

GENERAL CATALOGUE 2004/2005

Industrial Components



- Electromechanical Relays
- Timers
- Counters
- Programmable Relays
- Level Controllers
- Limit Switches
- Pushbutton Switches
- Low Voltage Switch Gear
- Temperature Controllers
- Solid State Relays
- Panel Indicators
- Power Supplies

Advanced Industrial Automation

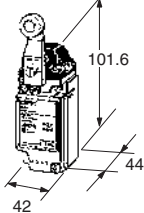
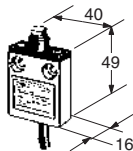
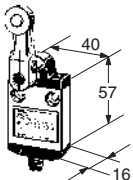
Cat. No. Y202-EN2-02 ICD

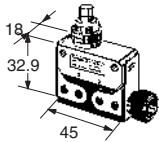
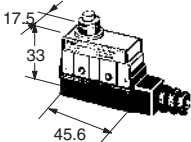
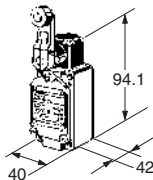
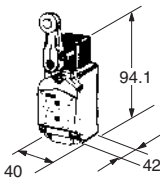












OMRON

Limit Switches

Selection Guide		F-2
D4C	Enclosed Switch	F-9
D4E-□N	Small Sealed Switch	F-31
SHL	Enclosed Switch	F-45
WL	Two-circuit Limit Switch	F-57
WLM□	Long-life Two-circuit Limit Switch	F-99
ZC-□55	Enclosed Switch	F-109
ZE/ZV/XE/XV	Enclosed Switches	F-119
A	General-purpose Basic Switch	F-131
DZ	Special-purpose Basic Switch	F-139
TZ	High-temperature Basic Switch	F-145
X	General-purpose Basic Switch	F-149
Z	General-purpose Basic Switch	F-157
Z/A/X/DZ	Z/A/X/DZ Common Accessories	F-189
Technical Information	Limit Switches	F-195
	Basic Switches	F-205

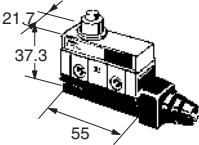
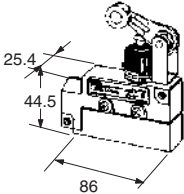
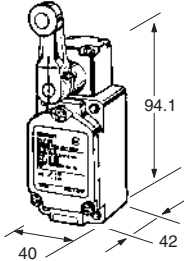
Limit Switches

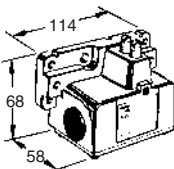
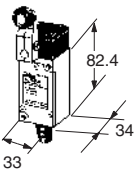
Classification		General-purpose limit switch	Enclosed switch	Miniature limit switch
Model		D4A-□N	D4C	D4CC
Appearance				
Features		A new version with better seal, shock resistance, and strength	Small, slim-bodied high-precision enclosed switch	Many models including roller lever switches only 16-mm thick with connector
Degree of protection	IEC	IP67	IP67	IP67
	JIS	Immersion-proof	Immersion-proof	Immersion-proof
Rated current (A)		<div>20</div> <div>15</div> <div>10</div> <div>5</div> <div>480 VAC</div>	<div>250 VAC</div>	<div>125 VAC</div> <div>30 VDC</div>
Microload type		Yes	Yes	---
Mechanical life* expectancy (x 1,000 operations min.)	50,000	Two circuits		
	40,000			
	30,000	Four circuits		
	20,000			
	10,000			
Electrical life* expectancy (x 1,000 operations min.)	1,000	Two circuits		
	800			
	600	Four circuits (750)		
	400			
	200			
Operation indicator		Yes	Yes	Yes
Mounting pitch		59.5 x 29.4 mm	25 mm	25 mm
Actuators		Roller lever, adjustable roller lever, top plunger, side roller lever, coil spring	Roller lever, top plunger, bevel plunger, top roller plunger	Center roller lever, roller lever, top plunger, bevel plunger, top roller plunger
Approved standards			—	UL, CSA
Page No.		This product is not shown in the catalogue. For more information please contact your local Omron sales office or download the data from www.eu.omron.com	F-9	This product is not shown in the catalogue. For more information please contact your local Omron sales office or download the data from www.eu.omron.com

Small sealed switches	Enclosed switch	General-purpose limit switch	
D4E-□N	SHL	WL	WLM□
			
Slim and compact switch with better seal and ensuring longer service life than D4E	Subminiature limit switch with high sealing property	Wide selection of two-circuit double break	Double seal fitted to rotating parts. Improved resistance to abrasion and smoother movement. Improved visibility when setting stroke zones.
IP67	IP67	IP67	IP67
Immersion-proof	Immersion-proof	Immersion-proof	Immersion-proof
			
Yes	Yes	Yes	Yes
			
			
Yes	Yes	Yes	Yes
33 mm	16.5 mm	58.7 x 30.2 mm	58.7 x 30.2 mm
Panel mount roller plunger, top roller plunger, hinge roller lever, top plunger	Panel mount roller plunger, hinge lever, hinge roller lever, top plunger	Roller lever, adjustable roller lever, adjustable rod lever, fork lever lock, top plunger, top roller plunger, side roller plunger, top ball plunger, side ball plunger, coil spring	Roller lever





F-31	F-45	F-57	F-99

Limit Switches

Classification		General-purpose limit switch	Enclosed switch	Miniature explosion-proof limit switch
Model		ZC-□55	ZE/ZV/XE/XV	WLF6E
Appearance				
Features		Small, high-precision enclosed switch	Long-service life and large breaking capacity	Miniature explosion-proof (hydrogen atmospheres) limit switch with terminal block. Same mounting method, pitch, and size as WL Switch.
Degree of protection	IEC	IP67	IP65 (-N type)/IP60 (-Q type)	IP67
	JIS	Immersion-proof	Jet-proof (-N type) Dust-proof (-Q type)	Immersion-proof
Rated current (A)		20 15 10 5 250 VAC	ZE/ZV/ZV2: 250 VAC XE/XV/XV2: 30 VDC	2 A 250 VAC
Microload type		Yes	---	---
Mechanical life* expectancy (x 1,000 operations min.)	50,000	---	---	---
	40,000	---	---	---
	30,000	---	---	---
	20,000	---	ZE/ZV/ZV2 XE/XV/XV2 (1,000)	2,000
	10,000	---	---	---
Electrical life* expectancy (x 1,000 operations min.)	1,000	---	---	---
	800	---	---	---
	600	---	---	---
	400	---	---	50
	200	---	---	---
Operation indicator		Yes	---	---
Mounting pitch		25.4 mm	ZE: 25.4 mm, ZV: 41.3 mm ZV2: 31 x 75 mm	58.7 x 30.2 mm
Actuators		Top roller plunger, hinge lever, hinge roller lever, top plunger	Top plunger, top roller plunger, roller arm lever	Stainless steel roller lever Resin roller lever Adjustable stainless steel roller lever Adjustable resin roller lever Adjustable rod lever Top plunger Top roller plunger
Approved standards		---	---	---
Page No.		F-109	F-119	This product is not shown in the catalogue. For more information please contact your local Omron sales office or download the data from www.eu.omron.com

Multiple limit switches	General purpose limit switch
VB	HL-5000
	
12-mm pitch between poles	Economical miniature limit switch boasting rigid construction
IP67	IP65
Immersion-proof	Jet-proof
<div> <div></div> <div>250 VAC</div> <div></div> </div>	<div> <div></div> <div>250 VAC</div> <div></div> </div>
Yes	---
<div> <div></div> <div>5,000</div> <div></div> </div>	<div> <div></div> <div></div> <div></div> </div>
<div> <div></div> <div>(300)</div> <div></div> </div>	<div> <div></div> <div></div> <div></div> </div>
---	---
98 x 28 mm, 50 mm	50 x 24 mm
Bevel plunger, roller plunger, hemispherical plunger	Roller lever, adjustable roller lever, top plunger, top roller plunger, coil spring
---	---
<p>This product is not shown in the catalogue. For more information please contact your local Omron sales office or download the data from www.eu.omron.com</p>	

Limit Switches

Classification		General-purpose Basic Switches, Z-size			
Model		A	DZ	TZ	X
Appearance					
Features		High-capacity load switching	Ideal for controlling two independent circuits with two built-in switches.	Stable operation at 400°C. Suitable for electric furnaces or boilers.	Direct current switching. Built-in permanent magnet for extinguishing arc.
Contact	Contact specification	Rivet	Rivet	Rivet	Cylinder+flat surface
	Contact material	Silver alloy	Silver alloy	Platinum	Silver alloy
	Rating (resistive load)	20 A at 250 VAC	10 A at 250 VAC	1 A at 250 VAC	10 A at 125 VDC
	Max. operating current (A)	20 15 10 8 5 3 2 1 0.5 0.3 0.1			
	Min. permissible load (mA)	100 10 1 0.1 0.01			
	(N-level reference value)				
Operating force (OF) (see note)		3.92..6.13 N {400..625 gf}	5.59 N {570 gf}	4.90 N {500 gf}	5.00 N {510 gf}
Life expectancy (see note)	Mechanical	1 x 10 ⁶ min.	1 x 10 ⁶ min.	1 x 10 ⁵ min.	1 x 10 ⁶ min.
	Electrical	500 x 10 ³ min.	500 x 10 ³ min.	50 x 10 ³ min.	100 x 10 ³ min.
Ambient operating temperature		-25°C..80°C	-25°C..80°C	-65°C..400°C	-25°C..80°C
Mounting pitch		25.4 mm	25.4 mm	25.4 mm	25.4 mm
Actuators		Pin plunger, panel mount plunger, panel mount roller plunger, hinge lever, hinge roller lever, roller leaf spring	Pin plunger, hinge lever, hinge roller lever	Pin plunger, hinge lever, hinge roller lever	Pin plunger, panel mount plunger, panel mount roller plunger, leaf Spring, hinge lever, hinge roller lever
Approved standards					
Page No.		F-131	F-139	F-145	F-149

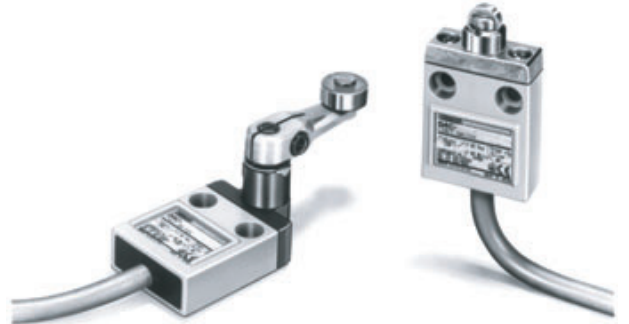
- Note:**
1. These values are for pin plunger models.
 2. The above table provides only an overview of specifications. Before actual use, be sure to check the specification details and precautions given on the relevant reference pages.

Limit Switches

Enclosed Switch D4C

Sealed, Compact, and Slim-bodied Switch Offers Choice of Many Actuators

- Liquid- and dust-resistance conforms to IEC IP67 standard.
- Triple-sealed construction:
Plunger section sealed via nitrile rubber packing seal and diaphragm; switch section sealed via nitrile rubber cap; cable entrance sealed via encapsulating material.
- Standard cable (S-FLEX VCTF) in 2-, 3-, or 5-meter lengths offers high flexibility with outstanding oil and extreme temperature resistance.
- Low temperature models are available.



Model Number Structure

■ Model Number Legend

Standard Models

D4C-□□□
1 2 3

1. Rated Current

- 1: 5 A at 250 VAC, 4 A at 30 VDC
- 2: 5 A at 125 VAC (with LED indicator)
- 3: 4 A 30 VDC (with LED indicator)
- 4: 0.1 A at 125 VAC, 0.1 A at 30 VDC
- 5: 0.1 A at 125 VAC (with LED indicator)
- 6: 0.1 A at 30 VDC (with LED indicator)

2. Cable Specifications

- 2: VCTF oil-resistant cable (3 m)
- 3: VCTF oil-resistant cable (5 m)
- 4: VCTF (3 m)
- 5: VCTF (5 m)
- 6: SJT(O) (3 m)
- 7: SJT(O) (5 m)
- 8: VCTF oil-resistant cable (2 m)
- 9: VCTF (2 m)

3. Actuator

- 01: Pin plunger
- 02: Roller plunger
- 03: Crossroller plunger
- 10: Bevel plunger
- 20: Roller lever
- 24: Roller lever (high-sensitivity model)
- 31: Sealed pin plunger
- 32: Sealed roller plunger
- 33: Sealed crossroller
- 41: Panel mount pin plunger
- 42: Panel mount roller plunger
- 43: Panel mount crossroller plunger
- 50: Plastic rod
- 60: Center roller lever plunger

Note 1: Some combinations of the above may not be supported.

2: With standard models, the operation indicator turns OFF when the switch operates. If models with operation indicators that turn ON when the switch operates are required, add "-B" to the end of the model number.

Pre-wired Models (Use VCTF Oil-resistant Cable)

D4C-0-
 1 2 3 4

1. Operation Indicator Lamp

- 1: Without operation indicator
- 2: 1 A at 125 VAC (with operation indicator)
- 3: 1 A at 30 VDC (with operation indicator)

2. Actuator

- 01: Pin plunger
- 02: Roller plunger
- 31: Sealed plunger
- 32: Sealed roller plunger
- 24: Roller lever (high-sensitivity model)

3. Wiring Specifications

- DK1EJ: Pre-wired models
(3 conductors: DC specification, NC wiring)
- AK1EJ: Pre-wired models
(3 conductors: AC specification, NC wiring)
- M1J: Connector models for ASI devices
(2 conductors: NO wiring)

4. Cable length

- 03: 0.3 m
- 05: 0.5 m
- 10: 1 m

Wiring Specifications

Internal switch	Connector
COM	3
NC	2
NO	4

Note: Since the above wiring specifications are different from those for the D4CC, be careful not to mistake them.

Weather-resistant Models

D4C--P
 1 2 3

1. Rated Current

- 1: 5 A at 250 VAC, 4 A at 30 VDC
- 2: 5 A at 125 VAC (with LED indicator)
- 3: 4 A at 30 VDC (with LED indicator)
- 4: 0.1 A at 125 VAC, 0.1 A at 30 VDC
- 5: 0.1 A at 125 VAC (with LED indicator)
- 6: 0.1 A at 30 VDC (with LED indicator)

2. Cable Specifications

- 2: VCTF oil-resistant cable (3 m)
- 3: VCTF oil-resistant cable (5 m)















3. Actuator

- 20: Roller lever
- 24: Roller lever (high-sensitivity model)
- 27: Variable roller lever
- 29: Variable rod lever

Ordering Information

List of Models

Standard Models

Actuator		Standard cable models					UL/CSA-approved cable models				
		S-FLEX VCTF Cable*			VCTF Cable**			5 A at 250 VAC without LED indicator	5 A at 125 VAC with LED indicator (100 VAC)		
		EN60947-5-1 approved						SJT(O) Cable***			
		2 m	3 m	5 m	2 m	3 m	5 m	3 m	5 m	3 m	5 m
Pin plunger		D4C-□801	D4C-□201	D4C-□301	D4C-□901	D4C-□401	D4C-□501	D4C-1601	D4C-1701	D4C-2601	D4C-2701
Sealed plunger		D4C-□831	D4C-□231	D4C-□331	D4C-□931	D4C-□431	D4C-□531	D4C-1631	D4C-1731	D4C-2631	D4C-2731
Roller plunger		D4C-□802	D4C-□202	D4C-□302	D4C-□902	D4C-□402	D4C-□502	D4C-1602	D4C-1702	D4C-2602	D4C-2702
Sealed roller plunger		D4C-□832	D4C-□232	D4C-□332	D4C-□932	D4C-□432	D4C-□532	D4C-1632	D4C-1732	D4C-2632	D4C-2732
Crossroller plunger		D4C-□803	D4C-□203	D4C-□303	D4C-□903	D4C-□403	D4C-□503	D4C-1603	D4C-1703	D4C-2603	D4C-2703
Sealed crossroller plunger		D4C-□833	D4C-□233	D4C-□333	D4C-□933	D4C-□433	D4C-□533	D4C-1633	D4C-1733	D4C-2633	D4C-2733
Bevel plunger		D4C-□810	D4C-□210	D4C-□310	D4C-□910	D4C-□410	D4C-□510	D4C-1610	D4C-1710	D4C-2610	D4C-2710
Coil spring		D4C-□850	D4C-□250	D4C-□350	D4C-□950	D4C-□450	D4C-□550	D4C-1650	D4C-1750	D4C-2650	D4C-2750
Roller lever		D4C-□820	D4C-□220	D4C-□320	D4C-□920	D4C-□420	D4C-□520	D4C-1620	D4C-1720	D4C-2620	D4C-2720
Roller lever (high-sensitivity model)		D4C-□824	D4C-□224	D4C-□324	D4C-□924	D4C-□424	D4C-□524	D4C-1624	D4C-1724	D4C-2624	D4C-2724
Panel mount pin plunger		D4C-□841	D4C-□241	D4C-□341	D4C-□941	D4C-□441	D4C-□541	D4C-1641	D4C-1741	D4C-2641	D4C-2741
Panel mount roller plunger		D4C-□842	D4C-□242	D4C-□342	D4C-□942	D4C-□442	D4C-□542	D4C-1642	D4C-1742	D4C-2642	D4C-2742
Panel mount crossroller plunger		D4C-□843	D4C-□243	D4C-□343	D4C-□943	D4C-□443	D4C-□543	D4C-1643	D4C-1743	D4C-2643	D4C-2743
Center roller lever plunger		D4C-□860	D4C-□260	D4C-□360	D4C-□960	D4C-□460	D4C-□560	D4C-1660	D4C-1760	D4C-2660	D4C-2760

Note 1. Cold-resistant models are also available. Order these models with reference to the following example.

D4C-1201 → D4C-1201-C

2. Models with viscosity-resistant oil specification (with an oil drain hole) are also available. Order these models with reference to the following example. Applicable only to the plunger models.

D4C-1202 → D4C-1202-M














3. Variable roller lever models are also available.

* Oil-resistant vinyl cabtire cables.






** Ordinary vinyl cabtire cables.

*** Models with SJT(O) Cables (approved by UL and CSA standards) conform to UL and CSA standards.

Standard Models (Continued)

Actuator	CENELEC cable models			
	EN60947-5-1 approved			
	1 m	2 m	3 m	5 m
Pin plunger 	D4C-1G01 1 M	D4C-1G01 2 M	D4C-1G01 3 M	D4C-1G01 5 M
Sealed plunger 	D4C-1G31 1 M	D4C-1G31 2 M	D4C-1G31 3 M	D4C-1G31 5 M
Roller plunger 	D4C-1G02 1 M	D4C-1G02 2 M	D4C-1G02 3 M	D4C-1G02 5 M
Sealed roller plunger 	D4C-1G32 1 M	D4C-1G32 2 M	D4C-1G32 3 M	D4C-1G32 5 M
Crossroller plunger 	D4C-1G03 1 M	D4C-1G03 2 M	D4C-1G03 3 M	D4C-1G03 5 M
Sealed crossroller plunger 	D4C-1G33 1 M	D4C-1G33 2 M	D4C-1G33 3 M	D4C-1G33 5 M
Bevel plunger 	D4C-1G10 1 M	D4C-1G10 2 M	D4C-1G10 3 M	D4C-1G10 5 M
Coil spring 	D4C-1G50 1 M	D4C-1G50 2 M	D4C-1G50 3 M	D4C-1G50 5 M
Roller lever 	D4C-1G20 1 M	D4C-1G20 2 M	D4C-1G20 3 M	D4C-1G20 5 M
Roller lever (high-sensitivity model) 	D4C-1G24 1 M	D4C-1G24 2 M	D4C-1G24 3 M	D4C-1G24 5 M
Panel mount pin plunger 	D4C-1G41 1 M	D4C-1G41 2 M	D4C-1G41 3 M	D4C-1G41 5 M
Panel mount roller plunger 	D4C-1G42 1 M	D4C-1G42 2 M	D4C-1G42 3 M	D4C-1G42 5 M
Panel mount crossroller plunger 	D4C-1G43 1 M	D4C-1G43 2 M	D4C-1G43 3 M	D4C-1G43 5 M

Pre-wired Models (Use VCTF Oil-resistant Cable)





Actuator	1 A at 125 VAC without operation indicator	1 A at 125 VAC with operation indicator	1 A at 30 VDC without operation indicator	1 A at 30 VDC with operation indicator
Pin plunger 	D4C-1001-AK1EJ□	D4C-2001-AK1EJ□	D4C-1001-DK1EJ□	D4C-3001-DK1EJ□
Roller plunger 	D4C-1002-AK1EJ□	D4C-2002-AK1EJ□	D4C-1002-DK1EJ□	D4C-3002-DK1EJ□
Sealed plunger 	D4C-1031-AK1EJ□	D4C-2031-AK1EJ□	D4C-1031-DK1EJ□	D4C-3031-DK1EJ□
Sealed roller plunger 	D4C-1032-AK1EJ□	D4C-2032-AK1EJ□	D4C-1032-DK1EJ□	D4C-3032-DK1EJ□
Roller lever (high-sensitivity model) 	D4C-1024-AK1EJ□	D4C-2024-AK1EJ□	D4C-1024-DK1EJ□	D4C-3024-DK1EJ□

Note 1. The □ contains the length of the cable.

For example: 30 cm → D4C-1001-AK1EJ03

2. M1 models are also available. Contact your OMRON sales representative for further information.

Weather-resistant Models

Actuator		5 A at 250 VAC 4 A at 30 VDC without operation indicator	0.1 A at 125 VAC 0.1 A at 30 VDC without operation indicator	5 A at 125 VAC with operation indicator	4 A at 30 VDC with operation indicator	0.1 A at 125 VAC with operation indicator	0.1 A at 30 VDC with operation indicator
Roller lever 	3 m	D4C-1220-P	D4C-4220-P	D4C-2220-P	D4C-3220-P	D4C-5220-P	D4C-6220-P
	5 m	D4C-1320-P	D4C-4320-P	D4C-2320-P	D4C-3320-P	D4C-5320-P	D4C-6320-P
Roller lever (high-sensitivity model) 	3 m	D4C-1224-P	D4C-4224-P	D4C-2224-P	D4C-3224-P	D4C-5224-P	D4C-6224-P
	5 m	D4C-1324-P	D4C-4324-P	D4C-2324-P	D4C-3324-P	D4C-5324-P	D4C-6324-P
Variable roller lever 	3 m	D4C-1227-P	D4C-4227-P	D4C-2227-P	D4C-3227-P	D4C-5227-P	D4C-6227-P
	5 m	D4C-1327-P	D4C-4327-P	D4C-2327-P	D4C-3327-P	D4C-5327-P	D4C-6327-P
Variable rod lever 	3 m	D4C-1229-P	D4C-4229-P	D4C-2229-P	D4C-3229-P	D4C-5229-P	D4C-6229-P
	5 m	D4C-1329-P	D4C-4329-P	D4C-2329-P	D4C-3329-P	D4C-5329-P	D4C-6329-P

Individual Parts (Head/Actuator)

Actuator type	Head (with actuator)	Actuator
Pin plunger	D4C-0001	-
Roller plunger	D4C-0002	-
Crossroller plunger	D4C-0003	-
Bevel plunger	D4C-0010	-
Roller lever	D4C-0020	WL-1A100
Roller lever	D4C-0024	WL-1A100
Variable roller lever	D4C-0027	HL-1HPA320
Variable rod lever	D4C-0029	HL-1HPA500
Sealed pin plunger	D4C-0031	-
Sealed roller plunger	D4C-0032	-
Sealed crossroller plunger	D4C-0033	-
Panel mount pin plunger	D4C-0041	-
Panel mount roller plunger	D4C-0042	-
Panel mount crossroller plunger	D4C-0043	-
Plastic rod	D4C-0050	-
Center roller lever	D4C-0060	-

Note 1: The model numbers for heads are of the form D4C-00□□, with the numbers in the squares indicating the type of actuator.

2: Actuators for plunger models, plastic rod models, and center roller lever models cannot be ordered individually. They must be ordered together with the head.

3: Consult your OMRON representative for details on cold-resistant specifications.

Mounting Plates

The WL model incorporated by equipment can be replaced with the D4C together with the Mounting Plate without changing the position of the dog or cam.

List of Replaceable Models

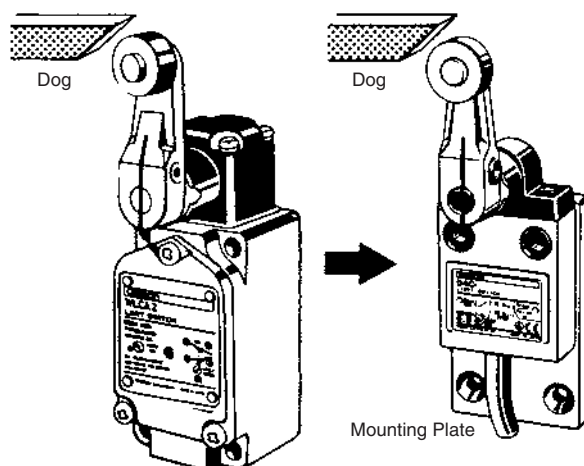
Contact your OMRON representative for the period required for delivery.

WL model (Actuator)	D4C model (Actuator)	Plate
WLD/WL01D (Top plunger)	→D4C-□□01 (Plunger)	D4C-P001
WLD2/WL01D2 (Top-roller plunger)	→D4C-□□02 (Roller plunger)	D4C-P002
WLCA2/WL01CA2 (Roller lever)	→D4C-□□20 (Roller lever)	D4C-P020

Note: The WL01□ is for micro loads.

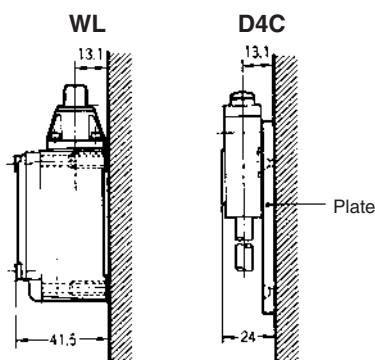
Application Example

Note: The position of the dog remains unchanged.



Remarks

There is no difference in mounting pitch between the Mounting Plate and the WL. The mounting depth of the D4C with the Mounting Plate attached is, however, shorter than that of the panel-mounted WL.



Specifications

■ Approved Standards

Agency	Standard	File No.
TÜV Rheinland	EN60947-5-1	R9451333 (see note 1) J9950970 (see note 2)
UL	UL508	E76675 (see note 3)
CSA	CSA C22.2 No. 14	LR45746 (see note 3)

Note 1: Models with VCTF oil-resistant cables only.

2: Pre-wired models only.

3: SJT(0)-cable models only.

■ Approved Standard Ratings

General Ratings

Model	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		
D4C-1□□□	125 VAC	5 A	5 A	1.5 A	0.7 A	3 A	3 A	2.5 A	1.3 A	20 A max.	10 A max.		
	250 VAC	5 A	5 A	1 A	0.5 A	2 A	2 A	1.5 A	0.8 A				
	8 VDC	5 A	5 A	2 A	2 A	5 A	4 A	3 A	3 A				
	14 VDC	5 A	5 A	2 A	2 A	4 A	4 A	3 A	3 A				
	30 VDC	4 A	4 A	2 A	2 A	3 A	3 A	3 A	3 A				
	125 VDC	0.4 A	0.4 A	0.05 A	0.05 A	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	0.2 A	0.2 A	0.03 A	0.03 A				
D4C-2□□□	125 VAC	5 A	5 A	1.5 A	0.7 A	3 A	3 A	2.5 A	1.3 A				
	125 VDC	0.4 A	0.4 A	0.05 A	0.05 A	0.4 A	0.4 A	0.05 A	0.05 A				
D4C-3□□□	30 VDC	4 A	4 A	2 A	2 A	3 A	3 A	3 A	3 A				
D4C-4□□□	125 VAC	0.1 A	0.1 A	---		---							
	8 VDC	0.1 A	0.1 A										
	14 VDC	0.1 A	0.1 A										
	30 VDC	0.1 A	0.1 A										
D4C-5□□□	125 VAC	0.1 A	0.1 A	---		---							
D4C-6□□□	30 VDC	0.1 A	0.1 A	---		---							

Ratings for Pre-wired Models

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	1	1	1	0.7	1	1	1	1	20 A max.	10 A max.
30 VDC	1	1	1	1	1	1	1	1		

Note 1. Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).

2. Lamp loads have an inrush current of 10 times the steady-state current.

3. Motor loads have an inrush current of 6 times the steady-state current.

UL/CSA Approved Ratings

B300 (D4C-16□□, -17□□), B150 (D4C-26□□, -27□□)

NEMA B300 (D4C-16□□, -17□□)

Rated voltage	Carry current	Current		Volt-amperes	
		Make	Break	Make	Break
120 VAC	5 A	30 A	3 A	3,600 VA	360 VA
240 VAC		15 A	1.5 A		

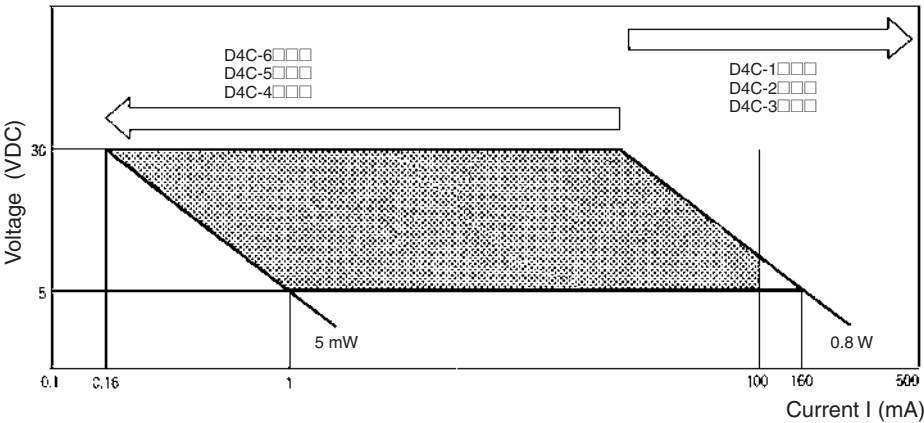
NEMA B150 (D4C-26□□, -27□□)

Rated voltage	Carry current	Current		Volt-amperes	
		Make	Break	Make	Break
120 VAC	5 A	30 A	3 A	3,600 VA	360 VA

TÜV Rheinland Approved Ratings (EN60947-5-1)

Model	Category and rating	I the
D4C-1□□□	AC-15 2 A/250 VAC DC-12 2 A/30 VDC	5 A 4 A
D4C-2□□□	AC-15 2 A/125 VAC	5 A
D4C-3□□□	DC-12 2 A/30 VDC	4 A
D4C-4□□□	AC-14 0.1 A/125 VAC DC-12 0.1 A/30 VDC	0.5 A 0.5 A
D4C-5□□□	AC-14 0.1 A/125 VAC	0.5 A
D4C-6□□□	DC-12 0.1 A/30 VDC	0.5 A

Applicable Load Range



■ Characteristics

Degree of protection	IP67
Durability (see note 2)	Mechanical: 10,000,000 operations min. Electrical: 200,000 operations min. (5A at 250 VAC, resistive load)
Operating speed	0.1 mm to 0.5 m/s (in case of plunger) 1 mm to 1 m/s (in case of roller lever)
Operating frequency	Mechanical: 120 operations/min Electrical: 30 operations/min
Rated frequency	50/60 Hz
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance (initial)	250 mΩ max. (initial value with 2-m VCTF cable) 300 mΩ max. (initial value with 3-m VCTF cable) 400 mΩ max. (initial value with 5-m VCTF cable)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between terminals of the same polarity 1,500 VAC, 50/60 Hz for 1 min between current-carrying metal part and ground, and between each terminal and non-current-carrying metal part, Uimp: 2.5 kV (EN60947-5-1)
Rated insulation voltage (U _i)	300 V (EN60947-5-1)
Switching overvoltage	1,000 VAC, 300 VDC max. (EN60947-5-1)
Pollution degree (operating environment)	3 (IEC60947-5-1)
Short-circuit protective device (SCPD)	10 A fuse type gG (IEC269)
Conditional short-circuit current	100 A (EN60947-5-1)
Conventional enclosed thermal current (I _{the})	5 A, 4 A, 0.5 A (EN60947-5-1)
Protection against electric shock	Class I (with grounding wire)
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: Approx. 1,000 m/s ² min. Malfunction: Approx. 500 m/s ² min.
Ambient temperature (see note)	Operating: -10°C to 70°C (with no icing)
Ambient humidity	Operating: 95% max.
Weight	With 3-m VCTF cable: 360 g; With 5-m VCTF cable: 540 g

Note 1. The above figures are initial values.

2. The 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.

■ Operating Characteristics

Model	D4C-□□01 D4C-□001-□K1EJ□	D4C-□□31 D4C-□031-□K1EJ□	D4C-□□02 D4C-□002-□K1EJ□	D4C-□□32 D4C-□032-□K1EJ□	D4C-□□03
OF max.	11.77 N	17.65 N	11.77 N	17.65 N	11.77 N
RF min.	4.41 N	4.41 N	4.41 N	4.41 N	4.41 N
PT max.	1.8 mm	1.8 mm	1.8 mm	1.8 mm	1.8 mm
OT min.	3 mm	3 mm	3 mm	3 mm	3 mm
MD max.	0.2 mm	0.2 mm	0.2 mm	0.2 mm	0.2 mm
OP	15.7±1 mm	24.9±1 mm	28.5±1 mm	34.3±1 mm	28.5±1 mm
TT	(5) mm	(5) mm	(5) mm	(5) mm	(5) mm

Model	D4C-□□33	D4C-□□10	D4C-□□50	D4C-□□20 D4C-□□27-P (see note 1) D4C-□□29-P (see note 1)	D4C-□□24 D4C-□□24-P D4C-□024-□K1EJ□
OF max.	17.65 N	11.77 N	1.47 N	5.69 N	5.69 N
RF min.	4.41 N	4.41 N	---	1.47 N	1.47 N
PT max.	1.8 mm	1.8 mm	15°	25°	10±3°
OT min.	3 mm	3 mm	---	40°	50°
MD max.	0.2 mm	0.2 mm	---	3°	3°
OP	34.3±1 mm	28.5±1 mm	---	---	---
TT	(5) mm	(5) mm	---	(70°)	(70°)

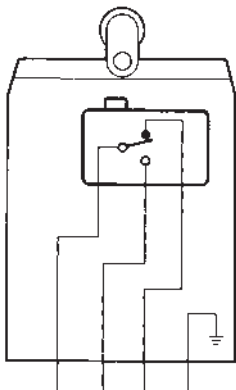
Model	D4C-□□41	D4C-□□42	D4C-□□43	D4C-□□60
OF max.	11.77 N	11.77 N	11.77 N	6.67 N
RF min.	4.41 N	4.41 N	4.41 N	1.47 N
PT max.	1.8 mm	1.8 mm	1.8 mm	10±3°
OT min.	3 mm	3 mm	3 mm	50°
MD max.	0.2 mm	0.2 mm	0.2 mm	3°
OP	31.2±1 mm	36.8±1 mm	36.8 mm	---
TT	(5) mm	(5) mm	(5) mm	---

Note 1. The values given for D4C-□□27-P and D4C-□□29-P are for when the length of the lever is 38 mm.
2. The operating characteristics for M1J□ models are the same as those for □K1EJ□ models.

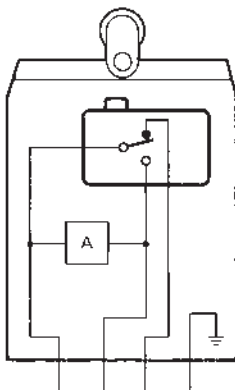
■ Contact Form

Standard Models / Weather-resistant Models

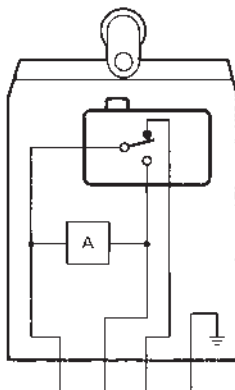
Without LED Indicator
(S-FLEX VCTF Cable)



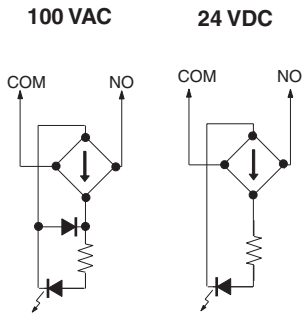
With LED Indicator
(S-FLEX VCTF Cable)



With LED Indicator
(lights when operated)



LED Indicator Circuits



Yellow/green: VCTF resin cable
Green: VCTF
UL/CSA-approved cable SJT(0)

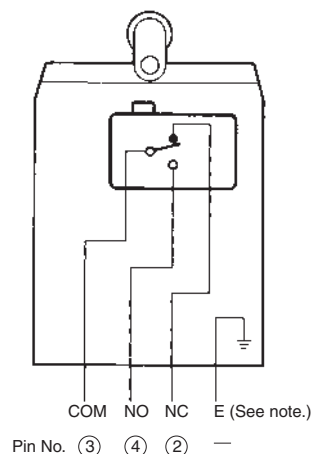
Note 1. "Lights when operated" means that when the actuator is turned or pushed and the Limit Switch contact leaves the NC side, the indicator lights.
2. "Lights when not in operation" means that when the actuator is in the free position, the indicator is lit, and when the actuator is turned or pushed and the contact comes into contact with the NO side, the indicator turns OFF.

Wire Color

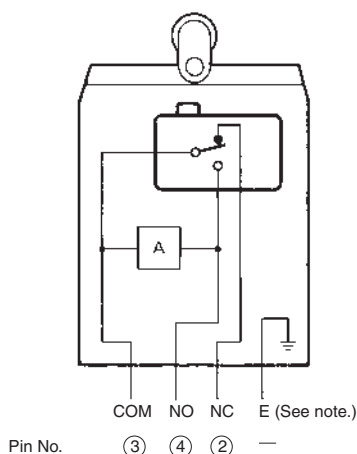
Cable	Without LED				With LED			
	COM	NO	NC	E	COM	NO	NC	E
VCTF	Black	White	Red	Green	Black	White	Red	Green
S-FLEX VCTF	Black	White	Red	Yellow/ Green	Black	White	Red	Yellow/ Green
SJT (0)	Black	Blue	Red	Green	Black	Blue	Red	Green
CENELEC CABLE	Blue	Black	Brown	Yellow/ Green	Blue	Black	Brown	Yellow/ Green

Pre-wired Models

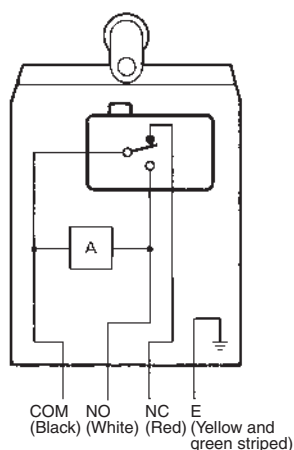
Without LED Indicator



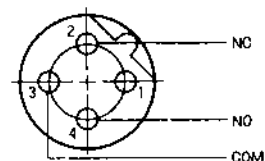
With LED Indicator
(lights when not in operation)



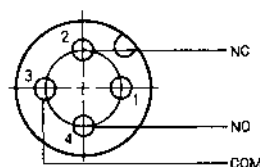
With LED Indicator
(lights when operated)



AC



DC



Note: Not connected to the ground.

