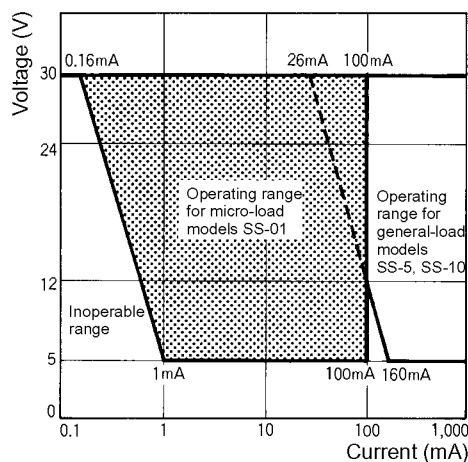
Specifications

■ Ratings

Type	Rated voltage	SS-10, SS-5								SS-01	
		Non-inductive load				Inductive load				Non-inductive load	
		Resistive load		Lamp load		Inductive load		Motor load		Resistive load	
		NC	NO	NC	NO	NC	NO	NC	NO	NC	NO
General-purpose	125 VAC	5 (10.1) A (see note 1)		1.5 A	0.7 A	3 A		2.5 A	1.3 A	0.1 A	
	250 VAC	3 (10.1) A (see note 1)		1 A	0.5 A	2 A		1.5 A	0.8 A	---	
	8 VDC	5 (10.1) A (see note 1)		2 A		5 A	4 A	3 A		0.1 A	
	14 VDC	5 (10.1) A (see note 1)		2 A		4 A	4 A	3 A		0.1 A	
	30 VDC	4 A		2 A		3 A	3 A	3 A		0.1 A	
	125 VDC	0.4 A		0.05 A		0.4 A	0.4 A	0.05 A		---	
	250 VDC	0.2 A		0.03 A		0.2 A	0.2 A	0.03 A		---	

- Note:**
1. Data in parentheses apply to the SS-10 models only.
 2. The above values are for 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).
 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, connect a surge suppressor across the Switch.
 7. The ratings values apply under the following test conditions:
 Ambient temperature: 20±2°C
 Ambient humidity: 65±5%
 Operating frequency: 30 operations/min

Use the Switch within the following operating range.



Item	SS-01	SS-5 SS-10
Minimum applicable load	1 mA at 5 VDC	160 mA at 5 VDC

■ Characteristics

Operating speed	0.1 mm to 1 m/s (pin plunger models)
Operating frequency	Mechanical: 400 operations/min Electrical: 60 operations/min
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance (initial value)	OF 1.47 N {150 gf}: SS-01 models: 50 mΩ max. SS-5, SS-10 models: 30 mΩ max. OF 0.49 N {50 gf}: SS-01 models: 100 mΩ max. SS-5 models: 50 mΩ max. OF 0.25 N {25 gf}: SS-01 models: 150 mΩ max.
Dielectric strength	1,000 VAC (600 VAC for SS-01 models), 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 part and ground, and between each terminal and non-current-carrying metal part (see note 1)
Vibration resistance (see note 2)	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: OF 1.47 N {150 gf}: 1,000 m/s ² {approx. 100G} max. OF 0.25 N {25gf}/0.49 N {50 gf}: 500 m/s ² {approx. 50G} max. Malfunction: OF 1.47 N {150 gf}: 300 m/s ² {approx. 30G} max. OF 0.25 N {25 gf}/0.49 N {50 gf}: 200 m/s ² {approx. 20G} max. Note: Lever-type model: Total travel position (with a contact separation time of 1 ms max.)
Life expectancy	Mechanical: 30,000,000 operations min. (Refer to the following <i>Engineering Data</i> .) 10,000,000 operations min. for SS-10 models Electrical: 200,000 operations min. (Refer to the following <i>Engineering Data</i> .) 50,000 operations min. for SS-10 models
Degree of protection	IP00
Degree of protection against electrical shock	Class 1
Proof Tracking Index (PTI)	175
Switch category	D (IEC 335-1)
Ambient temperature	Operating: -25°C to 85°C (at ambient humidity of 60% max.) (with no icing)
Ambient humidity	Operating: 85% max. (for 5°C to 35°C)
Weight	Approx. 1.6 g (pin plunger models)

- Note:** 1. The dielectric strength shown in the table indicates a value for models with a Separator.
2. For the pin plunger models, the above values apply for use at both the free position and total travel position. For the lever models, they apply at the total travel position.

■ Approved Standards

UL1054 (File No. E41515)
CSA C22.2 No. 55 (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
120 VAC (TV)	---	2 A	---

VDE0630 (File No. 6131ÜG)
SEMKO (File No. 9812216/01), (File No. 8916091)

Rated voltage	SS-10	SS-5
250 VAC	10 A	5 A

SEV (File No. 93. 5. 51936. 01)

Rated voltage	SS-5
250 VAC	5 A

EN61058-1 (IEC601058-1)
(TÜV Rheinland, File No. J9451450)

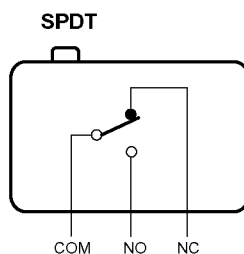
Rated voltage	SS-10	SS-5	SS-01
250 VAC	10 A	5 A 5 (1) A motor 3 A (see note 2)	---
125 VAC	---	---	0.1 A (see note 2)
30 VDC	---	5 A (see note 2)	0.1 A (see note 2)

- Note:** 1. Testing conditions: 50,000 operations, T85 (0°C to 85°C)
2. These approvals are only limited to OF 1.47 N {150 gf} models.

■ Contact Specifications

Item		SS-10	SS-5	SS-01
Contact	Specification	Rivet		Crossbar
	Material	Silver alloy	Silver	Gold alloy
	Gap (standard value)	0.5 mm		0.25 mm
Inrush current	NC	20 A max.		1 A max.
	NO	15 A max.	10 A max.	1 A max.

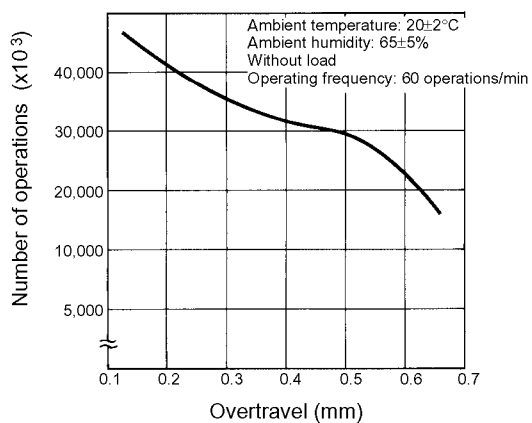
■ Contact Form (SPDT)



Engineering Data

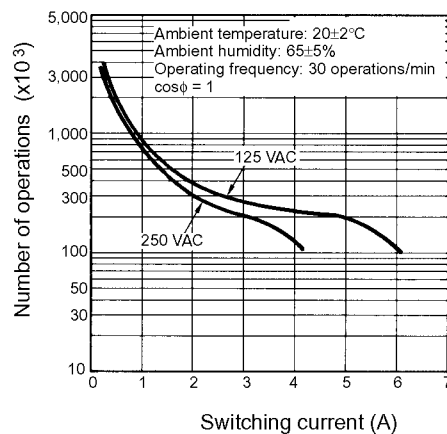
Mechanical Life Expectancy (Pin Plunger Model)

SS-5, SS-1, SS-01 Models



Electrical Life Expectancy (Pin Plunger Model)

SS-5 Models

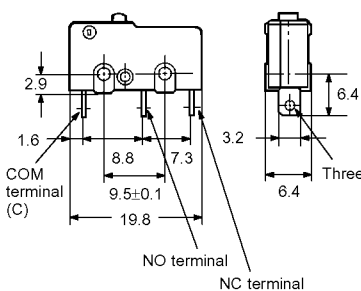


Dimensions

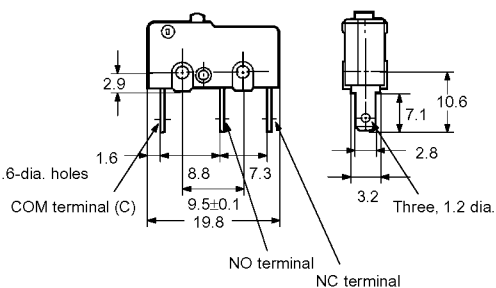
■ Terminals

Terminal plate thickness is 0.5 mm.

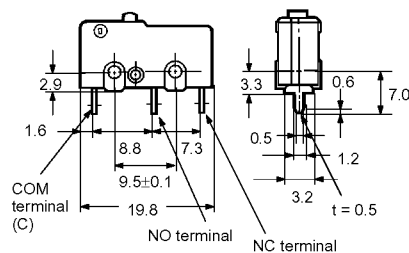
Solder Terminal



Quick-connect Terminal (#110)



PCB Terminal



■ Dimensions and Operating Characteristics

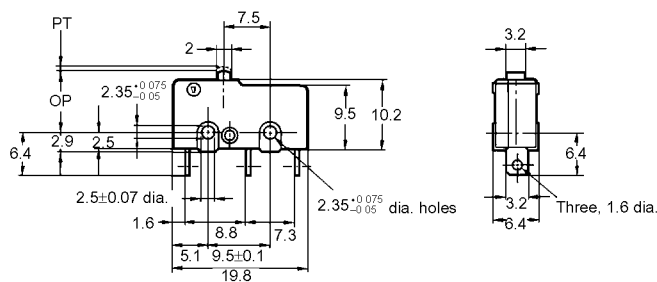
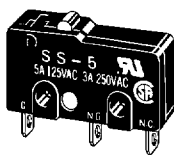
- Note:**
1. All units are in millimeters unless otherwise indicated.
 2. The following illustration and drawing are for solder terminal models. Refer to page 118 for details on models with quick-connect terminals (#110) or PCB terminals.
 3. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.

Pin Plunger

SS-01(-E, -F)

SS-5(-F)

SS-10



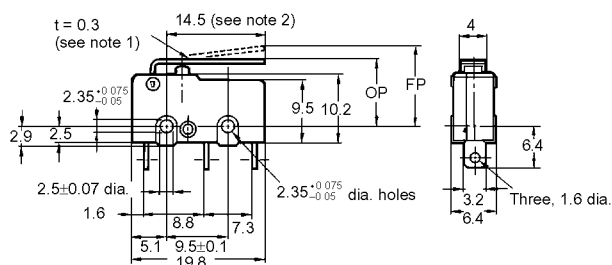
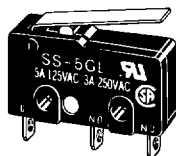
Model	SS-01-E	SS-01-F SS-5-F	SS-01 SS-5	SS-10
OF max.	0.25 N {25 gf}	0.49 N {50 gf}	1.47 N {150 gf}	1.47 N {150 gf}
RF min.	0.02 N {2 gf}	0.04 N {4 gf}	0.25 N {25 gf}	0.25 N {25 gf}
PT max.	0.5 mm	0.5 mm	0.5 mm	0.6 mm
OT min.	0.5 mm	0.5 mm	0.5 mm	0.4 mm
MD max.	0.1 mm	0.1 mm	0.1 mm	0.12 mm
OP	8.4±0.5 mm			

Hinge Lever

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-□GL111 models with a hinge lever length of 37.8 are available. Contact your OMRON representative for these models

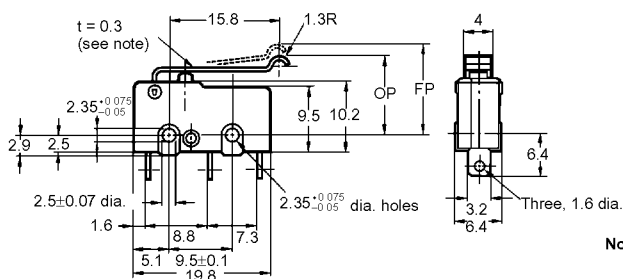
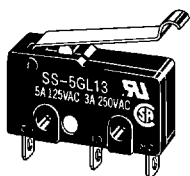
Model	SS-01GL-E	SS-01GL-F SS-5GL-F	SS-01GL SS-5GL	SS-10GL
OF max.	0.08 N {8 gf}	0.16 N {16 gf}	0.49 N {50 gf}	0.49 N {50 gf}
RF min.	0.01 N {1 gf}	0.02 N {2 gf}	0.06 N {6 gf}	0.06 N {6 gf}
OT min.	1.2 mm	1.2 mm	1.2 mm	1.0 mm
MD max.	0.8 mm	0.8 mm	0.8 mm	1.0 mm
FP max.	13.6 mm			
OP	8.8±0.8 mm			

Simulated Hinge Lever

SS-01GL13(-E, -F)

SS-5GL13(-F)

SS-10GL13



Note: Stainless-steel spring lever

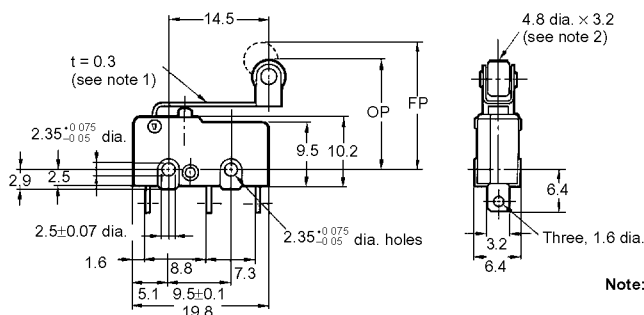
Model	SS-01GL13-E	SS-01GL13-F SS-5GL13-F	SS-01GL13 SS-5GL13	SS-10GL13
OF max.	0.08 N {8 gf}	0.16 N {16 gf}	0.49 N {50 gf}	0.49 N {50 gf}
RF min.	0.01 N {1 gf}	0.02 N {2 gf}	0.06 N {6 gf}	0.06 N {6 gf}
OT min.	1.2 mm	1.2 mm	1.2 mm	1.0 mm
MD max.	0.8 mm	0.8 mm	0.8 mm	1.0 mm
FP max.	15.5 mm			
OP	10.7±0.8 mm			

Hinge Roller Lever

SS-01GL2(-E, -F)

SS-5GL2(-F)

SS-10GL2



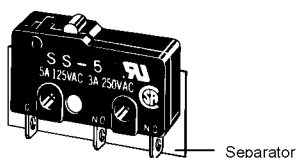
Note: 1. Stainless-steel spring lever
2. Polyacetal resin roller

Model	SS-01GL2-E	SS-01GL2-F SS-5GL2-F	SS-01GL2 SS-5GL2	SS-10GL2
OF max.	0.08 N {8 gf}	0.16 N {16 gf}	0.49 N {50 gf}	0.49 N {50 gf}
RF min.	0.01 N {1 gf}	0.02 N {2 gf}	0.06 N {6 gf}	0.06 N {6 gf}
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			

■ Separators (Insulation Sheet)

Applicable Switch	Thickness (mm)	Model (see note)
SS, D2S, D2SW	0.18	Separator for SS0.18
	0.4	Separator for SS0.4

Separator for SS□

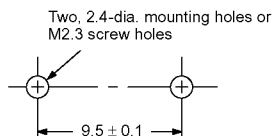


Precautions

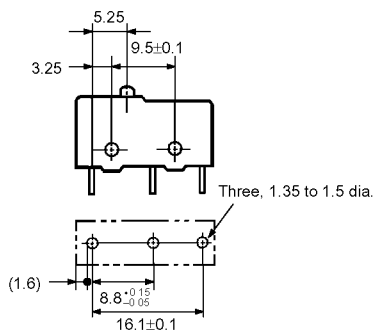
■ Mounting

Use two M2.3 mounting screws with spring washers to mount the Switch. Tighten the screws to a torque of 0.23 to 0.26 N • m {2.3 to 2.6 kgf • cm}.