Yellow/green: VCTF resin cable

Green: VCTF

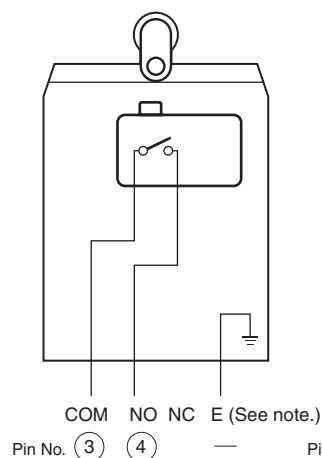
UL/CSA-approved cable SJT(0)

Note 1. "Lights when operated" means that when the actuator is turned or pushed and the Limit Switch contact leaves the NC side, the indicator lights.

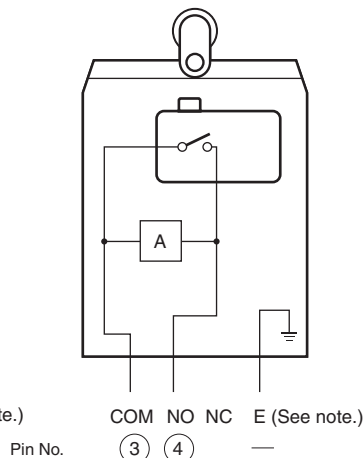
Note 2. "Lights when not in operation" means that when the actuator is in the free position, the indicator is lit, and when the actuator is turned or pushed and the contact comes into contact with the NO side, the indicator turns OFF.

Connector Models for ASI Devices

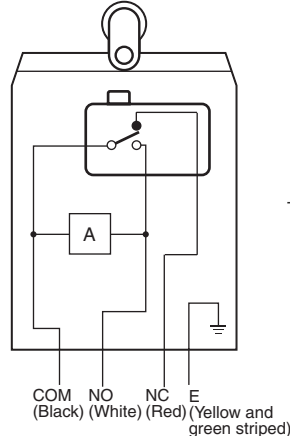
Without LED Indicator



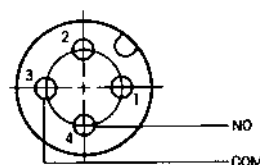
With LED Indicator
(lights when not in operation)



With LED Indicator
(lights when operated)



DC



Note: Not connected to the ground.

Yellow/green: VCTF resin cable

Green: VCTF

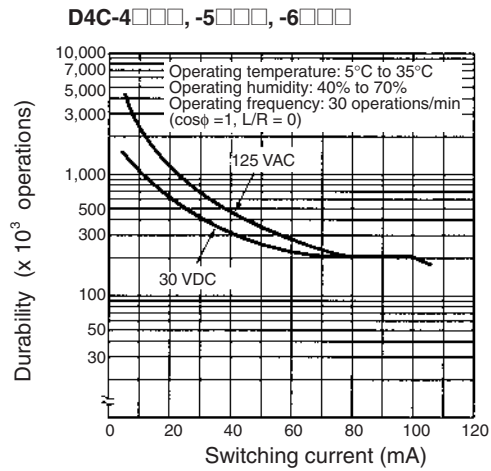
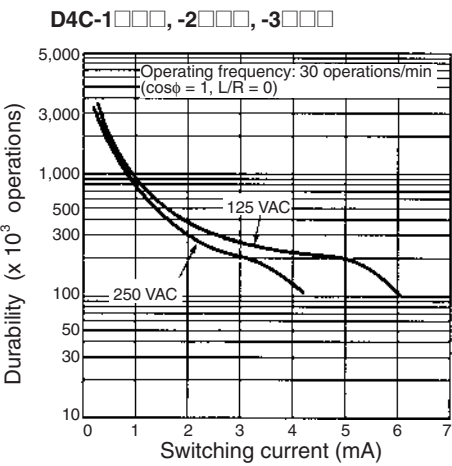
UL/CSA-approved cable SJT(0)

Note 1. "Lights when operated" means that when the actuator is turned or pushed and the Limit Switch contact leaves the NC side, the indicator lights.

Note 2. "Lights when not in operation" means that when the actuator is in the free position, the indicator is lit, and when the actuator is turned or pushed and the contact comes into contact with the NO side, the indicator turns OFF.

Engineering Data

Electrical Durability



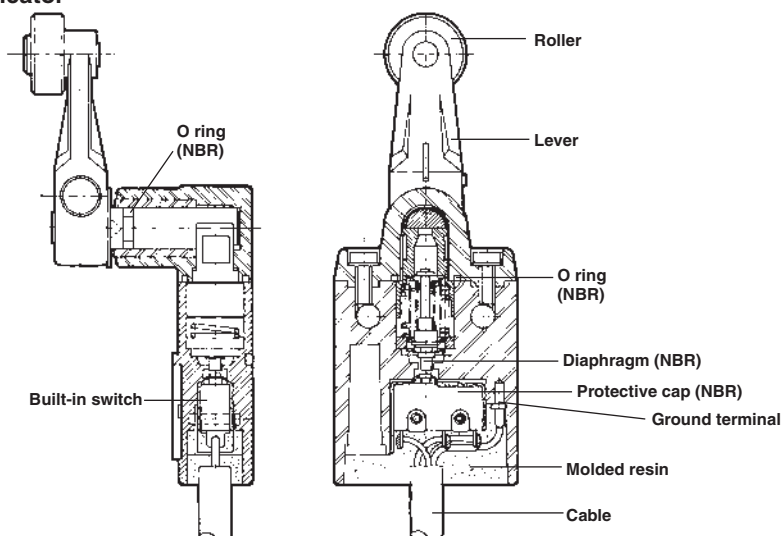
Leakage Current for LED-indicator Models

Model	Voltage	Leakage current	Resistance
D4C-2□□□	125 VAC	1.7 mA	68 kΩ
D4C-3□□□	30 VDC	1.7 mA	15 kΩ
D4C-5□□□	125 VAC	1.7 mA	68 kΩ
D4C-6□□□	30 VDC	1.7 mA	15 kΩ

Nomenclature

Standard Models

Roller Lever Models Without Indicator



Weather-resistant Models

Roller Lever Models Without Indicator

Roller

The roller is made of self-lubricating sintered stainless steel and boasts high resistance to wear.

Shaft Section Seal

By fitting an O-ring to the rotary shaft and with an appropriate interference of the screws, high-sealing properties are maintained. The O-ring is made of silicone rubber and is resistant to temperature changes and adverse weather conditions.

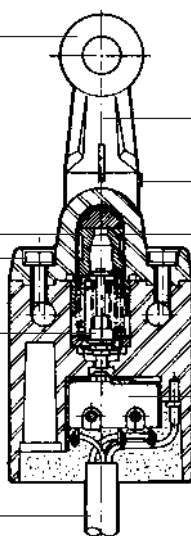
Head-mounting Screw

Diaphragm

The diaphragm is made of silicone rubber and is resistant to temperature changes and adverse weather conditions.

Cable

Vinyl cabtire cable and is resistant to adverse weather conditions.



Lever

The lever forged of anti-corrosive aluminium alloy features high corrosion resistances and outstanding ruggedness.

Roller Lever Setscrew

This screw is made of stainless steel and has high corrosion resistance.

Rotary Shaft

The shaft is made of stainless steel decreasing the likelihood of rusting.

Built-in Switch

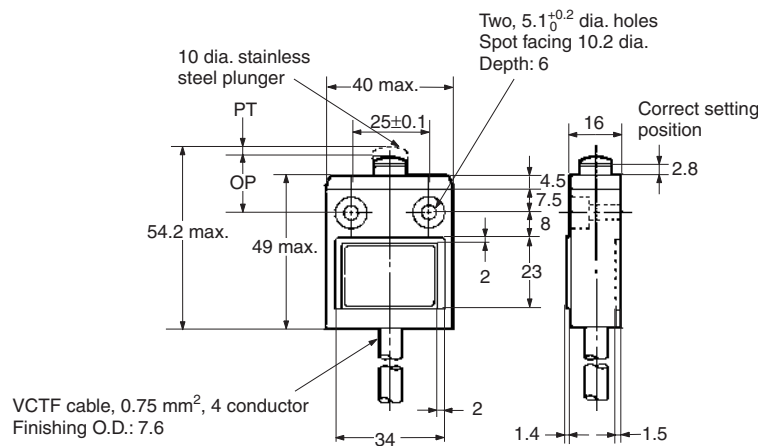
Both standard load and microload models available.

Dimensions

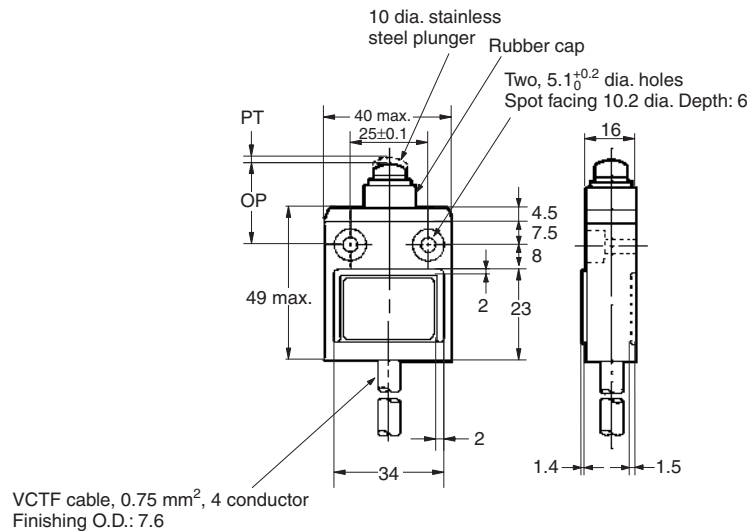
Note 1. All units are in millimeters unless otherwise indicated.
2. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.

Standard Models

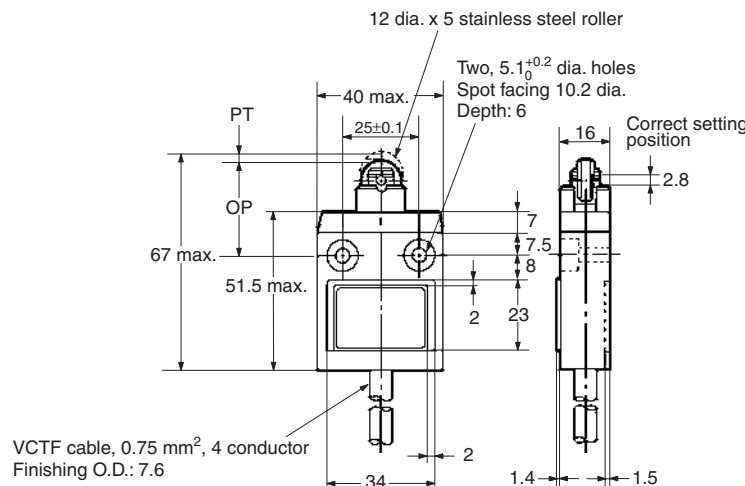
Pin Plunger D4C-□□01



Sealed Plunger D4C-□□31

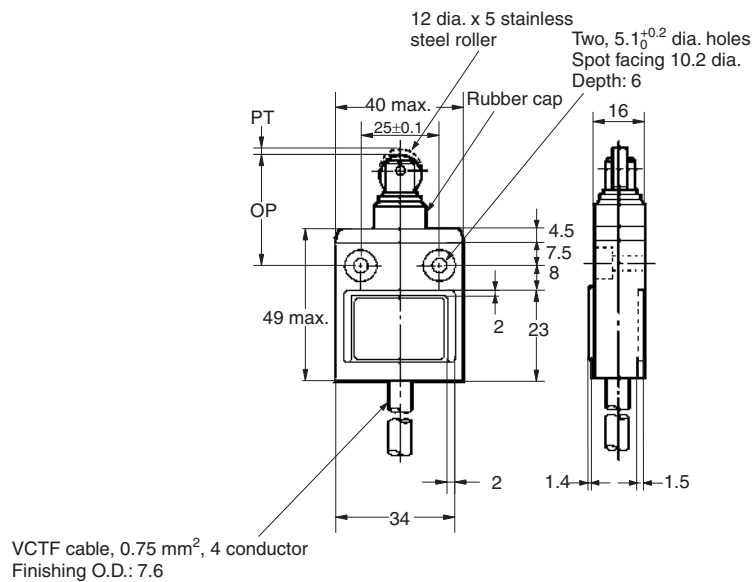


Roller Plunger D4C-□□02



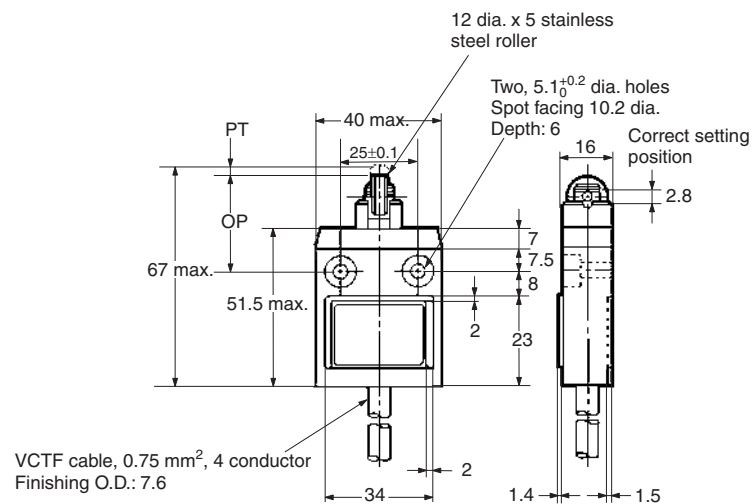
Sealed Roller Plunger

D4C-□□32



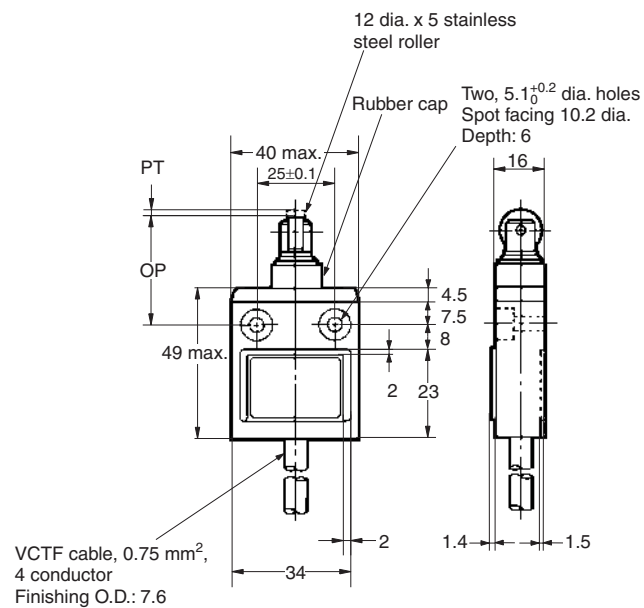
Crossroller Plunger

D4C-□□03

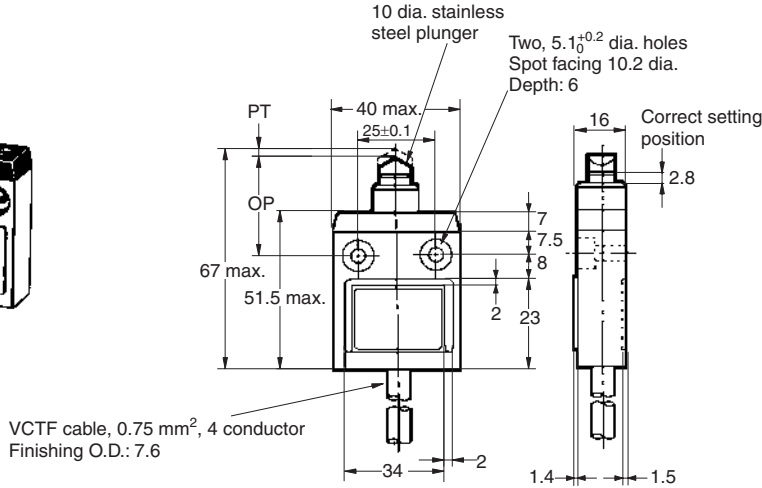


Sealed Crossroller Plunger

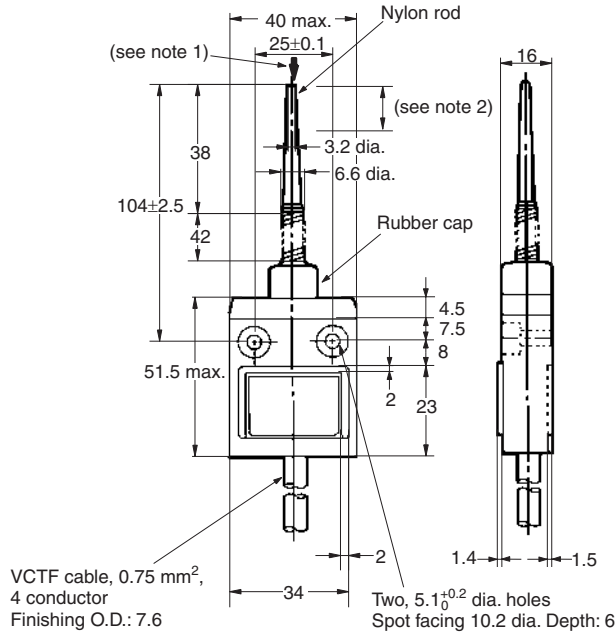
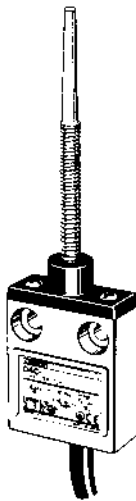
D4C-□□33



Bevel Plunger
D4C-□□10

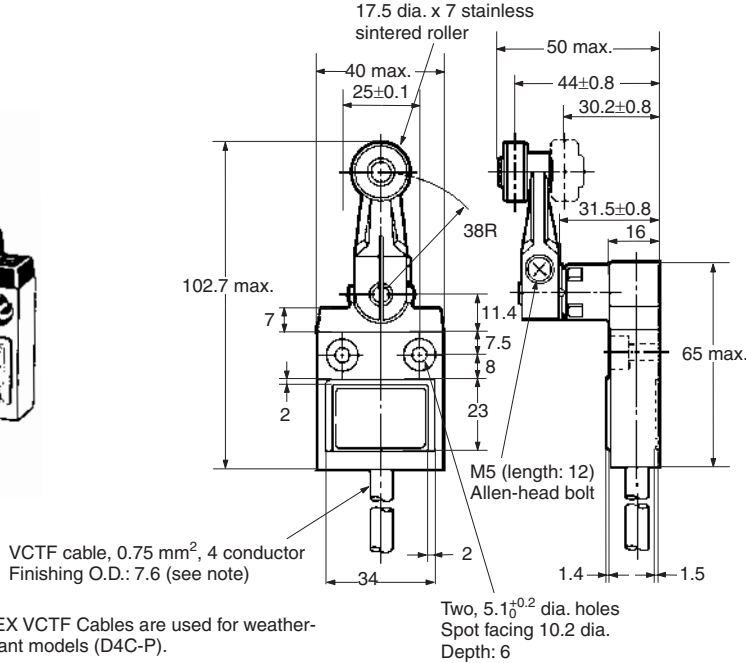


Coil Spring
D4C-□□50



- Note:**
1. Operation is possible in any direction except in parallel to the axis ↓.
 2. The ideal range for operation is between the tip of the rod and 1/3 of the length of the actuator.

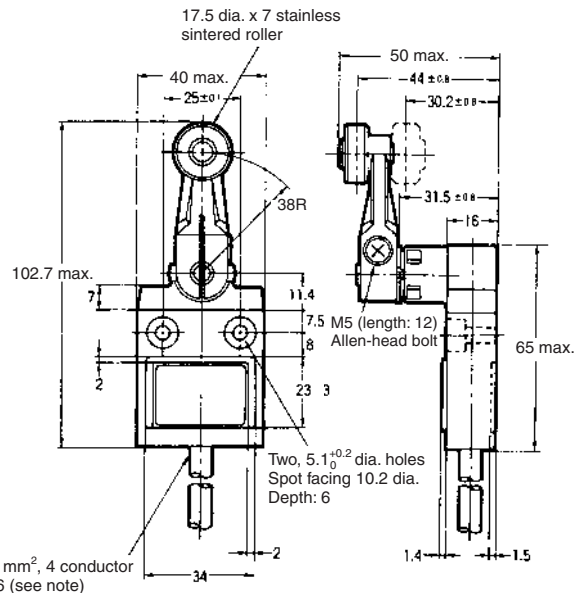
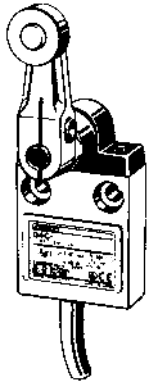
Roller Lever
D4C-□□20
D4C-□□20-P



Note: S-FLEX VCTF Cables are used for weather-resistant models (D4C-P).

Roller Lever (High-Sensitivity Model)

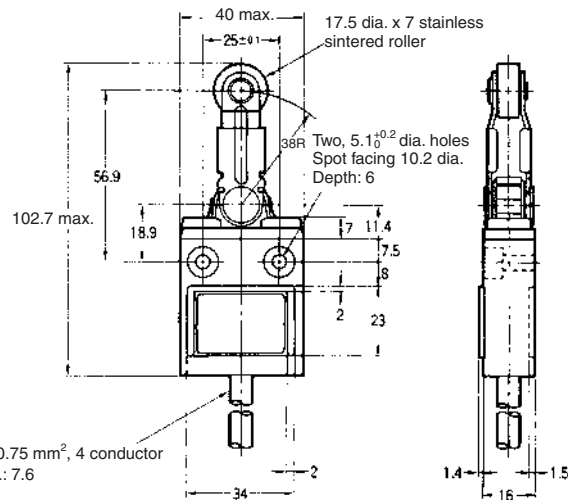
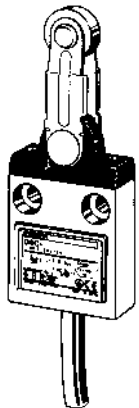
D4C-□□24
D4C-□□24-P



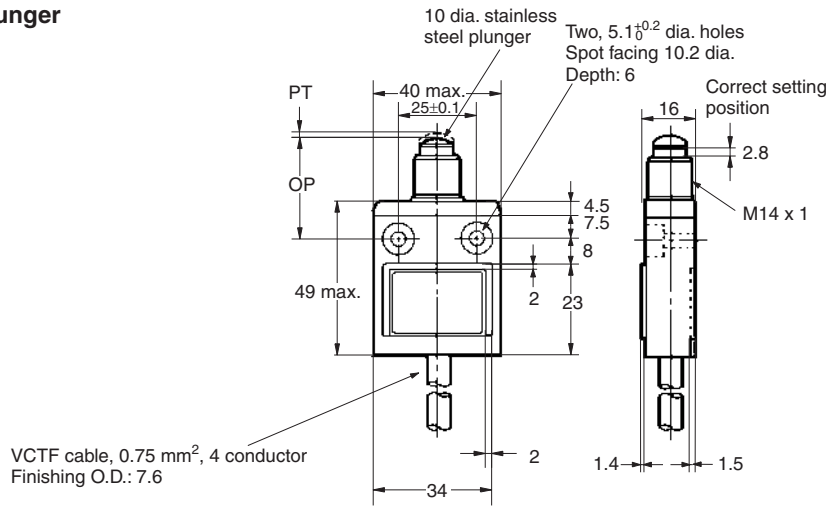
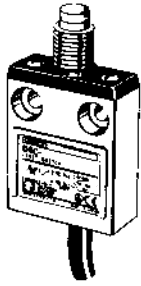
Note: S-FLEX VCTF Cables are used for weather-resistant models (D4C-P).

Center Roller Lever Plunger

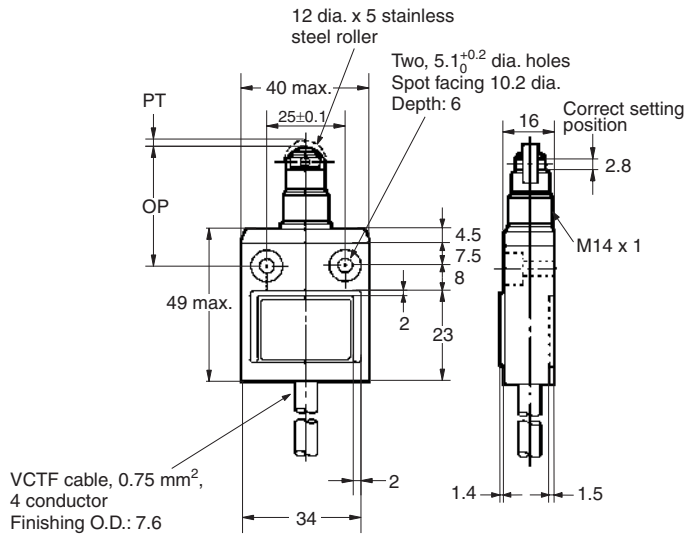
D4C-□□60



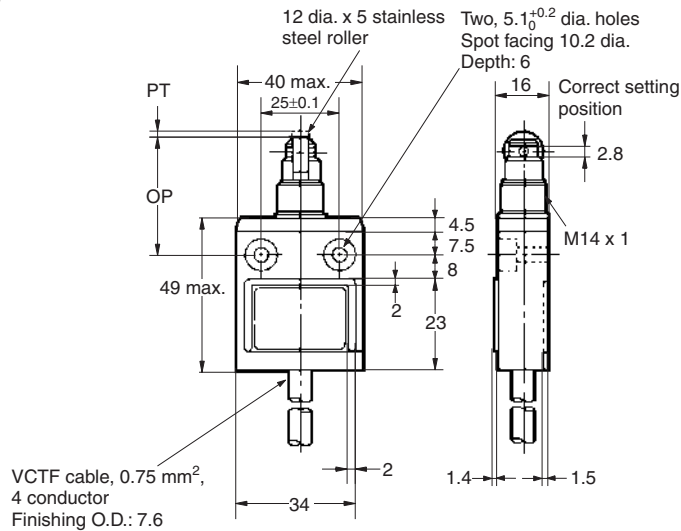
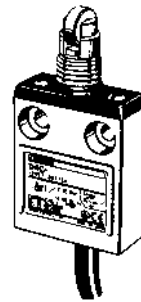
Panel Mount Pin Plunger
D4C-□□41



Panel Mount Roller Plunger
D4C-□□42



Panel Mount Crossroller Plunger
D4C-□□43



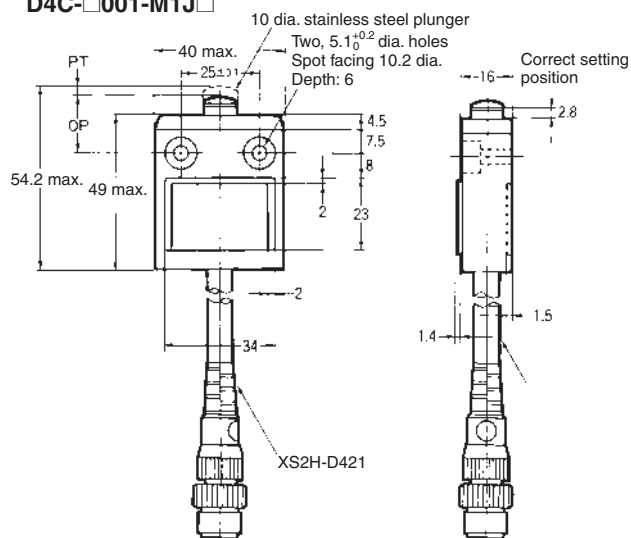
Note: Two nuts (thickness: 2.5; distance across: 17) are included with the D4C-□□41, D4C-□□42 and D4C-□□43.

Pre-wired Models

Pin Plunger

D4C-□001-□K1EJ□

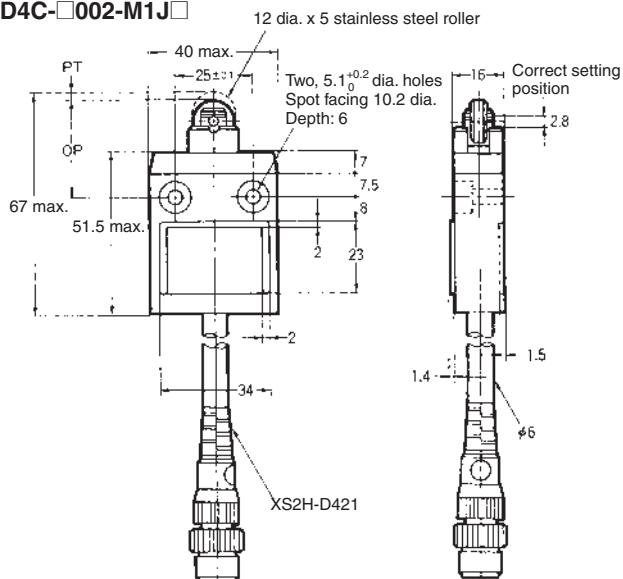
D4C-□001-M1J□



Roller Plunger

D4C-□002-□K1EJ□

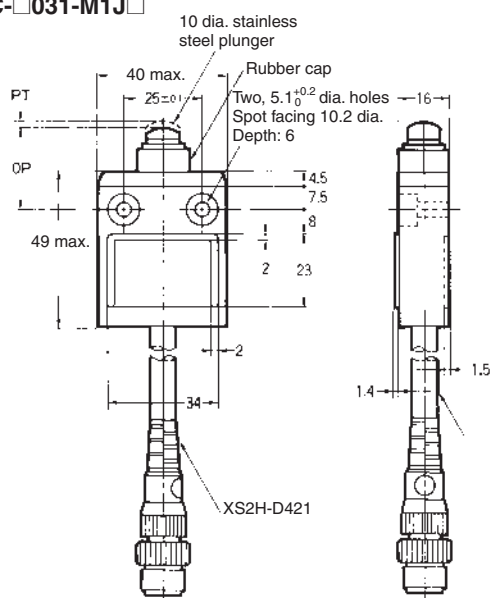
D4C-□002-M1J□



Sealed Pin Plunger

D4C-□031-□K1EJ□

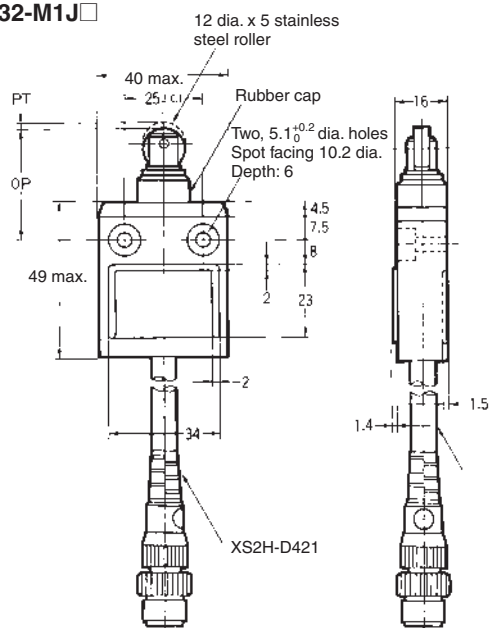
D4C-□031-M1J□



Sealed Roller Plunger

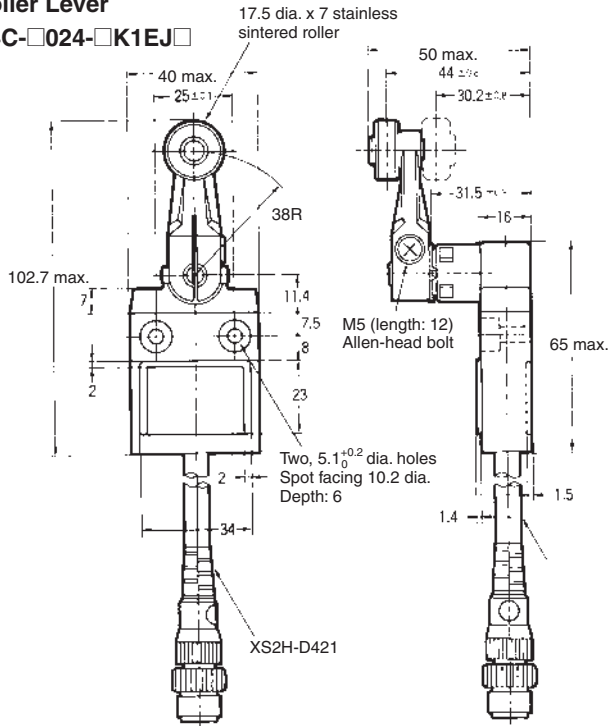
D4C-□032-□K1EJ□

D4C-□032-M1J□



Roller Lever

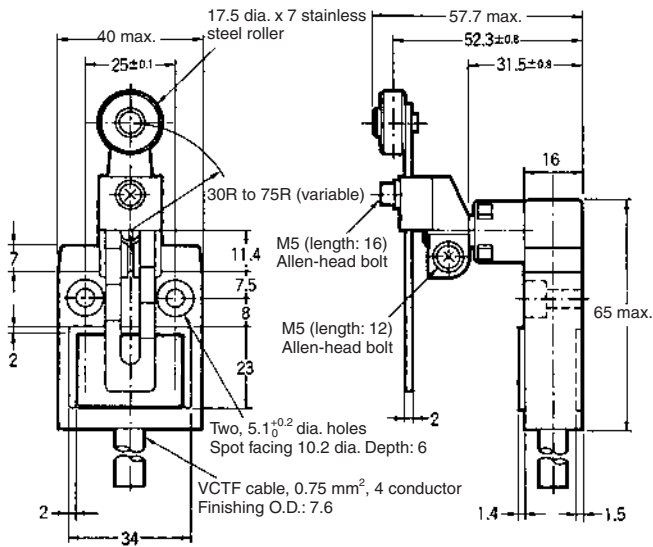
D4C-□024-□K1EJ□



Weather-resistant Models

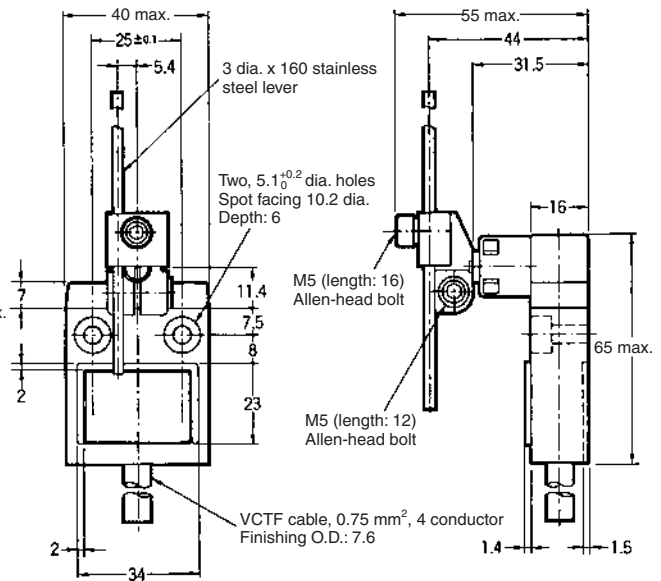
Adjustable Roller Lever

D4C-□□27-P



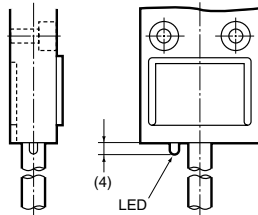
Adjustable Rod Lever

D4C-□□29-P



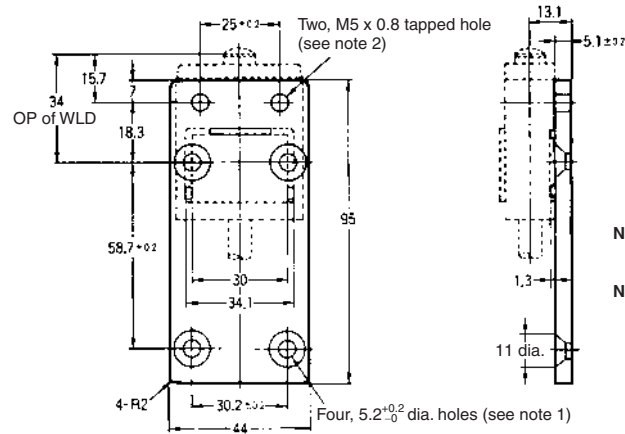
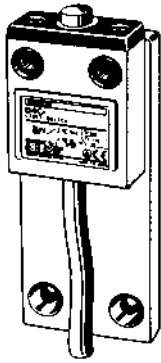
Models with LED Indicator

The dimensions of the LED indicator for models equipped with one are shown below.



Special Mounting Plates (Plates are not provided with Limit Switches.)

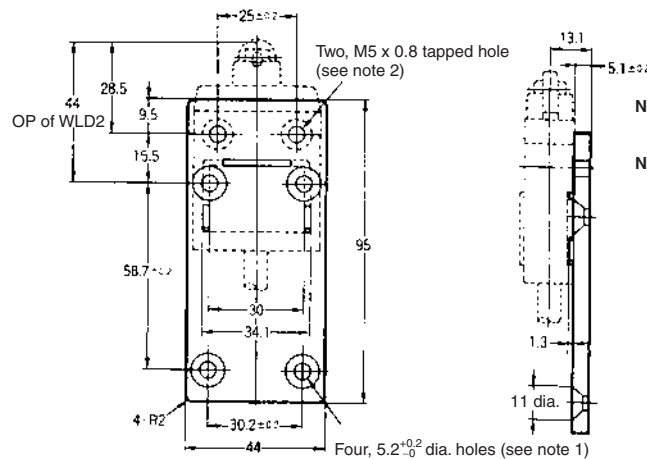
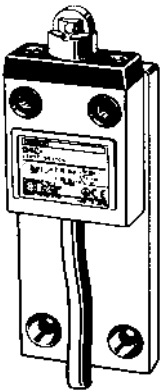
D4C-P001



Note: Four, M5 x 0.8 hexagon pan-head bolts and two M5 x 0.8 Allen-head bolts are provided.