Mounting Holes



PCB Mounting Dimensions (Reference)



■ Correct Use

Refer to pages 22 to 29 for common precautions.

Terminal Connection

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

To solder the lead to the terminal, apply a soldering iron rated at 60 W max. (temperature of soldering iron: 250°C to 300°C) within 5 seconds. During soldering and one minute after soldering, do not apply any external force to the soldered terminal.

Feed solder away from the switch case so that solder or flux will not flow into the case side.

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

Specifications Approved by TÜV Rheinland According to EN61058-1

Model	Conductor size
SS-5	0.5 to 0.75 mm ²
SS-10	0.75 mm ²

Solder Terminal Approved Conditions

Soldering iron can be used.
Soldering hook hole available.
Soldering terminal types 1 and 2 are met.

Spacing

The minimum thickness of insulation according to IEC61058-1 is 1.1 mm, and the minimum clearance between live terminals and mounting plate is 1.6 mm. If the proper insulation for the terminator cannot be obtained, add insulation such as a Separator or insulation guard on the switch.

■ Connector

Refer to Terminal Connectors on page 214.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Miniature Basic Switch

V

Reliable and Safe Basic Switch

- Self-cleaning contacts.
- Best-seller Switches with switching currents of 10 to 21 A.
- Can be used for shutting down current in doors.
- Widely used for operating switches in applications where long life expectancy is required.
- Available in two types of cases: thermoplastic resin and thermosetting resin.
- Available with right-angle PCB terminal.
- Conforms to EN61058-1



Ordering Information

■ Model Number Legend

V-□□□-□□□□-□
1 2 3 4 5 6 7 8

1. Ratings

21: 21 A
16: 16 A
15: 15 A
11: 11 A
10: 10 A

2. Contact Gap

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

3. Actuator

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

4. Contact Form

1: SPDT (COM bottom terminal, double-throw)
2: SPST-NC (COM bottom terminal, normally closed)
3: SPST-NO (COM bottom terminal, normally open)
4: SPDT (COM side terminal, double-throw)
5: SPST-NC (COM side terminal, normally closed)
6: SPST-NO (COM side terminal, normally open)

5. Terminals

A: Solder/quick-connect terminal (#187)
C2: Quick-connect terminal (#187)
C: Quick-connect terminal (#250)
B: Screw terminal

6. Barrier (Models with Thermoplastic Case Only)

None: Without barrier
R: Right-hand barrier
L: Left-hand barrier

7. Operating Force max.

6: 3.92 N {400 gf}
5: 1.96 N {200 gf}
4: 0.98 N {100 gf}

Note: These values are for the pin plunger models.

8. Special Purpose

T: Heat-resistive

■ Combinations of Available Terminals

Terminal				Model Rated current OF	Thermoplastic case			Thermosetting case			
					V-21	V-16	V-11	V-15	V-10		
					21 A	16 A	11 A	15 A	10 A		
					3.92 N {400 gf}	3.92 N {400 gf}	1.96 N {200 gf}	0.98 N {100 gf}	3.92 N {400 gf}	1.96 N {200 gf}	0.98 N {100 gf}
COM terminal position	Insulation barrier	Heat resistance	Terminal symbol								
Bottom	No	Standard (80°C)	Solder/Quick-connect terminal (#187) (A)	---	Semi- standard	Standard	Standard	Semi- standard	Standard	Standard	Standard
			Quick-connect terminal (#187) (C2)	---	Semi- standard	Standard	Standard	Semi- standard	Standard	Standard	Standard
			Quick-connect terminal (#250) (C)	Standard	Semi- standard	Standard	Standard	Semi- standard	Semi- standard	Semi- standard	Semi- standard
			Screw terminal (B)	---	---	---	---	Semi- standard	Standard	Standard	Standard
		Heat resistant (150°C)	Solder/Quick-connect terminal (#187) (A)	---	---	---	---	Semi- standard	Standard	Standard	Standard
			Quick-connect terminal (#187) (C2)	---	---	---	---	Semi- standard	Semi- standard	Semi- standard	Semi- standard
			Quick-connect terminal (#250) (C)	---	---	---	---	---	---	---	---
			Screw terminal (B)	---	---	---	---	---	---	---	---
	Yes	Standard (80°C)	Solder/Quick-connect terminal (#187) (A)	---	Semi- standard	Standard	---	---	---	---	---
			Quick-connect terminal (#187) (C2)	---	Semi- standard	Standard	---	---	---	---	---
			Quick-connect terminal (#250) (C)	Standard	Semi- standard	Standard	---	---	---	---	---
Side	No	Standard (80°C)	Solder/Quick-connect terminal (#187) (A)	---	---	---	---	Semi- standard	Standard	Standard	Standard
			Quick-connect terminal (#187) (C2)	---	---	---	---	Semi- standard	Semi- standard	Semi- standard	Semi- standard
			Quick-connect terminal (#250) (C)	Semi- standard	---	---	---	---	---	---	---

Consult OMRON for standard approvals of models.

■ List of Models

General-purpose Models

(Only standard combinations of terminal availability are shown.)

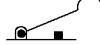
Thermoplastic Case

Actuator	COM terminal position	Contact form	Terminals (see note)	21 A (OF: 3.92 N {400 gf})		
				Without barrier	Right-hand barrier	Left-hand barrier
Pin plunger 	Bottom	SPDT	C	V-21-1C6	V-21-1CR6	V-21-1CL6
		SPST-NC	C	V-21-2C6	V-21-2CR6	V-21-2CL6
		SPST-NO	C	V-21-3C6	V-21-3CR6	V-21-3CL6
Short hinge lever 	Bottom	SPDT	C	V-211-1C6	V-211-1CR6	V-211-1CL6
Hinge lever 	Bottom	SPDT	C	V-212-1C6	V-212-1CR6	V-212-1CL6
Long hinge lever 	Bottom	SPDT	C	V-213-1C6	V-213-1CR6	V-213-1CL6
Simulated hinge lever 	Bottom	SPDT	C	V-214-1C6	V-214-1CR6	V-214-1CL6
Short hinge roller lever 	Bottom	SPDT	C	V-215-1C6	V-215-1CR6	V-215-1CL6
Hinge roller lever 	Bottom	SPDT	C	V-216-1C6	V-216-1CR6	V-216-1CL6

Note: C: Quick-connect terminals (#250)

Actuator	COM terminal position	Contact form	Terminals (see note)	16 A (OF: 1.96 N {200 gf})		
				Without barrier	Right-hand barrier	Left-hand barrier
Pin plunger 	Bottom	SPDT	A	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	---	---
Short hinge lever 	Bottom	SPDT	A	V-161-1A5	V-161-1AR5	V-161-1AL5
			C2	V-161-1C25	V-161-1C2R5	V-161-1C2L5
			C	V-161-1C5	---	---
Hinge lever 	Bottom	SPDT	A	V-162-1A5	V-162-1AR5	V-162-1AL5
			C2	V-162-1C25	V-162-1C2R5	V-162-1C2L5
			C	V-162-1C5	---	---
Long hinge lever 	Bottom	SPDT	A	V-163-1A5	V-163-1AR5	V-163-1AL5
			C2	V-163-1C25	V-163-1C2R5	V-163-1C2L5
			C	V-163-1C5	---	---
Simulated hinge lever 	Bottom	SPDT	A	V-164-1A5	V-164-1AR5	V-164-1AL5
			C2	V-164-1C25	V-164-1C2R5	V-164-1C2L5
			C	V-164-1C5	---	---
Short hinge roller lever 	Bottom	SPDT	A	V-165-1A5	V-165-1AR5	V-165-1AL5
			C2	V-165-1C25	V-165-1C2R5	V-165-1C2L5
			C	V-165-1C5	---	---
Hinge roller lever 	Bottom	SPDT	A	V-166-1A5	V-166-1AR5	V-166-1AL5
			C2	V-166-1C25	V-166-1C2R5	V-166-1C2L5
			C	V-166-1C5	---	---

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

Actuator	COM terminal position	Contact form	Terminals (see note)	11 A
				OF: 0.98 N {100 gf}
Pin plunger 	Bottom	SPDT	A	V-11-1A4
			C2	V-11-1C24
			C	V-11-1C4
Short hinge lever 	Bottom	SPDT	A	V-111-1A4
			C2	V-111-1C24
			C	V-111-1C4
Hinge lever 	Bottom	SPDT	A	V-112-1A4
			C2	V-112-1C24
			C	V-112-1C4
Long hinge lever 	Bottom	SPDT	A	V-113-1A4
			C2	V-113-1C24
			C	V-113-1C4
Simulated hinge lever 	Bottom	SPDT	A	V-114-1A4
			C2	V-114-1C24
			C	V-114-1C4
Short hinge roller lever 	Bottom	SPDT	A	V-115-1A4
			C2	V-115-1C24
			C	V-115-1C4
Hinge roller lever 	Bottom	SPDT	A	V-116-1A4
			C2	V-116-1C24
			C	V-116-1C4

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

Thermosetting Case

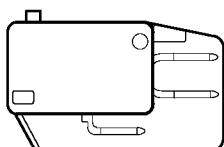
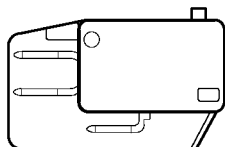
Actuator	COM terminal position	Contact form	Terminals (see note 2)	15 A	10 A	
				OF: 1.96 N {200 gf}	OF: 1.96 N {200 gf}	OF: 0.98 N {100 gf}
Pin plunger 	Bottom	SPDT	A	V-15-1A5	V-10-1A5	V-10-1A4
			C2	V-15-1C25	V-10-1C25	V-10-1C24
			B	V-15-1B5	V-10-1B5	V-10-1B4
	Bottom	SPST-NC	A	V-15-2A5	V-10-2A5	V-10-2A4
			C2	V-15-2C25	V-10-2C25	V-10-2C24
			B	V-15-2B5	V-10-2B5	V-10-2B4
	Bottom	SPST-NO	A	V-15-3A5	V-10-3A5	V-10-3A4
			C2	V-15-3C25	V-10-3C25	V-10-3C24
			B	V-15-3B5	V-10-3B5	V-10-3B4
	Side	SPDT	A	V-15-4A5	V-10-4A5	V-10-4A4
		SPST-NC	A	V-15-5A5	V-10-5A5	V-10-5A4
		SPST-NO	A	V-15-6A5	V-10-6A5	V-10-6A4
Short hinge lever 	Bottom	SPDT	A	V-151-1A5	V-101-1A5	V-101-1A4
			C2	V-151-1C25	V-101-1C25	V-101-1C24
			B	V-151-1B5	V-101-1B5	V-101-1B4
Hinge lever 	Bottom	SPDT	A	V-152-1A5	V-102-1A5	V-102-1A4
			C2	V-152-1C25	V-102-1C25	V-102-1C24
			B	V-152-1B5	V-102-1B5	V-102-1B4
Long hinge lever 	Bottom	SPDT	A	V-153-1A5	V-103-1A5	V-103-1A4
			C2	V-153-1C25	V-103-1C25	V-103-1C24
			B	V-153-1B5	V-103-1B5	V-103-1B4
Simulated hinge lever 	Bottom	SPDT	A	V-154-1A5	V-104-1A5	V-104-1A4
			C2	V-154-1C25	V-104-1C25	V-104-1C24
			B	V-154-1B5	V-104-1B5	V-104-1B4
Short hinge roller lever 	Bottom	SPDT	A	V-155-1A5	V-105-1A5	V-105-1A4
			C2	V-155-1C25	V-105-1C25	V-105-1C24
			B	V-155-1B5	V-105-1B5	V-105-1B4
Hinge roller lever 	Bottom	SPDT	A	V-156-1A5	V-106-1A5	V-106-1A4
			C2	V-156-1C25	V-106-1C25	V-106-1C24
			B	V-156-1B5	V-106-1B5	V-106-1B4

Note: 1. A: Solder/quick-connect terminals (#187)
C2: Quick-connect terminals (#187)
B: Screw terminals

2. OF values shown in the table are for the pin plunger models.

Heat Resistant Models (Up to 150°C)

Actuator	COM terminal position	Contact specifications	Terminal specification	15 A	10 A
				OF: 1.96 N {200 gf}	OF: 0.98 N {100 gf}
Pin plunger 	Bottom	SPDT	Solder/Quick-connect terminal (#187) (A)	V-15-1A5-T	V-10-1A4-T
Short hinge lever 				V-151-1A5-T	V-101-1A4-T
Hinge lever 				V-152-1A5-T	V-102-1A4-T
Long hinge lever 				V-153-1A5-T	V-103-1A4-T
Simulated hinge lever 				V-154-1A5-T	V-104-1A4-T
Short hinge roller lever 				V-155-1A5-T	V-105-1A4-T
Hinge roller lever 				V-156-1A5-T	V-106-1A4-T

■ Barrier (V-21 and V-16 Models Only)
Right-hand Barrier

Left-hand Barrier


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
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: 60 operations/min

■ Characteristics

Operating speed	0.1 mm to 1 m/s (at pin plunger models)
Operating frequency	Mechanical: 600 operations/min Electrical: 60 operations/min
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	15 mΩ max. (initial value)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between terminals of the same polarity V-21, V-16, and V-11 models: 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 (see note 1) V-15 and V-10 models: 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 (see note 1)
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 ² {approx. 100G} max. Malfunction: V-21/V-16/V-15: 300 m/s ² {approx. 30G} max. V-11/V-10: 200 m/s ² {approx. 20G} max.
Life expectancy (see note 3)	Mechanical: 50,000,000 operations min. Electrical: V-21/V-16/V-15: 100,000 operations min. (V-15 heat resistive: 20,000 operation min.) V-11/V-10: 300,000 operations min. (V-10 heat resistive: 50,000 operation min.)
Degree of protection	IP00
Degree of protection against electric shock	Class I
Proof tracking index (PTI)	175
Switch category	D (IEC335-1)
Ambient temperature	Operating: -25°C to 80°C (with no icing) -25°C to 150°C for heat-resistive model (with no icing)
Ambient humidity	Operating: 85% max. (for 5°C to 35°C)
Weight	Approx. 6.2 g (pin plunger model)

- Note:**
1. The dielectric strength values shown in the table are for models with a Separator.
 2. For the pin plunger models, the above values apply for use at both the free position and total travel position. For the lever models, they apply at the total travel position.
 3. For testing conditions, contact your OMRON sales representative.