- Note:**
1. Tighten the $5.2^{+0.2}_{-0}$ dia. holes with the M5 x 10 hexagon pan-head screws.
 2. Insert the M5 Allen-head bolts into the M5 tapping holes to tighten the Mounting Plate securely.

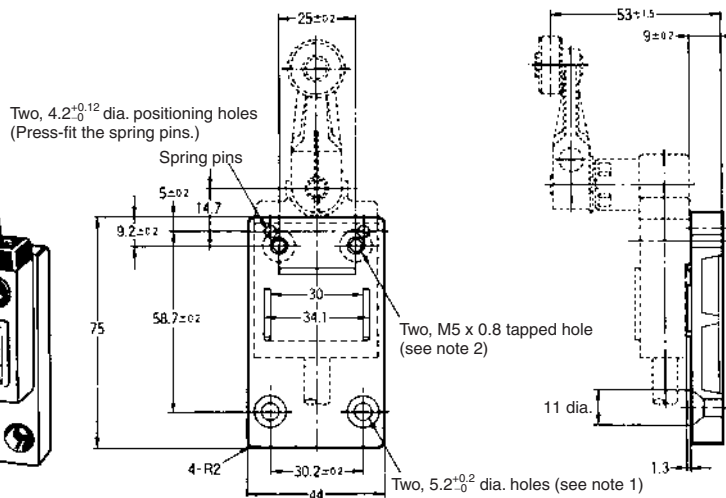
D4C-P002



Note: Four, M5 x 0.8 hexagon pan-head bolts and two M5 x 0.8 Allen-head bolts are provided.

- Note:**
1. Tighten the $5.2^{+0.2}_{-0}$ dia. holes with the M5 x 10 hexagon pan-head screws.
 2. Insert the M5 Allen-head bolts into the M5 tapping holes to tighten the Mounting Plate securely.

D4C-P020



Note: Four, M5 x 0.8 hexagon pan-head bolts and two M5 x 0.8 Allen-head bolts are provided.

- Note:**
1. Tighten the 5.2^{+0.2}₀ dia. holes with the M5 x 10 hexagon pan-head screws. Four, M5 x 0.8 hexagon pan-head bolts, two M5 x 0.8 Allen-head bolts are provided, and two 4 x 14 spring pins are provided.
 2. Insert the M5 Allen-head bolts into the M5 tapping holes to tighten the Mounting Plate securely.

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

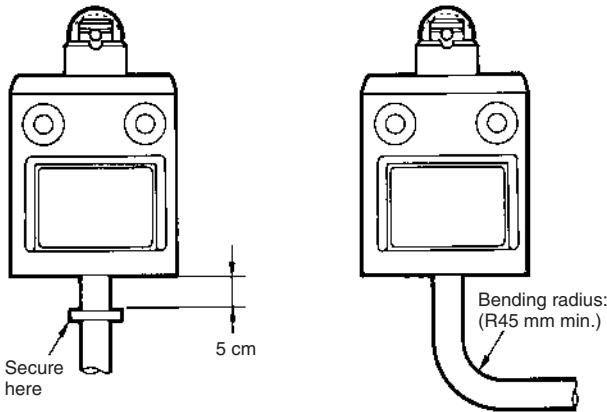
Precautions

Correct Use

Handling

The bottom of the Switch at the cable outlet is resin-molded. Secure the cable at a point 5 cm from the Switch bottom to prevent exertion of excess force on the cable.

When bending the cable, provide a bending radius of 45 mm min. so as not to damage the cable insulation or sheath. Excessive bending may cause fire or leakage current.



Connections

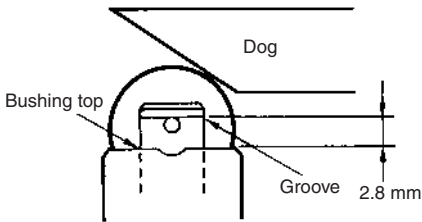
Be sure to connect a fuse with a breaking current 1.5 to 2 times larger than the rated current to the Limit Switch in series in order to protect the Limit Switch from damage due to short-circuiting.

When using the Limit Switch for the EN ratings, use the gI or gG 10-A fuse.

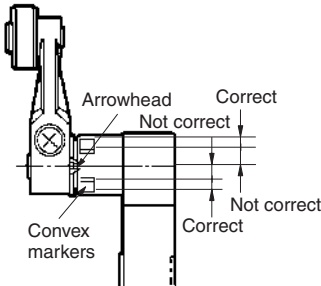
Operation

Operation method, shapes of cam and dog, operating frequency, and overtravel have a significant effect on the service life and precision of a Limit Switch. For this reason, the dog angle must be 30° max., the surface roughness of the dog must be 6.3S min. and hardness must be Hv400 to 500.

To allow the plunger-type actuator to travel properly, adjust the dog and cam to the proper setting positions. The proper position is where the plunger groove fits the bushing top.



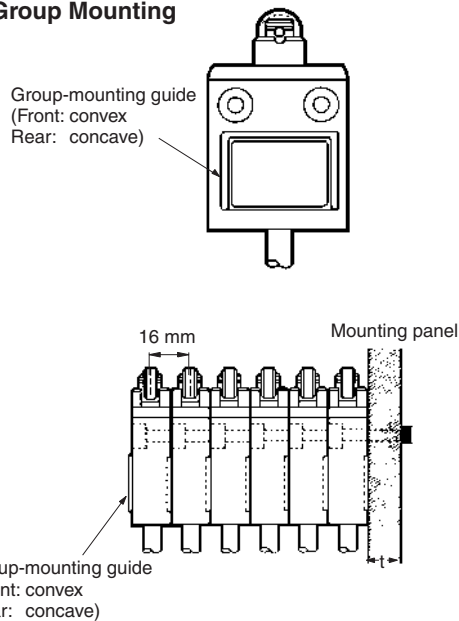
To allow the roller lever-type actuator to travel properly, adjust the dog and cam so that the arrow head is positioned between the two convex markers as shown below.



Mounting

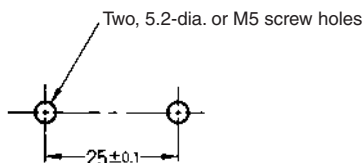
A maximum of 6 Switches may be group-mounted. In this case, pay attention to the mounting direction so that the convex part of the group-mounting guide on one Switch fits into the concave part of the guide on the other Switch as shown in the figure below. For group mounting, the mounting panel must have a thickness (t) of 6 mm min.

Group Mounting



If the mounting panel is warped or has protruding parts, a malfunction may result. Make sure that the mounting panel is not warped and has even surfaces.

Mounting Holes



Use a Switch with a rubber cap when using the plunger type in an environment where malfunction is possible due to environmental conditions such as dust or cutting chips which may not allow resetting.

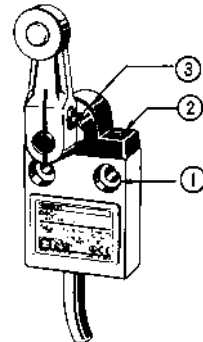
Do not expose the Switch to water exceeding 70°C or use it in steam.

When the D4C is used in a circuit of a device to be exported to Europe, classified as Overvoltage Class III as specified in IEC664, provide a contact protection circuit.

Tighten each screw to a torque according to the following table.

No.	Type	Torque
1	M5 Allen-head bolt	4.90 to 5.88 N·m
2	M3.5 head mounting screw	0.78 to 0.88 N·m
3	M5 Allen-head bolt	4.90 to 5.88 N·m

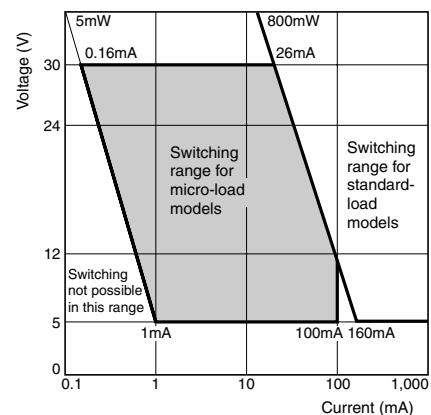
Note: By removing the two screws from the head, the head direction can be rotated 180°. After changing the head direction, re-tighten to the torque specified above. Be careful not to allow any foreign substance to enter the Switch.



Micro-load Models (D4C-4, -5, -6)

Switching Range

Micro-load models can be used for switching in the range shown below.



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Small Sealed Switch D4E-□N

Slim and Compact Switch with Better Seal and Ensuring Longer Service Life than D4E

- Flat springs with an improved lever ratio of the built-in switch ensure smooth snap action and long life expectancy.
- Protection cover protects the built-in switch from dust and oil. Plunger incorporates a tough seal cap that lasts for a long time.
- One touch connector eliminates need for tedious wiring operations and reduces downtime for wiring and maintenance (models with standard, easy-to-use screw terminals are also available).
- Minute load model with gold cladding is optimal for electronic control.
- Molded terminal types as well as molded terminal types with operating indicator lamps are available for screw terminal systems.
- No difference in mounting pitch and characteristics between D4E-□N and D4E models.



Model Number Structure

■ Model Number Legend

D4E-□□□□N
1 2 3 4

1. Rated Current

- 1: 5 A at 125 VAC
(1 A at 125 VAC/30 VDC for model with a connector)
- 2: 0.1 A at 125 VAC
(0.1 A at 125 VAC/30 VDC for model with a connector)

2. Actuator

- A: Roller plunger
- B: Crossroller plunger
- C: Plunger
- D: Sealed roller plunger
- E: Sealed crossroller plunger
- F: Sealed plunger
- G: Roller lever
- H: One-way action roller lever

3. Terminals

- 00: AC connector
- 10: DC connector
- 20: Screw terminals without a cable
- 21: Screw terminals with a cable (right-hand)
- 22: Screw terminals with a cable (left-hand)
- 23: Molded terminals with a cable (right-hand)
- 24: Molded terminals with a cable (left-hand)
(Cable is S-FLEX VCTF 3 m)

4. Operation Indicator

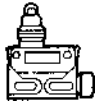
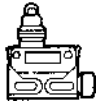
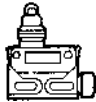
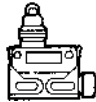
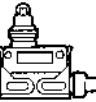
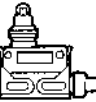








- L: Neon lamp (250 VAC)
- L1: LED (12 VDC)
- L2: LED (24 VDC)
- L3: LED (48 VDC)

Note: 1. Only the molded terminal models can be equipped with an operation indicator.

- 2. Desired Switches may not be manufactured depending on the combination between molds and indicators. Contact our sales representative for further information.

Ordering Information

List of Models

Actuator	One-touch connector type		Screw terminal type			
	General-purpose	Micro load	General-purpose without cable	Micro load without cable	General-purpose with cable	Micro load with cable
						
Roller plunger 	D4E-1A□0N	D4E-2A□0N	D4E-1A20N (see note 2)	D4E-2A20N	D4E-1A21N	D4E-2A21N
Crossroller plunger 	D4E-1B□0N	D4E-2B□0N	D4E-1B20N (see note 2)	D4E-2B20N	D4E-1B21N	D4E-2B21N
Plunger 	D4E-1C□0N	D4E-2C□0N	D4E-1C20N (see note 2)	D4E-2C20N	D4E-1C21N	D4E-2C21N
Sealed roller plunger 	D4E-1D□0N	D4E-2D□0N	D4E-1D20N (see note 2)	D4E-2D20N	D4E-1D21N	D4E-2D21N
Sealed crossroller plunger 	D4E-1E□0N	D4E-2E□0N	D4E-1E20N (see note 2)	D4E-2E20N	D4E-1E21N	D4E-2E21N
Sealed plunger 	D4E-1F□0N	D4E-2F□0N	D4E-1F20N (see note 2)	D4E-2F20N	D4E-1F21N	D4E-2F21N
Roller lever 	D4E-1G□0N	D4E-2G□0N	D4E-1G20N (see note 2)	D4E-2G20N	D4E-1G21N	D4E-2G21N
One-way action roller lever 	D4E-1H□0N	D4E-2H□0N	D4E-1H20N (see note 2)	D4E-2H20N	D4E-1H21N	D4E-2H21N

Note: 1. When ordering, specify the current type by replacing the blank box of the model number with 0 for AC connector or 1 for DC connector.
 2. Approved by UL and CSA.
 3. For the plunger and lever actuator models, the NC and NO terminal indicators are reversed.
 4. Cold tolerance specifications are available for actuator models with an A, B, C, G, or H in the model number. When ordering, add C to the model number.
 For example: D4E-1A20N → D4E-1A20N-C

Accessories (Order Separately)

Plug

Model	Current	Type	No. of conductors	Cable length	Applicable models
XS2F-A421-D90-A	AC	Straight	4	2 m	D4E-□□00N
XS2F-A421-G90-A				5 m	
XS2F-D421-D80A	DC			2 m	D4E-□□10N
XS2F-D421-G80-A				5 m	

Specifications

■ Approved Standards

Agency	Standard	File No.
UL	UL508	E76675
CSA	CSA C22.2 No. 14	LR45746
TÜV Rheinland	EN60947-5-1	R9551015

■ Approved Standard Ratings

UL, CSA

A300

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

TÜV (EN60947-5-1)

D4E- $\frac{1}{I}$ $\frac{G}{II}$ $\frac{23}{III}$ $\frac{L}{IV}$ N

Model				Applicable category and ratings	Thermal current (I_{the})	Indicator
I	II	III	IV			
1	<input type="checkbox"/>	00		AC-14 0.5 A/125 VAC	5 A	---
1	<input type="checkbox"/>	10		DC-12 0.5 A/30 VDC	5 A	---
1	<input type="checkbox"/>	20, 21, 22		AC-15 2A/250 VAC DC-12 2A/48 VDC	5 A	---
1	<input type="checkbox"/>	23, 24	L	AC-15 2A/250 VAC	5 A	Neon lamp
1	<input type="checkbox"/>	23, 24	L1	DC-12 2A/12 VDC	5 A	LED
1	<input type="checkbox"/>	23, 24	L2	DC-12 2A/24 VDC	5 A	LED
1	<input type="checkbox"/>	23, 24	L3	DC-12 2A/48 VDC	5 A	LED
2	<input type="checkbox"/>	00		AC-14 0.1A/125 VAC	0.5 A	---
2	<input type="checkbox"/>	10		DC-12 0.1A/30 VDC	0.5 A	---
2	<input type="checkbox"/>	20, 21, 22		AC-14 0.1A/125 VAC DC-12 0.1A/48 VDC	0.5 A	---
2	<input type="checkbox"/>	23, 24	L	AC-14 0.1A/125 VAC	0.5 A	Neon lamp
2	<input type="checkbox"/>	23, 24	L1	DC-12 0.1A/12 VDC	0.5 A	LED
2	<input type="checkbox"/>	23, 24	L2	DC-12 0.1A/24 VDC	0.5 A	LED
2	<input type="checkbox"/>	23, 24	L3	DC-12 0.1A/48 VDC	0.5 A	LED

Note: 1. ☐: Actuator variation of item II

2. AC-14 0.5 A/125 VAC means as follows:
 Applicable category: AC-14
 Rated operating current (I_o): 0.5 A
 Rated operating voltage (U_o): 125 VAC

■ Ratings

Rated voltage	General-purpose								Micro load	
	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
125 VAC	5 (1) A		1.5 (1) A		3 (1) A		2 (1) A	1 (1) A	0.1 A	
250 VAC	5 (1) A		1.5 (1) A		3 (1) A		1 A	0.5 A	---	
8 VDC	5 (1) A		---		1.5 (1) A		---		0.1 A	
14 VDC	5 (1) A		---		1.5 (1) A		---		0.1 A	
30 VDC	5 (1) A		---		1.5 (1) A		---		0.1 A	
125 VDC	0.5 A		---		0.05 A		---		---	
250 VDC	0.25 A		---		0.03 A		---		---	

Inrush current	NC	10 A max.
	NO	10 A max.

- Note:** 1. The above current ratings are for a standard current and the values in parentheses are for models with a connector.
 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.

■ Characteristics

Degree of protection	IP67
Durability (see note 3)	Mechanical: 10,000,000 operations min. Electrical: 500,000 operations min. (5 A at 250 VAC, resistive load) 5,000,000 operations min. (10 mA at 24 VDC, resistive load)
Operating speed	0.1 mm to 0.5 m/sec
Operating frequency	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 max. (initial value)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between terminals of same polarity 1,500 VAC, 50/60 Hz for 1 min/Uimp at 2.5 kV (EN60947-5-1) between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal part
Rated insulation voltage (Ui)	250 VAC
Switching overvoltage	1,000 VAC max. (EN60947-5-1)
Pollution degree (operating environment)	3 (EN60947-5-1)
Short-circuit protective device (SCPD)	10 A fuse (type gG or gI, IEC269 approved)
Conditional short-circuit current	100 A (EN60947-5-1)
Conventional enclosed thermal current (I _{the})	5 A (EN60947-5-1)
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	Operating: -10°C to 80°C (with no icing)
Ambient humidity	Operating: 95% max.
Weight	Approx. 86 g (in case of roller plunger)

- Note:** 1. The above values are initial values.
 2. The above ratings may vary depending on the model. Contact your OMRON representative for further details.
 3. Durability 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.

■ Operating Characteristics

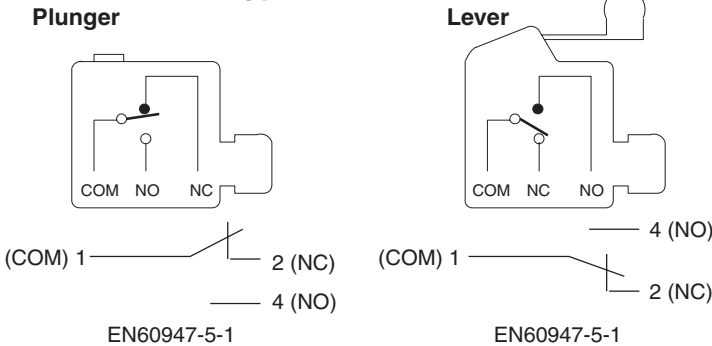
Model	D4E-1A□□N D4E-2A□□N	D4E-1B□□N D4E-2B□□N	D4E-1C□□N D4E-2C□□N	D4E-1D□□N D4E-2D□□N	D4E-1E□□N D4E-2E□□N
OF max.	11.77 N	11.77 N	11.77 N	11.77 N	11.77 N
RF min.	4.90 N	4.90 N	4.90 N	4.90 N	4.90 N
PT max.	1.5 mm	1.5 mm	1.5 mm	1.5 mm	1.5 mm
OT min.	3 mm	3 mm	3 mm	3 mm	3 mm
MD(reference value)	(0.1 mm)	(0.1 mm)	(0.1 mm)	(0.1 mm)	(0.1 mm)
OP	31.4±0.8 mm	31.4±0.8 mm	25.4±0.8 mm	41.3±0.8 mm	41.3±0.8 mm

Model	D4E-1F□□N D4E-2F□□N	D4E-1G□□N D4E-2G□□N	D4E-1H□□N D4E-2H□□N
OF max.	11.77 N	3.92 N	3.92 N
RF min.	4.90 N	0.78 N	0.78 N
PT max.	1.5 mm	2 mm	2 mm
OT min.	3 mm	4 mm	4 mm
MD(reference value)	(0.1 mm)	(0.3 mm)	(0.3 mm)
OP	30±0.8 mm	23.1±0.8 mm	34.3±0.8 mm

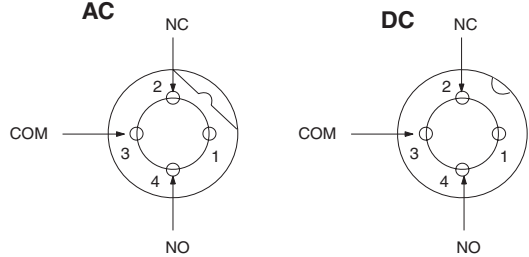
Note: The values given in parentheses are reference values.

■ Contact Form

Screw Terminal Type

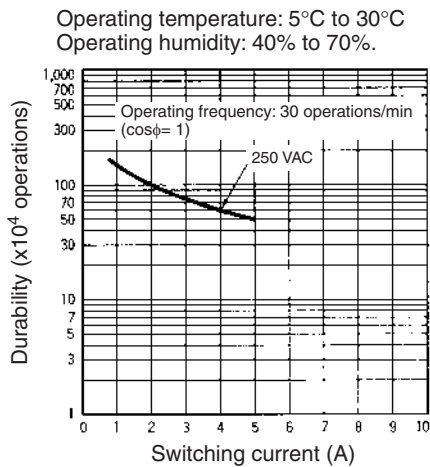


Connector Type

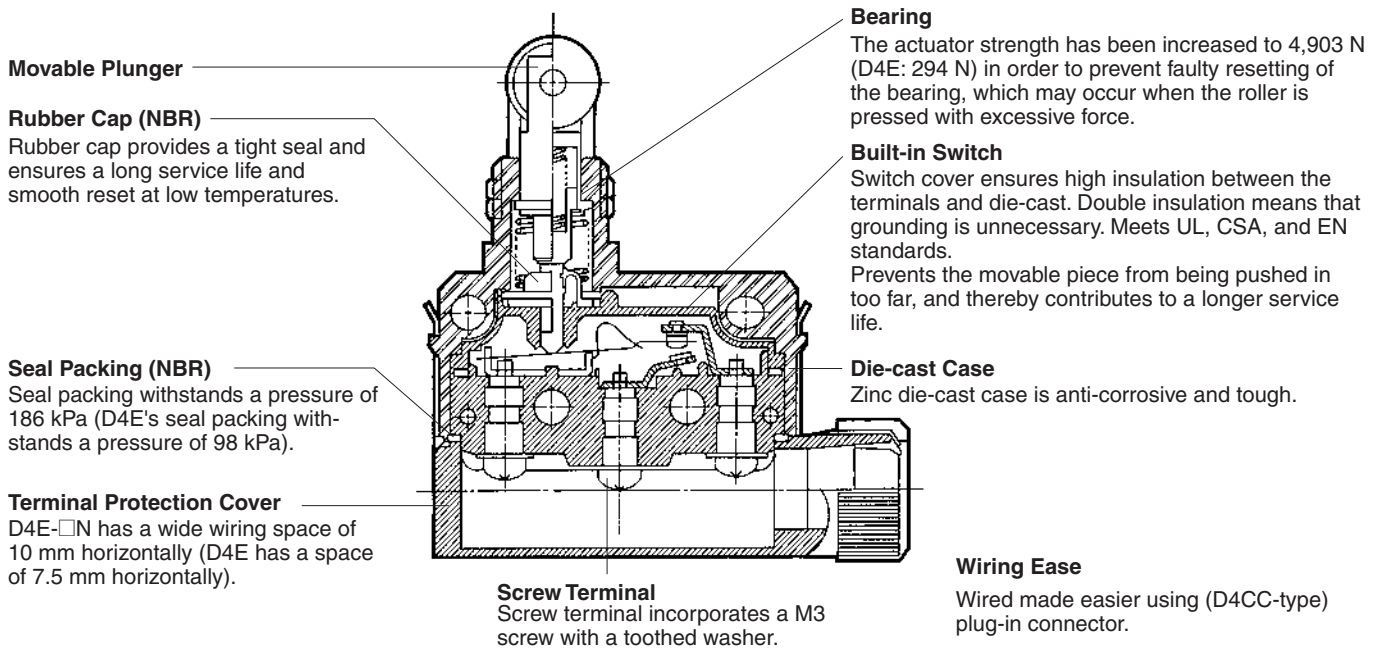


Engineering Data

Electrical Durability ($\cos\phi=1$)



Nomenclature

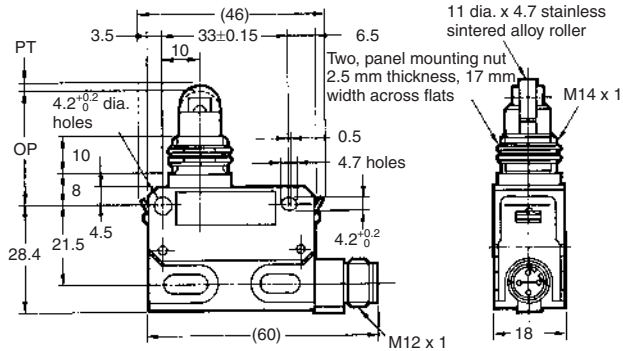
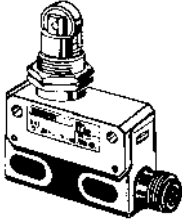


Dimensions

- 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. A 3-m lead wire cable equivalent to the 3-conductor VCTF S-FLEX cable (0.75 mm², 7 mm in dia.) is provided.
 4. A 5.8- to 7.6-dia. cable can be applied to the seal rubber for the lead wire outlet.

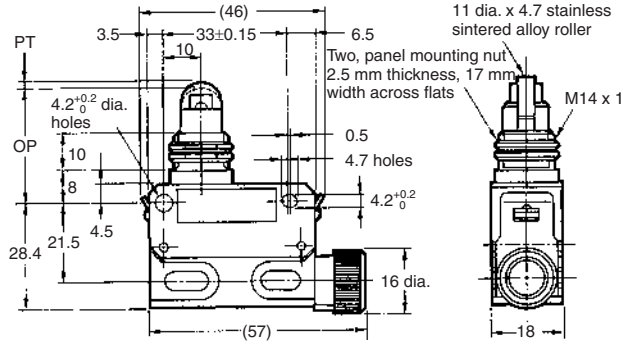
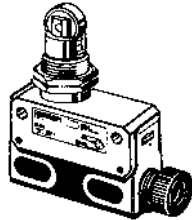
Roller Plunger

D4E-1A00N
 D4E-1A10N
 D4E-2A00N
 D4E-2A10N



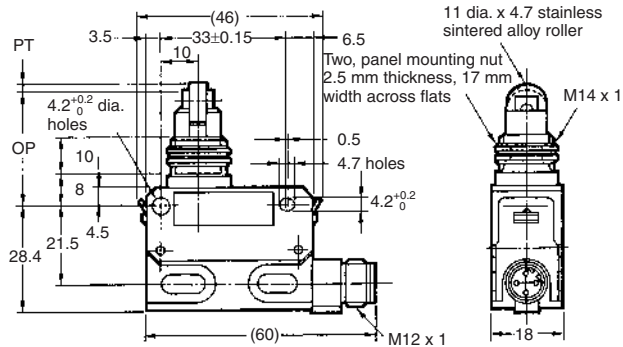
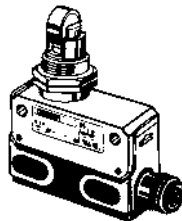
Roller Plunger

D4E-1A20N (See note 4.)
 D4E-2A20N (See note 4.)
 D4E-1A21N (See note 3.)
 D4E-2A21N (See note 3.)



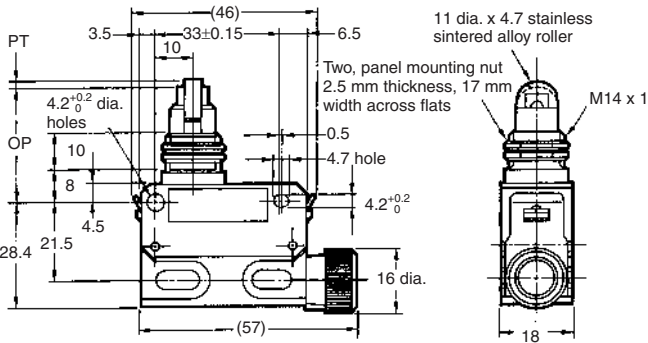
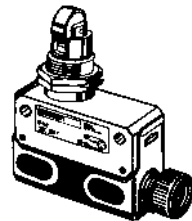
Cross Roller Plunger

D4E-1B00N
 D4E-1B10N
 D4E-2B00N
 D4E-2B10N



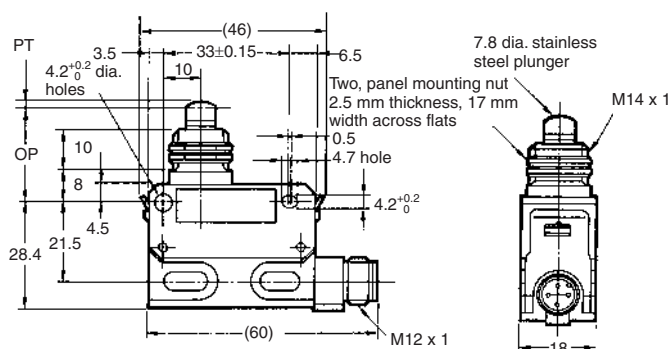
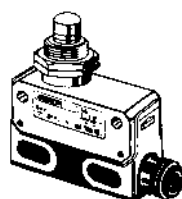
Cross Roller Plunger

D4E-1B20N
 D4E-2B20N
 D4E-1B21N
 D4E-2B21N



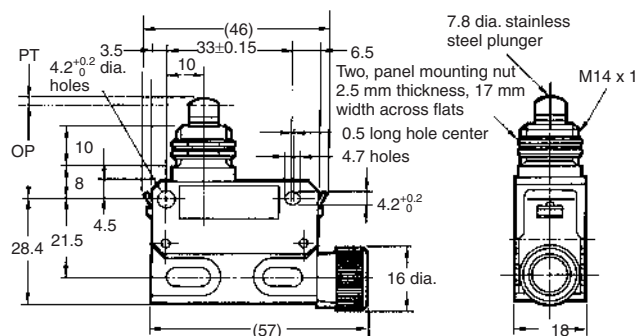
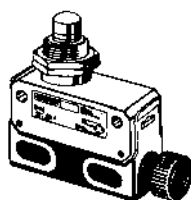
Plunger

D4E-1C00N
D4E-1C10N
D4E-2C00N
D4E-2C10N



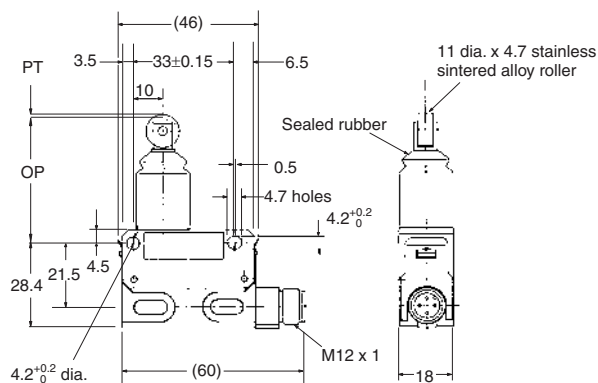
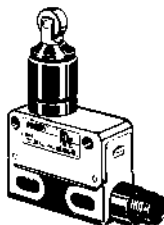
Plunger

D4E-1C20N (See note 4.)
D4E-2C20N (See note 4.)
D4E-1C21N (See note 3.)
D4E-2C21N (See note 3.)



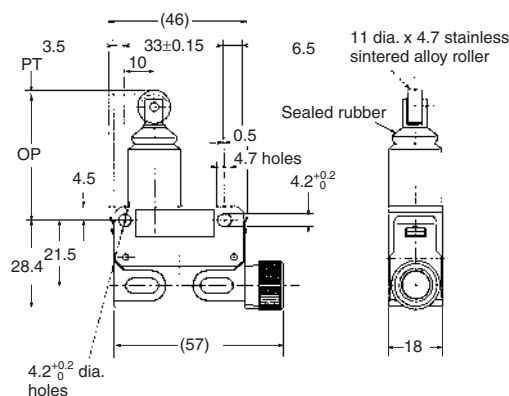
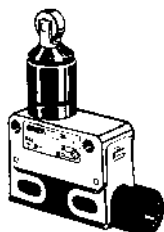
Sealed Roller Plunger

D4E-1D00N
D4E-1D10N
D4E-2D00N
D4E-2D10N



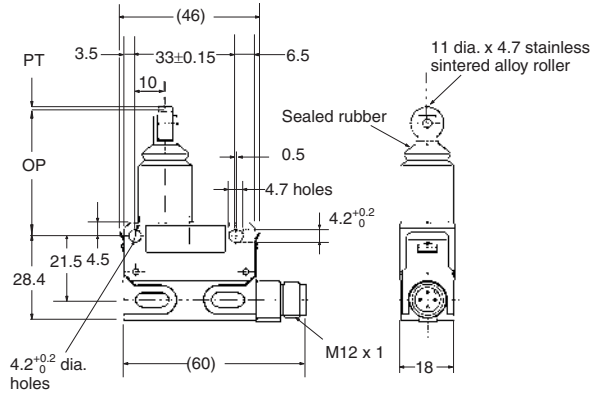
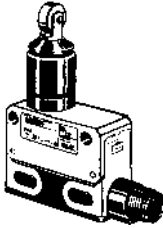
Sealed Roller Plunger

D4E-1D20N (See note 4.)
D4E-2D20N (See note 4.)
D4E-1D21N (See note 3.)
D4E-2D21N (See note 3.)



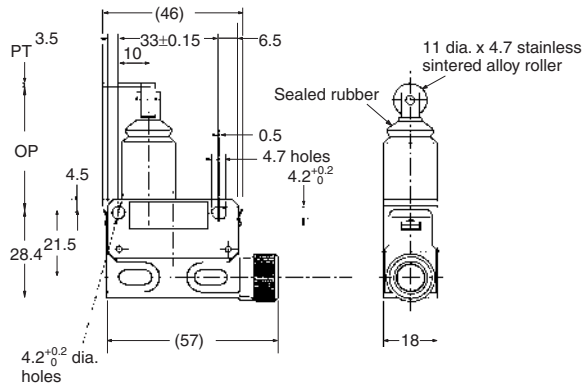
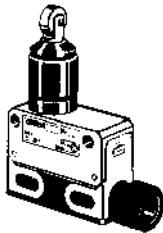
Sealed Cross Roller Plunger

D4E-1E00N
D4E-1E10N
D4E-2E00N
D4E-2E10N



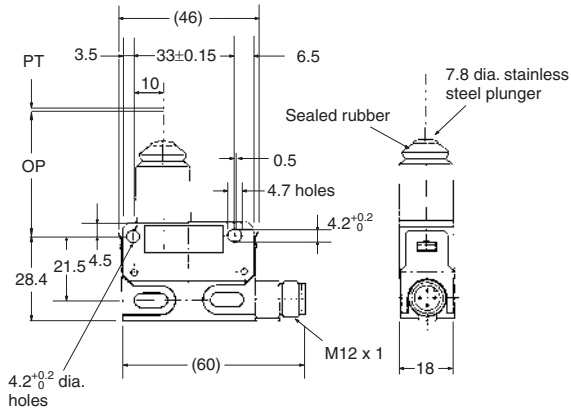
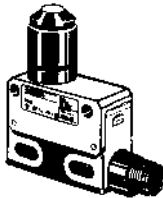
Sealed Cross Roller Plunger

D4E-1E20N (See note 4.)
D4E-2E20N (See note 4.)
D4E-1E21N (See note 3.)
D4E-2E21N (See note 3.)



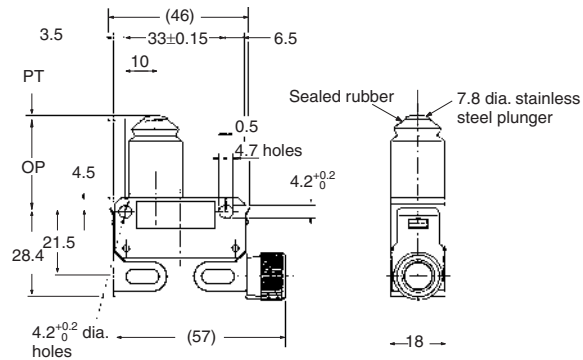
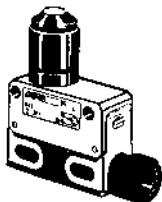
Sealed Plunger

D4E-1F00N
D4E-1F10N
D4E-2F00N
D4E-2F10N



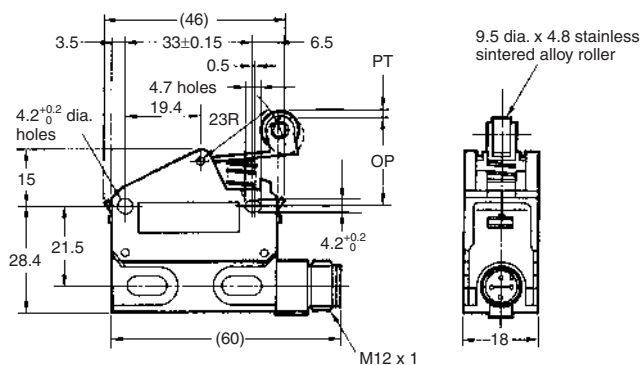
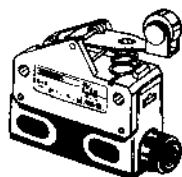
Sealed Plunger

D4E-1F20N (See note 4.)
D4E-2F20N (See note 4.)
D4E-1F21N (See note 3.)
D4E-2F21N (See note 3.)



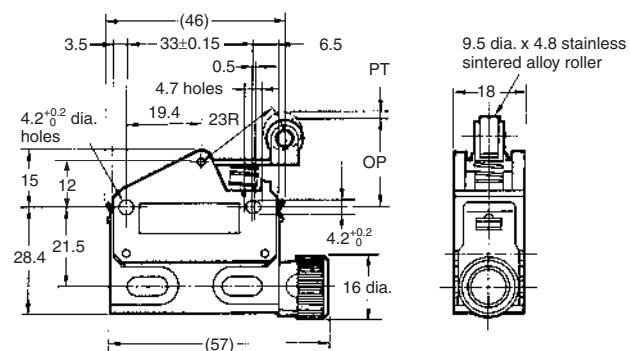
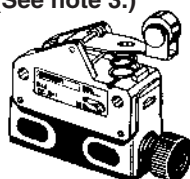
Roller Lever

D4E-1G00N
D4E-1G10N
D4E-2G00N
D4E-2G10N



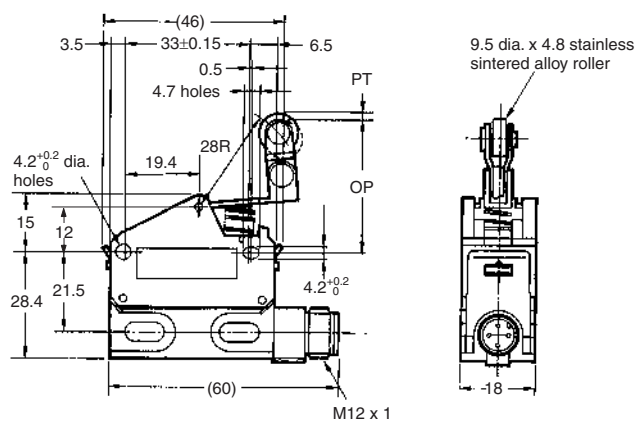
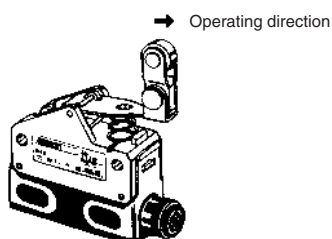
Roller Lever

D4E-1G20N (See note 4.)
D4E-2G20N (See note 4.)
D4E-1G21N (See note 3.)
D4E-2G21N (See note 3.)



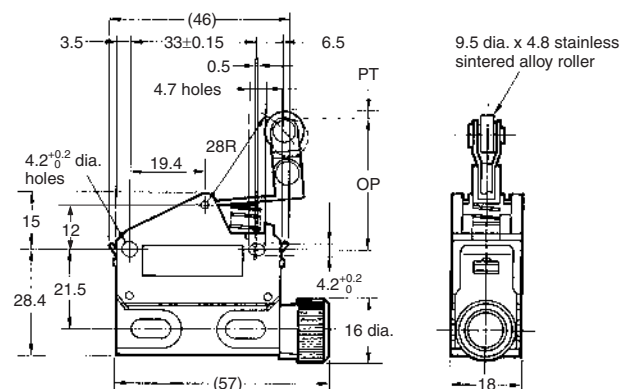
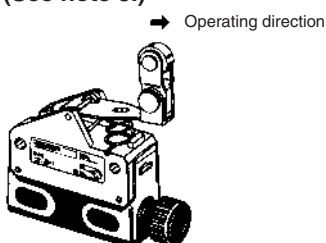
One-way Action Roller Lever

D4E-1H00N
D4E-1H10N
D4E-2H00N
D4E-2H10N



One-way Action Roller Lever

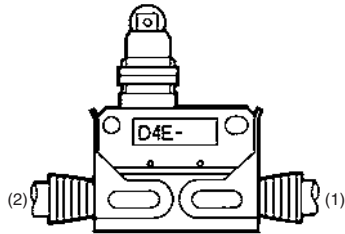
D4E-1H20N (See note 4.)
D4E-2H20N (See note 4.)
D4E-1H21N (See note 3.)
D4E-2H21N (See note 3.)



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. It can be used like a screw-terminal model (with a cable), and the dimensions and operating characteristics are the same as for standard models.



Example:
Standard type: D4E-1A20N
Location of lead output: Right-hand → D4E-1A23N

Suffix by Location of Lead Outlet

Location of lead output	Suffix for pre-wired terminal
	COM, NC, NO
(1) Right-hand	D4E-□□23N
(2) Left-hand	D4E-□□24N

Lead Supplies

Leads	Nominal cross-sectional area	Finished outside diameter	Terminal connections	Standard length
V.C.T.F. S-FLEX (vinyl cabtire coat)	0.75 mm ²	3 conductors 7 mm dia.	Black: COM White: NO Red: NC	3 m

Comparison between Old and New Mold Terminal Models

The D4E-N and D4E are different from each other in terminal specifications.

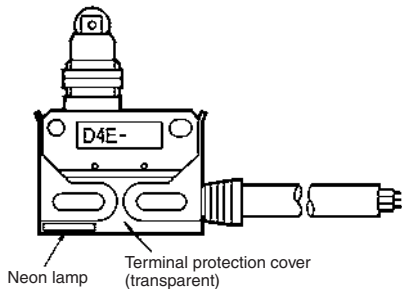
Location of lead output	D4E-N	D4E
Right-hand	D4E-□□23N	D4E-□□21
Left-hand	D4E-□□24N	D4E-□□23
Underside	---	D4E-□□22

Operation of Indicator-equipped Models

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.

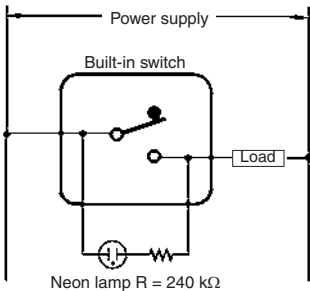


There is no difference in operating characteristics between D4E AC Models and corresponding D4E Standard Models.

There is no difference in dimensions between D4E AC Models and D4E Standard Models.

Example:
Basic type: D4E-1A23N
When placing your order for the molded terminal model with an neon lamp operation indicator, specify the model number as D4E-1A23LN.

Internal Circuit



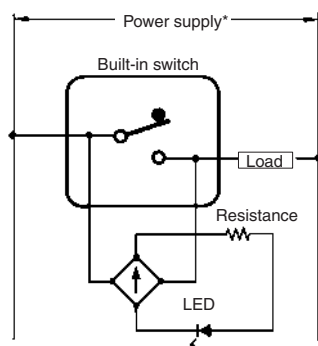
DC Operation

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.

Internal Circuit



Note: *An external 24VDC power supply can be used, eg. OMRON S8VS.

Type	Voltage rating	Lamp current	Internal resistance
L1	12 V	Approx. 2.4 mA	4.3 k Ω
L2	24 V	Approx. 1.2 mA	18 k Ω
L3	48 V	Approx. 2.1 mA	22 k Ω

Example:

When ordering a D4E DC Model, add the following suffix to the model number.

Basic Model: The model number of the D4E-1A23N with a built-in 12-V LED indicator is D4E-1A23L1N.

Precautions

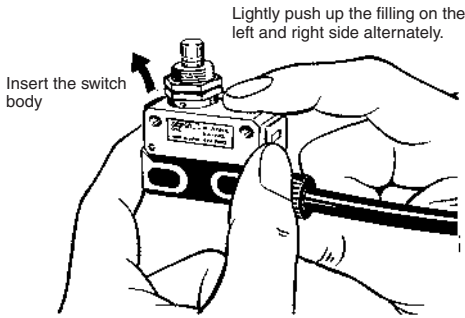
Refer to the *Technical Information for Limit Switches* (Cat. No. C121).

Correct Use

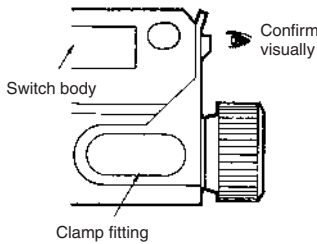
Do not solder the screw terminals.

Sealing materials may deteriorate when used outdoors or when exposed to cutting oil, solvents, or chemicals. Check this on actual equipment and, if deterioration is foreseen, consult your OMRON representative in advance.

If the one-touch connector is to be mounted onto the switch body, lightly push up the fitting so that the switch body can then be inserted into the clamp.



Be sure that the clamp is inserted to the full depth, because the Switch will not function properly if one of the clamps is improperly inserted.



If the clamp is properly inserted up to the full depth, it will not slide out easily. Be sure to carefully confirm all the above items.

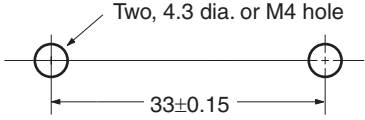
Be sure to connect a fuse with a breaking current 1.5 to 2 times the rated current to the Limit Switch in series in order to protect the Limit Switch from damage due to short-circuiting.

When using the Limit under the EN ratings, use a gl or gG 10-A fuse that conforms to IEC260.

Mounting

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.

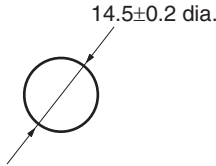
Mounting Holes



When mounting the panel mount-type Switch with screws on a side surface, remove the hexagonal nuts from the actuator.

When mounting the panel mount type on a panel, tighten the hexagonal nuts of the actuator to a torque less than 7.85 N-m.

Mounting Hole



Operating method, shape of cam or dog, operating frequency, and the overtravel (OT) have significant effect on the service life and precision of the Limit Switch. Make sure that the shape of the cam is smooth enough.

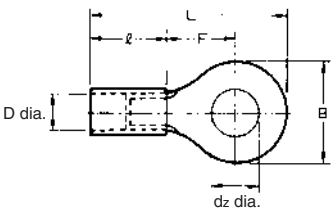
Check that OT has a sufficient margin. The actual OT should be rated OT x 0.7 to 1.

Do not change the operating position by remodeling the actuator.

Wiring

When wiring screw terminals, M3-size round solderless terminals with an insulation tube is recommended. The conductor size should be 0.75 mm² and cable diameter should be 7 mm.

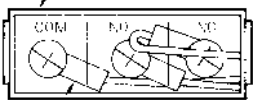
Refer to the following when wiring.



dz dia.:	3.2
D dia.:	1.9
B:	5.2
L:	16.4
F:	5.8
l:	8.0 (mm)

Wiring Method

D4E-N

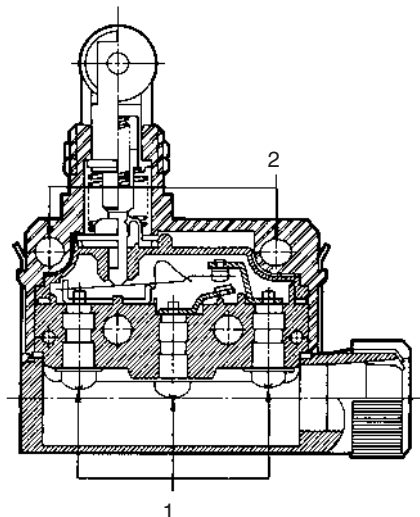


Round solderless terminal

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 (M3)	0.24 to 0.44 N·m
2	Switch mounting screw (M4)	1.18 to 1.37 N·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.

Cat. No. C028-E1-05

In the interest of product improvement, specifications are subject to change without notice.

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).
- Molded terminal model is available.
- Operation indicator model is also available.



Model Number Structure

Model Number Legend

Standard Models

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
- 01: Micro Load

Note: Refer to page 53 for Molded Terminal Models.

Ordering Information

List of Models

Actuator		Standard model	Micro voltage
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

Actuator	Standard model	Micro voltage
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

■ Approved Standards

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

■ 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		

TÜV Rheinland Approved Ratings (EN60947-5-1)

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

■ 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 max.	
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.

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	

■ Characteristics

Degree of protections (see note 3)	IP67 (EN60947-5-1)
Durability (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	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 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/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 (EN60947-5-1)
Switching overvoltage	1,000 VAC max., 300 VDC max. (EN60947-5-1)
Pollution degree (operating environment)	3 (EN60947-5-1)
Short-circuit protective device (SCPD)	10 A fuse type gG (IEC269)
Conditional short-circuit current	100 A (EN60947-5-1)
Conventional enclosed thermal current (I _{the})	5 A (EN60947-5-1)
Protection against electric shock	Class II (grounding not required with double insulation)
OFF reverse voltage	1,000 VAC max., 300 VDC max. (EN60947-5-1)
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	Operating: -10°C to 80°C (no icing)
Ambient humidity	Operating: 95% max.
Weight (see note 5)	Approx. 62 to 72 g

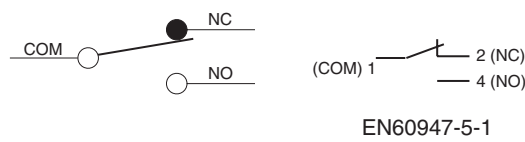
- Note:**
1. The above figures are for standard currents.
 2. The above ratings may vary depending on the model. Contact your OMRON representative for further details.
 3. The head section of the plunger type SHL-D(Q)□□ is excluded.
 4. Durability values are calculated at an operating temperature of 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.

■ 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

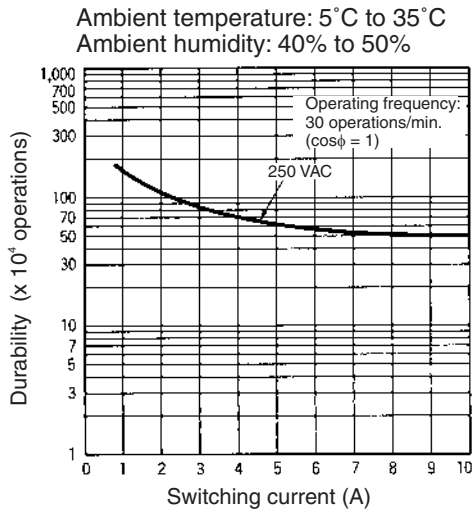
Model	SHL-W155 SHL-W155-01	SHL-W255 SHL-W255-01	SHL-W2155 SHL-W2155-01	SHL-W355 SHL-W355-01	SHL-W3155 SHL-W3155-01
OF max.	2.35 N	3.92 N	2.55 N	3.92 N	2.55 N
RF min.	0.44 N	0.78 N	0.49 N	0.78 N	0.49 N
PT max.	13 mm	8 mm	13 mm	8 mm	13 mm
OT min.	5 mm	3 mm	5.5 mm	3 mm	5.5 mm
MD max.	4 mm	2.5 mm	4 mm	2.5 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

■ Contact Form

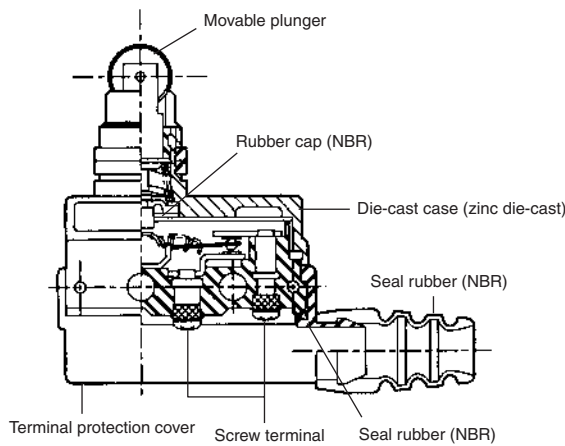


Engineering Data

■ Electrical Durability



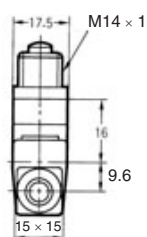
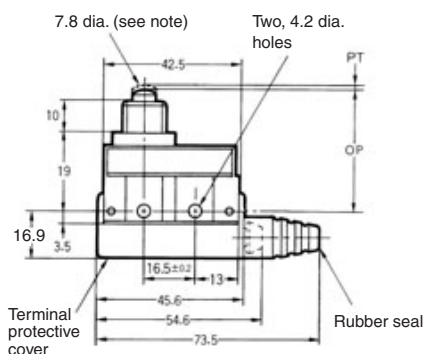
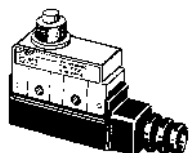
Nomenclature



Dimensions

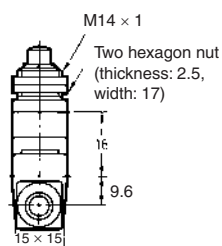
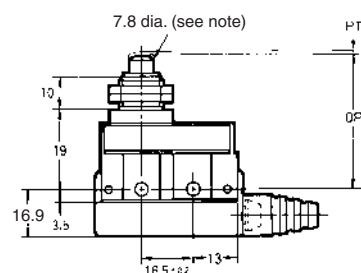
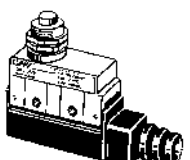
Note: 1. All units are in millimeters unless otherwise indicated.
2. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.

Plunger SHL-D55, SHL-D55-01



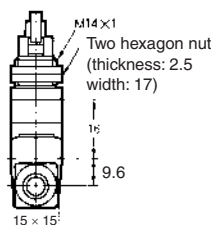
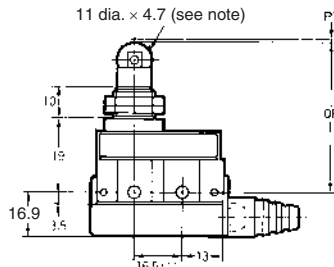
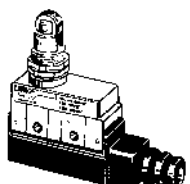
Note: Stainless steel pin plunger

Panel Mount Plunger SHL-Q55, SHL-Q55-01



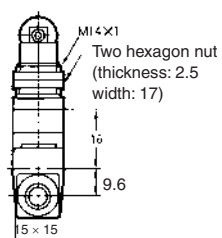
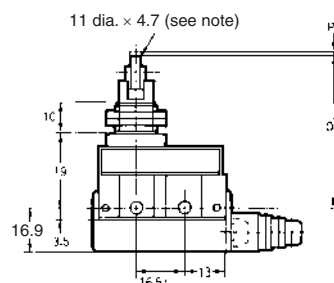
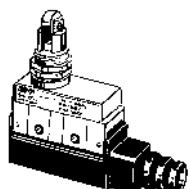
Note: Stainless steel pin plunger

Panel Mount Roller Plunger SHL-Q2255, SHL-Q2255-01



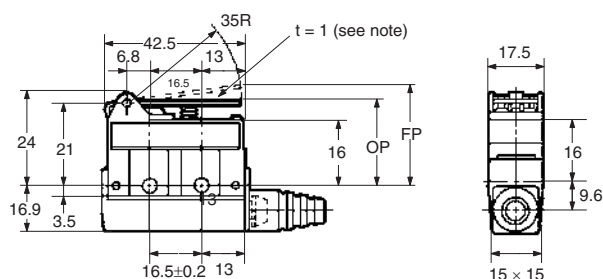
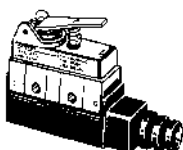
Note: Stainless sintered alloy roller

Panel Mount Crossroller Plunger SHL-Q2155, SHL-Q2155-01



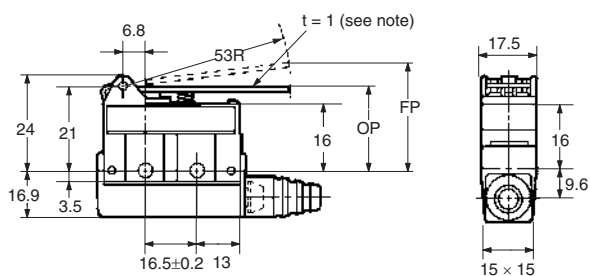
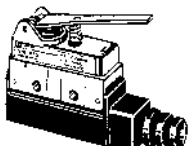
Note: Stainless sintered alloy roller

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



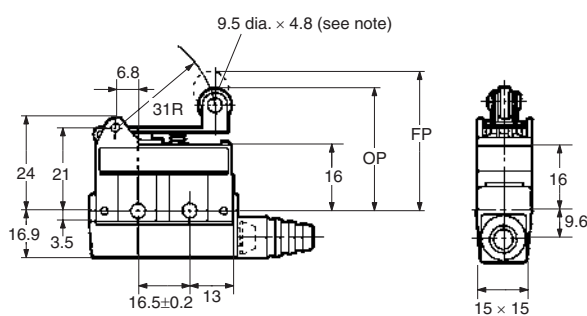
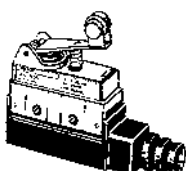
Note: Stainless steel lever

Hinge Lever
SHL-W155, SHL-W155-01



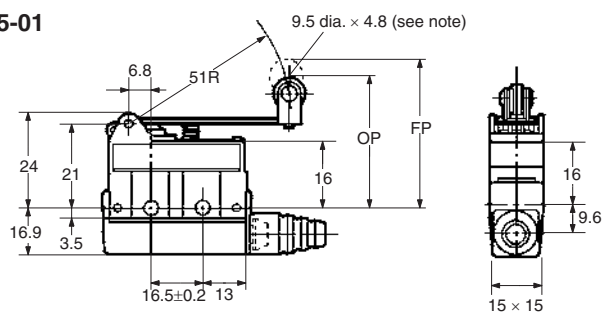
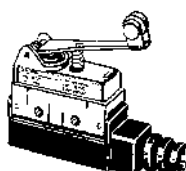
Note: Stainless steel lever

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



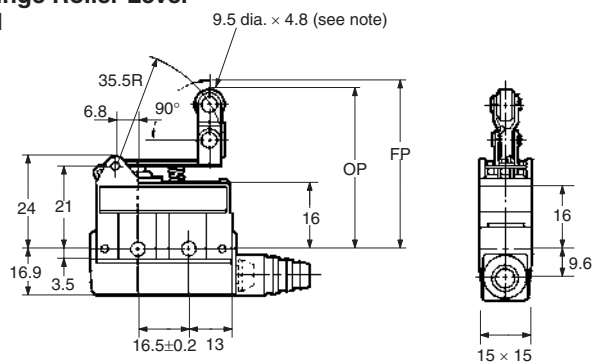
Note: Sintered stainless roller

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



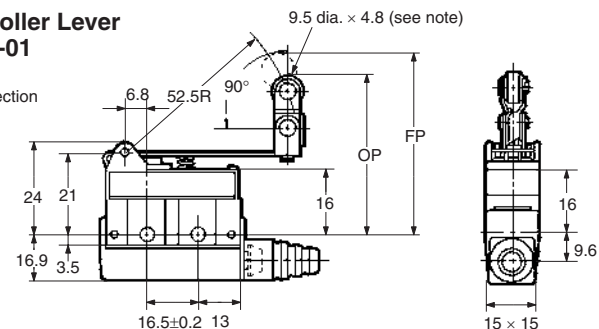
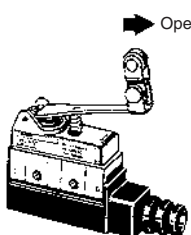
Note: Sintered stainless roller

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



Note: Stainless sintered roller

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



Note: Stainless sintered roller

Molded Terminal Models

Model Number Legend

Molded Terminal Models

SHL-□55-□□M□
1 2 3 4

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

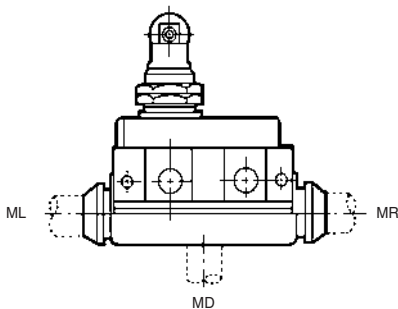
3. Operation Indicator

- 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 an 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

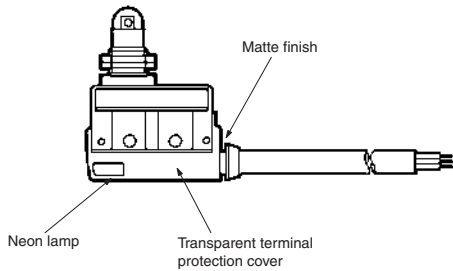
Leads	Nominal cross-sectional area	No. of conductors/cond. dia.	Finished outside diameter	Terminal connections	Standard length
VCTF (Vinyl cabtire cable)	0.75 mm ²	30/0.18 dia.	3-core 7 dia.	Black: COM White: NO Red: NC	3 m

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

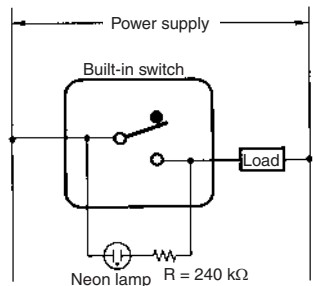
A neon lamp indicator is provided. The operating voltage is 90 to 250 VAC.



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.

Contact 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.

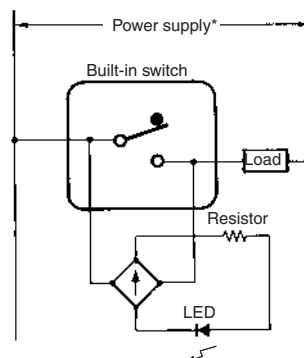
The Switch case has a protrusion to facilitate visual confirmation of LED indicator.

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



*An external power supply can be used, eg. OMRON S8VS.

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

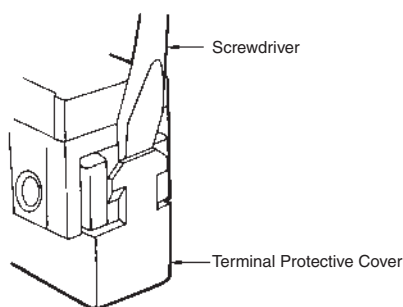
Correct Use

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.

Handling

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.



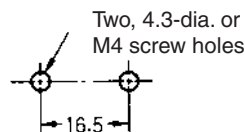
When mounting the Terminal Protective Cover to the case, align the cover on the case and then press the cover down to mount it firmly. If the cover is pressed down in an inclined position, rubber packing will deform and thus affect the sealing capability.

Mounting

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.

Tightening Torque

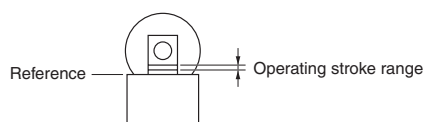
A loose screw may result in a malfunction. Be sure to tighten each screw to the proper tightening torque as shown below.

No.	Type	Torque
1	Terminal screw (M3 screw)	0.24 to 0.44 N·m
2	Panel mounting screw (M4 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.

Operating Stroke

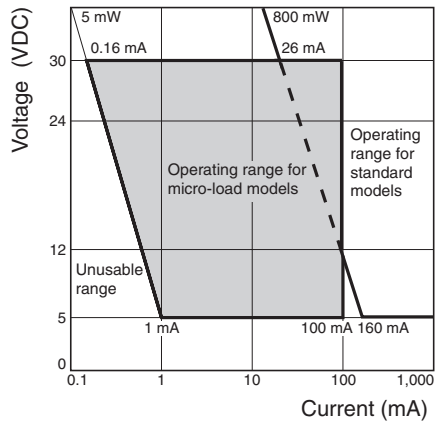
Ensure that the operating stroke for roller plunger models is within the set position display.



Micro Load Applicable Ranges

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.



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.

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.

Cat. No. C026-E1-09

In the interest of product improvement, specifications are subject to change without notice.

Two-circuit Limit Switch

WL

Wide Selection of Two-circuit Limit Switches

- A wide selection of models are available, including the overtravel models with greater OT, lamp-equipped models for checking operation, low-temperature and heat-resistant models, and microload models.
- Microload models are added to the product lineup.
- Meets EN/IEC standards (only Switches with ground terminals).
- Switches with ground terminals have the CE marking.



Model Number Structure

■ Model Number Legend

General-purpose Models/Environment-resistant Models

WL□□-□□□□□□□□
1 2 3 4 5 6 7 8 9 10

1. Electrical Rating

Blank: Standard
01: Micro

2. Actuator and Head Specifications

Symbol	Actuator type
CA2	Roller lever: Standard model (R38)
CA2-7	Roller lever: Standard, standard model (R50)
CA2-8	Roller lever: Standard, standard model (R63)
H2	Roller lever: Overtravel, general-purpose model, 80°
G2	Roller lever: Overtravel, high-sensitivity, 80°
CA2-2N	Roller lever: Overtravel, 90°
GCA2	Roller lever: High-precision
CA12	Adjustable roller lever: Standard
H12	Adjustable roller lever: Overtravel, general-purpose model, 80°
G12	Adjustable roller lever: Overtravel, high-sensitivity, 80°
CA12-2N	Adjustable roller lever: Overtravel, 90°
CL	Adjustable rod lever: Standard
HL	Adjustable rod lever: Overtravel, general-purpose model, 80°, 25 to 140 mm
HLAL4	Adjustable rod lever: Overtravel, general-purpose model, 80°, 350 to 380 mm
GL	Adjustable rod lever: Overtravel, high-sensitivity, 80°, 25 to 140 mm
CL-2N	Adjustable rod lever: Overtravel, 90°, 25 to 140 mm
HAL5	Rod spring lever: Protective, Overtravel, general-purpose model, 80°
CA32-41	Fork lever lock: Protective, WL-5A100
CA32-42	Fork lever lock: Protective, WL-5A102
CA32-43	Fork lever lock: Protective, WL-5A104
D	Plunger: Top plunger
D2	Plunger: Top-roller plunger
D28	Plunger: Sealed top-roller plunger
D3	Plunger: Top-ball plunger
SD	Plunger: Horizontal plunger

Switches without levers

WLRC A2
WLRC A2
WLRC A2
WLRH2
WLRG2
WLRC A2-2N
WLRGCA2
WLRC A2
WLRH2
WLRG2
WLRC A2-2N
WLRCL
WLRH2
WLRH2
WLRG2
WLRC A2-2N
WLRH2
WLRC A32
WLRC A32
WLRC A32

Symbol	Actuator type	Switches without levers
SD2	Plunger: Horizontal-roller plunger	---
SD3	Plunger: Horizontal-ball plunger	---
NJ	Flexible rod: Coil spring	---
NJ-30	Flexible rod: Coil spring, multi-wire	---
NJ-2	Flexible rod: Coil spring, resin rod	---
NJ-S2	Flexible rod: Steel wire	---

3. Environment-resistant Model Specifications

Blank:	Standard
RP:	Corrosion-proof (See note 1.)
P1:	Weather-resistant (See note 1.)

4. Built-in Switch Specifications

Blank:	General-purpose built-in switch
55:	Hermetically-sealed built-in switch (See note 1.)

5. Temperature Specifications

Blank:	Standard: -10°C to 80°C
TH:	Heat-resistive: 5°C to 120°C (See note 1.)
TC:	Low temperature: -40°C to 40°C (See note 1.)

6. Special Hermetic Model Specifications

Blank:	No cables or molding
139:	General-purpose built-in switch with cables attached and molded conduit opening and cover (cover cannot be removed). (See note 1.)
140:	Airtight built-in switch with cables attached and molded conduit opening, cover, and case cover (cover cannot be removed). (See note 1.)
141:	Airtight built-in switch with cables attached and molded conduit opening, cover, and case cover (cover cannot be removed). The Head opening is created to protect it from cutting powder. (See note 1.)
145:	Airtight built-in switch with cables attached and molded conduit opening, cover, and case cover (cover cannot be removed, Head can be mounted in any of 4 directions). The Head opening is created to protect it from cutting powder. (See note 1.)
RP40:	Airtight built-in switch with cables attached, SC Connector can be used, molded conduit opening, cover, and case cover (cover cannot be removed, Head direction can be changed). (See note 1.)
RP60:	Airtight built-in switch with cables attached, fluorine rubber-molded conduit opening, cover, and case cover (cover cannot be removed, Head direction cannot be changed). (See note 1.)

7. Conduit Size, Ground Terminal Specifications (See note 2.)

Blank:	G 1/2	Without ground terminal
G1:	G 1/2	With ground terminal
G:	Pg13.5	With ground terminal
Y:	M20	With ground terminal
TS:	1/2-14NPT	With ground terminal

8. Indicator Type

	Element	Voltage	Leakage Current
LE:	Neon lamp	125 VAC 250 VAC	Approx. 0.6 mA Approx. 1.9 mA
LD:	LED	10 to 115 VAC/VDC	Approx. 0.5 mA

9. Lamp Wiring

2:	NC connection: Light-ON when operating
3:	NO connection: Light-ON when not operating

10. Lever Type

Blank:	Standard lever
A:	Double nut lever

- Note:** 1. For information on applicable models, see page 60.
2. Switches with ground terminals meet EN/IEC standards (and have the CE marking).

Ground Terminal Models

WL -
1 2

- 1: Type of actuator
2: Conduit opening size
The models differ depending on the size of the case's conduit thread.

Model	Conduit opening size
G1	G 1/2
G	Pg 13.5
Y	M20
TS	1/2-14NPT

Sensor I/O Connector Models

WL - LD
 1 2 3 4

1. Electrical Rating

Blank: Standard
 01: Microload

2. Actuator Type

CA2: Roller lever: Standard
 GCA2: Roller lever: High-precision
 H2: Roller lever: Overtravel, general-purpose
 G2: Roller lever: Overtravel, high-sensitivity
 D2: Plunger: Top-roller plunger
 D28: Plunger: Sealed top-roller plunger

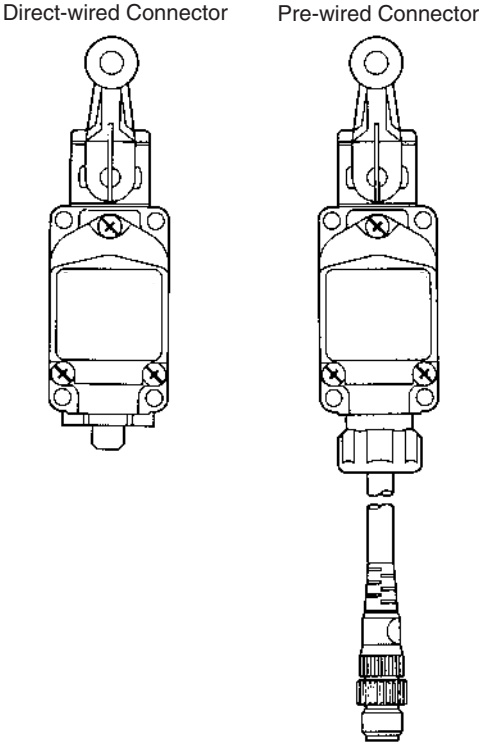
3. Built-in Switch Type

Blank: Standard
 55: Hermetically sealed

4. Wiring Specifications

K13A: Direct-wired Connector
 (2-core: AC, NO wiring, connector pins No. 3, 4)
 K13: Direct-wired Connector
 (2-core: DC, NO wiring, connector pins No. 3, 4)
 K43A: Direct-wired Connector (4-core: AC)
 K43: Direct-wired Connector (4-core: DC)
 -M1J: Pre-wired Connector (See note 2.)
 (2-core: DC, NO wiring, connector pins No. 3, 4)
 -M1GJ: Pre-wired Connector (See note 2.)
 (See note 1.) (2-core: DC, NO wiring, connector pins No. 1, 4)
 -M1JB: Pre-wired Connector (See note 2.)
 (See note 1.) (2-core: DC, NC wiring, connector pins No. 3, 2)
 -AGJ03: Pre-wired Connector (See note 2.) (4-core, AC)
 -DGJ03: Pre-wired Connector (See note 2.) (4-core, DC)
 (See note 1.)
 -DK1EJ03: Pre-wired Connector (See note 2.)
 (See note 1.) (3-core: DC, NO wiring, connector pins No. 2, 3, 4)

Note: 1. Models with pre-wired connectors and DC specifications have EN/IEC approval.
 2. With 0.3-m cable attached.



Spatter-prevention Models

WL - S
 1 2 3 4 5

1. Electrical Rating

Blank: Standard
 01: Microload

2. Actuator Type

CA2: Roller lever: Standard model
 GCA2: Roller lever: High-precision model
 H2: Roller lever: Overtravel, general-purpose model
 G2: Roller lever: Overtravel, high-sensitivity model
 D28: Plunger: Sealed top-roller plunger

3. Built-in Switch Type

Blank: Standard
 55: Hermetically sealed

4. Indicator Lamp

Blank: None
 LD: LED indicator lamp (AC/DC common)
 LE: Neon Lamp

5. Wiring Specifications

-M1J-1: Pre-wired Connector (See note.)
 (2-core: DC, NO wiring, connector pins No. 3, 4)
 -M1GJ-1: Pre-wired Connector (See note.)
 (2-core: DC, NO wiring, connector pins No. 1, 4)
 -DGJS03: Pre-wired Connector (See note.) (4 core, DC)

Note: With 0.3-m cable attached.

Ordering Information

Classification

Specifications			Standard	Overtravel	High-precision	Features	Page
Actuators	Roller lever		Yes	Yes	Yes	Five models: Roller lever, adjustable roller lever, adjustable rod lever, fork lever lock, rod spring lever.	77 to 94
	Plunger		Yes	---	---	Six models: Top plunger, top-roller plunger, top-ball plunger, horizontal plunger, horizontal-roller plunger, horizontal-ball plunger.	62 to 64
	Flexible rod		Yes	---	---	Two models: coil spring and steel wire.	69, 73 to 75
Load/contact	Standard load	SPST-NO/SPST-NC type	Yes			Standard models use a two-circuit double-break switch.	
	Microload	SPST-NO/SPST-NC type	Yes			Specifications include gold-plated contacts.	
Environment-resistant models (See note 3.)	Airtight-seal		WL□-55	Yes (Cannot be used with heat-resistive and low-temperature models.)		Uses an airtight-sealed built-in switch.	66, 76
	Hermetic seal	Molded terminals	WL□-139			Lead wires are attached. The case cover and conduit section are molded from epoxy resin to improve sealing performance.	
			WL□-140 WL□-141 WL□-145			Lead wires are attached. The case is filled with epoxy resin, to ensure high sealing performance. The Head opening is protected from cutting powder. (WL□-141 and -145 models) Only WLG2, WLCA2, and WLGCA2 can be fabricated. (WL□-141 models.)	
			Anti-coolant			WL□-RP40	
	WL□-RP60	Rubber parts are made from fluorine rubber. The Head cannot be removed.					
	Spatter-prevention		WL□-S			Yes	

Specifications			Standard	Overtravel	High-precision	Features	Page
Environment-resistant models (See note 3.)	Heat-resistive	WL□-TH	Yes (Cannot be used with airtight, hermetic, low-temperature, corrosion-proof, or lamp-equipped models.)			To improve heat resistance, silicone rubber is used for rubber parts and for the built-in switch. The operating temperature range is +5°C to 120°C.	66
	Low-temperature	WL□-TC	Yes (Cannot be used with airtight, hermetic, heat-resistive, corrosion-proof, or lamp-equipped models.)			To improve low temperature resistance, silicone rubber is used. The operating temperature range is -40°C to 40°C.	
	Corrosion-proof (See note 4.)	WL□-RP	Yes (Cannot be used with lamp-equipped models.)			Diecast parts such as the switch box are made of corrosion-proof aluminum. Rubber-sealing parts are made of fluorine rubber and exposed nuts and screws are made of stainless steel. These all aid in resisting oil, chemicals and adverse weather conditions.	
	Outdoor specifications	WL□-P1	---	Yes (See note 5.)	---	Rotary shafts are made of unquenched (i.e., untreated) stainless steel to improve corrosion resistance. Exposed nuts and screws are made of stainless steel and rubber sealing parts of silicone rubber. These factors all combine to create a product which is resistant to temperature changes and adverse weather conditions.	
Lamp-equipped		WL□-LE	Yes			Operating status can be checked at a glance. Lit when operating and not lit when not operating.	64, 72, 73, 75, 86
		WL□-LD	Yes			WL□-LE: 100 VAC/VDC min. WL□-LD: 115 VAC/VDC min. (Refer to page 71 for detailed ratings.)	
Relevant pages			Pages 77 to 94			---	---

Note: 1. Do not expose to extreme changes in temperature.