■ Approved Standards

UL1054 (File No. E41515) CSA C22.2 No.55 (File No. LR21642)
(Standard Ratings Only is listed.)

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, 1/2 HP	10 A, 1/2 HP
250 VAC	21 A, 1/2 HP	16 A, 1/2 HP	15 A, 1/2 HP	11 A, 1/2 HP	10 A, 1/2 HP
125 VDC	0.6 A	0.6 A	0.6 A	0.6 A	0.6 A
250 VDC	0.3 A	0.3 A	0.3 A	0.3 A	0.3 A

VDE 0630 (File No. 6162ÜG),
SEV (File No. 96. 550868. 01) DEMKO

Rated voltage	V-21	V-16	V-11
250 VAC	20 (4) A	16 (3) A	11 (2) A

Testing conditions: 50,000 operations, T105 (0°C to 105°C)

SEMKO EN61058-1 (File No. 9403007)

Rated voltage	V-16	V-11
250 VAC	16 (3) A	11 (2) A

Testing conditions: 5E4 (50,000 operations), T105 (0°C to 105°C)

TÜV Rheinland EN61058-1 (File No. T9451451)

Rated voltage	V-15	V-10
250 VAC	15 A	10 A
250 VDC	0.3 A	0.3 A

Testing conditions: 5E4 (50,000 operations), T105 (0°C to 105°C)

■ 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) or 0.5 mm (G gap)				
Inrush current	NC	50 A max.	40 A max.	36 A max.	24 A max.	
	NO					

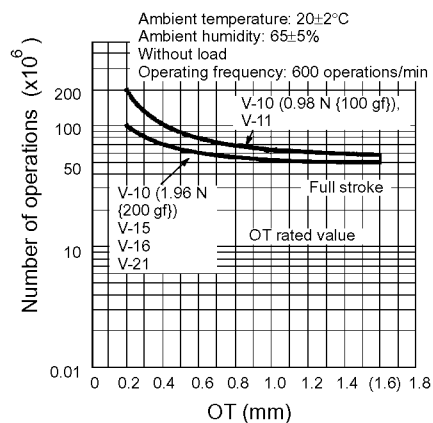
■ Contact Form

Terminal type	SPDT	SPST-NC	SPST-NO
Bottom terminal			
Side terminal			

Engineering Data

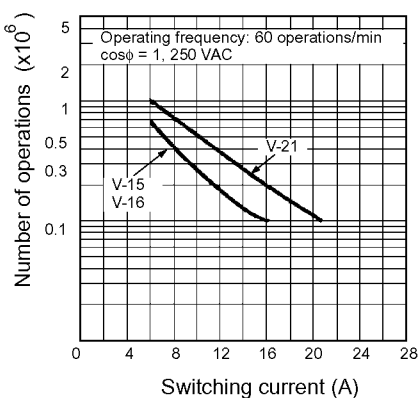
Mechanical Life Expectancy (Pin Plunger)

V-21/-16/-15/-10

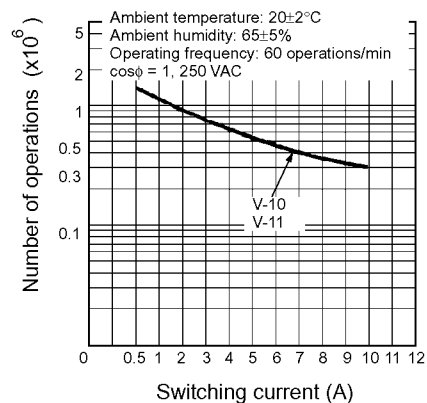


Electrical Life Expectancy

V-21/-16/-15

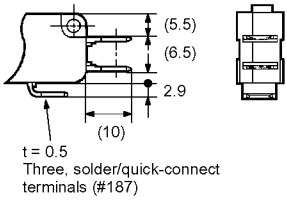
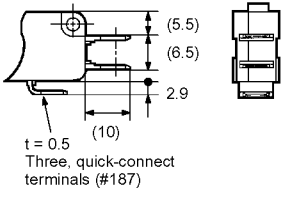
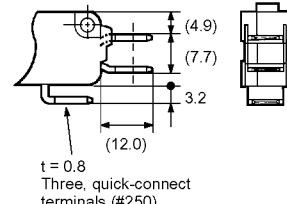
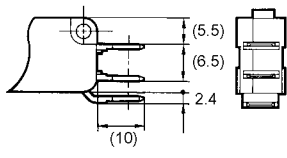
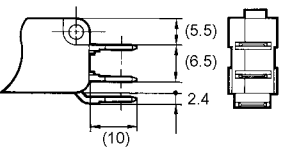
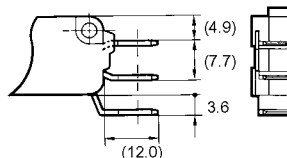
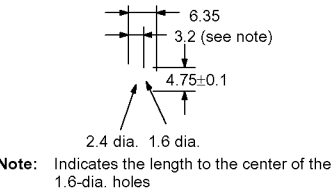
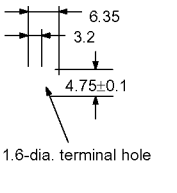
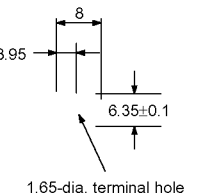


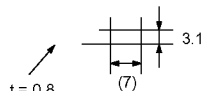
V-11/-10



Dimensions

■ Terminals

Terminal type	Solder/Quick-connect Terminal (#187) (A)	Quick-connect Terminal (#187) (C2)	Quick-connect Terminal (#250) (C)
COM bottom position			
COM side position			
Terminal dimensions	 Note: Indicates the length to the center of the 1.6-dia. holes	 1.6-dia. terminal hole	 1.65-dia. terminal hole

Terminal type	Screw Terminal (B)
Bottom	Three, #M3 x 0.5 x 3.2 Phillips screw washer 

- Note:**
1. The 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*.
 2. Right-angle PCB terminal type is available
 D5 type: Pins at right angles, to the right.
 D6 type: Pins at right angles, to the left.
 Drawings will be provided if requested.

■ Dimensions and Operating Characteristics

Note: 1. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.

2. The following illustrations and drawings are for quick-connect terminals (#250) (terminals C). V models with a switching current of 16 A or 11 A incorporates terminals A and C2. These models are different from #250 models in terminal size only. Terminals A, C2, and side common terminals are omitted from the following drawings. Refer to *Kinds of Terminals* on page 85 for these terminals.

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

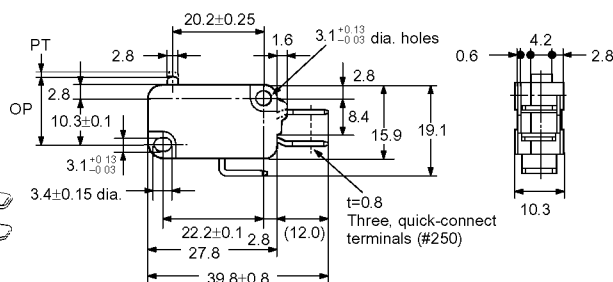
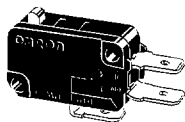
Pin Plunger

(Without Barrier)

V-21-1□6

V-16-1□5

V-11-1□4

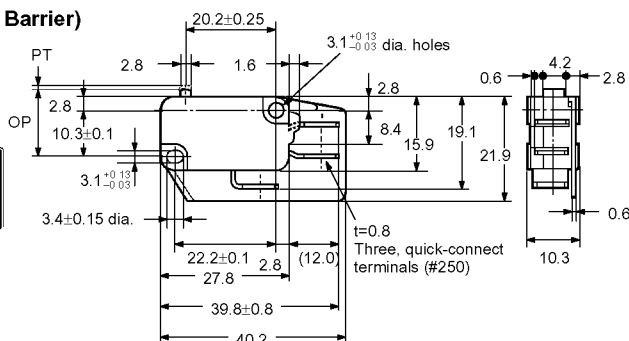
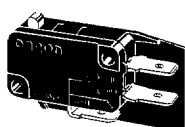


Model	V-21-1□6	V-16-1□5
OF max.	3.92 N {400 gf}	1.96 N {200 gf}
RF min.	0.78 N {80 gf}	0.49 N {50 gf}
PT max.	1.2 mm	
OT min.	1.0 mm	
MD max.	0.4 mm	
OP	14.7±0.4 mm	

(With Right-hand Barrier)

V-21-1□R6

V-16-1□R5

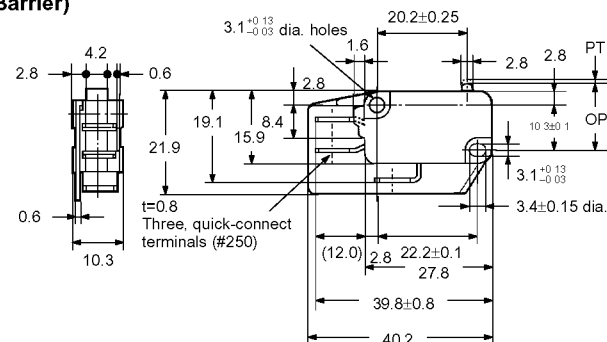


Model	V-11-1□4
OF max.	0.98 N {100 gf}
RF min.	0.20 N {20 gf}
PT max.	1.2 mm
OT min.	1.0 mm
MD max.	0.4 mm
OP	14.7±0.4 mm

(With Left-hand Barrier)

V-21-1□L6

V-16-1□L5

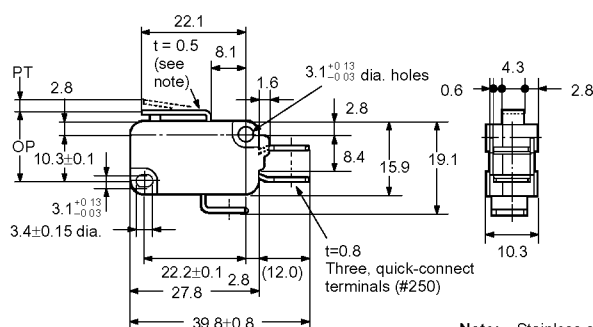
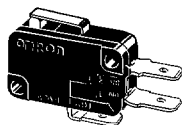


Short Hinge Lever

V-211-1□6

V-161-1□5

V-111-1□4



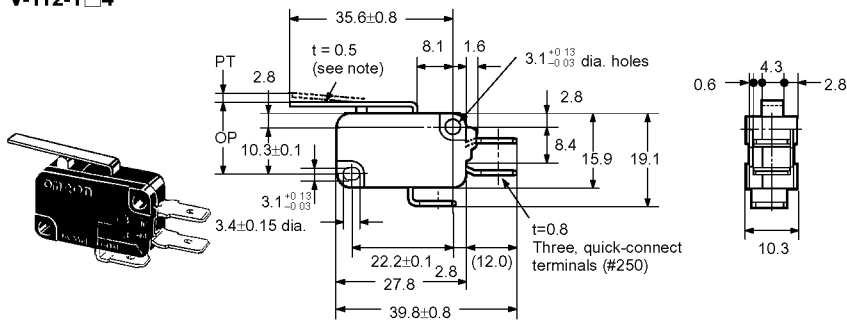
Note: Stainless-steel lever

Model	V-211-1□6	V-161-1□5
OF max.	3.92 N {400 gf}	1.96 N {200 gf}
RF min.	0.49 N {50 gf}	0.49 N {50 gf}
PT max.	1.6 mm	
OT min.	0.8 mm	
MD max.	0.6 mm	
OP	15.2±0.5 mm	

Model	V-111-1□4
OF max.	0.98 N {100 gf}
RF min.	0.15 N {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

V-212-1□6
V-162-1□5
V-112-1□4



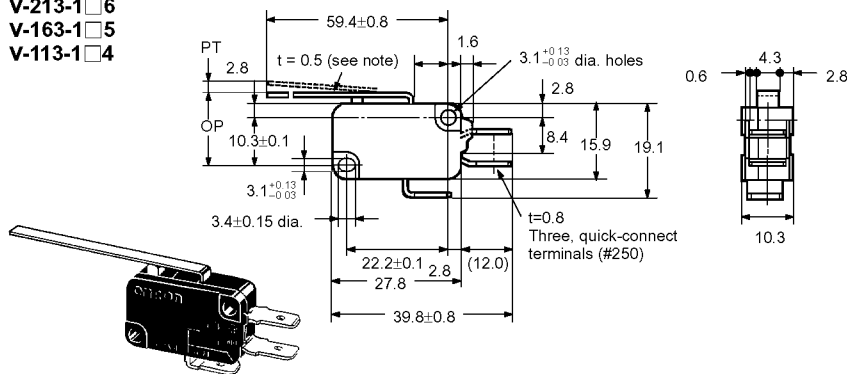
Note: Stainless-steel lever

Model	V-212-1□6	V-162-1□5
OF max.	2.45 N {250 gf}	1.23 N {125 gf}
RF min.	0.25 N {25 gf}	0.14 N {14 gf}
PT max.	4.0 mm	
OT min.	1.6 mm	
MD max.	1.5 mm	
OP	15.2±1.2 mm	

Model	V-112-1□4
OF max.	0.59 N {60 gf}
RF min.	0.06 N {6 gf}
PT max.	4.0 mm
OT min.	1.6 mm
MD max.	1.5 mm
OP	15.2±0.5 mm

Long Hinge Lever

V-213-1□6
V-163-1□5
V-113-1□4



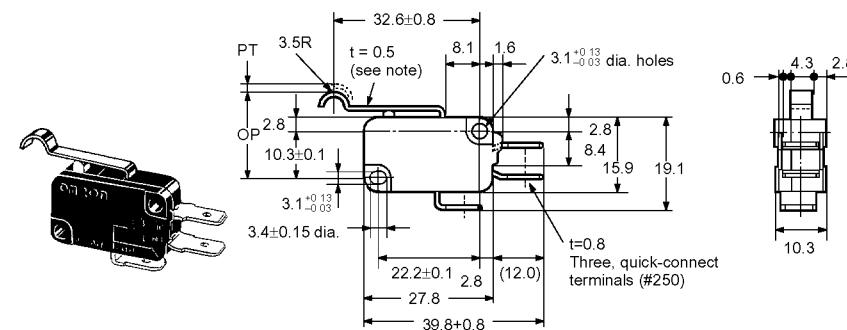
Note: Stainless-steel lever

Model	V-213-1□6	V-163-1□5
OF max.	1.27 N {130 gf}	0.69 N {70 gf}
RF min.	0.12 N {12 gf}	0.06 N {6 gf}
PT max.	9.0 mm	
OT min.	2.0 mm	
MD max.	2.8 mm	
OP	15.2 ^{+2.6} _{-3.2} mm	

Model	V-113-1□4
OF max.	0.34 N {35 gf}
RF min.	---
PT max.	9.0 mm
OT min.	3.2 mm
MD max.	2.8 mm
OP	15.2±2.6 mm

Simulated Hinge Lever

V-214-1□6
V-164-1□5
V-114-1□4



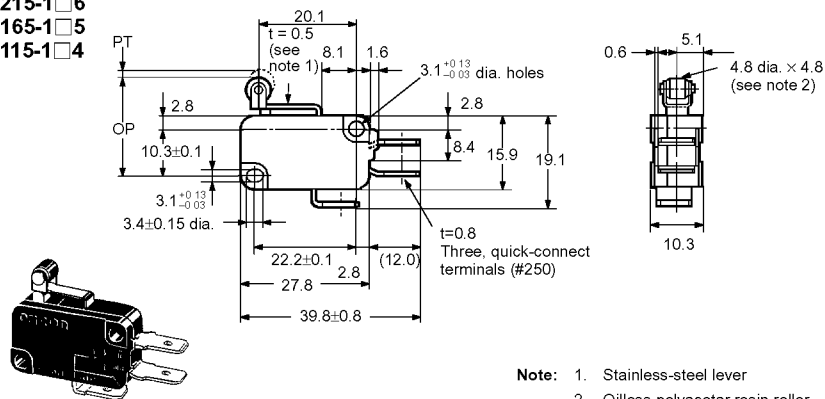
Note: Stainless-steel lever

Model	V-214-1□6	V-164-1□5
OF max.	2.45 N {250 gf}	1.23 N {125 gf}
RF min.	0.25 N {25 gf}	0.14 N {14 gf}
PT max.	4.0 mm	
OT min.	1.6 mm	
MD max.	1.5 mm	
OP	18.7±1.2 mm	

Model	V-114-1□4
OF max.	0.59 N {60 gf}
RF min.	0.06 N {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

V-215-1□6
V-165-1□5
V-115-1□4



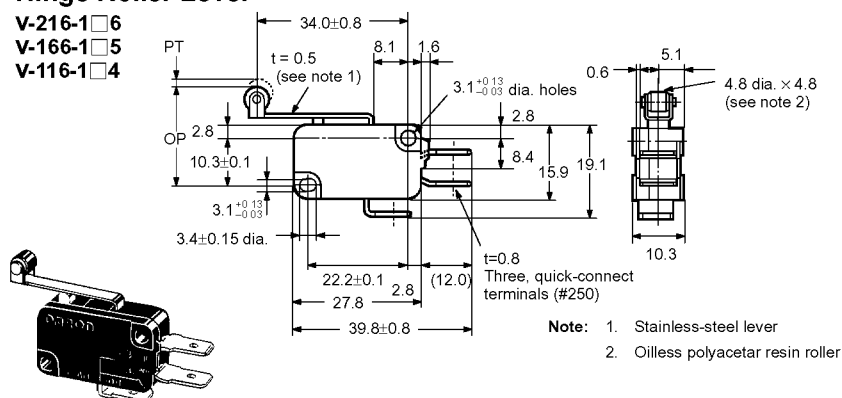
Note: 1. Stainless-steel lever
2. Oilless polyacetal resin roller

Model	V-215-1□6	V-165-1□5
OF max.	4.71 N {480 gf}	2.35 N {240 gf}
RF min.	0.49 N {50 gf}	0.49 N {50 gf}
PT max.	1.6 mm	
OT min.	0.8 mm	
MD max.	0.6 mm	
OP	20.7±0.6 mm	

Model	V-115-1□4
OF max.	1.18 N {120 gf}
RF min.	0.15 N {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

V-216-1□6
V-166-1□5
V-116-1□4



Note: 1. Stainless-steel lever
2. Oilless polyacetal resin roller

Model	V-216-1□6	V-166-1□5
OF max.	2.45 N {250 gf}	1.23 N {125 gf}
RF min.	0.25 N {25 gf}	0.14 N {14 gf}
PT max.	4.0 mm	
OT min.	1.6 mm	
MD max.	1.5 mm	
OP	20.7±1.2 mm	

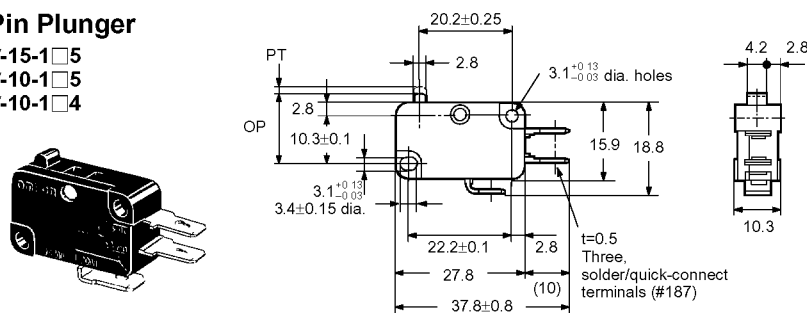
Model	V-116-1□4
OF max.	0.59 N {60 gf}
RF min.	0.06 N {6 gf}
PT max.	4.0 mm
OT min.	1.6 mm
MD max.	1.5 mm
OP	20.7±1.2 mm

■ Thermosetting Case (V-15/-10 Models)

The following illustration and drawing are for solder and quick-connect terminals (#187) (terminals A). V models with a switching current of 15 A or 10 A incorporate terminals B or C2. These models are different from #187 models in terminal size only. Refer to *Terminals* on page 85 for these terminals.

Pin Plunger

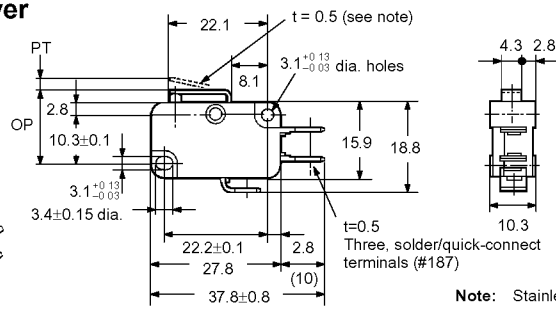
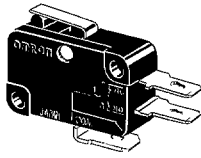
V-15-1□5
V-10-1□5
V-10-1□4



Model	V-15-1□5 V-10-1□5	V-10-1□4
OF max.	1.96 N {200 gf}	0.98 N {100 gf}
RF min.	0.49 N {50 gf}	0.20 N {20 gf}
PT max.	1.2 mm	
OT min.	1.0 mm	
MD max.	0.4 mm	
OP	14.7±0.4 mm	

Short Hinge Lever

V-151-1□5
V-101-1□5
V-101-1□4

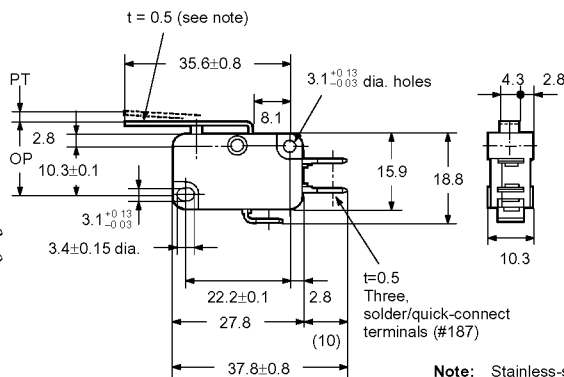
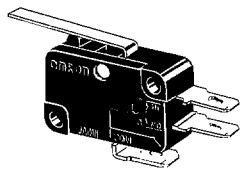


Note: Stainless-steel lever

Model	V-151-1□5 V-101-1□5	V-101-1□4
OF max.	1.96 N {200 gf}	0.98 N {100 gf}
RF min.	0.49 N {50 gf}	0.15 N {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

V-152-1□5
V-102-1□5
V-102-1□4

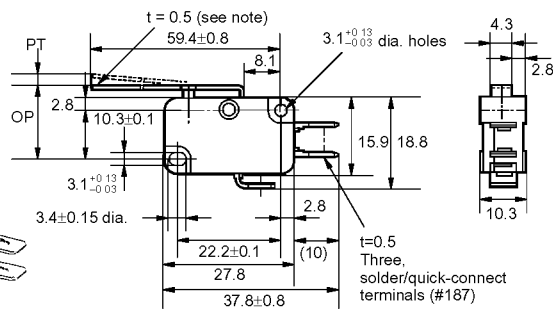
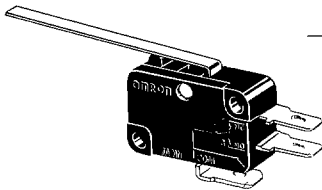


Note: Stainless-steel lever

Model	V-152-1□5 V-102-1□5	V-102-1□4
OF max.	1.23 N {125 gf}	0.59 N {60 gf}
RF min.	0.14 N {14 gf}	0.06 N {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

V-153-1□5
V-103-1□5
V-103-1□4

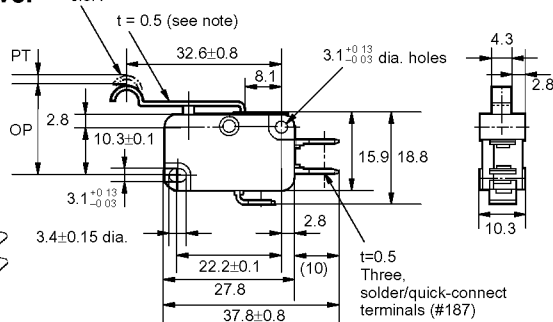
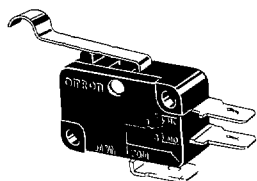


Note: Stainless-steel lever

Model	V-153-1□5 V-103-1□5	V-103-1□4
OF max.	0.69 N {70 gf}	0.34 N {35 gf}
RF min.	0.06 N {6 gf}	---
PT max.	9.0 mm	
OT min.	2.0 mm	3.2 mm
MD max.	2.8 mm	
OP	15.2 ^{+2.6} / _{-3.2} mm	15.2±2.6 mm

Simulated Hinge Lever

V-154-1□5
V-104-1□5
V-104-1□4

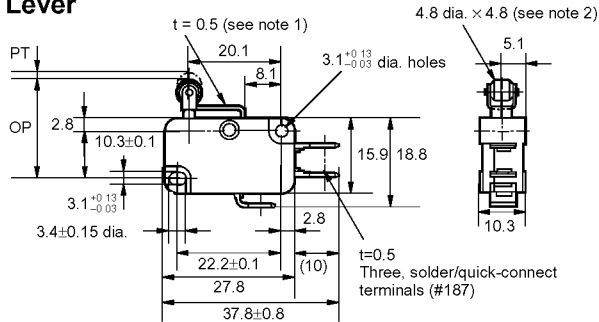
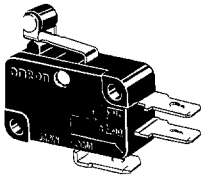


Note: Stainless-steel lever

Model	V-154-1□5 V-104-1□5	V-104-1□4
OF max.	1.23 N {125 gf}	0.59 N {60 gf}
RF min.	0.14 N {14 gf}	0.06 N {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

V-155-1□5
V-105-1□5
V-105-1□4

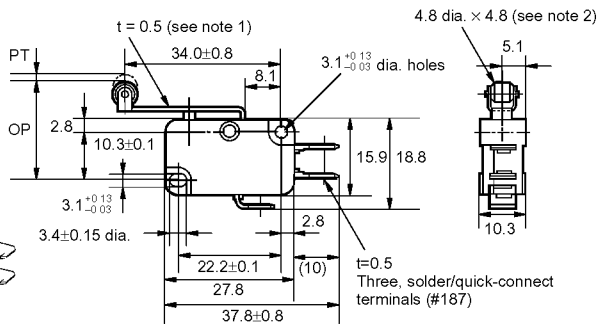
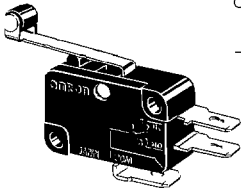


Note: 1. Stainless-steel lever
2. Oilless polyacetar resin roller

Model	V-155-1□5 V-105-1□5	V-105-1□4
OF max.	2.35 N {240 gf}	1.18 N {120 gf}
RF min.	0.49 N {50 gf}	0.15 N {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

V-156-1□5
V-106-1□5
V-106-1□4



Note: 1. Stainless-steel lever
2. Oilless polyacetar resin roller

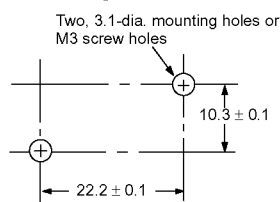
Model	V-156-1□5 V-106-1□5	V-106-1□4
OF max.	1.23 N {125 gf}	0.59 N {60 gf}
RF min.	0.14 N {14 gf}	0.06 N {6 gf}
PT max.	4.0 mm	
OT min.	1.6 mm	
MD max.	1.5 mm	
OP	20.7±1.2 mm	

Precautions

■ Mounting Dimensions

Use two M3 mounting screws with an appropriate screwdriver to mount the switch. Tighten the screws to a torque of 0.39 to 0.59 N • m {4 to 6 kgf • cm}.

Mounting Holes



■ Correct Use

Refer to pages 22 to 29 for common precautions.

Specifications Approved by TÜV Rheinland According to EN61058-1

Appropriate Cable Size (mm²)

Model	Solder terminal	Screw terminal
V-10	0.75, 1.25, 2.0	0.75, 1.25
V-15	1.25, 2.0	1.25

Terminal Connection

Use M3 crimp terminals for connecting to the screw terminals.

Appropriate tightening torque: 0.39 to 0.59 N • m (4 to 6 kgf • cm)

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.

Solder Terminal Approval Conditions

Soldering iron can be used.
Soldering hook hole available.
Soldering terminal types 1 and 2 are met.

■ Connector

Refer to Terminal Connectors on page 214.