2. Standard Models: Operate on each side at an angle of 45°. Possible to set to one-side operation on either side. Pretravel (PT) is 15°.

- Overtravel Models: Standard and high-sensitivity models operate on each side at an angle of 80°. Not possible to set to one-side operation. -2N Series operate on each side at an angle of 90°. Possible to set to one-side operation on either side.

- High-precision Models: Operate on each side at an angle of 45°. Possible to set to one-side operation on either side. Pretravel (PT) is 5°.

3. When ordering, add the suffix for the environment-resistant model or indicator specifications required according to the operating environment and purpose.
4. The overtravel model (-2N Series), fork lever lock model (WLCA32-41 to 44), horizontal plunger (WLSD□) model, heat-resistive model, low-temperature model, and lamp-equipped model cannot be used with the corrosion-proof model.
5. Outdoor specifications are available for some standard models. Consult your OMRON representative for details.
6. Outdoor specifications are only available for general models and high-sensitivity models.

List of Models

General-purpose Models

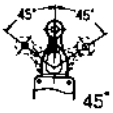
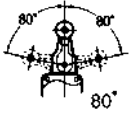
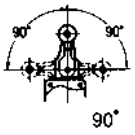
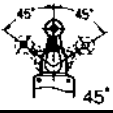
These Limit Switches are two-circuit double-break switches housed in rugged diecast, thus making it an oil-tight, waterproof and dustproof construction (complies with IP67).

In addition to the standard models, microload models are also available.

A wide range of actuators with a range of functions are available; rotating lever, plunger, flexible rod etc.

The rubber material in the standard models is designed to be resistant to water and most oils.

Roller Lever Models: Short, Medium, and Long Lever Models



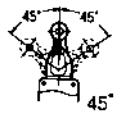

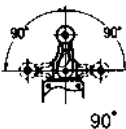
Type		Total travel (TT)	Features	Actuator (See note 2.)		
				WL-1A100 Roller Lever: Short lever (R38)	WL-1A200 Roller Lever: Medium lever (R50)	WL-1A300 Roller Lever: Long lever (R63)
Standard			One-side operation is possible. (See note 3.) Head can be mounted in any of the four directions.	WLCA2	WLCA2-7	WLCA2-8
Over-travel	General		One-side operation is impossible. (See note 3.) Head can be mounted in any of the four directions.	WLH2	---	---
	High-sensitivity		One-side operation is possible. (See note 3.) Head can be mounted in any of the four directions.	WLG2	---	---
	Side-installation		One-side operation is possible. (See note 3.) Head can be mounted in any of the two directions. (When the Head can be mounted horizontally, the Head can be mounted in any of the four directions.)	WLCA2-2N	---	---
High-precision			One-side operation is possible. (See note 3.) Head can be mounted in any of the four directions.	WLGCA2	---	---

Note: 1. For the approved standards file numbers, refer to page 69.

2. For external dimensions and other information, refer to pages 77 to 94.

3. One-side operation means that three operational directions can be selected electrically, according to the change in direction of the operating plunger. Those models for which one-side operation is impossible can only operate on both sides. For details, see page 94.

Adjustable Roller Levers and Adjustable Rod Levers



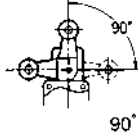
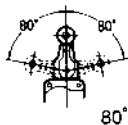
Type		Total Travel (TT)	Features	Actuator (See note 2.)	
				WL-2A100 Adjustable Roller Lever 	WL-4A100 Adjustable Rod Lever (Adjustable length: 25 to 140 mm) WL-3A100 (Adjustable length: 350 to 380 mm) 
Standard			One-side operation possible. (See note 3.) Head can be mounted in any of the four directions.	WLCA12	---
				---	WLCL (WL-4A100)
Overtravel	General		One-side operation possible. (See note 3.) Head can be mounted in any of the four directions.	WLH12	WLHL (WL-4A100) WLHAL4 (WL-3A100)
	High-sensitivity		One-side operation possible. (See note 3.) Head can be mounted in any of the four directions.	WLG12	WLGL (WL-4A100)
	Side-installation		One-side operation is possible. (See note 3.) Head can be mounted in any of the two directions. (When the Head can be mounted horizontally, the Head can be mounted in any of the four directions.)	WLCA12-2N	WLCL-2N (WL-4A100)

Note: 1. For the approved standards file numbers, refer to page 69.

2. For external dimensions and other information, refer to pages 77 to 94.

3. One-side operation means that three operational directions can be selected electrically, according to the change in direction of the operating plunger. The operating plunger is set for operation on both sides before delivery. Those models for which one-side operation is impossible can only operate on both sides. For details, see page 94. The operational plunger is factory-set to both sides.

Rod Spring Levers and Fork Lever Locks

Type		Total travel (TT)	Features	Actuator (See note 2.)	
				WL-3A200 Rod Spring Lever 	Fork Lever Locks: WL-5A100, WL-5A102, WL-5A104 
Protective			Head can be mounted in any of the four directions.	---	WLCA32-41 (WL-5A100)
					WLCA32-42 (WL-5A102)
					WLCA32-43 (WL-5A104)
Overtravel	General		One-side operation is possible. (See note 3.) Head can be mounted in any of the four directions.	WLHAL5	---







Note: 1. For the approved standard file numbers, refer to page 69.

2. For external dimensions and other information, refer to pages 77 to 94.

3. One-side operation means that three operational directions can be selected electrically, according to the change in direction of the operating plunger. The operating plunger is set for operation on both sides before delivery. Those models for which one-side operation is impossible can only operate on both sides. For details, see page 94. The operational plunger is factory-set to both sides.



4. The fork lever lock is configured so that the dog pushes the lever to reverse the output and this reversed state is maintained even after the dog continues on. If the dog then pushes the lever from the opposite direction, the lever will return to its original position.

Standard Plungers

Type	Actuators	Model
Top	Top Plunger 	WLD
	Top-roller Plunger 	WLD2 WLD28 (See note.)
	Top-ball Plunger 	WLD3
Horizontal	Horizontal Plunger 	WLS
	Horizontal-roller Plunger 	WLS2
	Horizontal-ball Plunger 	WLS3

Note: Sealed roller.

Standard Flexible Rods

Actuators		Model
Coil spring 	Spring dia. 6.5	WLNJ
	Spring dia. 4.8	WLNJ-30
	Resin rod dia. 8.0	WLNJ-2
Steel wire 	1.0-dia. wire	WLNJ-S2

Microload Models

A series of microload models has also been developed for the configurations outlined on pages 62 to 64. The model numbers become WL01□. For example, WLCA2 becomes WL01CA2.

Lamp-equipped Models

Operating characteristics	Rated voltage	Leakage current	Lamp-equipped Switch	Lamp-equipped cover only
Neon lamp	125 VAC	Approx. 0.6 mA	WL□-LE (See note 1.)	WL-LE
	250 VAC	Approx. 1.9 mA		
LED	10 to 115 VAC/VDC	Approx. 0.5 mA	WL□-LD (See note 1.)	WL-LD

Note: 1. In the model number, □ indicates the actuator number. For example, CA2, D, NJ, etc.

2. The default setting is "light-ON when not operating." Turn the lamp holder by 180° to change the setting to "light-ON when operating."

Ordering Information

When ordering general-purpose indicator-equipped models insert the specifications number at the end of the basic model number.

E.g.: When a neon lamp is installed in a General-purpose/Standard Roller Lever Switch (WLCA2).

<u>WLCA2</u>	<u>LE</u>
↑	↑
Standard	Lamp specifications

When ordering indicator-equipped molded terminal models, insert the specifications number at the end of the standard model number.

E.g.: When a Neon Lamp (WL-LE) is installed in a general-purpose molded terminal model (WLCA2-139).

<u>WLCA2-139</u>	<u>LE</u>	<u>2</u>	
↑	↑	↑	
Standard	Lamp specifications	Lamp wiring	2: NC connection: Light-ON when operating 3: NO connection: Light-ON when not operating

Note: The indicator cover cannot be replaced on the molded terminals. In all cases the indicator does not light when the load is ON.

Sensor I/O Connector Models

A reduction in the amount of wiring and parts makes maintenance easy and reduced wiring mistakes, in addition it's already compact size for fitting into areas of limited space.

Ordering Information

Item		Standard	Overtravel	High sensitivity
Actuators	Rotating lever	Yes	Yes	Yes
	Plunger	Yes	---	---
Load	Standard load (SPST-NO/SPST-NC)	Yes		
	Microload (SPST-NO/SPST-NC)	Yes		
High-precision models WL-□55		Yes		
Spatter-prevention models (See note 3.)		Yes		
Lamp		Yes		

- Note:** 1. Standard Models: For standard models only one-side operation at an angle of 45° is possible.
 Overtravel Models: Only one-side operation at an angle of 80° is possible. One-side operation only is not possible.
 High-precision Models: Only one-side operation at an angle of 45° is possible, and pretravel (PT) is 5°, as opposed to 15° for standard models.
2. For information other than that listed at the above, contact your OMRON representative.
3. The spatter-prevention models are only available as pre-wired connectors.

Direct-wired Connectors

Type	2-core (NO)	4-core
Lamp-equipped	WL□-LDK13	WL□-LDK43
Double-seal	WL□-55LDK13	WL□-55LDK43

- Note:** 1. In the model number, □ indicates the actuator number. For example, Overtravel Model WLG2-LDK13.
2. The lamp is set to "light-ON when not operating" (NO connection).

Pre-wired Connectors

Type	2-core (NO)	2-core (NC)	4-core	3-core (NO)
Lamp-equipped	WL□-LD-M1J	WL□-LD-M1JB	WL□-LD-DGJ03	WL□-LD-DK1EJ03
Double-seal	WL□-55LD-M1J	WL□-55LD-M1JB	WL□-55LD-DGJ03	WL□-55LD-DK1EJ03

- Note:** 1. In the model number, □ indicates the actuator number. For example, Overtravel Model WLG2-LD-M1J.
2. The lamp is set to "light-ON when not operating" (NO connection).

Environment-resistant Models

Airtight, Hermetic Seal, Low-temperature, Heat-resistive, Corrosion-proof, and Weather-resistant Models

Using the general-purpose model, six types of environment-resistant models can be created to meet a variety of difficult operating conditions. Select the model most appropriate to your operating environment.

Type		Usage	Environment-resistant construction			Appropriate models
WL□-55	Airtight seal	For use in locations subject to splashes of water and anti-coolant	Uses the W-10FB3-55 Airtight Built-in Switch. (See note 2.)			All models except the low-temperature and heat-resistive models. (See note 3.)
WL□-139	Hermetic seal (molded terminals and anti-coolant models)		General-purpose built-in switch	Connection lead wires: Standard 5-m VCT (vinyl cabtire cable) cable attached. Finished diameter: 11.5 mm, 4-core.	The case cover and conduit opening are molded from epoxy resin. The cover cannot be removed.	All models except the low-temperature and heat-resistive models. (See note 4.)
WL□-140			Hermetically-sealed built-in switch	Connection lead wires: Standard 5-m VCT cable, with high flexibility and good anti-oil properties attached. Finished diameter: 11.5 mm, 4-core.	The case cover, cover box and conduit opening are molded from epoxy resin. The cover cannot be removed (141, 145). The Head opening is protected from cutting powder. (WL□-141)	
WL□-141					The connector can be removed, so it is possible to use flexible wires in the cable.	
WL□-145					Rubber parts are made from fluorine rubber.	
WL□-RP40						
WL□-RP60						
WL□-TC	Low-temperature	Can be used at a temperature of −40°C (The operating temperature range is −40°C to 40°C), but cannot withstand icing.	Uses the general-purpose built-in switch. Silicone rubber is used for rubber parts such as the O-ring, gasket, etc.			All models except airtight, hermetic, heat-resistive, corrosion-proof, or lamp-equipped models.
WL□-TH	Heat-resistive	Can be used in temperatures of 120°C (The operating temperature range is 5°C to 120°C).	Uses a special built-in switch made from heat-resistant resin. Silicone rubber is used for rubber parts such as the O-ring, gasket etc.			All models except airtight, hermetic, low-temperature, corrosion-proof, lamp-equipped, nylon roller (WLCA2-26N), seal roller models, and resin rod (WLNJ-2) models.
WL□-RP	Corrosion-proof	For use in locations subject to corrosive gases and chemicals.	Diecast parts such as the switch box are made of corrosion-proof aluminum. Rubber sealing parts are made of fluorine rubber which aids in resisting oil, chemicals and adverse weather conditions. Exposed nuts and screws (except the actuator section) are made of stainless steel. Moving and rotary parts such as rollers are made of sintered stainless steel or stainless steel.			All models except overtravel model (-2N), fork lever lock models (WLCA32-41 to -43), low-temperature, heat-resistive, and lamp-equipped models.
WL□-P1	Outdoor specifications	For use in parking lots and other such outdoor locations.	Rubber parts are made from silicone rubber, which has a high-tolerance to deterioration over time, and changes in temperature. Rollers are made of stainless steel to improve corrosion resistance. Exposed nuts and screws are made of stainless steel.			Only the general-purpose overtravel models (WLH2/12), the overtravel high-sensitivity models (WLG2/12) and some standard models (e.g., WLCA2) can be used. Excluding heat-resistive models.

Note: 1. Consult your OMRON representative for the microload WL01□ models.

2. Use the SC Connector for the conduit opening.

3. The actuator can be created using the standard model.

4. The actuator can be created using the standard model. For WL-□141 and -145, only WLG2, WLCA2, WLGCA2, and WLH2 can be used.

Ordering Information

Use the following as a guide when ordering environment-resistant models.

E.g.: For a hermetic model of WLCA2

WLCA2 -

↑
Standard

55




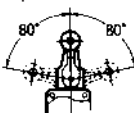
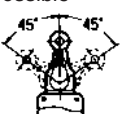


↑
Specifications No.

An additional catalog is available for outdoor specifications models.

Spatter-prevention Models






These models are most effective in an arc welding line or places where cutting powder is spattered.

Standard Models

Type		Total travel (TT)	Actuators	Neon lamp		LED	
				125 VAC	250 VAC	10 to 115 VAC/DC	
				Approx. 0.6 mA	Approx. 1.9 mA	Approx. 0.5 mA	
Standard		One-side operation is possible 	Double nut lever 	WLCA2-LEAS		WLCA2-LDAS	
			Allen-head lever 	WLCA2-LES		WLCA2-LDS	
Overtravel	General	One-side operation is impossible 	Double nut lever	WLH2-LEAS		WLH2-LDAS	
			Allen-head lever	WLH2-LES		WLH2-LDS	
	High-sensitivity		Double nut lever	WLG2-LEAS		WLG2-LDAS	
			Allen-head lever	WLG2-LES		WLG2-LDS	
High-precision		One-side operation is possible 	Double nut lever 	WLGA2-LEAS		WLGA2-LDAS	
			Allen-head lever 	WLGA2-LES		WLGA2-LDS	

Note: Consult your OMRON representative for the microload WL01□ models.

Levers/Lamp-equipped Covers








Type	Without lever 	Complete Head (lever with Head) 	Double nut lever 	Allen-head lever 	Lamp-equipped cover 
Model	Add an "R" to the product number to order. E.g.: WL□CA2-LES	WL-1H1100S (in case of WLCA2-□, WLGCA2-□)	WL-1A105S (forward and backward lever)	WL-1A103S (forward and backward lever)	WL-LES (Neon Lamp)
		WL-2H1100S (in case of WLH2-□, WLG2-□)			WL-LDS (LED)

Switches Without Lever

WLRCA2-LES, WLRCA2-LDS
WLRH2-LES, WLRH2-LDS, WLRG2-LES
WLRG2-LDS
WLRGCA2-LES, WLRGCA2-LDS

Limit
Switches

Head Models

Actuators	Set model	Head model	Head model without lever
Roller lever 	WLCA2	WL-1H1100	WLRCA2
	WLGCA2	WL-1H1100-1 (See note.)	WLRGCA2
	WLG2	WL-2H1100	WLRG2
	WLH2	WL-2H1100-1 (See note.)	WLRH2
	WLCA2-2N	WL-6H1100	WLRCA2-2N
Adjustable roller lever 	WLCA12	WL-1H2100	WLRCA2
	WLG12	WL-2H2100	WLRG2
	WLH12	WL-2H2100-1 (See note.)	WLRH2
	WLCA12-2N	WL-6H2100	WLRCA2-2N
Adjustable rod lever 	WLCL	WL-4H4100	WLRCL
	WLGL	WL-2H4100	WLRG2
	WLCL-2N	WL-6H4100	WLRCA2-2N
Top plunger 	WLD	WL-7H100	---
	WLD2	WL-7H200	
	WLD3	WL-7H300	
	WLD28	WL-7H400	
Horizontal plunger 	WLS D	WL-8H100	---
	WLS D2	WL-8H200	
	WLS D3	WL-8H300	
Fork lever lock 	WLCA32-41	WL-5H5100	WLRCA32
Coil spring 	WLNJ	WL-9H100	---
	WLNJ-30	WL-9H200	
	WLNJ-2	WL-9H300	
	WLNJ-S2	WL-9H400	

Note: For the model number of Heads without lever, simply remove the numbers after WL-□H. For example, WL-1H1100 becomes WL-1H. WLH2 and WLH12 however, become WL-2H-1, and WLGCA2 becomes WL-1H-1. Other Head models are available, but must be ordered separately.

Specifications

■ Approved Standards

Agency	Standard	File No.
UL	UL508	E76675
CSA	CSA C22.2 No. 14	LR45746
TÜV Rheinland	EN60947-5-1	R9551016

Note: Contact your OMRON representative for more information on approved models.

■ Approved Standard Ratings

General-purpose Models

UL/CSA

Standard Models: 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		

Microload Models:

0.1 A at 125 VAC, 0.1 A at 30 VDC

TÜV (EN60947-5-1)

(Only Ground Terminal Models are Approved)

Model	Category/rating	Thermal current	Indicator
WL□-□	AC-15 2 A/250 V DC12 2 A/48 V	10 A	---
WL01□	AC-14 0.1 A/125 V DC12 0.1 A/48 V	0.5 A	---
WL□-LE	AC-15 2 A/250 V	10 A	Neon lamp
WL01□-LE	AC-14 0.1 A/125 V	0.5 A	Neon lamp
WL□-LD	AC-15 2 A/115 V DC12 2 A/48 V	10 A	LED
WL01□-LD	AC-14 0.1 A/115 V DC12 0.1 A/48 V	0.5 A	LED

Note: As an example, AC-15 2 A/250 V means the following:

Application category	AC-15
Rated operating current (Ie)	2 A
Rated operating voltage (Ue)	250 V

Spatter-prevention Models

UL/CSA

LE (Neon Lamp) 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		

LD (LED)

Rated voltage	Carry current
115 VAC	10 A
115 VDC	0.8 A

■ Ratings

General-purpose Models/Environment-resistant Models

Standard Load Models

Type	Rated voltage	Non-inductive load				Inductive load			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
Standard, overtravel (except high-sensitivity models), and high-precision models.	125 VAC	10 A		3 A	1.5 A	10 A		5 A	2.5 A
	250 VAC	10 A		2 A	1 A	10 A		3 A	1.5 A
	500 VAC	10 A		1.5 A	0.8 A	3 A		1.5 A	0.8 A
	8 VDC	10 A		6 A	3 A	10 A		6 A	
	14 VDC	10 A		6 A	3 A	10 A		6 A	
	30 VDC	6 A		4 A	3 A	6 A		4 A	
	125 VDC	0.8 A		0.2 A	0.2 A	0.8 A		0.2 A	
	250 VDC	0.4 A		0.1 A	0.1 A	0.4 A		0.1 A	
Overtravel (high-sensitivity models)	125 VAC	5 A		---		---		---	
	250 VAC	5 A		---		---		---	
	125 VDC	0.4 A		---		---		---	
	250 VDC	0.2 A		---		---		---	

Note: 1. The above figures are for standard 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. For PC loads, use the microload models.

Inrush current	NC	30 A max. (15 A max. (See note.))
	NO	20 A max. (10 A max. (See note.))

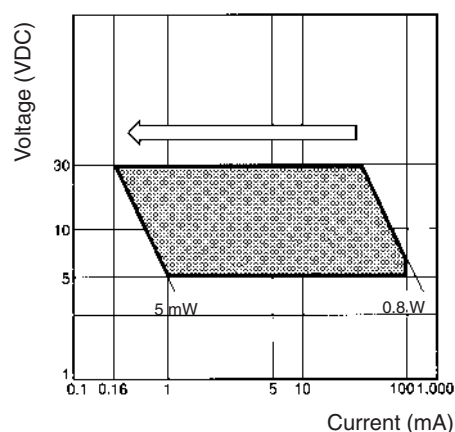
Note: Only for high-sensitivity overtravel models.

Microload Models

Rated voltage	Resistive load
125 VAC	0.1 A
30 VDC	

Operation within the three zones illustrated in the following diagram will produce optimum performance.

Recommended Load Range: 5 to 30 VDC, 0.5 to 100 mA



Lamp-equipped Models

Neon lamp (WL-LE)		LED (WL-LD)
125 VAC	250 VAC	10 to 115 VAC/DC
Approx. 0.6 mA	Approx. 1.9 mA	Approx. 0.5 mA
WLD28-LES		WLD28-LDS

Sensor I/O Connector Models

Type	Rated voltage	Non-inductive load				Inductive load			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
For DC	12 VDC	1 A	1 A	1 A	1 A	1 A	1 A	1 A	1 A
	24 VDC	1 A	1 A	1 A	1 A	1 A	1 A	1 A	1 A
	48 VDC	1 A	1 A	1 A	1 A	1 A	1 A	1 A	1 A
	115 VDC	0.8 A	0.8 A	0.2 A	0.2 A	0.8 A	0.8 A	0.2 A	0.2 A
For AC	115 VAC	1 A	1 A	1 A	1 A	1 A	1 A	1 A	1 A

- Note:**
1. The above figures are for standard 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.

Spatter-prevention Models

Model	Rated current	Non-inductive load				Inductive load			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
WL□-LES	125 VAC	10 A		3 A	1.5 A	10 A		5 A	2.5 A
	250 VAC	10 A		2 A	1 A	10 A		3 A	1.5 A
	125 VDC	0.8 A		0.2 A	0.2 A	0.8 A		0.2 A	0.2 A
	250 VDC	0.4 A		0.1 A	0.1 A	0.4 A		0.1 A	0.1 A
WL□-LDS	115 VAC	10 A		3 A	1.5 A	10 A		5 A	2.5 A
	12 VDC	10 A		6 A	3 A	10 A		6 A	
	24 VDC	6 A		4 A	3 A	6 A		4 A	
	48 VDC	3 A		2 A	1.5 A	3 A		2 A	

- Note:**
1. The above figures are for standard 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.

Inrush current	NC	30 A max.
	NO	20 A max.
Operating temperature		-10°C to 80°C (with no icing)
Operating humidity		95% max.

■ Characteristics

General-purpose Models/Environment-resistant Models

Degree of protection	IP67
Durability (See note 3.)	Mechanical: 15,000,000 operations min. (See note 4.) Electrical: 750,000 operations min. (See note 5.)
Operating speed	1 mm to 1 m/s (for WLCA2)
Operating frequency	Mechanical: 120 operations/minute min. Electrical: 30 operations/minute min.
Rated frequency	50/60 Hz
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	25 mΩ max. (initial value)
Dielectric strength	1,000 VAC (600 VAC), 50/60 Hz for 1 min between non-continuous terminals. 2,200 VAC, 50/60 Hz for 1 min/Uimp 2.5 kV non-current-carrying metal part and ground. 2,200 VAC, 50/60 Hz for 1 min Uimp 2.5 kV between each terminal and non-current-carrying metal part.
Rated insulation voltage (U _i)	250 V (EN60947-5-1)
Switching overvoltage	1,000 V max. (EN60947-5-1)
Pollution degree (operating environment)	3 (EN60947-5-1)
Short-circuit protective device (SCPD)	10 A, fuse type gG or gI (IEC269)
Conditional short-circuit current	100 A (EN60947-5-1)
Conventional enclosed thermal current (I _{the})	10 A, 0.5 A (EN60947-5-1)
Protection against electric shock	Class I
Vibration resistance	10 to 55 Hz, 1.5-mm double amplitude (See note 6.)
Shock resistance	Destruction: 1,000 m/s ² min. Malfunction: 300 m/s ² min. (See note 6.)
Ambient temperature	Operating: -10°C to 80°C (with no icing) (See note 7.)
Ambient humidity	Operating: 95% max.
Weight	Approx. 275 g (in the case of WLCA2)

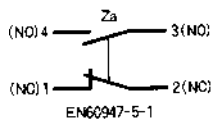
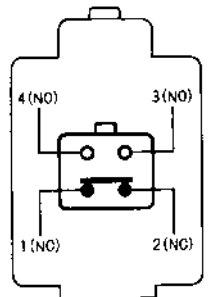
Note: 1. The above figures are initial values.

- The figures in parentheses for dielectric strength, are those for the overtravel (high-sensitivity) model.
- The 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.
- 10,000,000 operations min. for general-purpose, high-sensitivity, and flexible rod overtravel models.
- 500,000 operations min. for high-precision and outdoor specifications models. All microload models however, are 1,000,000 operations min.
- Except the flexible rod models. The shock resistance (malfunction) for microload models is 200 m/s² min.
- For low temperature models this is -40°C to 40°C (no icing). For heat-resistive models the range is +5°C to 120°C.

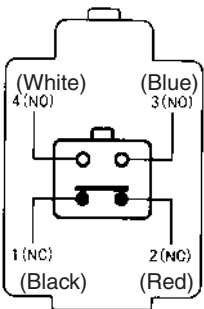
■ Contact Form

General-purpose Models

Standard (WL□)/Microload (WL01□) Models

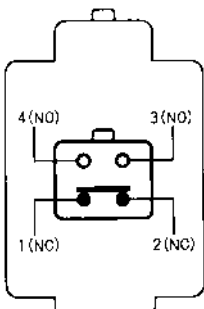


Environment-resistant Models


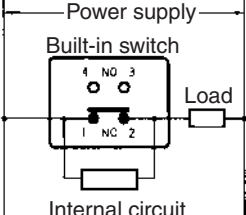

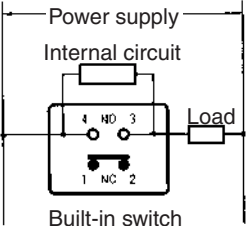


Spatter-prevention Models

Standard Model

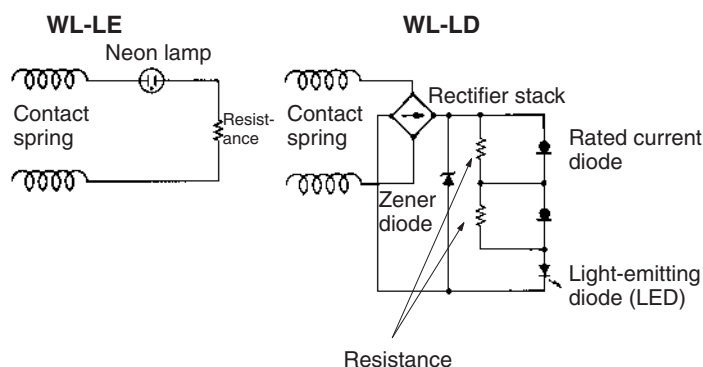


Lamp-equipped Models

Light-ON when operating (See note 1.)	WL-LE WL-LD 	
Light-ON when not operating (See note 2.)	WL-LE WL-LD 	

- Note:** 1. Light-ON when operating means that the lamp lights when the Limit Switch contacts (NC) release, or when the actuator rotates or is pushed down.
2. Light-ON when not operating means the lamp remains lit when the actuator is free, or when the Limit Switch contacts (NO) close when the actuator rotates or is pushed down.

Internal circuit of Lamp-equipped Models



■ Wiring Specifications of Sensor I/O Connector Models

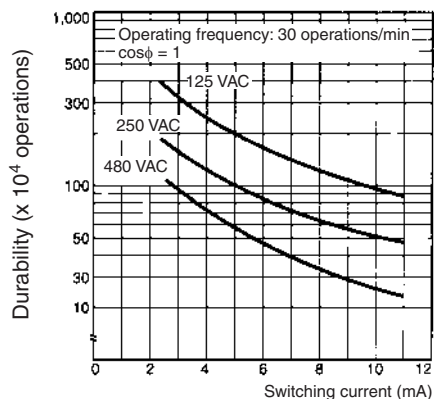
Direct-wired Connector				Pre-wired Connector									
2-core		4-core											
K13 (DC) K13A (AC)		K43 (DC) K43A (AC)		M1J (DC)		M1GJ (DC)		M1JB (DC)		DGJ03 (DC) AGJ03 (AC)		DK1EJ03 (DC)	
Built-in switch	Connector	Built-in switch	Connector	Built-in switch	Connector	Built-in switch	Connector	Built-in switch	Connector	Built-in switch	Connector	Built-in switch	Connector
1 (NC)	---	1 (NC)	1	1 (NC)	---	1 (NC)	---	1 (NC)	3	1 (NC)	1	1 (NC)	---
2 (NC)	---	2 (NC)	2	2 (NC)	---	2 (NC)	---	2 (NC)	2	2 (NC)	2	2 (NC)	2
3 (NO)	3	3 (NO)	3	3 (NO)	3	3 (NO)	1	3 (NO)	---	3 (NO)	3	3 (NO)	3
4 (NO)	4	4 (NO)	4	4 (NO)	4	4 (NO)	4	4 (NO)	---	4 (NO)	4	4 (NO)	4

Engineering Data

General-purpose Models/Spatter-prevention Models/Environment-resistant Models

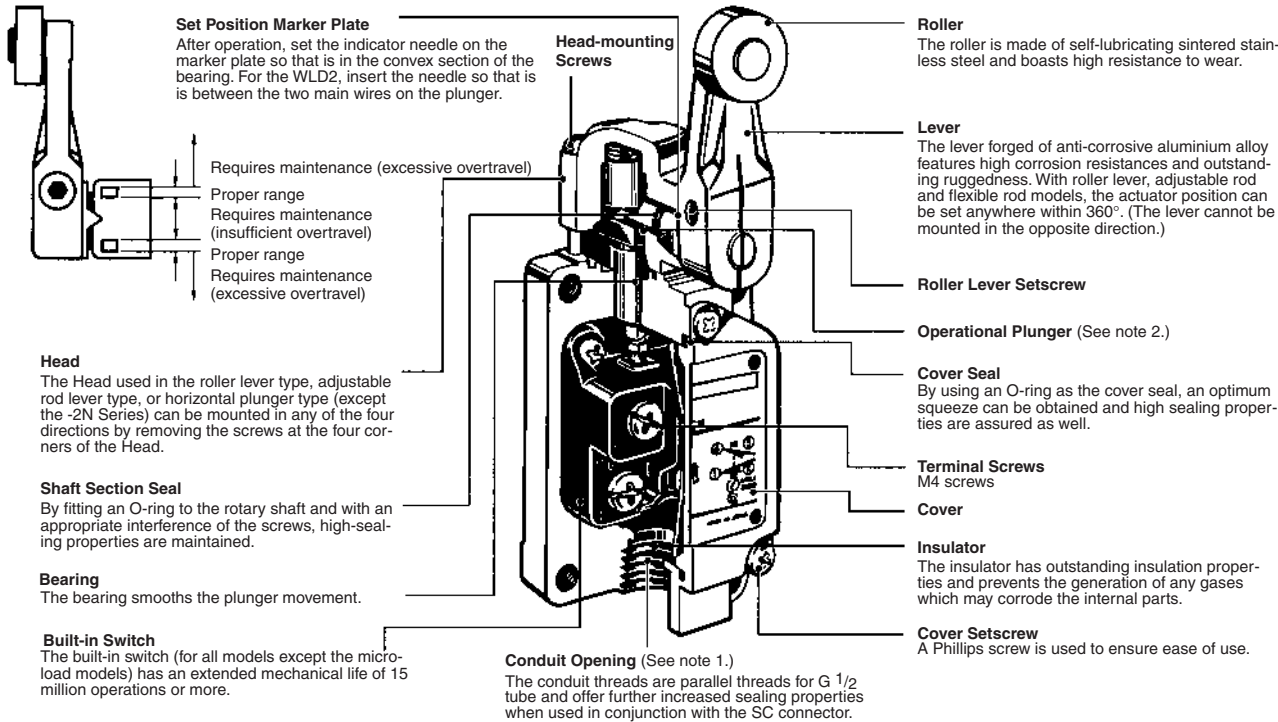
Electrical Durability

Operating temperature: 5°C to 30°C
Operating humidity: 40% to 70%.



Nomenclature

General-purpose Models

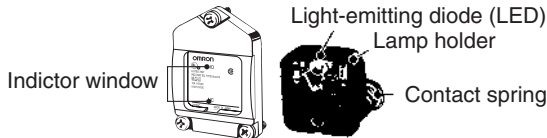


- Note:** 1. The display for conduit threads has changed from PF1/2 to G1/2 according to revisions of JIS B 0202. This is only a change in the display, so the thread size and pitch have not changed. (Conduit threads Pg 13.5 and 1/2-14NPT are also available.)
2. By changing the orientation of the operational plunger, three operational directions can be selected electrically. (This is only possible with general-purpose roller lever, adjustable roller lever, and adjustable rod lever models. For the overtravel models, only -2N Series models have this function.)

Lamp-equipped Models

The operating status of the Switch can be checked using a neon lamp or LED indicator.

Circuit checks and troubleshooting errors are easy done.



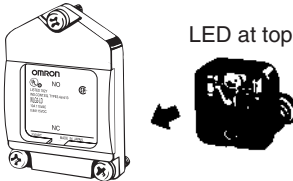
The built-in switch's terminal screws are used to connect the lamp terminal (indicator cover). Since the connection spring (coil spring) is used for this connection, it will not be necessary to connect to the lamp terminal. When a ground terminal is provided however, lead wire method must be used.

WL-LD has a built-in rectifier stack, so it will not be necessary to change the polarity.

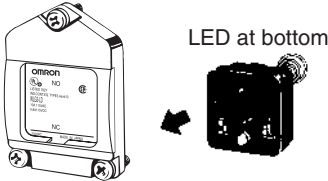
The indicator cover is molded from diecast aluminum and has outstanding sealing properties. Furthermore, regardless of whether the power is connected or not, the operating status is shown (operating or not operating), and indicators can be switched from light-ON when operating and light-ON when not operating, by simply rotating the lamp holder by 180°. (Molded terminals do not have this switching capacity.)

The lamp-equipped models are ideal in locations using a conveyor belt where items need to be checked, or locations that are difficult to inspect for faults.

Light-ON when Operating

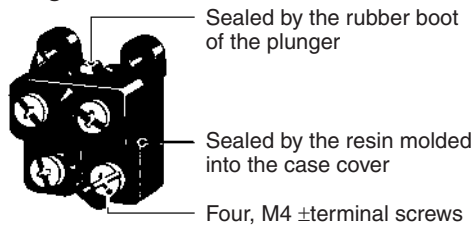


Light-ON when Not Operating



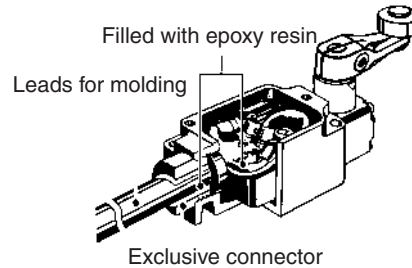
■ Environment-resistant Models

Airtight Built-in Switch



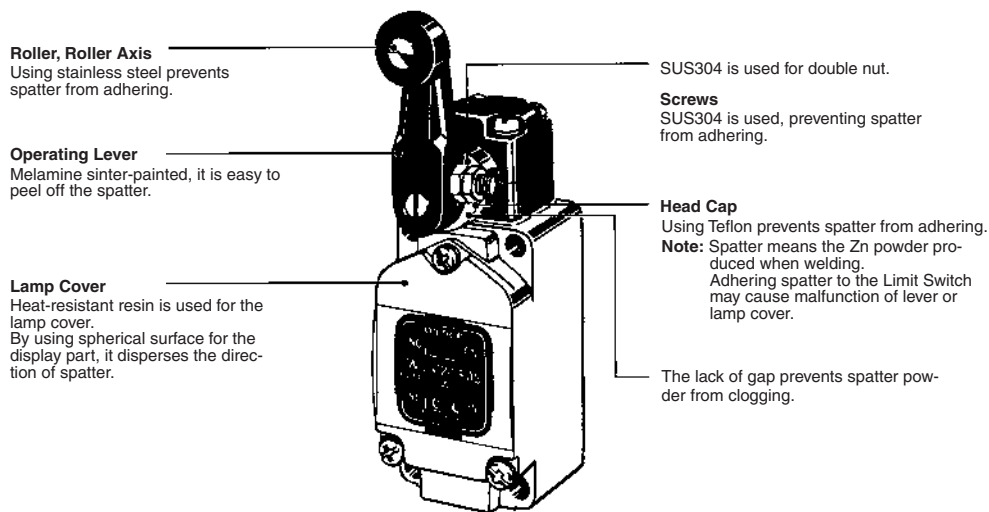
Hermetic Seal Model

The lead wires are sealed to the Limit Switch with resin, providing a hermetically sealed construction.



■ Spatter-prevention Models

Double Nut Lever



Dimensions

General-purpose Models

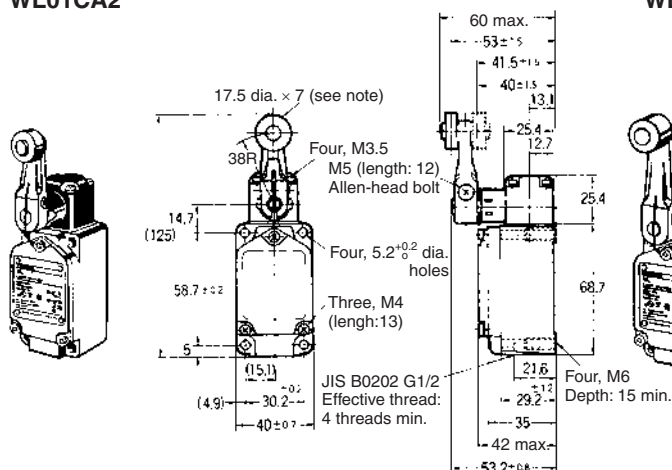
Standard Models

Note: 1. Rotating Lever Models: For all models WL□ indicates a standard model and WL01□ indicates a microload model.