■ Actuator (Sold Separately)

Various Actuators are available as shown on pages 111 to 113.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Basic Switch

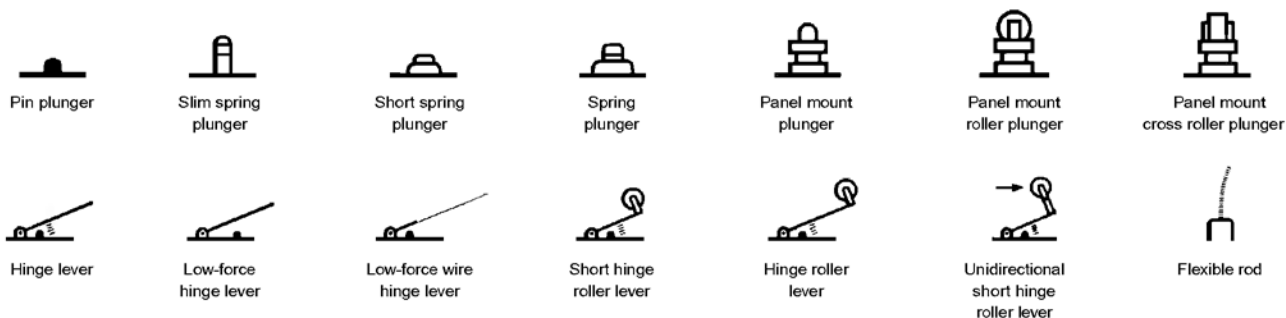
Z

General Purpose Basic Switch

- High precision basic switch in a variety of styles
- Wide margins of operating conditions increase the operating speed range
- Available in general purpose and drip-proof types



Ordering Information



GENERAL PURPOSE TYPE

Standard

Actuator	Operating Characteristics	Rated Current	Part Number	
			Solder Terminal	Screw Terminal
Pin plunger		15 A	Z-15G	Z-15G-B
Slim spring plunger		15 A	Z-15GS	Z-15GS-B
Short spring plunger	Low OP	15 A	Z-15GD	Z-15GD-B
Panel mount plunger	Middle OP	15 A	Z-15GQ	Z-15GQ-B
Panel mount roller plunger		15 A	Z-15GQ22	Z-15GQ22-B
Panel mount cross roller plunger		15 A	Z-15GQ21	Z-15GQ21-B
Hinge lever	Low OF	15 A	Z-15GW	Z-15GW-B
Low-force hinge lever		15 A	Z-15GW4	Z-15GW4-B
Short hinge roller lever		15 A	Z-15GW22	Z-15GW22-B
Hinge roller lever	Parallel	15 A	Z-15GW2	Z-15GW2-B
Unidirectional short hinge roller lever	Low OF	15 A	Z-15GW2277	Z-15GW2277-B

GENERAL PURPOSE TYPE

High-sensitivity

Actuator	Operating Characteristics	Rated Current	Part Number	
			Solder Terminal	Screw Terminal
Pin plunger		15 A	—	Z-15H-B
Low-force hinge lever		15 A	—	Z-15HW24-B
Low-force, wire hinge lever	Low OF	15 A	Z-15HW78	Z-15HW78-B
Short hinge roller lever		15 A	—	Z-15HW22-B

DRIP-PROOF TYPE

Standard

Actuator	Operating Characteristics	Rated Current	Contact Gap	Part Number	
				Solder Terminal	Screw Terminal
Slim spring plunger		15 A	0.5 mm	Z-15GS55	Z-15GS55-B
Short spring plunger		15 A	0.5 mm	Z-15GD55	Z-15GD55-B
Spring plunger	Middle OP	15 A	0.5 mm	Z-15GK55	Z-15GK55-B
	High OP	15 A	0.5 mm	Z-15GK355	Z-15GK355-B
Panel mount plunger	Middle OP	15 A	0.5 mm	Z-15GQ55	Z-15GQ55-B
Panel mount roller plunger		15 A	0.5 mm	—	Z-15GQ2255-B
Panel mount cross roller plunger		15 A	0.5 mm	—	Z-15GQ2155-B
Hinge lever	Low OF	15 A	0.5 mm	Z-15GW55	Z-15GW55-B
Short hinge roller lever		15 A	0.5 mm	Z-15GW2255	Z-15GW2255-B
Hinge roller lever	Parallel	15 A	0.5 mm	Z-15GW255	Z-15GW255-B
Flexible rod	High OF	15 A	0.5 mm	Z-15GNJ55	Z-15GNJ55-B

DRIP-PROOF TYPE

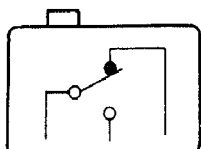
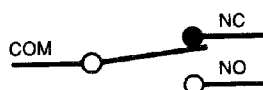
High-sensitivity

Actuator	Operating Characteristics	Rated Current	Contact Gap	Part Number	
				Solder Terminal	Screw Terminal
Panel mount plunger	Middle OP	15 A	0.25 mm	—	Z-15HQ55-B
Flexible rod	High OF	15 A	0.25 mm	—	Z-15HNJS55-B

Note: For smaller mounting hole types, please consult OMRON.

■ BASIC CONTACT FORM

Type	Contact gap	Features
General purpose	H: 0.25 mm (high sensitivity)	Pin plunger and lever types available. Drip-proof and flexible rod types are also available.
	G: 0.5 mm (standard)	
Drip-proof	H: 0.25 mm (high sensitivity)	The pin plunger is sealed from the other switch mechanisms by a resilient rubber, and the case and cover are sealed by adhesive so that the switch is resistant to humidity, oil and dust. The degree of protection conforms to IEC IP63.
	G: 0.5 mm (standard)	



Basic Contact form

Specifications

Standard type (except flexible rod types)

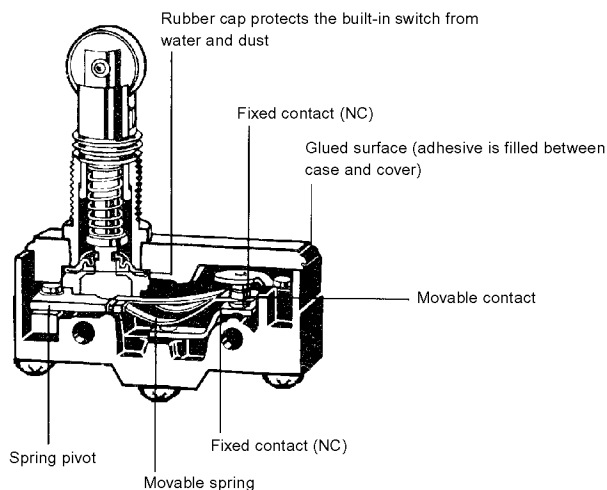
Contact gap	Rated voltage	Non-inductive load (A)				Inductive load (A)				Inrush current (A)	
		Resistive load		Lamp load		Inductive load		Motor load			
		NC	NO	NC	NO	NC	NO	NC	NO	NC	NO
G,H	125 VAC	15 (10)	—	3	1.5	15 (10)	—	5	2.5	30 max.	15 max.
	250 VAC	15 (10)	—	2.5	1.25	15 (10)	—	3	1.5		
	500 VAC	10	—	1.5	0.75	6	—	1.5	0.75		
G	8 VDC	15	—	3	1.5	15	—	5	2.5		
	14 VDC	15	—	3	1.5	10	—	5	2.5		
	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	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		
	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		

Standard flexible rod types

Rated voltage	Non-inductive load (A)				Inductive load (A)				Inrush current (A)	
	Resistive load		Lamp load		Inductive load		Motor load			
	NC	NO	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	15	—	2	1	7	—	2.5	2	30 max.	15 max.
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		

■ CONSTRUCTION

Drip-proof type



Characteristics

		Standard (except flexible rod types)	Standard flexible rod types (coil spring and steel wire type)
Operating speed		0.01 mm to 1 m/second (see note 2)	1 mm to 1 m/second
Operating frequency	Mechanical	240 operations/min.	120 operations/min.
	Electrical	20 operations/min.	20 operations/min.
Insulation resistance		100 MΩ min. (at 500 VDC)	
Contact resistance		50 mΩ max. (initial)	15 mΩ max. (initial)
Dielectric strength (VAC)	G contact gap model	1,000 VAC, 50/60 Hz for 1 minute between terminals of same polarity	
	H contact gap model	600 VAC, 50/60 Hz for 1 minute	
		2,000 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	Malfunction	10 to 55 Hz, 1.5 mm double amplitude (see note 4)	10 to 20 Hz, 1.5 mm double amplitude
Shock	Mechanical durability	1,000 m/s ² min. (approx. 100 g)	
	Malfunction	300 m/s ² min. (approx. 30 g) (see note 3)	50 m/s ² min. (approx. 5 g)
Ambient temperature	Standard types	-25° to 80°C (with no icing)	
	Drip-proof types	-15° to 80°C (with no icing)	
Humidity	Standard types	35% to 85% RH	
	Drip-proof types	35% to 95% RH	
Service life	Mechanical	G, H contact gap models 20,000,000 operations min. (see note 4)	1,000,000 operations min.
	Electrical	G, H contact gap models 500,000 operations min. (see note 2)	100,000 operations min.
Weight		Approx. 22 to 58 g	Approx. 42 to 48 g

- Note: 1. Data shown are of initial value.
 2. Apply to the pin plunger models or the pin plunger of the lever models.
 3. Apply to Z-15G.
 4. Apply to the pin plunger models.

■ ACCESSORIES (order separately)

Operating Characteristics (when used with Z-15)

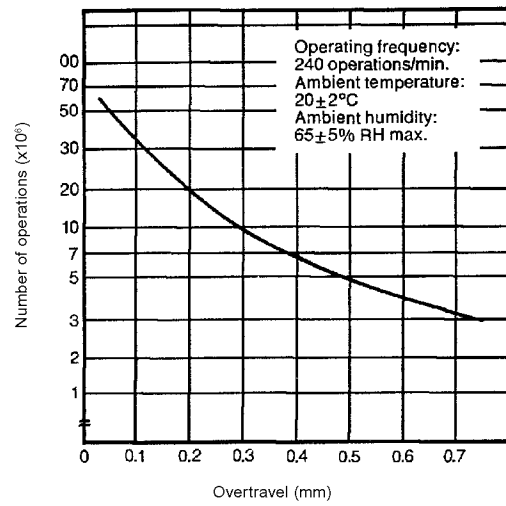
Characteristics	ZAA-1 w/Z-15G-B	ZAA-2 w/Z-15G-B
OF max.	500 g	500 g
RF min.	170 g	170 g
PT max.	—	—
OT min.	12.7 mm	12.7 mm
MD max.	2.2 mm	2.2 mm
FP max.	34.5 mm	46.1 mm
OP	28.9±1.6 mm	40.4±1.6 mm

Terminal enclosures - Standard models

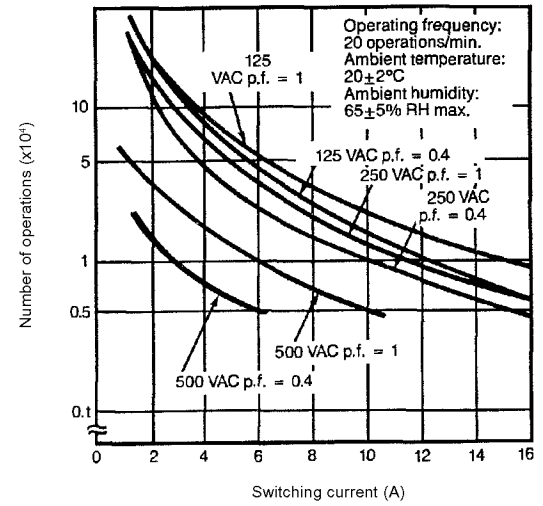
Material	Mounting method	For solder terminal	For screw terminal	Remarks
Phenolic resin	Side mounting	AP-A	AP-B	—
Metal	Side mounting	AP1-A	AP1-B	Use in conjunction with AP-A and AP-B
Polyvinyl chloride	Side mounting	AP-Z	AP-Z	Excels in safety and dust-proofing property

■ CHARACTERISTIC DATA

Mechanical service life Z-15G



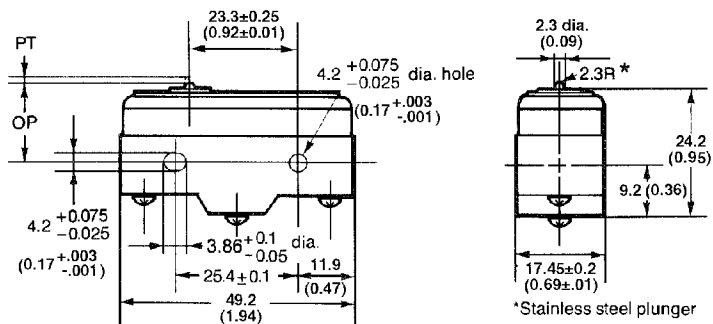
Electrical service life Z-15G



Dimensions

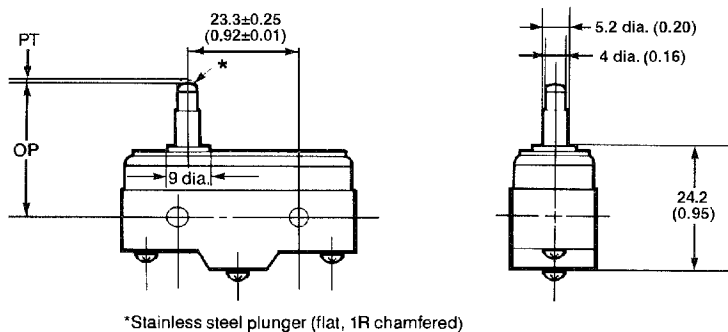
Unit: mm (inch)

Z-15G-B, Z-15H-B



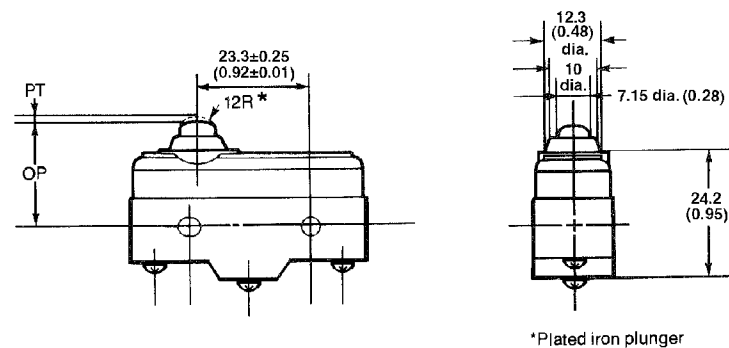
Operating characteristics	Z-15G-B	Z-15H-B
OF	250 to 350 g	200 to 280 g
RF min.	114 g	114 g
PT max.	.4 mm (0.02)	.3 mm (0.01)
OT min.	.13 mm (0.01)	.13 mm (0.01)
MD max.	.05 mm (0.002)	.025 mm (0.001)
OP	15.9 ± 0.4 mm (0.63 ± 0.02)	15.9 ± 0.4 mm (0.63 ± 0.02)

Z-15GS-B



Operating characteristics	Z-15GS-B
OF	250 to 350 g
RF min.	114 g
PT max.	0.4 mm (0.02)
OT min.	1.6 mm (0.06)
MD max.	0.05 mm (0.002)
OP	28.2 ± 0.5 mm (1.1 ± 0.02)

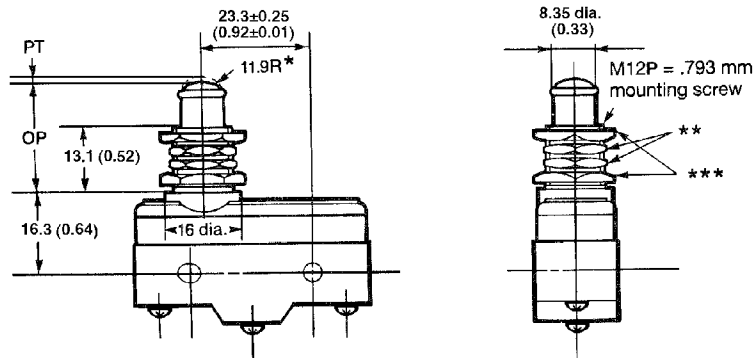
Z-15GD-B



Operating characteristics	Z-15GD-B
OF	250 to 350 g
RF min.	114 g
PT max.	0.4 mm (0.02)
OT min.	1.6 mm (0.06)
MD max.	0.05 mm (0.002)
OP	21.5 ± 0.5 mm (0.85 ± 0.02)

- Note: 1. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.
 2. For smaller diameter mounting holes, please consult OMRON.
 3. All drawings show the switches with screw terminals. For solder terminals, remove the "-B" from the end of the part number.

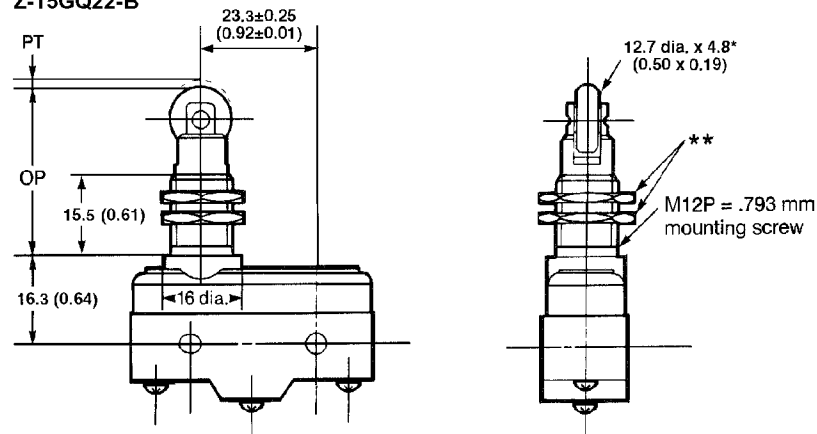
Z-15GQ-B



- * Stainless steel plunger
 ** Two hexagonal nuts (2 t x 14 width across flats)
 *** Two lock nuts (2 t x 15.6 width across flats)

Operating characteristics	Z-15GQ-B
OF	250 to 350 g
RF min.	114 g
PT max.	0.4 mm (0.02)
OT min.	5.5 mm (0.22)
MD max.	0.05 mm (0.002)
OP	21.8 ± 0.8 mm (0.86 ± 0.03)

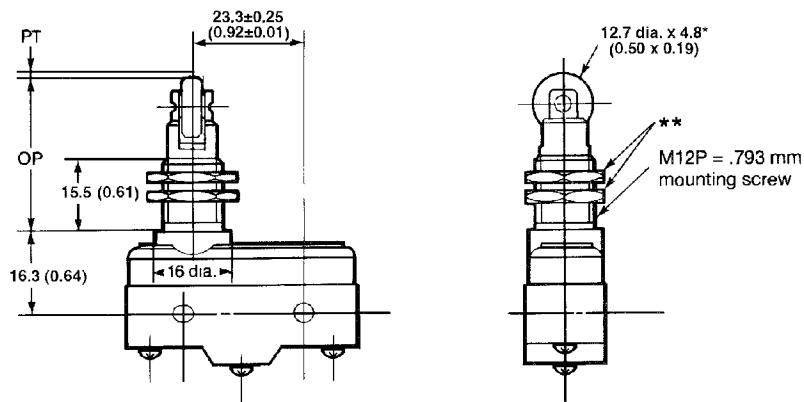
Z-15GQ22-B



- * Stainless steel roller
 ** Two hexagonal nuts
 (3 t x 17 width across flats)

Operating characteristics	Z-15GQ22-B
OF	250 to 350 g
RF min.	114 g
PT max.	0.4 mm (0.02)
OT min.	3.58 mm (0.14)
MD max.	0.05 mm (0.002)
OP	33.4 ± 1.2 mm (1.31 ± 0.05)

Z-15GQ21-B



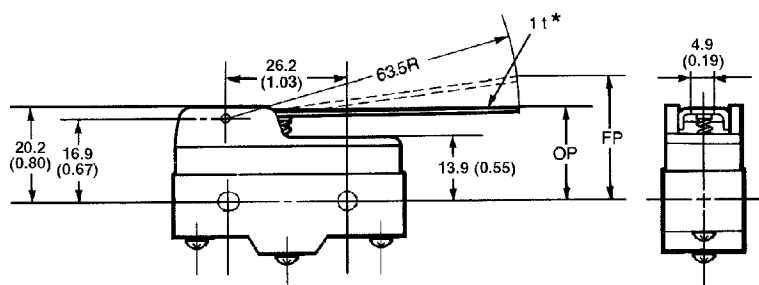
- * Stainless steel roller
 ** Two hexagonal nuts
 (3 t x 17 width across flats)

Operating characteristics	Z-15GQ21-B
OF	250 to 350 g
RF min.	114 g
PT max.	0.4 mm (0.02)
OT min.	3.58 mm (0.14)
MD max.	0.05 mm (0.002)
OP	33.4 ± 1.2 mm (1.31 ± 0.05)

- Note: 1. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.
 2. For smaller diameter mounting holes, please consult OMRON.
 3. All drawings show the switches with screw terminals. For solder terminals, remove the "-B" from the end of the part number.

Unit: mm (inch)

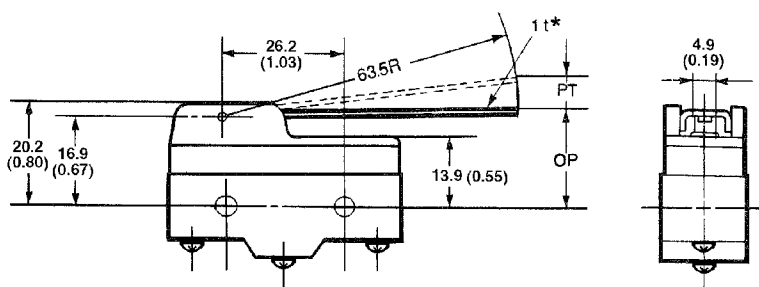
Z-15GW-B



*Stainless steel lever

Operating characteristics	Z-15GW-B
OF max.	70 g
RF min.	14 g
OT min.	5.6 mm (0.22)
MD max.	1.27 mm (0.05)
FP max.	28.2 mm (1.11)
OP	19 ± 0.8 mm (0.75 ± 0.03)

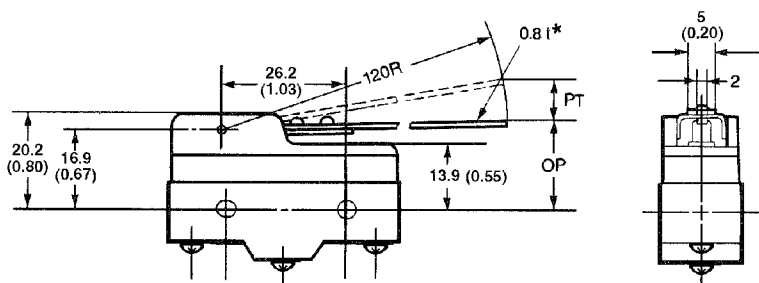
Z-15GW4-B



*Stainless steel lever

Operating characteristics	Z-15GW4-B
OF max.	28 g
RF min.	3.5 g
PT max.	10 mm (0.39)
OT min.	5.6 mm (0.22)
MD max.	1.27 mm (0.05)
OP	19 ± 0.8 mm (0.75 ± 0.03)

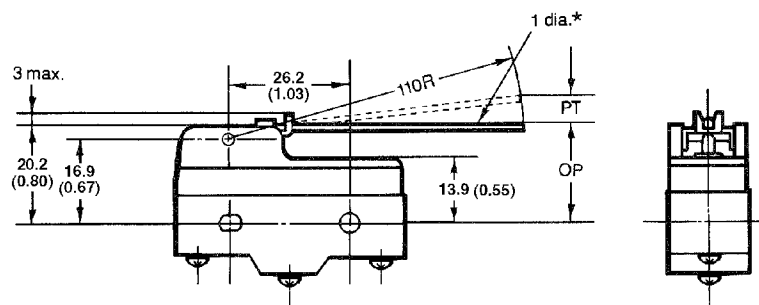
Z-15HW24-B



*Stainless steel lever

Operating characteristics	Z-15HW24-B
OF max.	6 g
RF min.	0.5 g
PT max.	19.8 mm (0.78)
OT min.	10 mm (0.39)
MD max.	2 mm (0.08)
OP	19.8 ± 1.6 mm (0.75 ± 0.03)

Z-15HW78-B

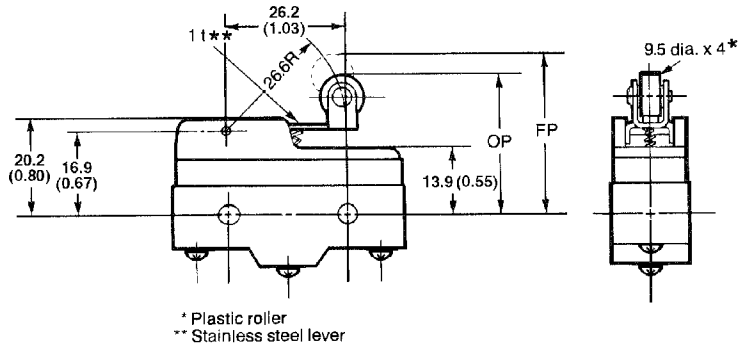


*Stainless steel wire lever

Operating characteristics	Z-15HW78-B
OF max.	4 g
RF min.	0.3 g
PT max.	10 mm (0.39)
OT min.	6 mm (0.24)
MD max.	3 mm (0.12)
OP	20 ± 1 mm (0.79 ± 0.04)

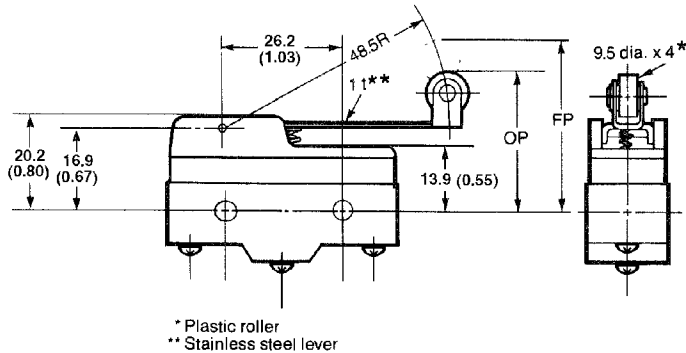
Note: 1. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.
 2. For smaller diameter mounting holes, please consult OMRON.
 3. All drawings show the switches with screw terminals. For solder terminals, remove the "B" from the end of the part number.

Z-15GW22-B, Z-15HW22-B



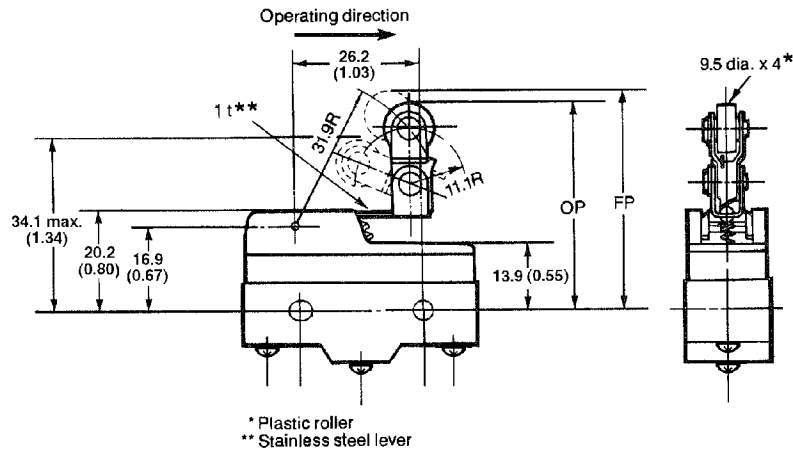
Operating characteristics	Z-15GW22-B	Z-15HW22-B
OF max.	160 g	150 g
RF min.	42 g	42 g
OT min.	2.4 mm (0.09)	2.4 mm (0.09)
MD max.	0.5 mm (0.02)	0.45 mm (0.02)
FP max.	32.5 mm (1.28)	32.5 mm (1.28)
OP	30.2 ± 0.4 mm (1.19 ± 0.02)	30.2 ± 0.4 mm (1.19 ± 0.02)

Z-15GW2-B



Operating characteristics	Z-15GW2-B
OF max.	100 g
RF min.	22 g
OT min.	4 mm (0.16)
MD max.	1.02 mm (0.04)
FP max.	36.5 mm (1.44)
OP	30.2 ± 0.8 mm (1.19 ± 0.03)

Z-15GW2277-B

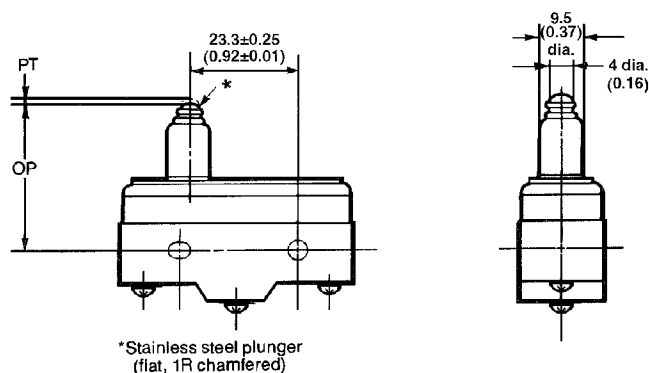


Operating characteristics	Z-15GW2277-B
OF max.	170 g
RF min.	42 g
OT min.	2.4 mm (0.09)
MD max.	0.51 mm (0.02)
FP max.	43.6 mm (1.72)
OP	41.3 ± 0.8 mm (1.63 ± 0.03)

- Note: 1. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.
 2. For smaller diameter mounting holes, please consult OMRON.
 3. All drawings show the switches with screw terminals. For solder terminals, remove the "-B" from the end of the part number.