2. Unless otherwise indicated, a tolerance of ± 0.4 mm applies to all dimensions.

Roller Lever

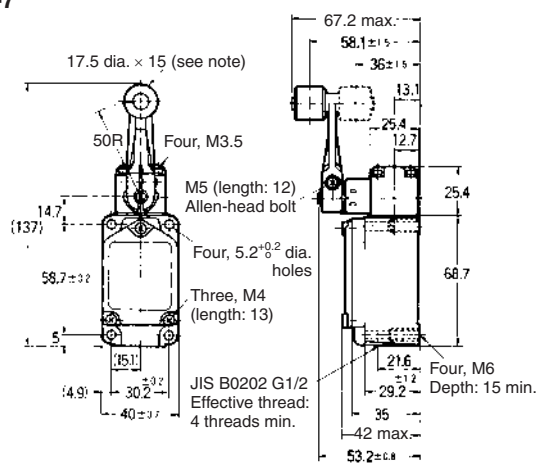
WLCA2
WL01CA2



Note: Stainless sintered roller

Roller Lever

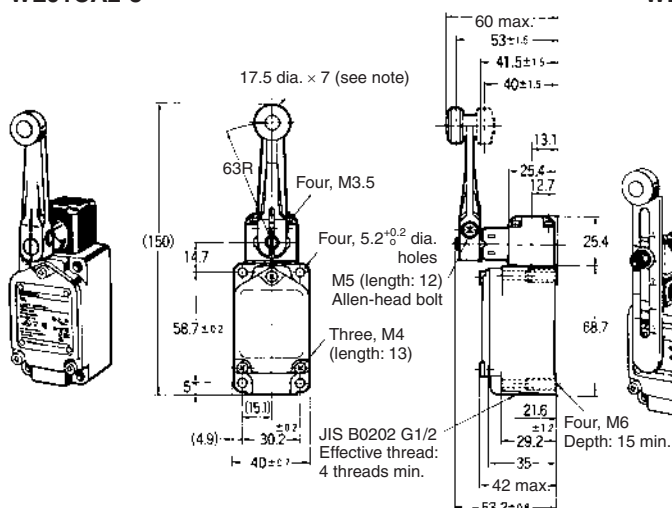
WLCA2-7
WL01CA2-7



Note: Stainless steel roller

Roller Lever

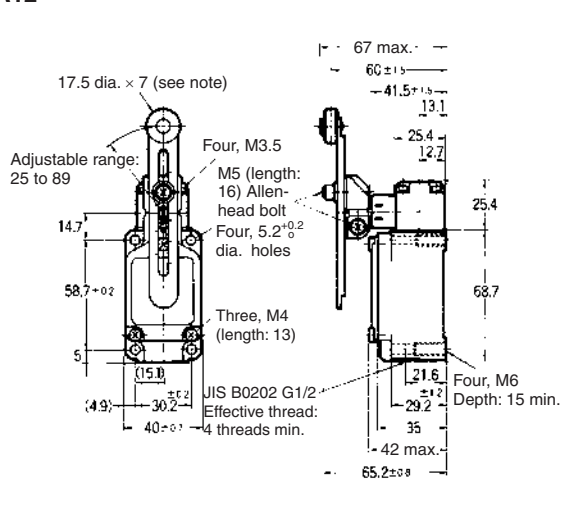
WLCA2-8
WL01CA2-8



Note: Stainless sintered roller

Adjustable Roller Lever

WLCA12
WL01CA12



Note: Stainless sintered roller

Operating characteristics	WLCA2 WL01CA2	WLCA2-7 WL01CA2-7	WLCA2-8 WL01CA2-8	WLCA12 WL01CA12 (See note.)
Operating force: OF max.	13.34 N	10.2 N	8.04 N	13.34 N
Release force: RF min.	2.23 N	1.67 N	1.34 N	2.23 N
Pretravel: PT	15±5°	15±5°	15±5°	15±5°
Overtravel: OT min.	30°	30°	30°	30°
Movement differential: MD max.	12°	12°	12°	12°

Note: The operating characteristics for WLCA12 and WL01CA12 are measured at the lever length of 38 mm.

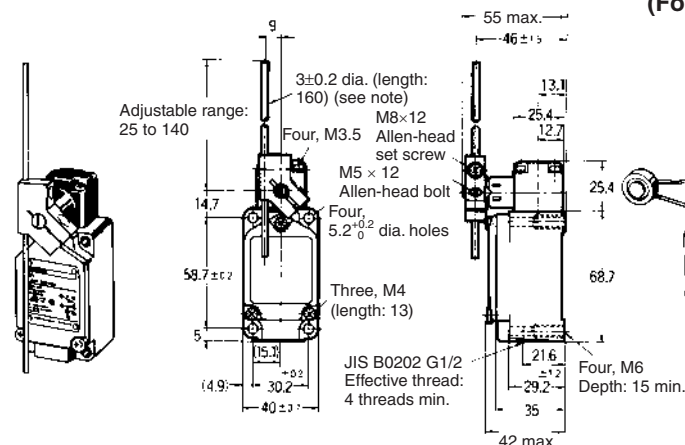
OF and RF for WLCA12, with a lever length of 89 mm.

Operating characteristics	WLCA12, WL01CA12
OF	5.68 N
RF	0.95 N

Rotating Lever Models: For all models WL indicates a standard model and WL01□ indicates a microload model.

Adjustable Rod Lever

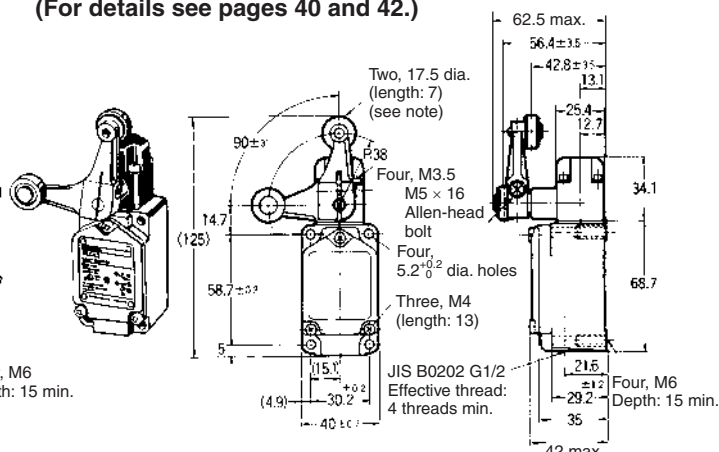
WLCL
WL01CL



Note: Stainless steel rod

Fork Lever Lock

WLCA32-41 to 44
WL01CA32-41 to 44
(For details see pages 40 and 42.)



Note: Plastic roller. This illustration shows the external dimensions of the WLCA32-41. (Models WLCA32-041 to -044 and WL01CA32-041 to -044 have stainless steel rollers.)

WLCA32-41 WLCA32-42 WLCA32-43 WLCA32-44



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

Operating characteristics	WLCL, WL01CL
Operating force: OF max.	1.39 N
Release force: RF min.	0.27 N
Pretravel: PT	$15 \pm 5^\circ$
Overtravel: OT min.	30°
Movement differential: MD max.	12°

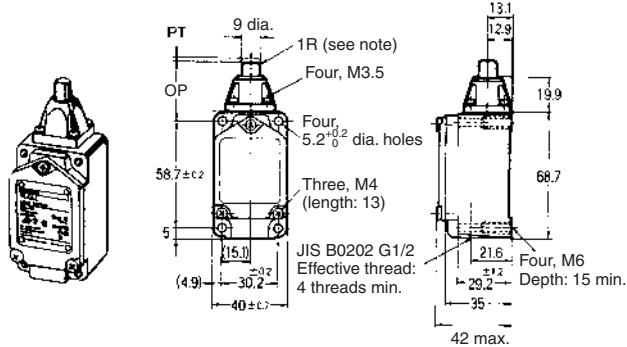
Note: The operating characteristics for WLCA12 and WL01CA12 are measured at the lever length of 140 mm.

Operating characteristics	WLCA32-41 to 44, WL01CA32-41 to 44
Force necessary to reverse the direction of the lever: Max.	11.77 N
Movement until the lever reverses	$50 \pm 5^\circ$
Movement until switch operation: Max.	55°
Movement after switch operation: Min.	35°

Note: 1. Plunger Models: For all models WL□ indicates a standard model and WL01□ indicates a microload model.
2. Unless otherwise indicated, a tolerance of ± 0.4 mm applies to all dimensions.

Top Plunger

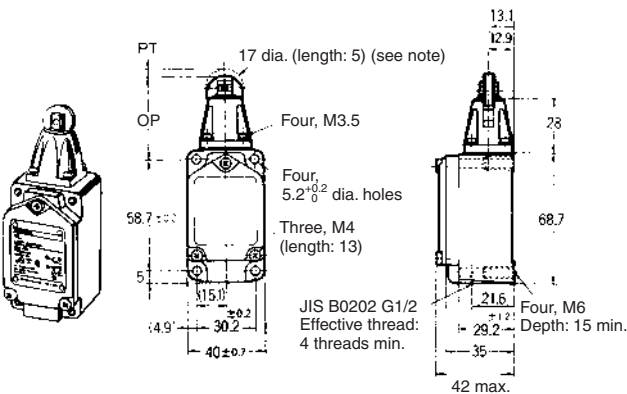
WLD
WL01D



Note: Stainless steel plunger

Top-roller Plunger

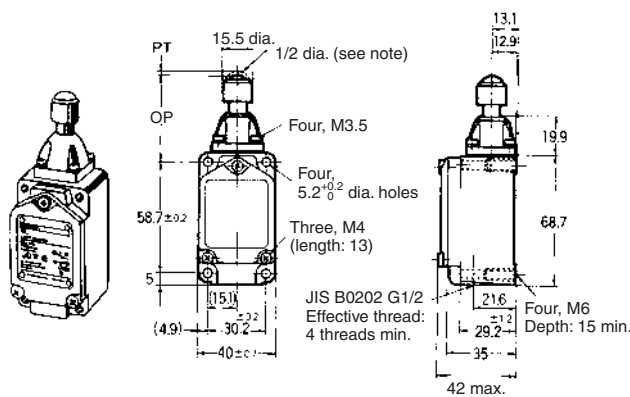
WLD2
WL01D2



Note: Stainless sintered roller

Top-ball Plunger

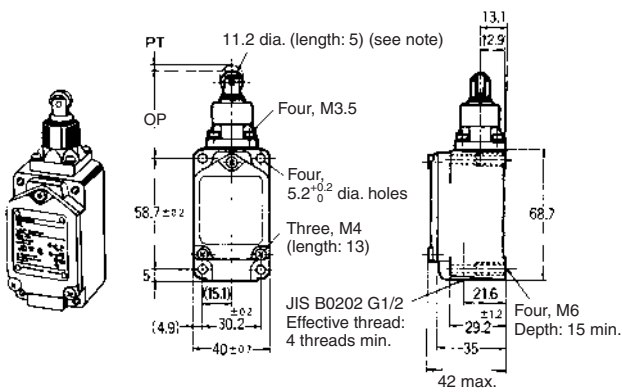
WLD3
WL01D3



Note: Stainless steel ball

Sealed Top-roller Plunger

WLD28
WL01D28

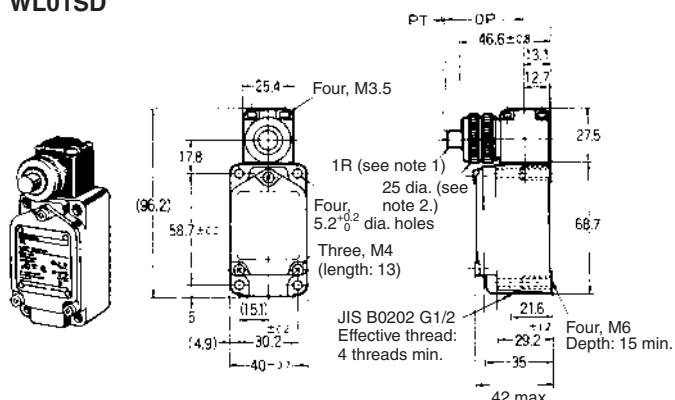


Note: Stainless steel roller

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

Horizontal Plunger

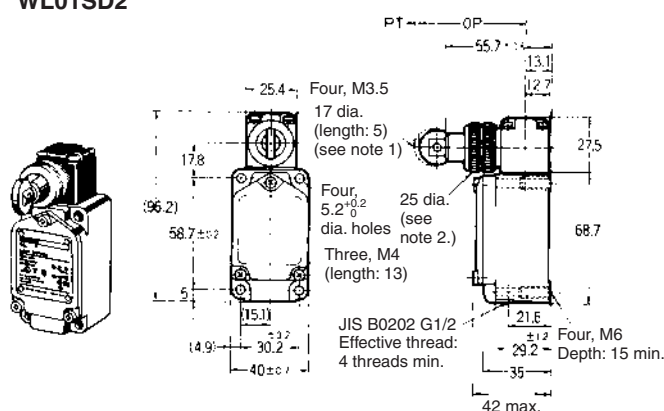
WLSD
WL01SD



Note: 1. Stainless steel plunger
2. Cosmetic nuts.

Horizontal-roller Plunger

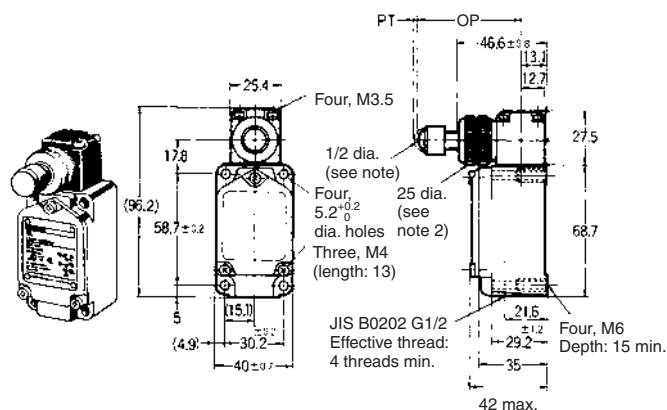
WLSD2
WL01SD2



Note: 1. Stainless sintered roller
2. Cosmetic nuts
3. The WLSD21 model, which has the roller rotated by 90° is also available.

Horizontal-ball Plunger

WLSD3
WL01SD3



Note: 1. Stainless steel ball
2. Cosmetic nuts

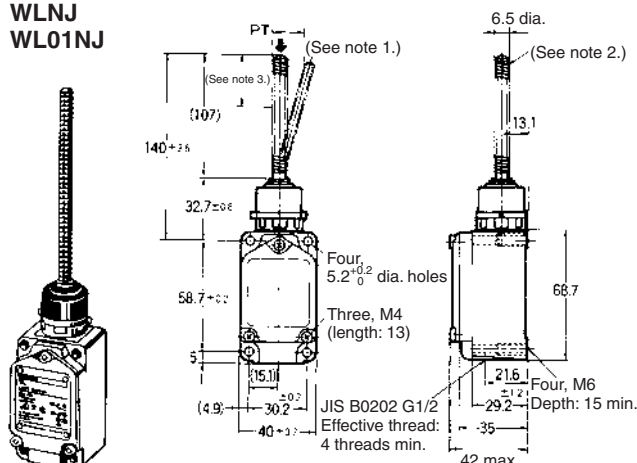
Operating characteristics	WLD WL01D	WLD2 WL01D2	WLD3 WL01D3	WLD28 WL01D28	WLSD WL01SD	WLSD2 WL01SD2	WLSD3 WL01SD3
Operating force: OF max.	26.67 N	26.67 N	26.67 N	16.67 N	40.03 N	40.03 N	40.03 N
Release force: RF min.	8.92 N	8.92 N	8.92 N	4.41 N	8.89 N	8.89 N	8.89 N
Pretravel: PT max.	1.7 mm	1.7 mm	1.7 mm	1.7 mm	2.8 mm	2.8 mm	2.8 mm
Overtravel: OT min.	6.4 mm	5.6 mm	4 mm	5.6 mm	6.4 mm	5.6 mm	4 mm
Movement differential: MD max.	1 mm	1 mm	1 mm	1 mm	1 mm	1 mm	1 mm
Operating position: OP	34 ± 0.8 mm	44 ± 0.8 mm	44.5 ± 0.8 mm	44 ± 0.8 mm	40.6 ± 0.8 mm	54.2 ± 0.8 mm	54.1 ± 0.8 mm
Total travel position: TTP max.	29.5 mm	39.5 mm	41 mm	39.5 mm	---	---	---

Note: 1. Flexible Rod Models: For all models WL□ indicates a standard model and WL01□ indicates a microload model.

2. Unless otherwise indicated, a tolerance of ± 0.4 mm applies to all dimensions.

Coil Spring

WLNJ
WL01NJ



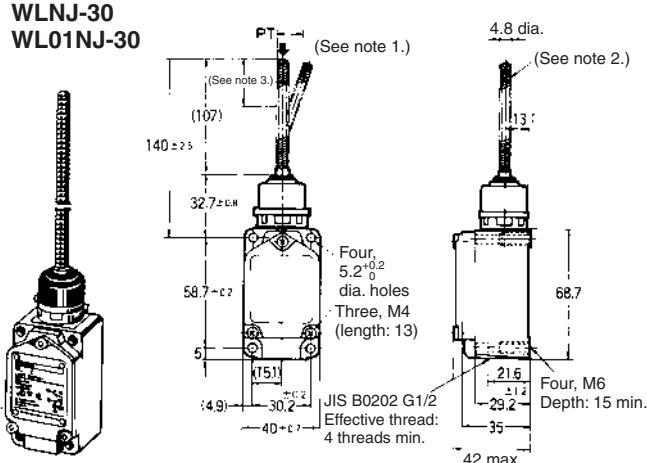
Note: 1. The coil spring may be operated from any direction except the axial direction (\downarrow).

2. Stainless steel coil spring

3. Optimum operating range of the coil spring is within 1/3 of the entire length from the top end.

Coil Spring (Multi-wire)

WLNJ-30
WL01NJ-30



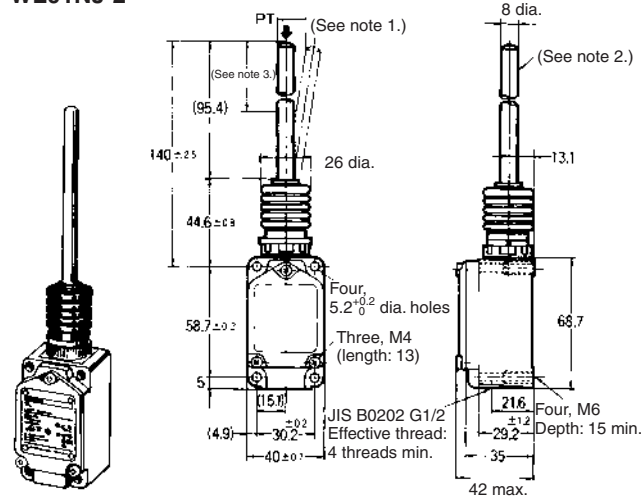
Note: 1. The coil spring may be operated from any direction except the axial direction (\downarrow).

2. Piano wire coil

3. Optimum operating range of the coil spring is within 1/3 of the entire length from the top end.

Coil Spring (Resin Rod)

WLNJ-2
WL01NJ-2



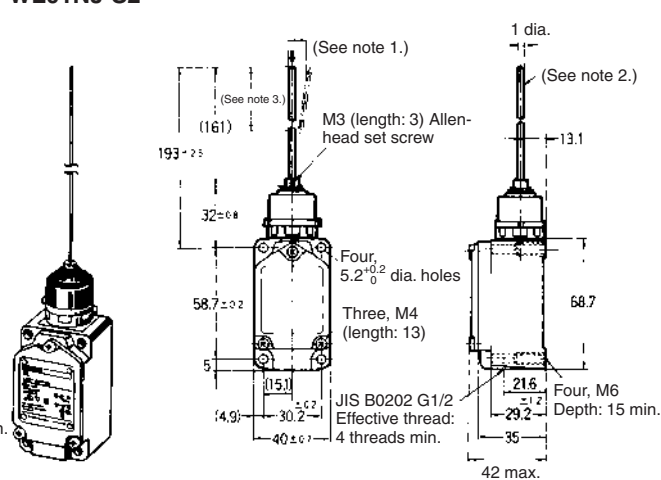
Note: 1. The coil spring may be operated from any direction except the axial direction (↓).

2. Polyamide resin rod

3. Optimum operating range of the rod is within 1/3 of the entire length from the top end.

Steel Wire

WLNJ-S2
WL01NJ-S2



Note: 1. The coil spring may be operated from any direction except the axial direction (\downarrow).

2. Stainless steel wire

3. Optimum operating range of the wire is within 1/3 of the entire length from the top end.

Operating characteristics	WLNJ WL01NJ (See note.)	WLNJ30 WL01NJ30 (See note.)	WLNJ-2 WL01NJ-2 (See note.)	WLNJ-S2 WL01NJ-S2 (See note.)
Operating force: OF max.	1.47 N	1.47 N	1.47 N	0.28 N
Pretravel: PT	20±10 mm	20±10 mm	40±20 mm	40±20 mm

Note: These values are taken from the top end of the wire or spring.

Overtravel Models

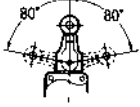
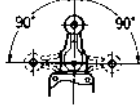
Overtravel models are Limit Switches which are provided with a greater OT to facilitate dog setting.

The overtravel models are classified into three types; general-purpose, high-sensitivity, and models which are capable of one-side 90° operation, the -2N Series.

The -2N Series can also be installed on either side.

Since this model is identical to the standard model in dimensions, both models are interchangeable.

Like the standard model, it is oil-tight, waterproof, and dustproof (complies with IP67).

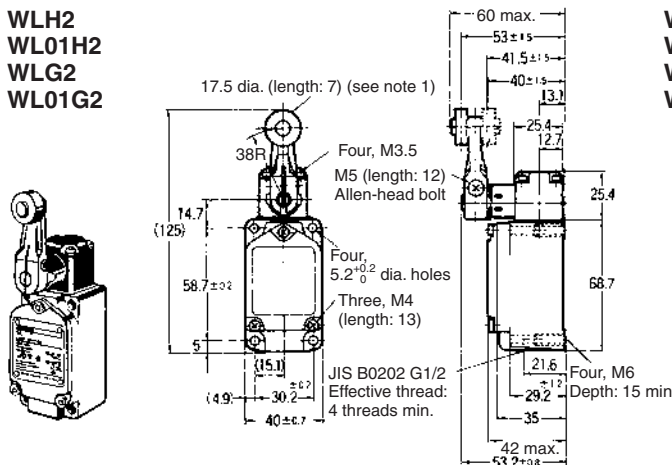
General-purpose, high sensitivity models	Side-installation models
	
Head can be mounted in any of the four directions. The lever operates on either side at 80°. One-side operation is impossible.	The Head can be mounted in two directions, forward and backward. The lever operates on either side at 90°. One side operation is possible.

General-purpose/High Sensitivity Models

- Note:** 1. For all models WL□ indicates a standard model and WL01□ indicates a microload model.
2. One-side operation is not possible with the general-purpose and high-sensitivity models.
3. Unless otherwise indicated, a tolerance of ± 0.4 mm applies to all dimensions.

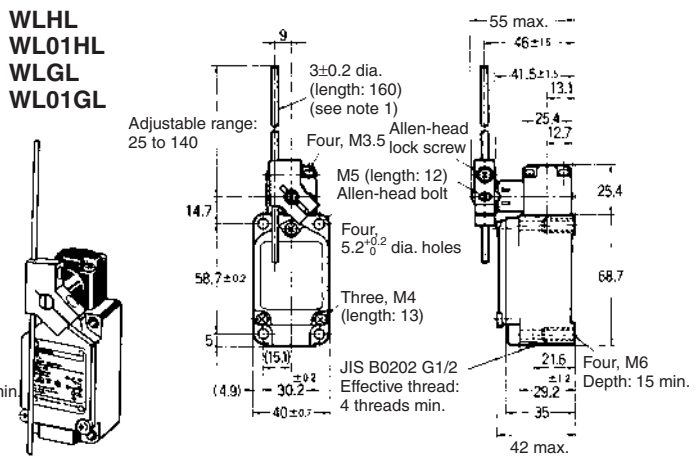
Roller Lever

WLH2
WL01H2
WLG2
WL01G2



Adjustable Rod Lever

WLHL
WL01HL
WLGL
WL01GL

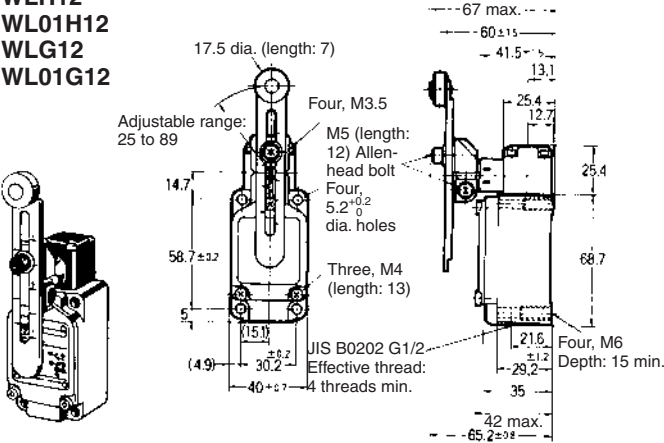


- Note:** 1. Stainless sintered roller
2. WL□G2 is identical to other models except in the shape of the set position marker plate.
3. The built-in switch for WLH2 is W-10FB3.
4. The built-in switch for WLG2 is W-10FB3-8.

- Note:** 1. WL□GL is identical to other models except in the shape of the set position marker plate.
2. The built-in switch for WLHL is W-10FB3.
3. The built-in switch for WLGL is W-10FB3-8.

Adjustable Roller Lever

WLH12
WL01H12
WLG12
WL01G12



- Note:**
1. Stainless sintered roller
 2. WL□G12 is identical to other models except in the shape of the set position marker plate.
 3. The built-in switch for WLH12 is W-10FB3.
 4. The built-in switch for WLG12 is W-10FB3-8.

Operating characteristics	WLH2 WL01H2	WLG2 WL01G2	WLHL WL01HL (See note 2.)	WLGL WL01GL (See note 2.)	WLH12 WL01H12 (See note 1.)	WLG12 WL01G12 (See note 1.)
Operating force: OF max.	9.81 N	9.81 N	2.84 N	2.84 N	9.81 N	9.81 N
Release force: RF min.	0.98 N	0.98 N	0.25 N	0.25 N	0.98 N	0.98 N
Pretravel: PT	15±5°	10 ⁺² ₋₁	15±5°	10 ⁺² ₋₁	15±5°	10 ⁺² ₋₁
Overtravel: OT min.	55°	65°	55°	65°	55°	65°
Movement differential: MD max.	12°	7°	12°	7°	12°	7°

- Note:**
1. The operating characteristics of WLH12, WL01HL12, WLG12, and WL01G12 are measured at the lever length of 38 mm.
 2. The operating characteristics of WLHL, WL01HL, WLGL, and WL01GL are measured at the rod length of 140 mm.

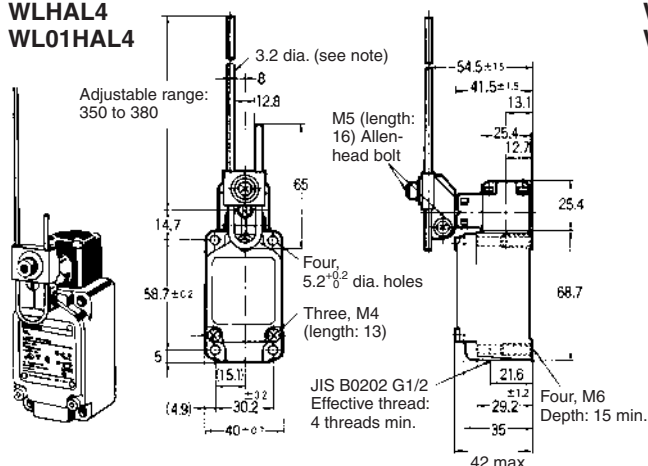
OF and RF for WLH12 and WL01H12, with a lever length of 89 mm.

Operating characteristics	WLH12, WL01H12	WLG12, WL01G12
OF	4.18 N	4.18 N
RF	0.42 N	0.42 N

Note: 1. For all models WL□ indicates a standard model and WL01□ indicates a microload model.
2. Unless otherwise indicated, a tolerance of ± 0.4 mm applies to all dimensions.

Adjustable Rod Lever

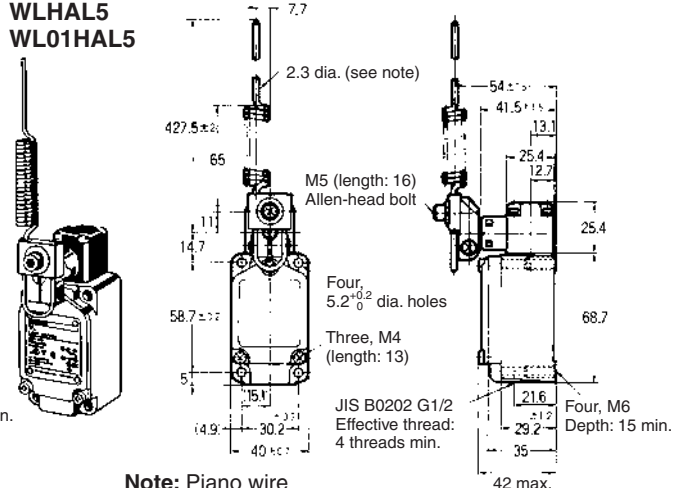
WLHAL4
WL01HAL4



Note: Stainless steel rod

Rod Spring Lever

WLHAL5
WL01HAL5



Note: Piano wire

Operating characteristics	WLHAL4 WL01HAL4 (See note 2.)	WLHAL5 WL01HAL5
Operating force: OF max.	0.98 N	0.90 N
Release force: RF min.	0.15 N	0.09 N
Pretravel: PT	15±5°	15±5°
Overtravel: OT min.	55°	55°
Movement differential: MD max.	12°	12°

Note: 1. With WLHAL4, WL01HAL4, WLHAL5, and WL01HAL5, the actuator's tare is large, so depending on the installation direction, they may not be properly reset. Always install so that the actuator is facing downwards.

2. The operating characteristics of WLHAL4, and WL01HAL4 are measured at the rod length of 380 mm.

Side-installation Models

90° operation on one side is possible by simply changing the direction of the cam.

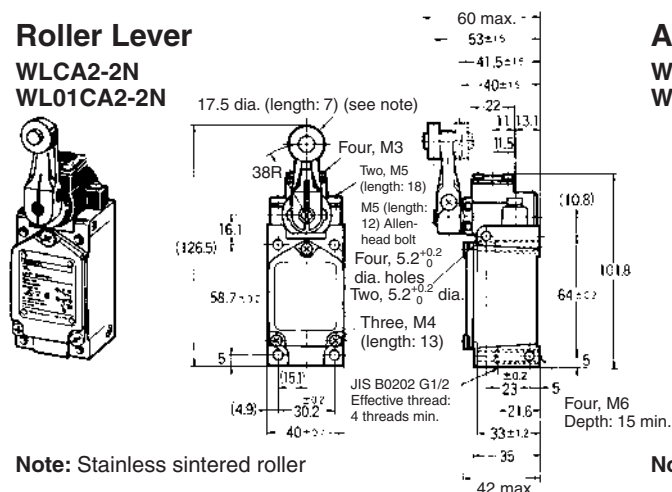
Note: 1. For all models WL□ indicates a standard model and WL01□ indicates a microload model.

2. With the side-installation models, 90° operation on one side is possible by simply changing the direction of the cam.

3. Unless otherwise indicated, a tolerance of ± 0.4 mm applies to all dimensions.

Roller Lever

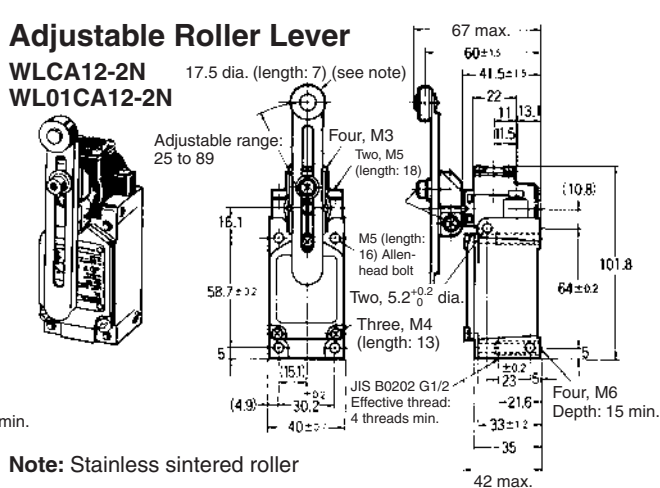
WLCA2-2N
WL01CA2-2N



Note: Stainless sintered roller

Adjustable Roller Lever

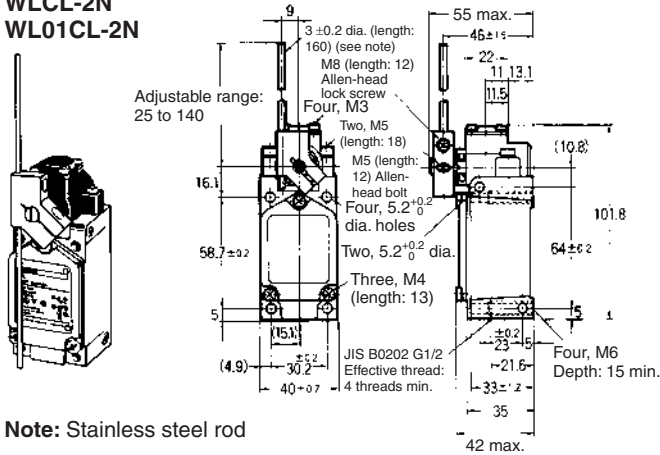
WLCA12-2N
WL01CA12-2N



Note: Stainless sintered roller

Adjustable Rod Lever

WLCL-2N
WL01CL-2N



Note: Stainless steel rod

Operating characteristics	WLCA2-2N WL01CA2-2N	WLCA12-2N WL01CA12-2N (See note 1.)	WLCL-2N WL01CL-2N (See note 2.)
Operating force: OF max.	9.61 N	9.61 N	2.84 N
Release force: RF min.	1.18 N	1.18 N	0.25 N
Pretravel: PT max.	20°	20°	20°
Overtravel: OT min.	70°	70°	70°
Movement differential: MD max.	10°	10°	10°

Note: 1. The operating characteristics of WLCA12-2N and WL01CA12-2N are measured at the lever length of 38 mm.
2. The operating characteristics of WLCL-2N and WL01CL-2N are measured at the rod length of 140 mm.

OF and RF for WLCA12-2N and WL01CA12-2N, with a lever length of 89 mm.

Operating characteristics	WLCA12-2N, WL01CA12-2N
OF	4.10 N
RF	0.50 N

High-precision Models

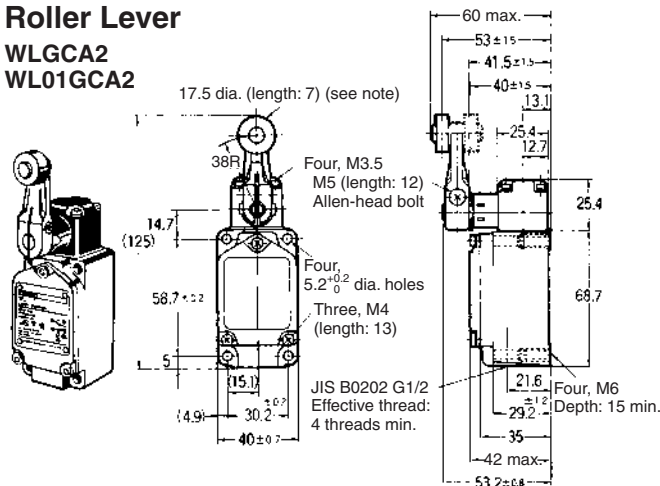
The high-precision models feature a pretravel of 5° (as compared with 15° for the standard models) and a repeat accuracy twice as great as standard models. The high-precision models are ideal for positioning control of machine tools.

For all models WL□ indicates a standard model and WL01□ indicates a microload model.

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

Roller Lever

WLGCA2
WL01GCA2



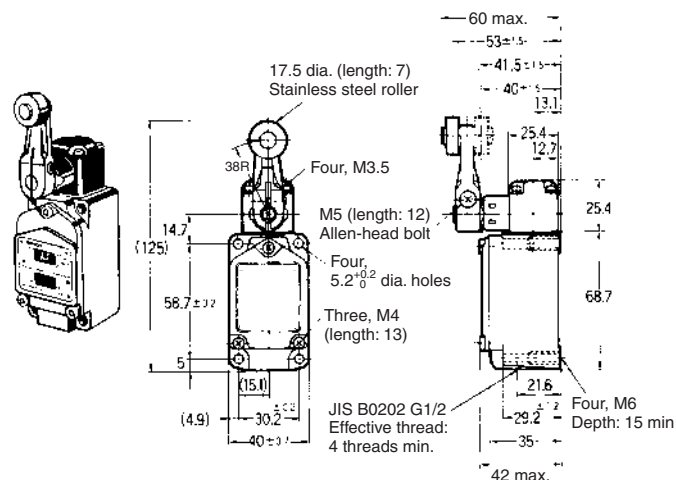
Note: Stainless sintered roller

Operating characteristics	WLGCA2 WL01GCA2
Operating force: OF max.	13.34 N
Release force: RF min.	1.47 N
Pretravel: PT	5° ⁺² ₀
Overtravel: OT min.	40°
Movement differential: MD max.	3°

Lamp-equipped Models

Roller Lever

WLCA2-LE/LD
WL01CA2-LE/LD



Note: Stainless steel roller

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

OF max.	13.34 N
RF min.	2.23 N
PT	15±5°
OT min.	30°
MD max.	12°

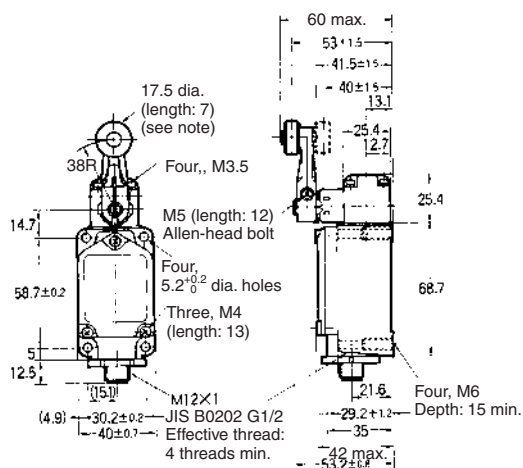
Sensor I/O Connector Models

Roller Lever Models

Standard Model (WLCA2), High-precision Model (WLGCA2), Overtravel Model (WLH2), and Overtravel High-sensitivity Model (WLG2)

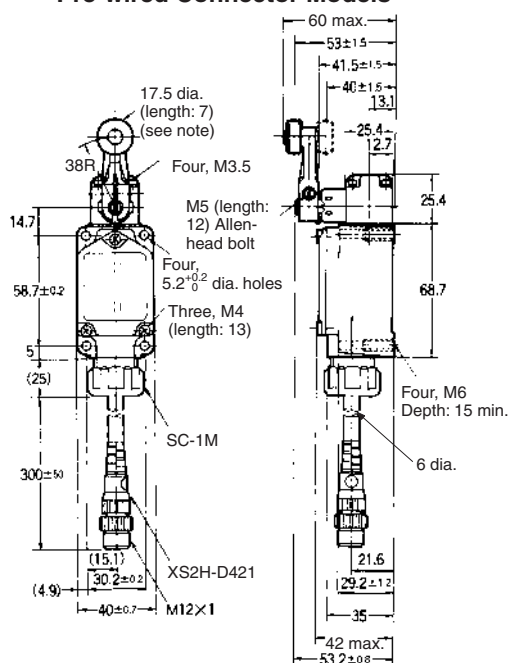
- Note: 1. For the WLG2 model, only the dimensions for the set position marker plate change.
2. Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.
3. The above diagram is for a lamp-equipped model.