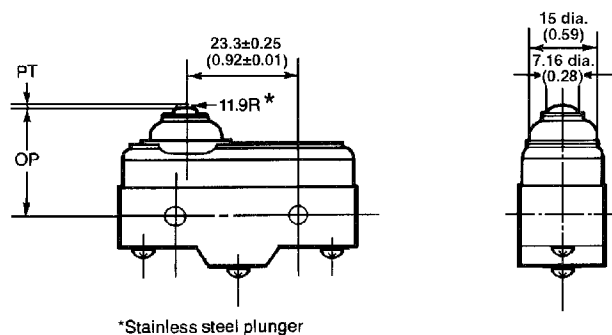
Unit: mm (inch)

Z-15GS55-B



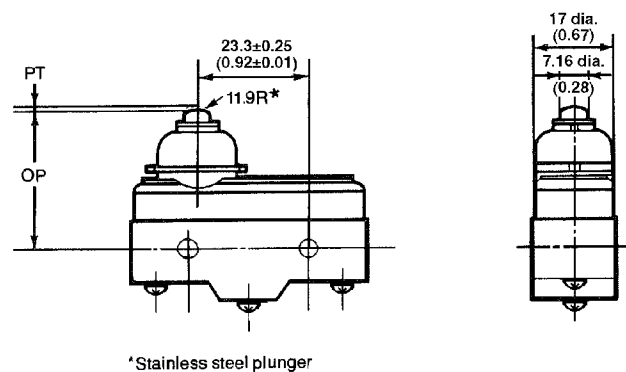
Operating characteristics	Z-15GS55-B
OF max.	540 g
RF min.	114 g
PT max.	1.9 mm (0.07)
OT min.	1.6 mm (0.06)
MD max.	0.06 mm (0.002)
OP	28.2 ± 0.5 mm (1.11 ± 0.02)

Z-15GD55-B



Operating characteristics	Z-15GD55-B
OF max.	540 g
RF min.	114 g
PT max.	1.8 mm (0.07)
OT min.	1.6 mm (0.06)
MD max.	0.06 mm (0.002)
OP	21.5 ± 0.5 mm (.85 ± 0.02)

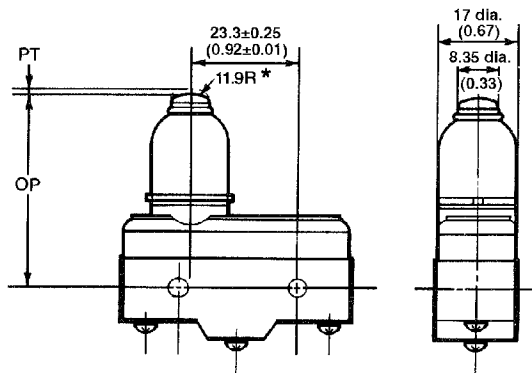
Z-15GK55-B



Operating characteristics	Z-15GK55-B
OF max.	540 g
RF min.	114 g
PT max.	2.3 mm (0.09)
OT min.	1.6 mm (0.06)
MD max.	0.06 mm (0.002)
OP	28.2 ± 0.5 mm (1.11 ± 0.02)

Note: 1. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.
 2. For smaller diameter mounting holes, please consult OMRON.
 3. All drawings show the switches with screw terminals. For solder terminals, remove the "B" from the end of the part number.

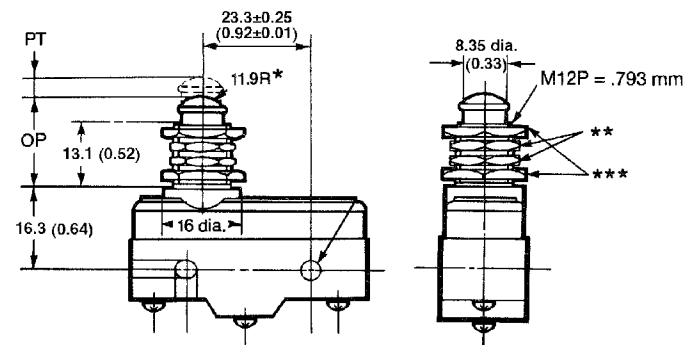
Z-15GK355-B



*Stainless steel plunger

Operating characteristics	Z-15GK355-B
OF max.	540 g
RF min.	114 g
PT max.	2.4 mm (0.09)
OT min.	3.5 mm (0.14)
MD max.	0.06 mm (0.002)
OP	37.8 ± 1.2 mm (1.49 ± 0.05)

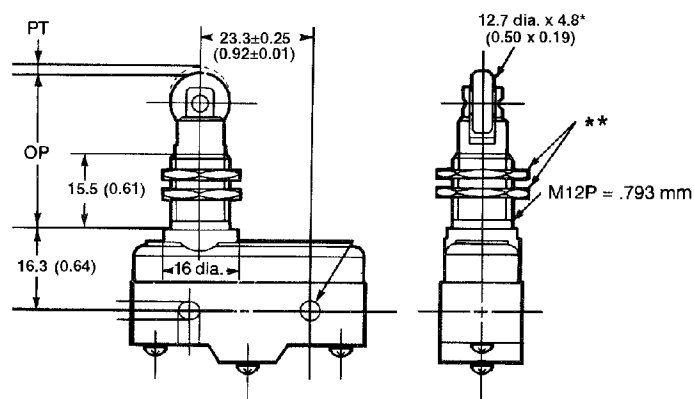
Z-15GQ55-B, Z-15HQ55-B



* Stainless steel plunger
 ** Two hexagonal nuts (2 t x 14 width across flats)
 *** Two lock nuts (2 t x 15.6 width across flats)

Operating characteristics	Z-15GQ55-B	Z-15HQ55-B
OF max.	540 g	400 g
RF min.	114 g	114 g
PT min.	1.8 mm (0.07)	1.7 mm (0.07)
OT min.	5.5 mm (0.22)	5.5 mm (0.22)
MD max.	0.06 mm (0.002)	0.04 mm (0.002)
OP	21.8 ± 0.8 mm (0.86 ± 0.03)	21.8 ± 0.8 mm (0.86 ± 0.03)

Z-15GQ2255-B



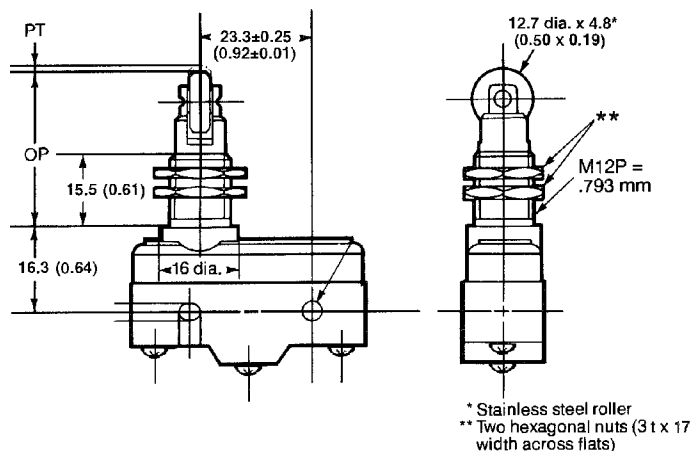
* Stainless steel roller
 ** Two hexagonal nuts (3 t x 17 width across flats)

Operating characteristics	Z-15GQ2255-B
OF max.	540 g
RF min.	114 g
PT max.	1.8 mm (0.07)
OT min.	3.58 mm (0.14)
MD max.	0.06 mm (0.002)
OP	33.4 ± 1.2 mm (1.31 ± 0.05)

- Note: 1. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.
 2. For smaller diameter mounting holes, please consult OMRON.
 3. All drawings show the switches with screw terminals. For solder terminals, remove the "-B" from the end of the part number.

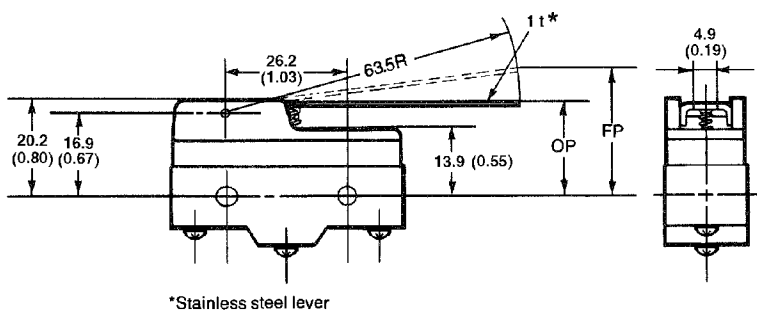
Unit: mm (inch)

Z-15GQ2155-B



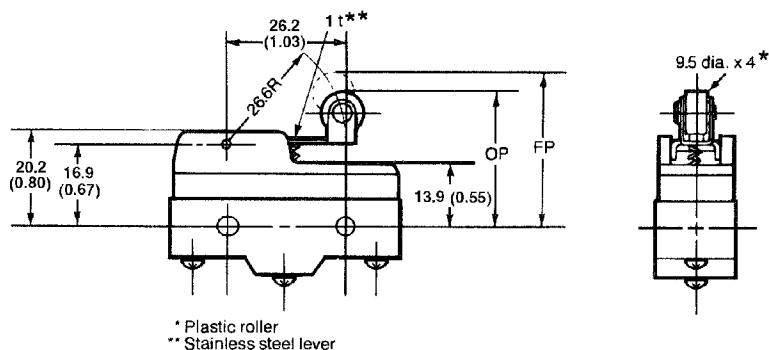
Operating characteristics	Z-15GQ2155-B
OF max.	540 g
RF min.	114 g
PT max.	1.8 mm (0.07)
OT min.	3.58 mm (0.14)
MD max.	0.06 mm (0.002)
OP	33.4 ± 1.2 mm (1.31 ± 0.05)

Z-15GW55-B



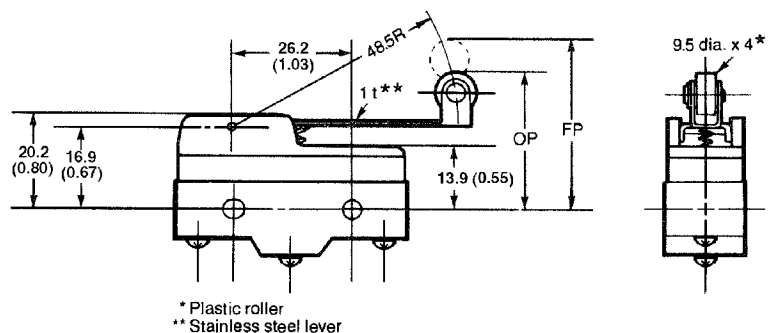
Operating characteristics	Z-15GW55-B
OF max.	100 g
RF min.	14 g
OT min.	5.6 mm (0.22)
MD max.	2 mm (0.08)
FP max.	28.2 mm (1.11)
OP	19 ± 0.8 mm (0.75 ± 0.03)

Z-15GW2255-B



Operating characteristics	Z-15GW2255-B
OF max.	200 g
RF min.	42 g
OT min.	2.44 mm (0.10)
MD max.	0.8 mm (0.03)
FP max.	32.9 mm (1.30)
OP	30.2 ± 0.4 mm (1.19 ± 0.02)

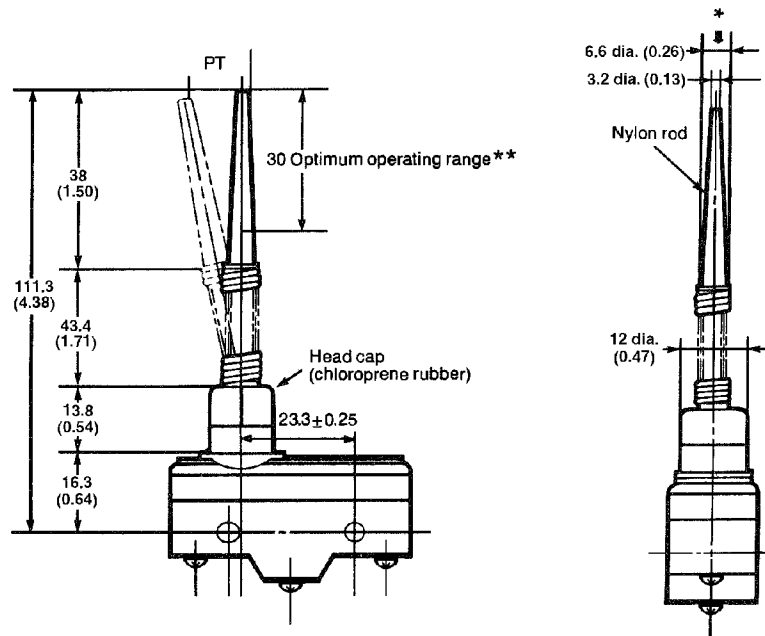
Z-15GW255-B



Operating characteristics	Z-15GW255-B
OF max.	130 g
RF min.	21 g
OT min.	4 mm (0.16)
MD max.	1.6 mm (0.06)
FP max.	36.5 mm (1.44)
OP	30.2 ± 0.8 mm (1.19 ± 0.03)

- Note: 1. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.
2. For smaller diameter mounting holes, please consult OMRON.
3. All drawings show the switches with screw terminals. For solder terminals, remove the "B" from the end of the part number.

Z-15GNJ55-B

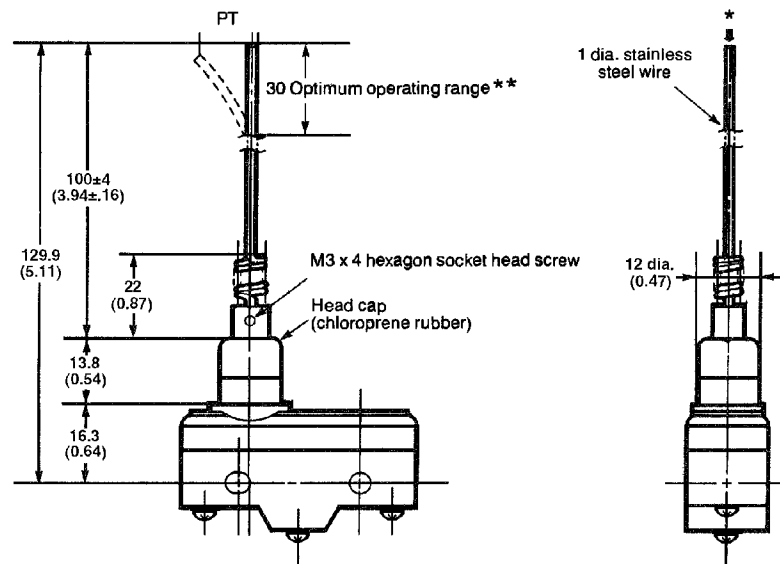


- * The coil spring may be operated from any direction except axial direction (⌘).
- ** Be sure to use the cam within 30 mm from the top end of the stainless wire. (Avoid use within 80 mm from the mounting hole.)