Direct-wired Connector Models



Note: Stainless sintered roller

Pre-wired Connector Models



Note: Stainless sintered alloy roller

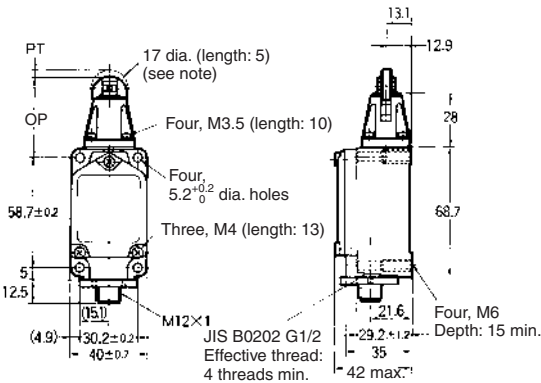
Operating characteristics	Roller lever/Standard model	Roller lever/High precision model	Roller lever/Overtravel model	Roller lever/Overtravel high sensitivity model
Operating force: OF max.	13.34 N	13.34 N	9.81 N	9.81 N
Release force: RF min.	2.23 N	1.47 N	0.98 N	0.98 N
Pretravel: PT	15±5°	5 ^{+2°} _{-0°}	15±5°	10 ^{+2°} _{-1°}
Overtravel: OT min.	30°	40°	55°	65°
Movement differential: MD max.	12°	3°	12°	7°

Top-roller Plunger

WLD2

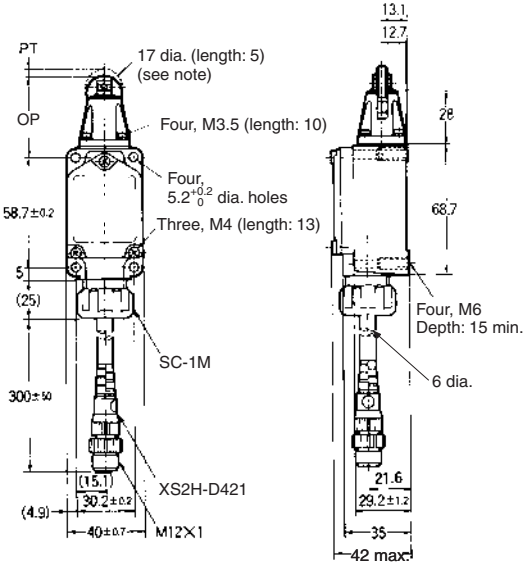
Note: 1. Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.
2. The above diagram is for a lamp-equipped model.

Direct-wired Connector Models



Note: Stainless sintered roller

Pre-wired Connector Models



Note: Stainless sintered roller

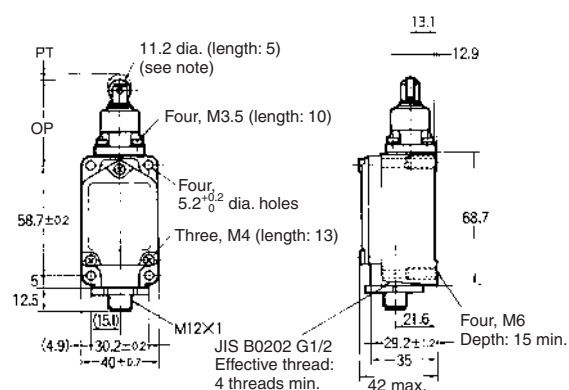
Operating characteristics	Top-roller plunger actuator
Operating force: OF max.	26.67 N
Release force: RF min.	8.92 N
Pretravel: PT max.	1.7 mm
Overtravel: OT min.	5.6 mm
Movement differential: MD max.	1 mm
Operating position: OP	44±0.8 mm
Total travel position: TTP max.	39.5 mm

Sealed Top-roller Plunger

WLD28

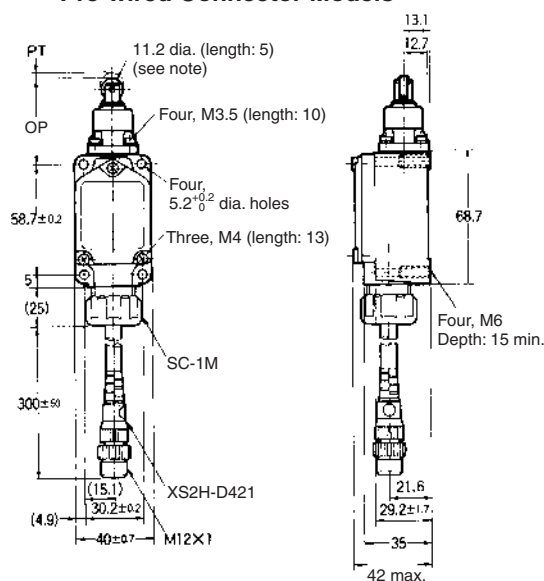
- Note:** 1. Unless otherwise indicated, a tolerance of ± 0.4 mm applies to all dimensions.
2. The above diagram is for a lamp-equipped model.

Direct-wired Connector Models



Note: Stainless sintered alloy roller

Pre-wired Connector Models



Note: Stainless sintered alloy roller

Operating characteristics	Sealed top-roller plunger actuator
Operating force: OF max.	16.67 N
Release force: RF min.	4.41 N
Pretravel: PT max.	1.7 mm
Overtravel: OT min.	5.6 mm
Movement differential: MD max.	1 mm
Operating position: OP	44 ± 0.8 mm
Total travel position: TTP max.	39.5 mm

■ Environment-resistant Models

The dimensions and operating characteristics are the same as general-purpose, environment-resistant models.

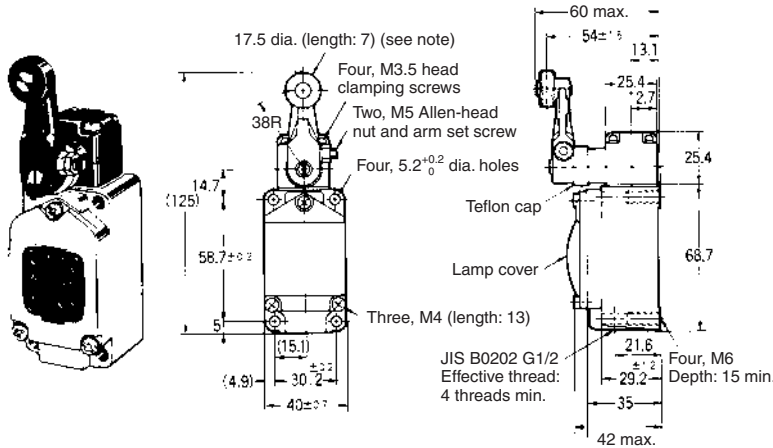
■ Spatter-prevention Models

Roller Lever (Screw Terminals)

WLCA2-□S/WL01□-□S

WLH2-□S/WLG2-□S

WLGCA2-□S



Note: Stainless steel roller

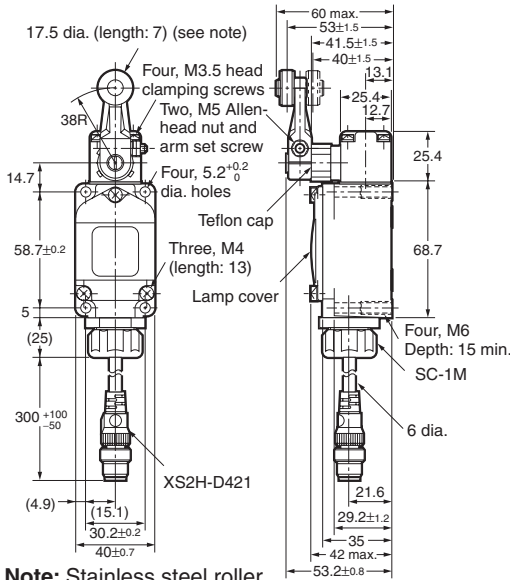
Roller Lever (Pre-wired Connector)

WLCA2-□S-M1J/WL01□-□S-M1J

WLH2-□S-M1J/WLG2-□S-M1J

WLGCA2-□S-M1J

Note: The dimensions are the same regardless of the number of core lines.

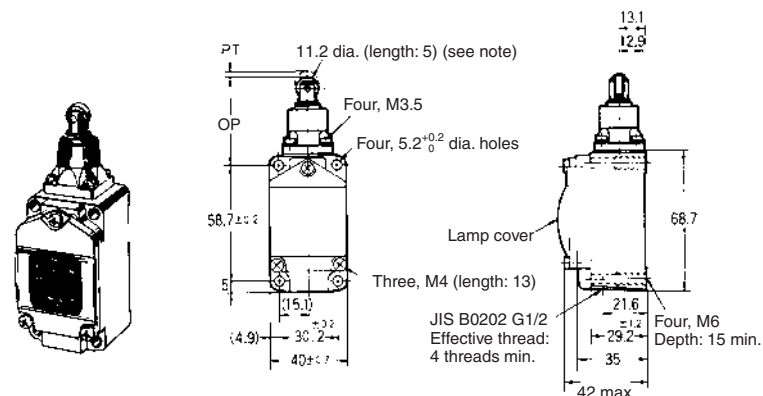


Note: Stainless steel roller

Operating characteristics	Standard	Overtravel models		High-precision
		General	High-sensitivity	
Operating force: OF max.	13.34 N	9.81 N	9.81 N	13.34 N
Release force: RF min.	2.23 N	0.98 N	0.98 N	1.47 N
Pretravel: PT	15° $\pm 5^\circ$	15° $\pm 5^\circ$	10° $^{+2}_{-1}$	5° $^{+2}_{-0}$
Overtravel: OT min.	30°	55°	65°	40°
Movement differential: MD max.	12°	12°	7°	3°

Sealed Top-roller Plunger (Screw Terminals)

WLD28-□S

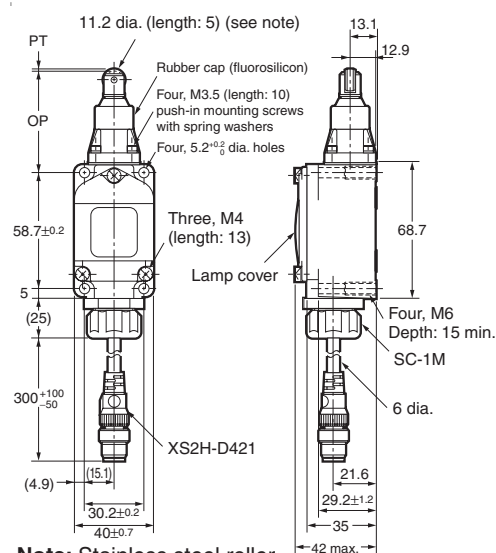


Note: Stainless steel roller

Sealed Top-roller Plunger (Pre-wired Connector)

WLD28-□S-M1J

Note: The dimensions are the same regardless of the number of core lines.



Note: Stainless steel roller

Operating characteristics	WLD28-L□S
Operating force: OF max.	16.67 N
Release force: RF min.	4.41 N
Pretravel: PT max.	1.7 mm
Overtravel: OT min.	5.6 mm
Movement differential: MD max.	1 mm
Operating position: OP	44±0.8 mm
Total travel position: TTP max.	39.5 mm

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

■ Actuators (Levers Only)

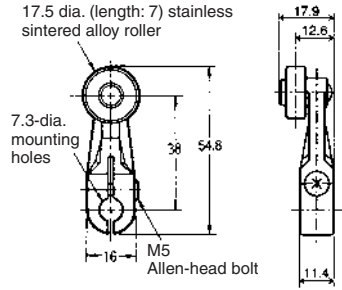
Note: 1. Lever: Only rotating lever models are illustrated.

2. Unless otherwise indicated, a tolerance of ± 0.4 mm applies to all dimensions.

3. When using the adjustable roller (rod) lever, make sure that the lever is facing downwards. Use caution, as telegraphing (the Switch turns ON and OFF repeatedly due to inertia) may occur.

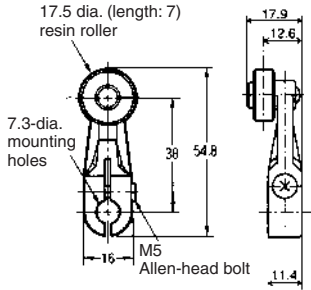
WL-1A100

Standard Lever



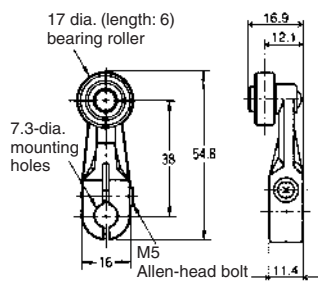
WL-1A115

Resin Roller



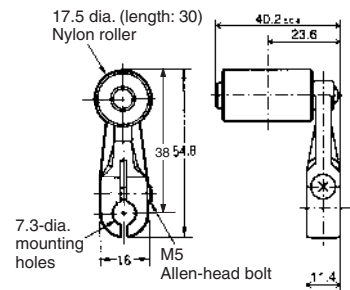
WL-1A400

Bearing Roller



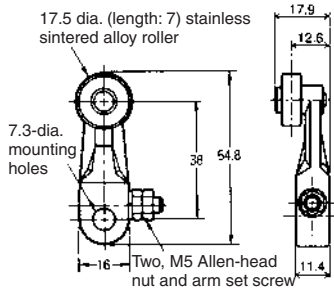
WL-1A118

Nylon Roller: Roller Width: 30 mm



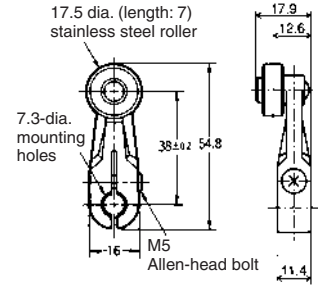
WL-1A105

Double Nut



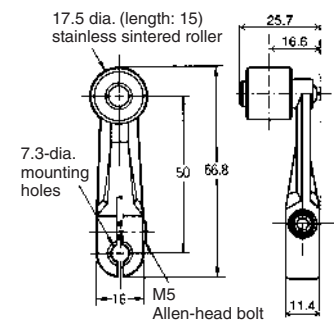
WL-1A103S

Spatter Prevention



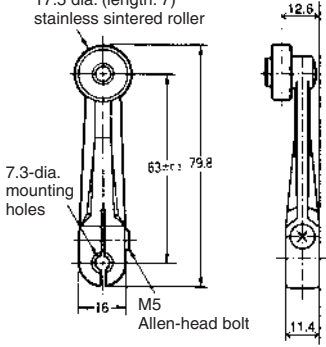
WL-1A200

Lever Length: 50 Roller Width: 15

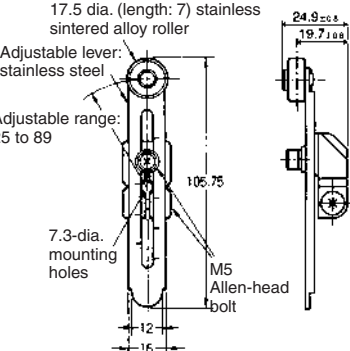


WL-1A300

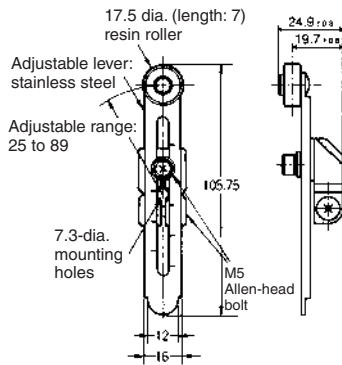
Lever Length: 63



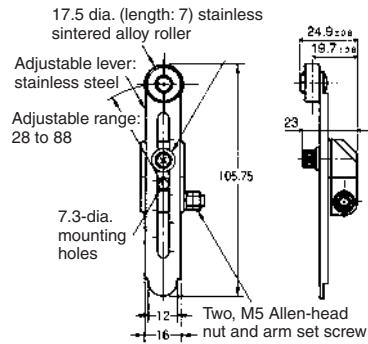
WL-2A100



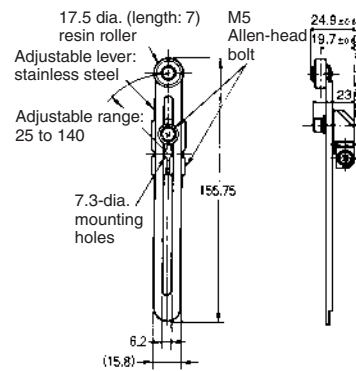
WL-2A111 Resin Roller



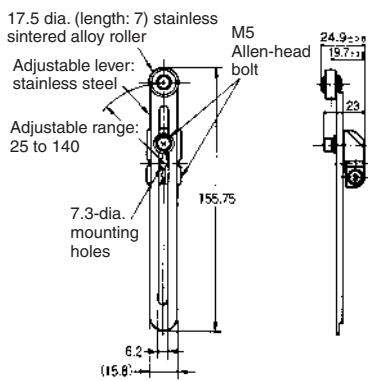
WL-2A107 Double Nut



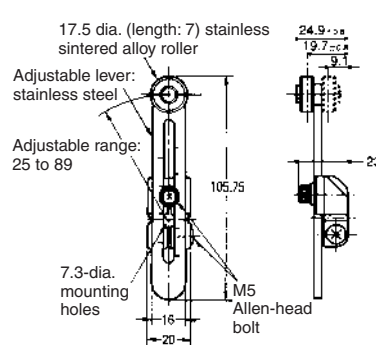
WL-2A108 Resin Roller



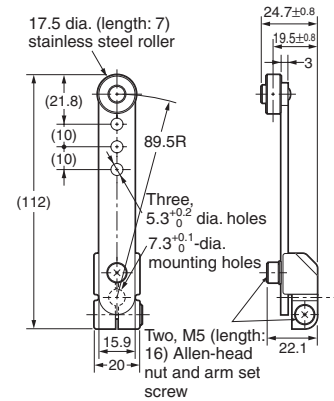
WL-2A122



WL-2A106

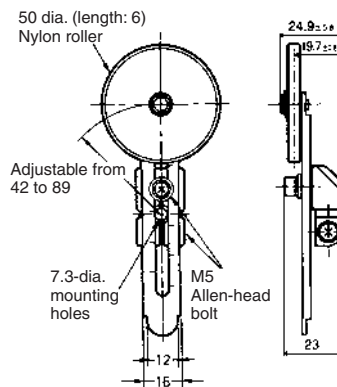


WL-2A130

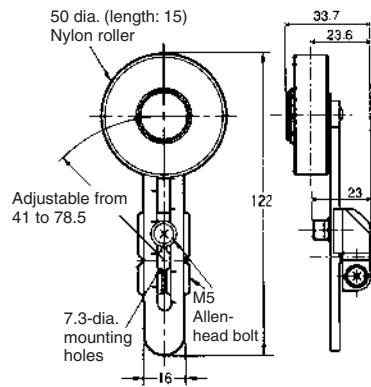


Note: Can be installed on the rear side.

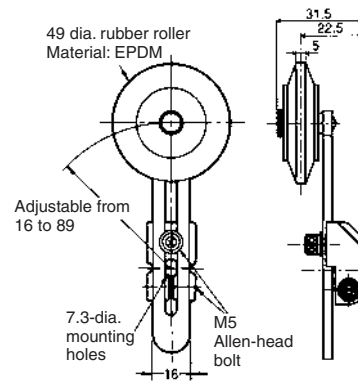
WL-2A104



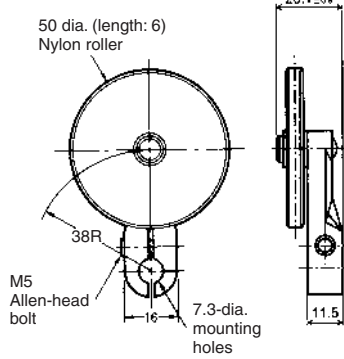
WL-2A110



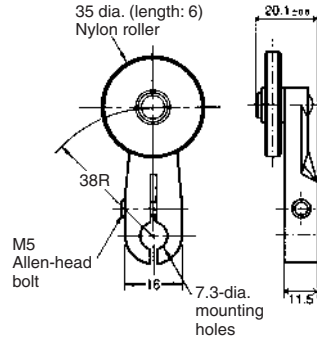
WL-2A105



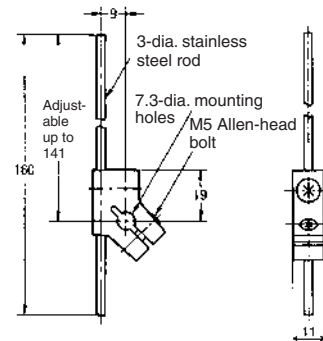
WL-1A106



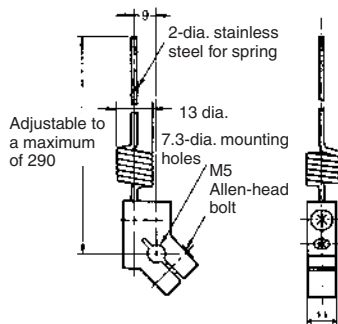
WL-1A110



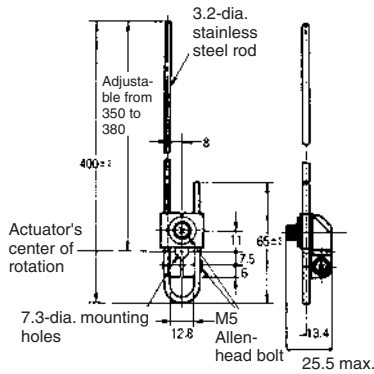
WL-4A100



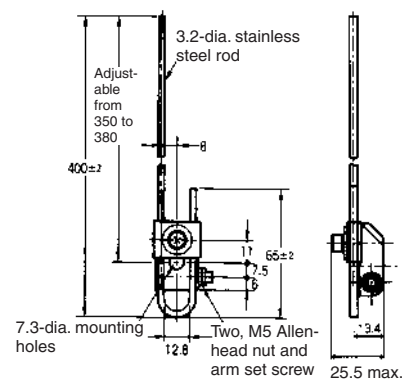
WL-4A201



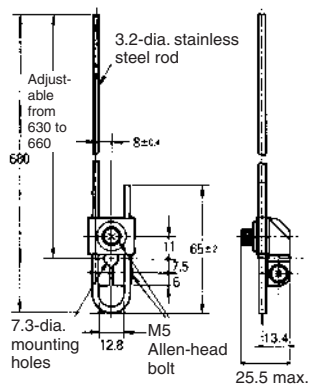
WL-3A100



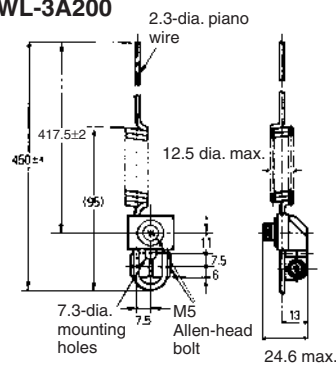
**WL-3A106
Double Nut**



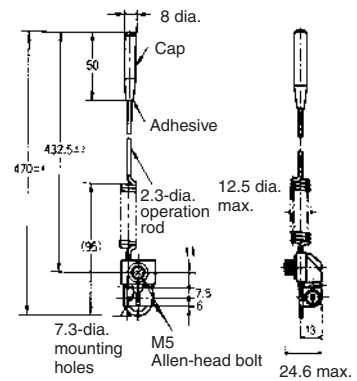
WL-3A108



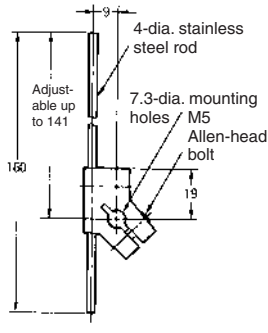
WL-3A200



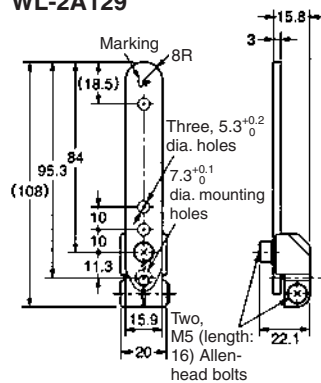
WL-3A203



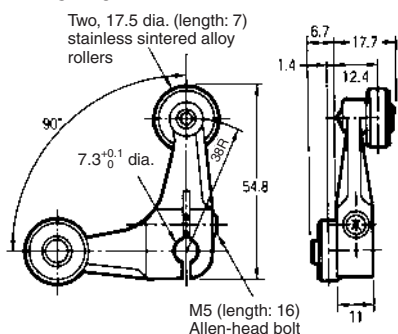
WL-4A112



WL-2A129

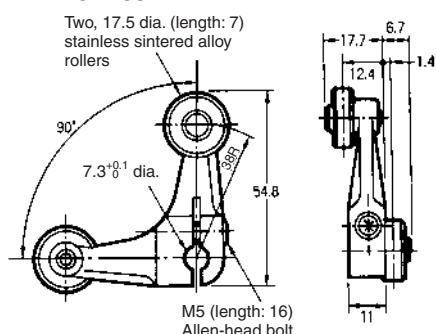


WL-5A101



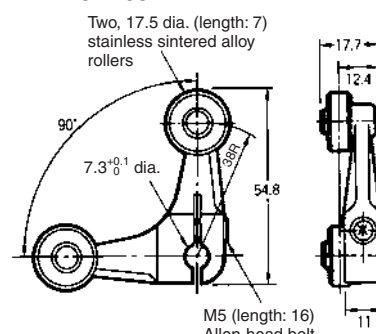
WL-5A100 has a resin roller

WL-5A103



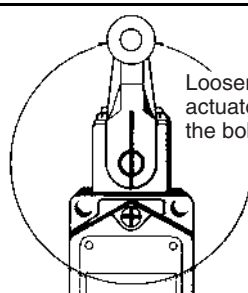
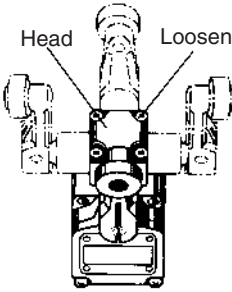
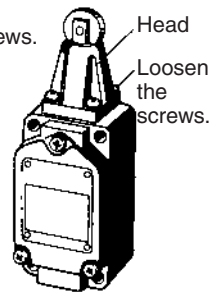
WL-5A102 has a resin roller

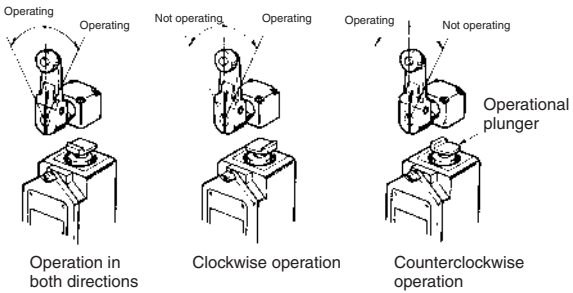
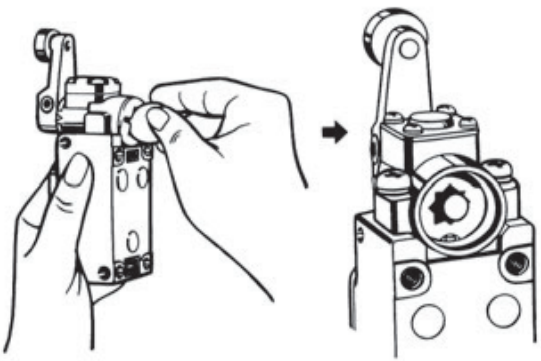
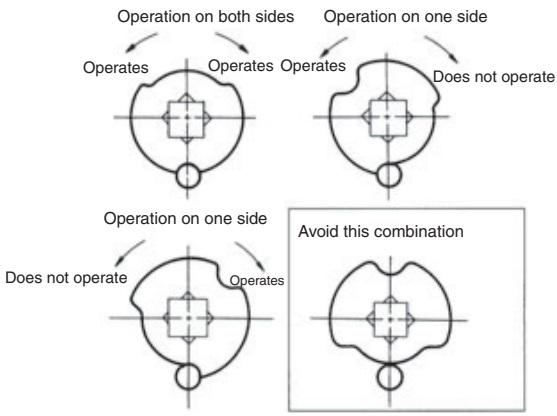
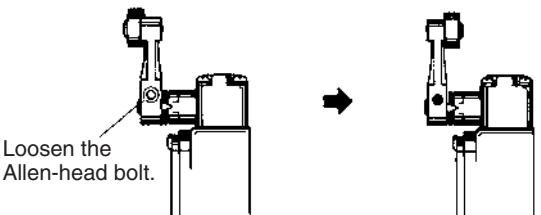
WL-5A105





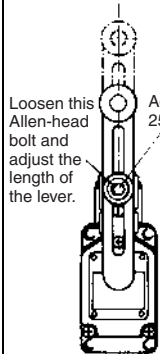
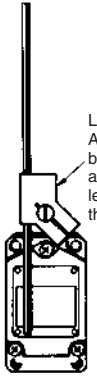


WL-5A104 has a resin roller

Installation

Item	Appropriate model/actuator	Details
Changing the installation position of the actuator By loosening the Allen-head bolt on the actuator lever, the position of the actuator can be set anywhere within the 360°. With Lamp-equipped Switches, the actuator lever comes in contact with the top of the lamp cover, so use caution when rotating and setting the lever. When the lever only moves forwards and backwards, it will not contact the lamp cover.	Roller Levers: WLCA2, WL01CA2, WLH2, WL01H2, WLG2, WL01G2 Adjustable Roller Levers: WLCA12, WL01CA12, WLH12, WL01H12, WLG12, WL01G12 Adjustable Rod Levers: WLCL, WL01CL, WLHL, WL01HL, WLGL, WL01GL	 <p>Loosen the M5 × 12 bolt, set the actuator's position and then tighten the bolt again.</p>
Changing the orientation of the Head By removing the screws in the four corners of the Head, the Head can be set in any of the four directions. Be sure to change the plunger for internal operations at the same time. (The operational plunger does not need to be changed on overtravel general-purpose and high-sensitivity models.) The roller plunger can be set in either two positions at 90°. WLCA2-2N and WL01CA2-2N can only be set in either the forward or backward direction.	Roller Levers: WLCA□, WL01CA□, WLGCA□ Adjustable Rod Levers: WLCL, WL01CL Horizontal Plungers: WLSD□, WL01SD□ Roller Plungers: WLD2, WL01D2 Sealed Roller Plungers: WLD28, WL01D28. Note: Does not include -RP60 Series or -141 Series.	  <p>Head Loosen the screws.</p> <p>Head Loosen the screws.</p>

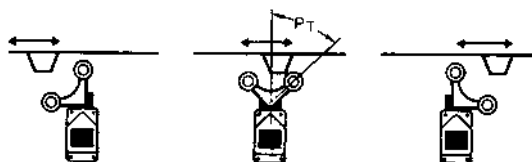
Item	Appropriate model/actuator	Details
<p>Changing the operating direction</p> <p>By removing the Head on models which can operate on one-side only, and then changing the direction of the operational plunger, one of three operating directions can be selected. In the case of overtravel models, by loosening the rubber holder using either a coin or a flat-blade screwdriver, and changing the direction of the internal rubber section, one of three operating directions can be selected.</p> <p>The tightening torque for the screws on the Head is 0.78 to 0.88 N·m.</p>	<p>Roller Levers: WLCA2, WL01CA2, WLGCA2, WLMGCA2□</p> <p>Adjustable Roller Levers: WLCA12, WL01CA12</p> <p>Adjustable Rod Levers: WLCL, WL01CL</p> <p>Overtravel Models: WLCA□-2N, WL01CA□-2N</p> <p>Note: The diagram at the right is not correct for the overtravel -2N models.</p>	<div><div><p>The output of the Switch will be changed, regardless of which direction the lever is pushed.</p></div><p>For details on overtravel -2N models, refer to page 28.</p><p>Cam direction changing procedure for side-installation models</p><div><p>Loosen the cam holder with a coin or screwdriver. Take out the cam from the Switch.</p><p>Change the direction of the cam as required by your intended operation and then reinstall the cam.</p></div><p>Relationship of cam to operation as observed from the rear of Switch</p><div></div></div>
<p>Installing the roller on the inside</p> <p>By installing the roller lever in the opposite direction, the roller can be installed on the inside. (Set so that operation can be completed within a 180° level range.)</p>	<p>Roller Levers: WLCA□, WL01CA□, except for the adjustable roller levers.</p> <p>Fork Lever Locks: WLCA32-4□, WL01CA32-4□</p>	 <p>Loosen the Allen-head bolt.</p>

Item	Appropriate model/actuator	Details
Selecting the roller position There are four types of fork lever lock for use depending on the roller position.	Fork Lever Locks: WLCA32-4□, WL01CA32-4□	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>WLCA32-41</p> </div> <div style="text-align: center;">  <p>WLCA32-43</p> </div> </div> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>WLCA32-42</p> </div> <div style="text-align: center;">  <p>WLCA32-44</p> </div> </div> <p>Note: An explanation of the operation of fork lever locks is provided after this table.</p>
Adjusting the length of the rod or lever The length of the rod or lever can be adjusted by loosening the Allen-head bolt.	Adjustable Roller Levers: WLCA12, WL01CA12 etc. Adjustable Rod Levers: WLCL, WL01CL, etc.	<p>WLCA12 etc.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Loosen this Allen-head bolt and adjust the length of the lever.</p> <p>Adjustment range: 25 to 89 mm</p> </div> <div style="text-align: center;">  <p>Loosen this Allen-head bolt and adjust the length of the rod.</p> </div> </div>

■ Operation of Fork Lever Locks

The fork lever lock is configured so that the dog pushes the lever to reverse the output and this reversed state is maintained even after the dog continues on. If the dog then pushes the lever from the opposite direction, the lever will return to its original position.

Example



NC terminal: ON NO terminal: ON NO terminal: ON

Precautions

Refer to the *Technical Information for Limit Switches* (Cat. No. C121).

Correct Use

When a rod or wired-type actuator is used, do not touch the top end of the actuator. Doing so may result in injury.

Applicable models: WLHAL5 and WL01HAL5 Rod Spring Levers and WLNJ-S2 and WL01NJ-S2 Steel-wire Actuators.

A short-circuit may cause damage to the Switch, so insert a circuit breaker fuse, of 1.5 to 2 times the rated current, in parallel with the Switch. In order to meet EN approval ratings, use a 10-A fuse that corresponds to IEC269, either a gI or gG for general-purpose types and spatter-prevention models only.

When wiring terminal screws, use M4 round crimp terminals and tighten screws to the recommended torque. Wiring with broken wires, or the incorrect crimp terminals, or not tightening screws to the recommended torque can lead to short-circuits, leakage current, and fire.

When performing internal wiring there is a chance of short-circuit, leakage current, or fire, so be sure to protect the inside of the Switch from splashes of oil or water, corrosive gases, and cutting powder.

Using an inappropriate connector or assembling Switches incorrectly (assembly, tightening torque) can result in malfunction, leakage current, or fire, so be sure to read the instruction manual thoroughly beforehand.

Even when the connector is assembled and set correctly, the end of the cable and the inside of the Switch may come in contact. This can lead to malfunction, leakage current, or fire, so be sure to protect the end of the cable from splashes of oil or water and corrosive gases.

Environmental Precautions

When the Switch is used in locations subject to splashes of water or oil, the material of the seal, which ensures the sealing properties of the Switch, may undergo changes in shape and quality. This is due to deterioration (including expansion and contraction), and may result in reduced performance, ineffective return, and ineffective sealing (leading to ineffective contact, insulation, leakage current, and fire). Confirm the possible effects of the operating environment on the Switch before use.

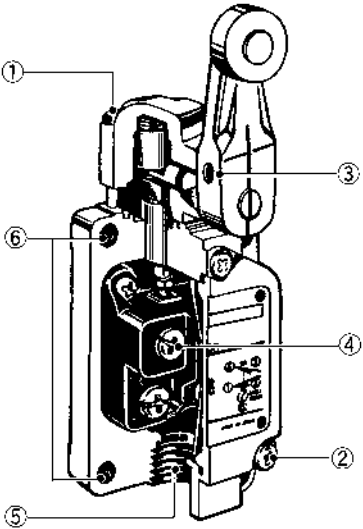
Built-in Switch

Do not remove or replace the built-in switch. If the position of the built-in switch moves, it can cause reduced performance, and if the insulation sheet moves (separator), the insulation may become ineffective.

Tightening Torque

If screws are too loose they can lead to an early malfunction of the Switch, so ensure that all screws are tightened using the correct torque.

No.	Type	Torque
①	Head mounting screw	0.78 to 0.88 N·m
②	Cover mounting screw	1.18 to 1.37 N·m
③	Allen-head bolt (for securing the lever)	4.90 to 5.88 N·m
④	Terminal screw	0.59 to 0.78 N·m
⑤	Connector	1.77 to 2.16 N·m
⑥	Main Unit screws	4.90 to 5.88 N·m



In particular, when changing the direction of the Head, make sure that all screws are tightened again to the correct torque. Do not allow foreign objects to fall into the Switch.

Installing the Switch

To install the Switch, make a mounting panel, as shown in the following diagram, and tighten screws using the correct torque.