Operating characteristics	Z-15GNJ55-B
OF max.	50 g
PT max.	20 mm* (0.79)

* Reference value

Z-15HNJ55-B



- * The coil spring may be operated from any direction except axial direction (⌘).
- ** Be sure to use the cam within 30 mm from the top end of the stainless wire. (Avoid use within 100 mm from the mounting hole.)

Operating characteristics	Z-15HNJ55-B
OF max.	15 g
PT max.	25 mm* (0.98)

* Reference value

Note: 1. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.

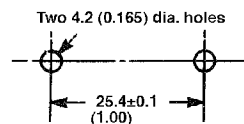
2. For smaller diameter mounting holes, please consult OMRON.

3. All drawings show the switches with screw terminals. For solder terminals, remove the "-B" from the end of the part number.

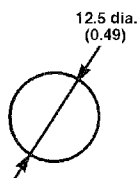
Unit: mm (inch)

■ MOUNTING HOLES

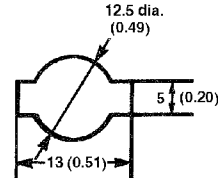
Side mounting



Panel mounting plunger type

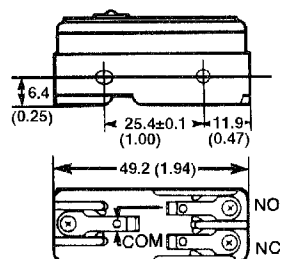


Roller plunger type

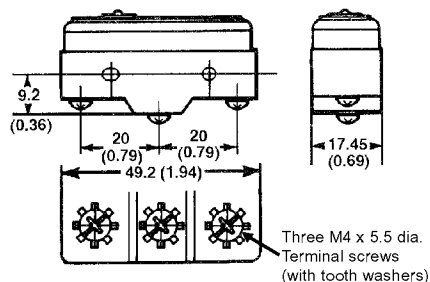


■ TERMINALS

Solder terminal (blank)



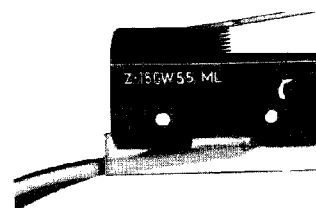
Screw terminal (B)



■ MOLDED TERMINAL TYPE ORDERING INFORMATION

The solder terminal type can be supplied with molded terminals with a choice of five different lead outlet directions. When placing your order for the molded terminal type, add the following code to the model number.

-M□□
 — Lead outlet directions (L, R, D, F, H)
 — Mold thickness
 (No symbol)...a = 12 mm with VSF
 19...a = 19 mm with VCT

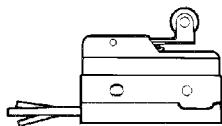


- Note: 1. Standard leads are single-core vinyl cords (VSF) with a nominal cross sectional area of 1.25 mm².
 2. Standard vinyl cord lengths are 1 m, 3 m, and 5 m.
 3. Mold thickness will be 19 mm when using VCT cords.
 4. Standard unit has three lead outlets in the same direction.
 5. Connect the black lead to the COM terminal, white lead to the NO terminal, and red lead to the NC terminal, respectively.

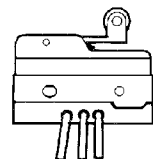
■ DIRECTIONS OF LEAD OUTLETS

The following diagrams show the molded terminal version of sealed type Z-15GW2255, with a mold thickness of 12 mm.

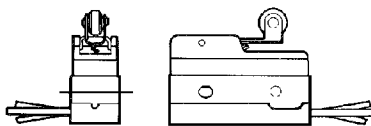
Z-15GW2255-ML (left-hand)



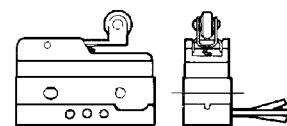
Z-15GW2255-MF (forward)



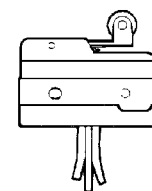
Z-15GW2255-MR (right-hand)



Z-15GW2255-MH (rearward)



Z-15GW2255-MD (underside)



Note: Respective directions of lead outlets are determined with the plunger viewed on your left.

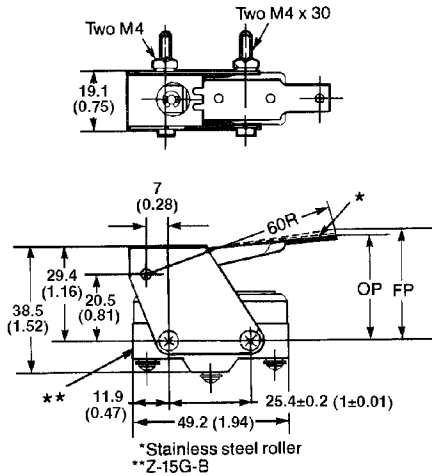
■ LEAD WIRE SPECIFICATIONS

Type	Nominal cross-sectional area (mm ²)	Finished outer diameter (mm)	Connection to terminal	Length (m)
VSF (single-core, vinyl cord)	1.25	Approx. 3.1	Black-COM	0.5, 1, 2, 3, 5 (standard)
VCT (vinyl-insulated cable)		Approx. 9.6 (2-core)	White-NO	
		Approx. 10.5 (3-core)	Red-NC	

■ ACCESSORIES, order separately

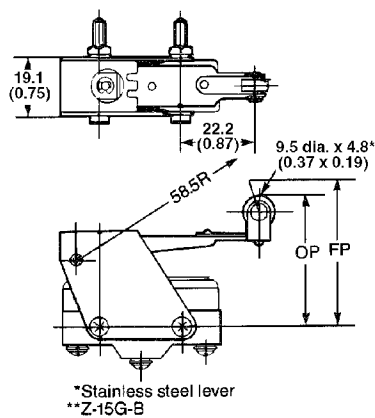
Hinge lever

ZAA-1



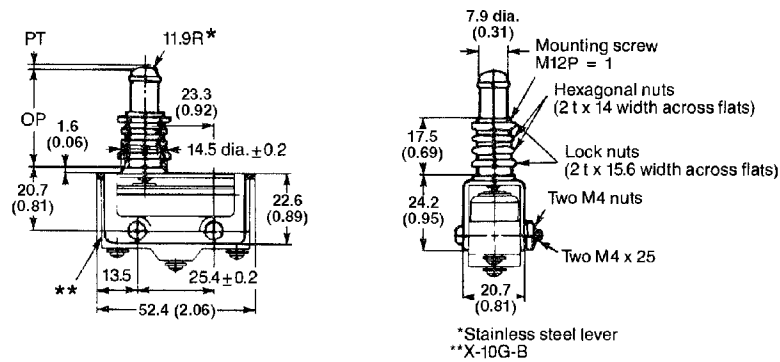
Hinge roller lever

ZAA-2



Panel mount plunger

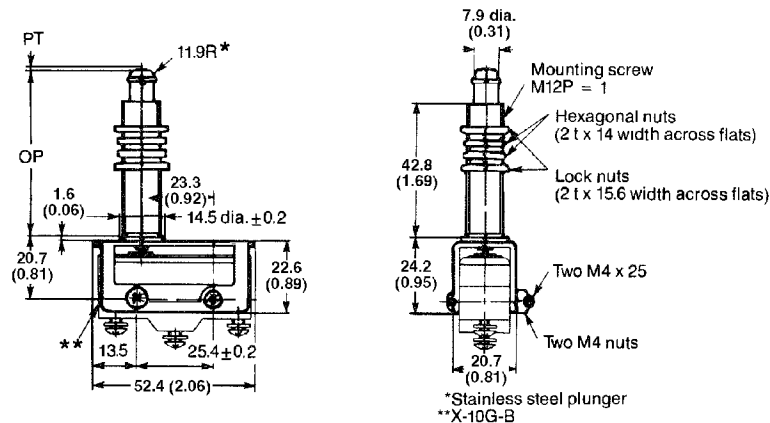
ZAQ-3



Operating characteristics	ZAQ-3 with Z-15G
OF max.	550 g
RF min.	144 g
RT max.	1 mm (0.04 in)
OT min.	4.5 mm (0.18 in)
MD max.	0.2 mm (0.01 in)
OP	27.8±1.5 mm (1.09±0.06 in)

Panel mount plunger

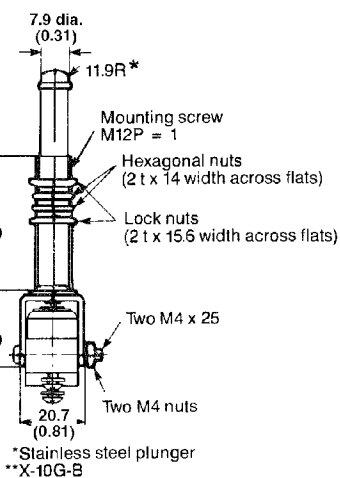
ZAQ-2



Operating characteristics	ZAQ-2 with Z-15G
OF max.	550 g
RF min.	144 g
RT max.	1 mm (0.04 in)
OT min.	4.5 mm (0.18 in)
MD max.	0.2 mm (0.01 in)
OP	53.2±1.5 mm (2.09±0.06 in)

Note: Unless otherwise specified, a tolerance of ± 0.8 mm applies to all dimensions.

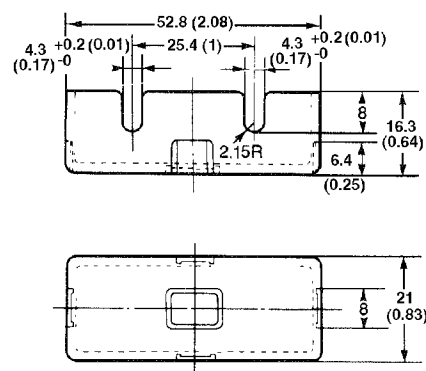
Panel mount plunger ZAQ-1



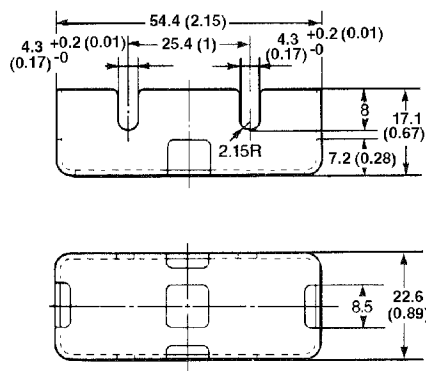
Operating characteristics	ZAQ-1 with Z-15G
OF max.	550 g
RF min.	144 g
RT max.	1 mm (0.04 in)
OT min.	20.4 mm (0.80 in)
MD max.	0.2 mm (0.01 in)
OP	69.1±1.5 mm (2.72±0.06 in)

Note: Unless otherwise specified, a tolerance of ± 0.8 mm applies to all dimensions.

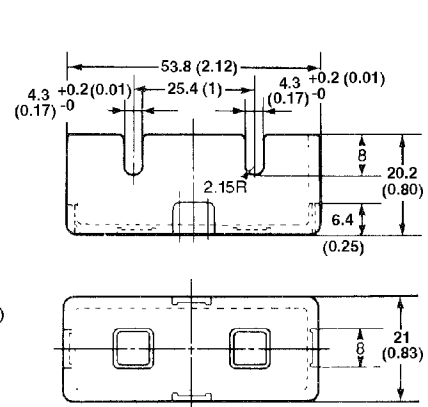
AP-A (for solder terminal)



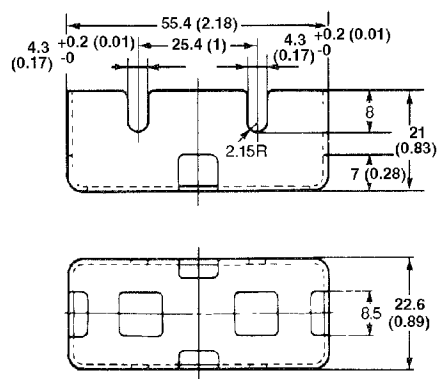
AP1-A (for solder terminal)



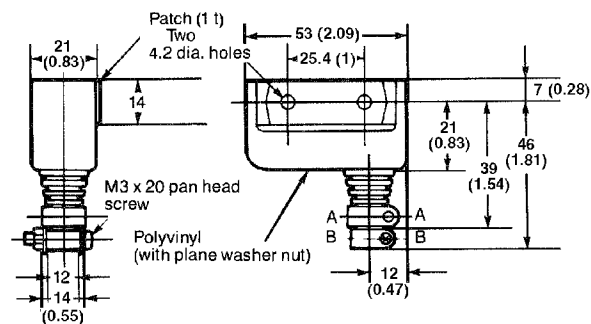
AP-B (for screw terminal)



AP1-B



AP-Z



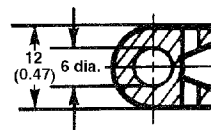
Note: Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.

■ CABLE OUTLET DIMENSIONS

A-A section



B-B section



Note: The cable outlet is provided with two stepped openings (6 dia. and 8 dia.) to permit the use of either opening according to the finished OD of the cable to be connected.

■ APPROVALS

UL (File No. E41515)/CSA (File No. LR21642)/SEV (File No. S20/163)

Type	Rating
Z-15 Series	15 A 125, 250 or 480 VAC 1/2 A 125 VDC, 1/4 A 250 VDC 1/8 HP 125 VAC, 1/4 A 250 VAC

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.

Precautions

■ MOUNTING

Use M4 mounting screws with plain washers or spring washers to mount the switch. Tighten the screws at a torque of 12 to 15 kg-cm.

Solder the lead to the terminal by applying a soldering iron rated at 60 W max. quickly (within 5 seconds). 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.

Panel mount type (Z-15□Q)

When mounting a panel mount type switch (the one having a suffix “-Q” in its model number) to a panel, tighten the hexagon nut of the actuator at a torque of 50 kg-cm or less.

When mounting a panel mount type switch on its side, remove the hexagon nut from the actuator and carefully adjust the dog angle and operating speed because too large a dog angle or too high an operating speed may damage the switch. Especially be careful not to apply an impulsive force to the actuator when operating it. By the same token, too high an operating speed and too long an overtravel may damage a panel mount switch with a roller pin plunger.

Do not use mounting holes of the switch body when mounting on panel with M12 mounting nut.

■ OPERATION

High sensitivity switch (Z-15H)

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 current of the relay coil is the load of the switch.)

Do not apply a force of 2 kg or higher to the pin plunger.

Exercise care that the environment conditions such as temperature and humidity do not change abruptly.

Drip-proof type (Z-□55)

The switch is not perfectly oil-tight; so, do not dip it in oil or water.

Depending on the environments, the materials of the rubber boots must be selected. Oil-tight, cold-resistive, and heat-resistive rubbers are available from OMRON.

Flexible rod type (Z-15□NJ□55) (drip-proof type)

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.

Cat.No. Z-15-E3-1 In the interest of product improvement, specifications are subject to change without notice.

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