Standard/Overtravel model	Overtravel model (side installation)
<p>Mounting holes</p> <p>Four, $5.2^{+0.2}_0$ dia. holes</p>	<p>Mounting holes</p> <p>Two, $5.2^{+0.2}_0$ dia. holes</p>

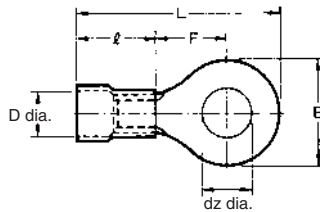
Connectors

Either the easy-to-use Allen-head nut or the SC Connector can be used as connectors. To ensure high-sealing properties, use the SC Connector. Consult your OMRON representative for details on SC Connectors.

Wiring

Use 1.25-mm lead wires and M4-insulation covered crimp terminals for wiring.

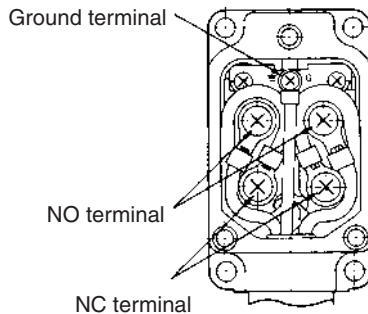
Crimp Terminal External Dimensions



dz dia.:	4.3
D dia.:	4.5
B:	8.5
L:	21.0
F:	7.8
l:	9.0 (mm)

Wiring Method

Switch Box Section



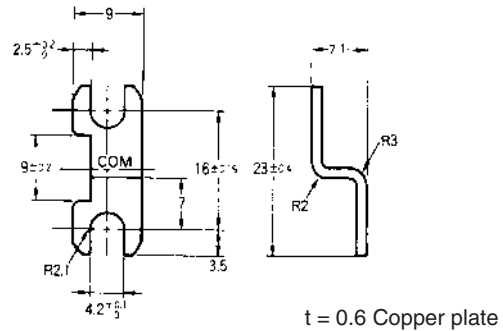
Note: The ground terminal is only installed on models with ground terminals.

Rotating Lever Set Position

All rotating lever models, except the fork lever lock, have a set position marker plate. (See page 75.) After operation, set the indicator needle on the marker plate so that it is in the convex section of the bearing.

Terminal Plate

By using a short circuit plate, as shown in the following diagram, the Switch can be fabricated into a single-polarity double-break model. When ordering specify WL Terminal Plate (product code: WL-9662F).



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Long-life Two-circuit Limit Switch WLM□

New Long-life Limit Switches Added to the Wide Variety of WL Models

- Improved resistance to abrasion and smoother movement in the head section means that a mechanical life of 30,000,000 operations minimum is now a reality.
- Wiring and replacement for maintenance purposes are easy done.
- Fluorescent indicators improve visibility when setting stroke zones.



Model Number Structure

■ Model Number Legend

WLM□-LD□
1 2

1. Actuators

- CA2: Roller lever: Standard
- GCA2: Roller lever: High-precision
- H2: Roller lever: Overtravel, general-purpose
- G2: Roller lever: Overtravel, high-sensitivity

2. Wiring Specifications

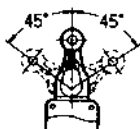
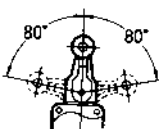
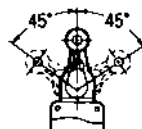
- Blank: Screw terminal: G1/2 conduit
- K13A: Direct-wired connector: 2-core, AC
- K13: Direct-wired connector: 2-core, DC
- K43A: Direct-wired connector: 4-core, AC
- K43: Direct-wired connector: 4-core, DC
- M1J: Pre-wired connector: 2-core, DC (See note.)
- AGJ03: Pre-wired connector: 4-core, AC (See note.)
- DGJ03: Pre-wired connector: 4-core, DC (See note.)

Note: With 0.3-m cable attached.

Ordering Information

List of Models

Roller Lever with LED

Item			Model			
Type			Standard	Overtravel		High-precision
				General-purpose	High-sensitivity	
Overall movement						
Features			One-side operation not possible. Head can be mounted in any of the four directions. (See note 3.)			One-side operation possible. Head can be mounted in any of the four directions. (See note 3.)
Screw terminal			WLMCA2-LD	WLMH2-LD	WLMG2-LD	WLMGCA2-LD
Direct-wired connector	2-core	AC	WLMCA2-LDK13A	WLMH2-LDK13A	WLMG2-LDK13A	WLMGCA2-LDK13A
		DC	WLMCA2-LDK13	WLMH2-LDK13	WLMG2-LDK13	WLMGCA2-LDK13
	4-core	AC	WLMCA2-LDK43A	WLMH2-LDK43A	WLMG2-LDK43A	WLMGCA2-LDK43A
		DC	WLMCA2-LDK43	WLMH2-LDK43	WLMG2-LDK43	WLMGCA2-LDK43
Pre-wired connector (See note 2.)	2-core	DC	WLMCA2-LD-M1J	WLMH2-LD-M1J	WLMG2-LD-M1J	WLMGCA2-LD-M1J
	4-core	AC	WLMCA2-LD-AGJ03	WLMH2-LD-AGJ03	WLMG2-LD-AGJ03	WLMGCA2-LD-AGJ03
		DC	WLMCA2-LD-DGJ03	WLMH2-LD-DGJ03	WLMG2-LD-DGJ03	WLMGCA2-LD-DGJ03

Note: 1. The default setting is light-ON when not operating (NO connection). To switch to light-ON when operating, simply rotate the lamp holder by 180°. Contact your OMRON representative for details on the 2-core models.

2. 0.3-m cable attached.

3. One-side operation possible means that, by changing the direction of the operational plunger, one of three operating directions can be selected. One-side operation not possible means that only operation on both sides is possible. See page 106 for details.

Applicable Cables

Use the Cables listed below with the Limit Switch with Connector.

Voltage	Core wires	Cable length	Model	Connection wires			
				1	2	3	4
AC	2	2 m	XS2F-A421-DB0-A	---	---	Brown	Blue
		5 m	XS2F-A421-GB0-A	---	---	Brown	Blue
	4	2 m	XS2F-A421-D90-A	Brown	White	Blue	Black
		5 m	XS2F-A421-G90-A	Brown	White	Blue	Black
DC	2	2 m	XS2F-D421-DD0	---	---	Blue	Brown
		5 m	XS2F-D421-GD0	---	---	Blue	Brown
	4	2 m	XS2F-D421-D80-A	Brown	White	Blue	Black
		5 m	XS2F-D421-G80-A	Brown	White	Blue	Black

Specifications

■ Ratings

General-purpose Ratings

Refer to these ratings before using the product.

Screw Terminal Models

Model	Rated voltage	Non-inductive load				Inductive load			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
Standard, overtravel (except high-sensitivity), and high-precision	115 VAC	10		3	1.5	10		5	2.5
	12 VDC	10		6	3	10		6	
	24 VDC	6		4	3	6		4	
	48 VDC	3		2	1.5	3		2	
	115 VDC	0.8		0.2	0.2	0.8		0.2	
Overtravel (High-sensitivity)	115 VAC	5		---		---		---	
	115 VDC	0.4		---		---		---	

Inrush current	NC	30 A max. (15 A max. (See note))
	NO	20 A max. (10 A max. (See note))

Note: Only for high-sensitivity overtravel models.

Direct-wired/Pre-wired Models

Model	Rated voltage	Non-inductive load				Inductive load			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
DC	12 VDC	3	3	3	3	3	3	3	3
	24 VDC	3	3	3	3	3	3	3	3
	48 VDC	3	3	3	3	3	3	3	3
	115 VDC	0.8	0.8	0.2	0.2	0.8	0.8	0.2	0.2
AC	115 VAC	3	3	3	1.5	3	3	3	2.5

- Note:** 1. The above figures are for standard 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.

■ Characteristics

Degree of protection	IP67
Durability (See note 2.)	Mechanical: 30,000,000 operations min. (10 mA at 24 VDC, resistive load) Electrical: 750,000 operations min. (10 A at 115 VAC, resistive load), but for high-precision models: 500,000 operations min. (10 A at 115 VAC, resistive load)
Operating speed	1 mm to 1 m/s (for WLMCA2)
Operating frequency	Mechanical: 120 operations/minute Electrical: 30 operations/minute
Rated frequency	50/60 Hz
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	25 mΩ max. (initial value)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between non-continuous terminals. (Except connector models.) 2,200 VAC (1,500 V), 50/60 Hz for 1 min between non-current-carrying metal part and ground. 2,200 VAC (1,500 V), 50/60 Hz for 1 min between each terminal and non-current-carrying metal part.
Vibration resistance	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	Operating: -10°C to 80°C (with no icing)
Ambient humidity	Operating: 95% max.
Weight	Approx. 275 g (for WLMCA2)

- Note:** 1. The figures in parentheses for dielectric strength, are those for overtravel (high-sensitivity) or connector models.
 2. The 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.

■ Operating Characteristics

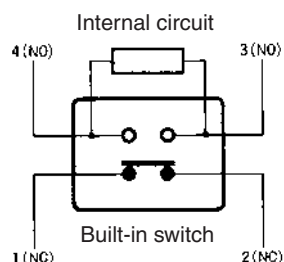
Operating characteristics	WLMCA2-LD□ Standard models	WLMH2-LD□ Overtravel models (general-purpose)	WLMG2-LD□ Overtravel models (high-sensitivity)	WLMGCA2-LD□ High-precision models
OF max.	9.81 N	9.81 N	9.81 N	13.34 N
RF min.	0.98 N	0.98 N	0.98 N	1.47 N
PT	15±5°	15±5°	10 ^{+2°} _{-1°}	5 ^{+2°} _{0°}
OT min.	30°	55°	65°	40°
MD max.	12°	12°	7°	3°

■ Contact Form

Screw Terminal Models

WLM□-LD

Lamp-equipped: Light-ON when not operating

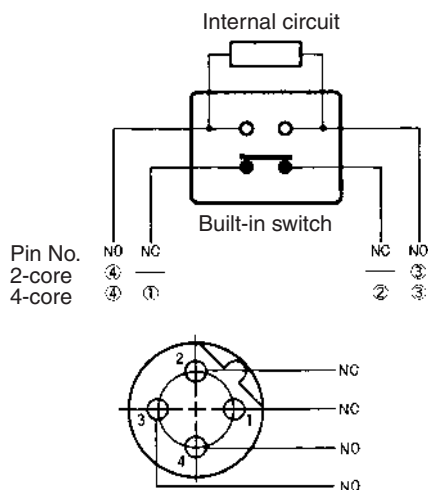


Direct-wired Connector/Pre-wired Connector Models

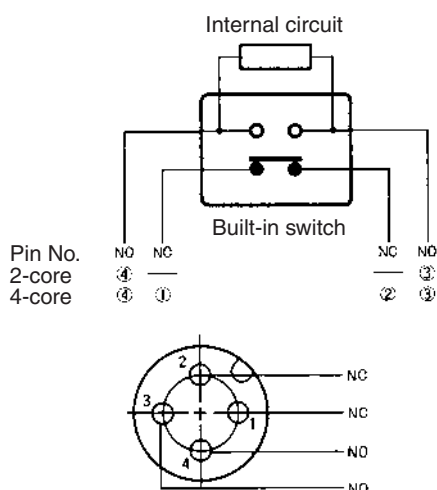
AC Models: WLM□-LD□□

Lamp-equipped: Light-ON when not operating (See note.)

AC model



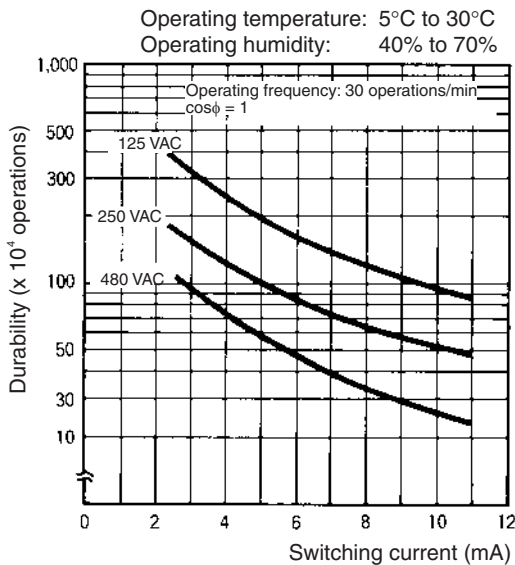
DC model



Note: Light-ON when not operating means that the lamp remains lit when the actuator is free, and goes out when the Limit Switch contacts (NO) close when the actuator rotates or is pushed down.

Engineering Data

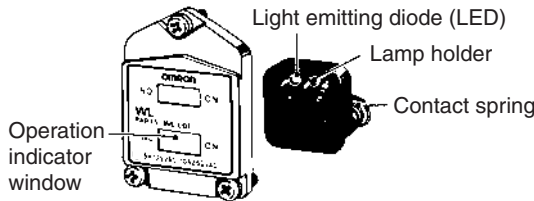
■ Electrical Durability: $\cos\phi = 1$



■ Lamp-equipped Models

The operating status of the Switch can be checked using a neon lamp or LED indicator.

Circuit checks and troubleshooting errors are easy done.



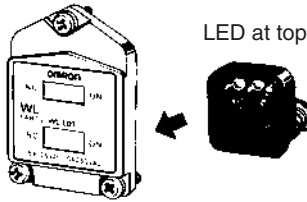
The built-in switch's terminal screws are used to connect the lamp terminal (indicator cover). Since the connection spring (coil spring) is used for this connection, it will not be necessary to connect to the lamp terminal. When a ground terminal is provided however, lead wire method must be used.

WL-LD has a built-in rectifier stack, so it will not be necessary to change the polarity.

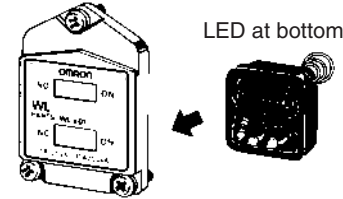
The indicator cover is molded from diecast aluminum and has outstanding sealing properties. Furthermore, regardless of whether the power is connected or not, the operating status is shown (operating or not operating), and indicators can be switched from light-ON when operating and light-ON when not operating, by simply rotating the lamp holder by 180°.

The lamp-equipped models are ideal in locations using a conveyor belt where items need to be checked, or locations that are difficult to inspect for faults.

Light-ON when Operating



Light-ON when Not Operating



Indicator Lamp and Load Operation

When the indicator lamp is set to light-ON when operating, connect the load on the NC side, and set so that the load turns ON when the actuator is free.

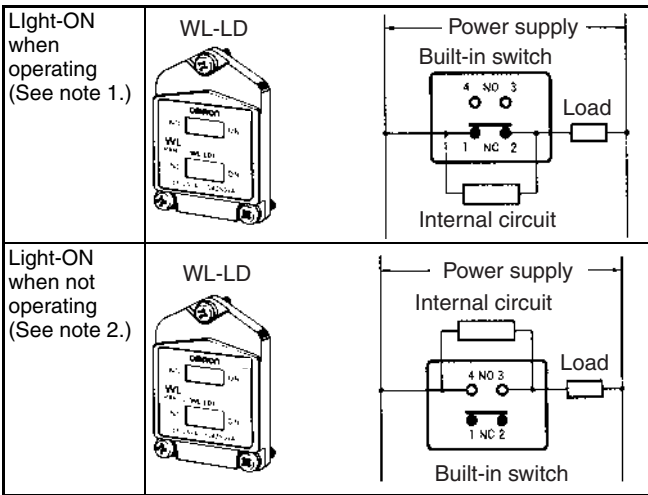
When the indicator lamp is set to light-ON when not operating, connect the load on the NO side, and set so that the load turns ON when the actuator is pushed down.

Light-ON when Operating

When the Switch's contacts and the internal circuit of the lamp holder are connected in parallel, there is large resistance from the internal circuit, so the current will flow through the Switch's contacts and the load will turn ON.

When the contacts and the internal circuit are separated, only a small voltage, enough to light the indicator lamp will flow to the lamp, but the load will not turn ON.

Operation



Note: 1. Light-ON when operating means that the lamp lights when the Limit Switch contacts (NC) release, or when the actuator rotates or is pushed down.

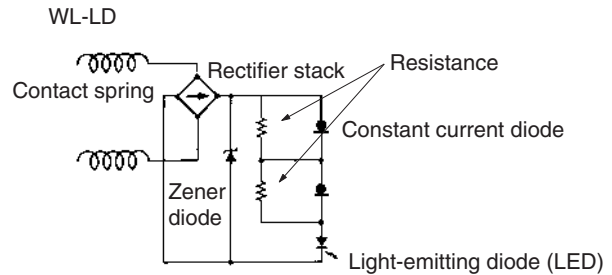
2. Light-ON when not operating means the lamp remains lit when the actuator is free, or when the Limit Switch contacts (NO) close when the actuator rotates or is pushed down.

Models/Ratings

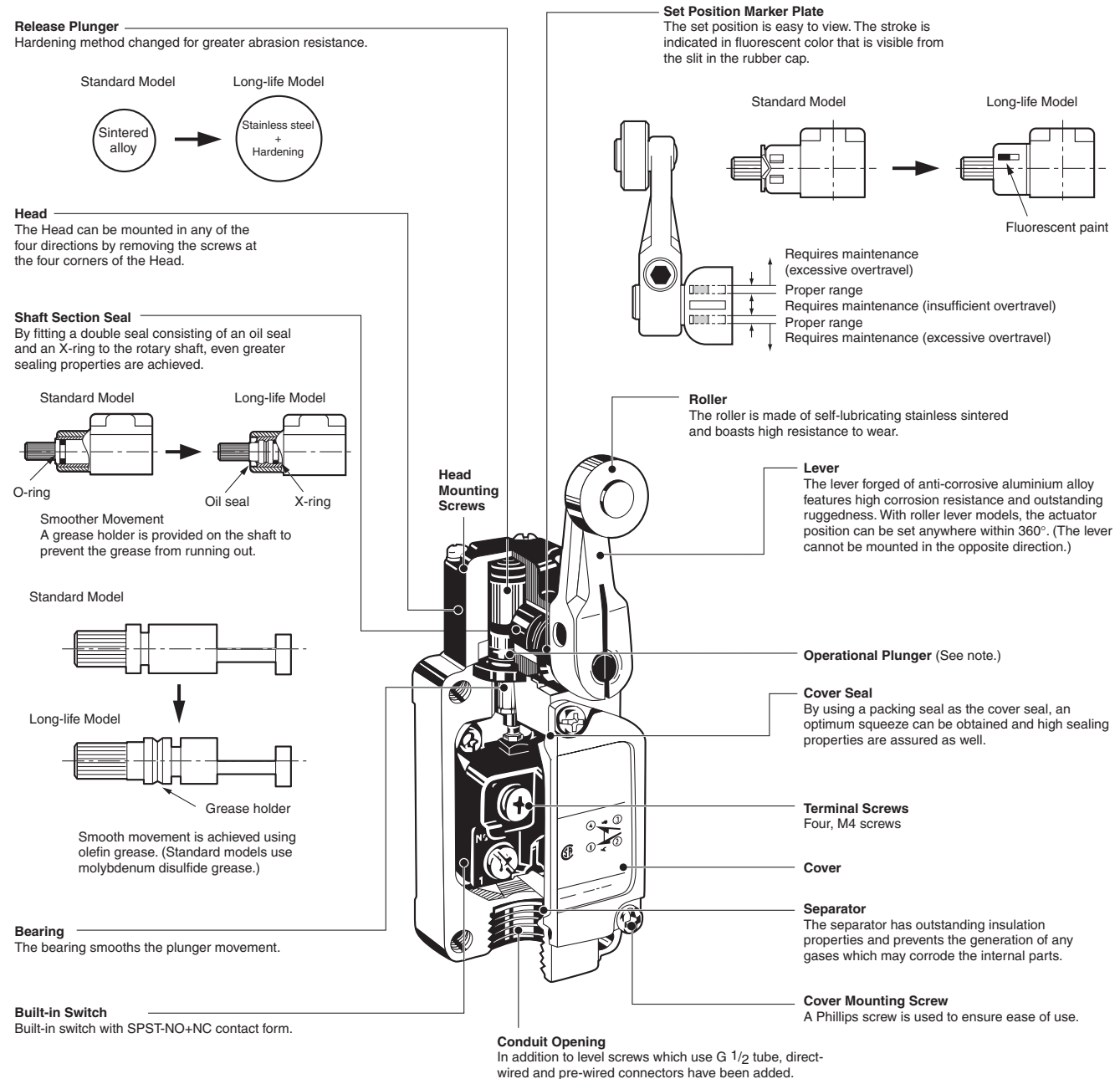
Operating characteristics	Maximum rated voltage	Leakage current	Lamp-equipped Switch	Lamp-equipped cover only
LED	10 to 115 VAC, DC	Approx. 1 mA	WL□-LD (See note 1.)	WL-LD

- Note:** 1. In the model number, □ indicates the actuator number. For example, MCA2, etc.
2. The default setting is "light-ON when not operating." Turn the lamp holder by 180° to change the setting to "light-ON when operating."

Internal Circuits



Nomenclature

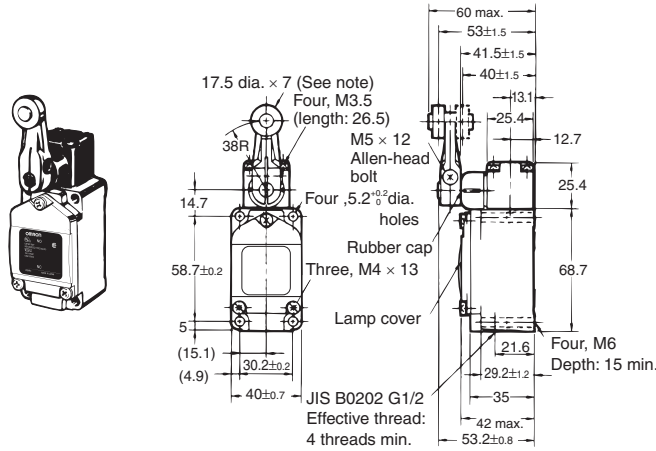


- Note:** By changing the direction of the operational plunger, any one of the three operational directions (both sides, left, or right) can be selected. (Only applicable to the WLMGCA2-□.)

Dimensions

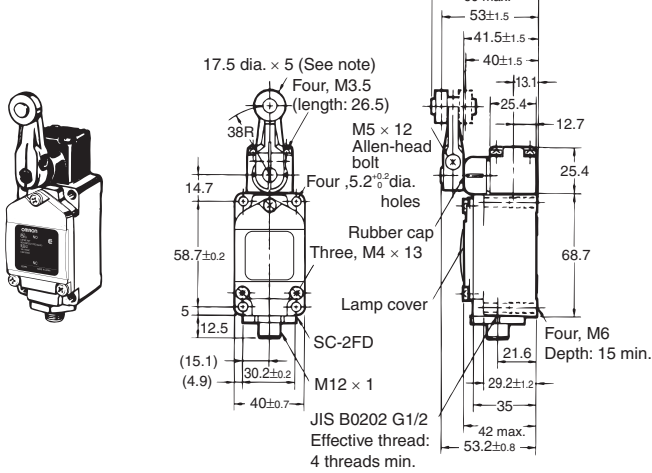
Rotating Lever Models: Standard

Screw Terminals WLM□-LD



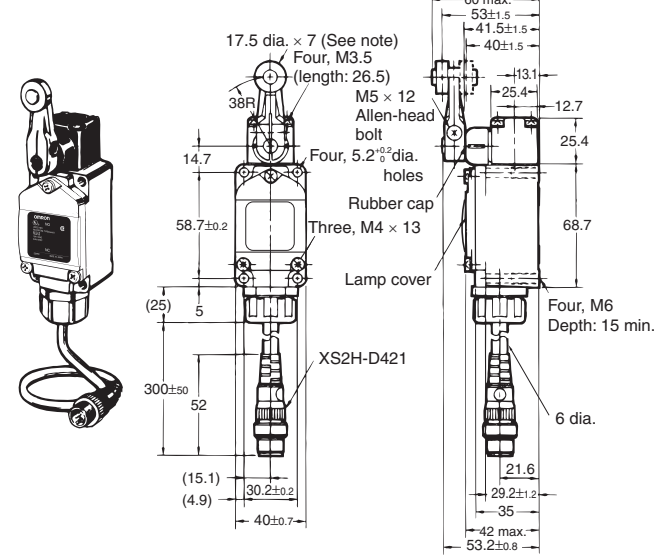
Note: Stainless steel roller

Direct-wired Connectors WLM□-LD□



Note: Stainless steel roller

Pre-wired Connectors WLM□-LD□

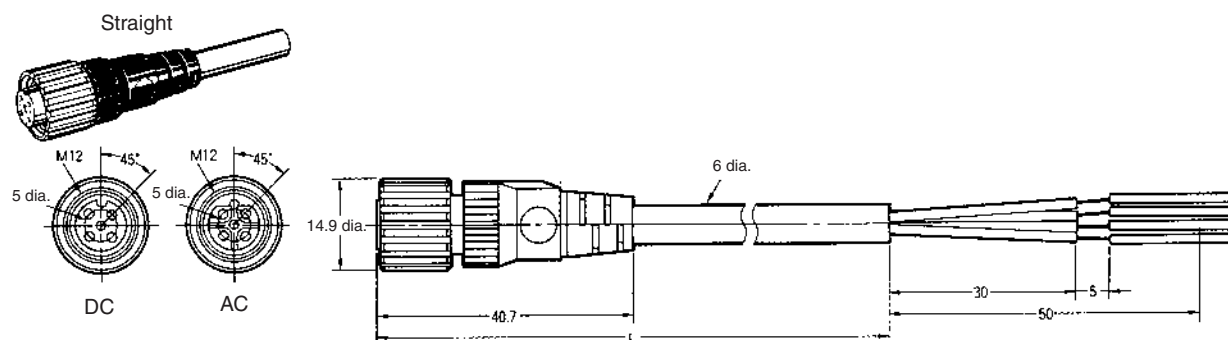


Note: Stainless steel roller

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

Accessories

Cable



Installation

Item	Appropriate model/actuator	Details
Changing the installation position of the actuator By loosening the Allen-head bolt on the actuator lever, the position of the actuator can be set anywhere within 360°. With Lamp-equipped Switches, the actuator lever comes in contact with the top of the lamp cover, so use caution when rotating and setting the lever.	Roller Levers: WLMCA2□, WLMH2□, WLMG2□, WLMGCA2□	<p>Loosen the M5 × 12 bolt, set the actuator's position and then tighten the bolt again.</p>
Installing the roller on the inside By installing the roller lever in the opposite direction, the roller can be installed on the inside. (Set so that operation can be completed within a 180° level range.)	Roller Levers: WLMCA2□, WLMH2□, WLMG2□, WLMGCA2□	<p>Loosen the Allen head bolt</p>
Changing the orientation of the head By removing the screws in the four corners of the Head, the Head can be set in any of the four directions. Be sure to change the plunger for internal operations at the same time. (The operational plunger does not need to be changed on overtravel general-purpose and overtravel high-sensitivity models.)	Roller Levers: WLMCA2□, WLMH2□, WLMG2□, WLMGCA2□	<p>Head Loosen the screws</p> <p>Head Loosen the screws</p>
Changing the operating direction By moving the Head on models which can operate on one-side, and then changing the direction of the operational plunger, one of three operating directions can be selected. The tightening torque for the screws on the Head is 0.78 to 0.88 N·m.	Roller Levers: WLMGCA2□	<p>The output of the Switch will be changed, regardless of which direction the lever is pushed.</p> <p>The output of the Switch will only be changed when the lever is pushed in one direction.</p> <p>Operating Not operating Operating Not operating</p> <p>Operational plunger</p> <p>Operation in both directions Clockwise operation Anti-clockwise operation</p>

Precautions

■ Correct Use

When wiring terminal screws, use M4 round crimp terminals and tighten screws to the recommended torque. Wiring with broken wires, or the incorrect crimp terminals, or not tightening screws to the recommended torque can lead to short-circuits, leakage current, and fire.

When performing internal wiring there is a chance of short-circuit, leakage current, or fire, so be sure to protect the inside of the Switch from splashes of oil or water, corrosive gases, and cutting powder.

Using an inappropriate connector or assembling Switches incorrectly (assembly, tightening torque) can result in malfunction, leakage current, or fire, so be sure to read the instruction manual thoroughly beforehand.

Even when the connector is assembled and set correctly, the end of the cable and the inside of the Switch may come in contact. This can lead to malfunction, leakage current, or fire, so be sure to protect the end of the cable from splashes of oil or water and corrosive gases.

Environmental Precautions

When the Switch is used in locations subject to splashes of water or oil, the material of the seal, which ensures the sealing properties of the Switch, may undergo changes in shape and quality. This is due to deterioration (including expansion and contraction), and may result in reduced performance, ineffective return, and ineffective sealing (leading to ineffective contact, insulation, leakage current, and fire). Confirm the possible effects of the operating environment on the Switch before use.

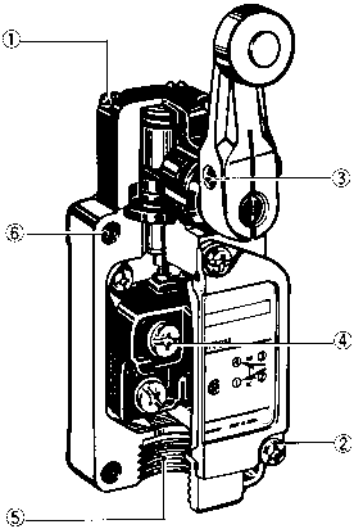
Built-in Switch

Do not replace the built-in switch. If the position of the insulation sheet moves (separator), the insulation may become ineffective.

Tightening Torque

If screws are too loose they can lead to an early malfunction of the Switch, so ensure that all screws are tightened using the correct torque.

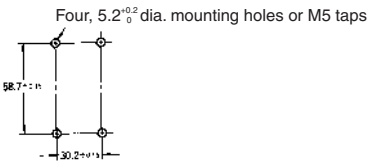
No.	Type	Torque
1	Head mounting screw	0.78 to 0.88 N·m
2	Cover mounting screw	1.18 to 1.37 N·m
3	Allen-head bolt (for securing the lever)	4.90 to 5.88 N·m
4	Terminal screw	0.59 to 0.78 N·m
5	Connector	1.77 to 2.16 N·m
6	Main Unit screws	4.90 to 5.88 N·m



In particular, when changing the direction of the Head, make sure that all screws are tightened again to the correct torque. Do not allow foreign objects to fall into the Switch.

Installing the Switch

To install the Switch, make a mounting panel, as shown in the following diagram, and tighten screws using the correct torque.



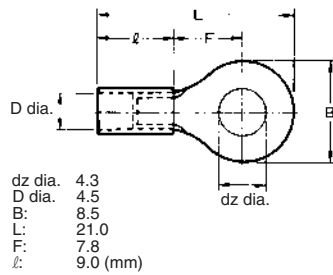
Connectors

Either the easy-to-use Allen-head nut or the SC Connector can be used as connectors. To ensure high-sealing properties, use the SC Connector. (SC-1M to -5M and others.)

Wiring

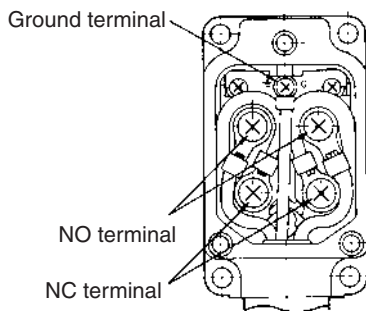
Use 1.25-mm lead wires and M4-insulation covered crimp terminals for wiring.

Crimp Terminal External Dimensions



Wiring Method

Switch Box Section



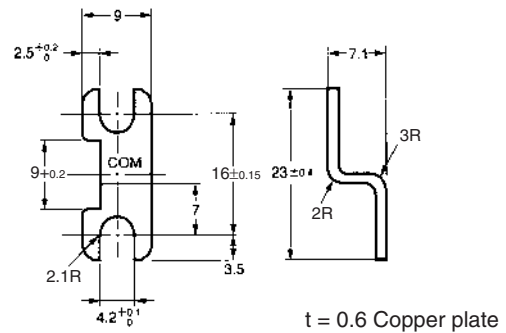
Note: Ground terminals are not installed on the standard models.

Operation Set Position

There is a set position marker slit on the rubber cap of the head. After operation, set the slit on the rubber cap so that the fluorescent color on the shaft section can be seen.

Terminal Plate

By using a short circuit plate, as shown in the following diagram, the Switch can be fabricated into a single-polarity double-break model. When ordering specify WL Terminal-Plate (IWPA01).



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

ZC-□55

Small, High-precision Enclosed Switch

- Employs a modified version of Z Basic Switch as built-in switch.
- Same mounting pitch as Z Basic Switch.
- Pre-wired molded terminal models are available.
- Requires less operating force than conventional limit switches.
- Long life expectancy and economical.
- UL, CSA, and EN models are available.



Model Number Structure

Model Number Legend













ZC-□55
1

1. Actuator

- | | |
|--------------------------------------|---|
| D: Plunger | W: Short hinge lever |
| Q: Panel mount plunger | W1: Hinge lever |
| Q22: Panel mount roller plunger | W2: Short hinge roller lever |
| Q21: Panel mount crossroller plunger | W21: Hinge roller lever |
| N22: Sealed roller plunger | W3: One-way action short hinge roller lever |
| N21: Sealed crossroller plunger | W31: One-way action hinge roller lever |

Ordering Information

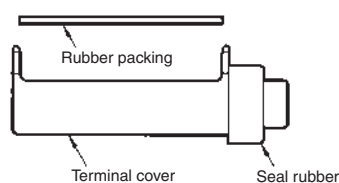
List of Models

Actuator		Model	Actuator		Model
Plunger		ZC-D55	Short hinge lever		ZC-W55
Panel mount plunger		ZC-Q55	Hinge lever		ZC-W155
Panel mount roller plunger		ZC-Q2255	Short hinge roller lever		ZC-W255
Panel mount crossroller plunger		ZC-Q2155	Hinge roller lever		ZC-W2155
Sealed roller plunger		ZC-N2255	One-way action short hinge roller lever		ZC-W355
Sealed crossroller plunger		ZC-N2155	One-way action hinge roller lever		ZC-W3155

- Note:** 1. Use molded terminal models (refer to page 117) 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. Standard model Micro-load model
 ZC-Q55 ZC-Q55-01

Terminal Protective Cover, Seal Rubber, and Rubber Packing

(The Switch is equipped with these 3 items as a standard.)



- ZC Terminal Cover
(Product code: ZC55-0002H)
- ZC Seal Rubber
(Product code: SC-1404C)
- ZC Rubber Packing
(Product code: ZC55-9999G)

Specifications

■ Approved Standards

(Except Molded Terminal Models and Operation Indicator-equipped Model)

Agency	Standard	File No.
UL	UL508	E76675
CSA	C22.2, No. 14	LR45258
TÜV Rheinland	EN60947-1, EN60947-5-1	J9650089

■ Approved Standard Ratings

UL/CSA

A300

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
------------	---------------------------------

TÜV Rheinland

250 V, 10 A (AC12)

■ 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
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	0.4 A	0.05 A		0.05 A	0.05 A
250 VDC	0.25 A		0.2 A	0.2 A	0.03 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

■ Characteristics

Degree of protections	IP67
Durability	Mechanical: 10,000,000 operations min. Electrical: 500,000 operations min.
Operating speed	0.05 mm to 0.5 m/s (at pin 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 non-continuous terminals 2,000 VAC, 50/60 Hz for 1 min between current-carrying metal part and ground, and between each terminal and non-current-carrying metal parts
Rated insulation voltage (U _i)	1,000 VAC
Pollution degree (operating environment)	3 (IEC947-5-1)
Short-circuit protective device	10 A-fuse type gG (IEC 269)
Protection against electric shock	Class II
PT1 (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 max. Malfunction: 300 m/s ² max. (at pin plunger) (see note)
Ambient temperature	Operating: -10°C to 80°C (with no icing)
Ambient humidity	Operating: 35% to 95%
Weight	Approx. 92 g (in case of ZC-Q22(21)55)

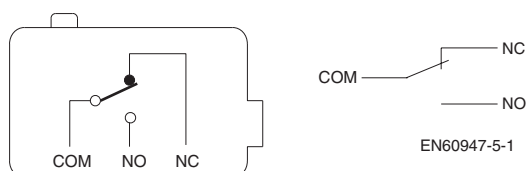
Note: Less than 1 ms under a free state at the operating limits.

■ Operating Characteristics

Model	ZC-D55	ZC-Q55	ZC-Q2255	ZC-Q2155	ZC-N2255	ZC-N2155
OF max.	11.8 N	11.8 N			6.86 N	
RF min.	4.90 N	4.90 N			1.67 N	
PT max.	1.5 mm	1.5 mm			1.5 mm	
OT min.	2.4 mm	3 mm			2.5 mm	
MD max.	0.2 mm	0.2 mm			0.2 mm	
OP	32.4±0.8 mm	38.2±0.8 mm	47.4±0.8 mm			

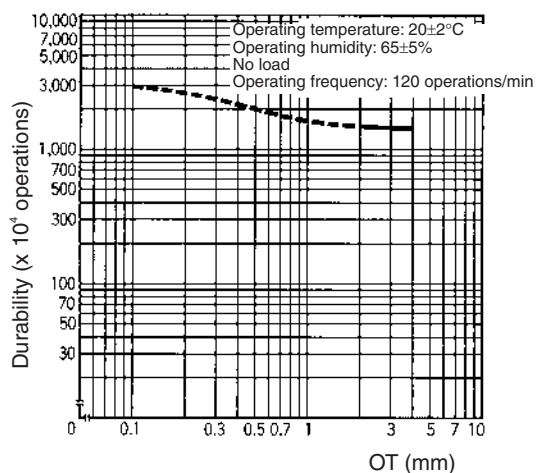
Model	ZC-W55	ZC-W155	ZC-W255	ZC-W2155	ZC-W355	ZC-W3155
OF max.	3.92 N	2.75 N	3.92 N	2.75 N	3.92 N	2.75 N
RF min.	0.78 N	0.59 N	0.78 N	0.59 N	0.78 N	0.59 N
OT min.	6 mm	8.4 mm	6 mm	8.4 mm	6 mm	8.4 mm
MD max.	1 mm	1.4 mm	1 mm	1.4 mm	1 mm	1.4 mm
OP	28.5±1.2 mm	28.5±1.2 mm	43±1.2 mm	43±1.2 mm	53±1.2 mm	53±1.2 mm
FP max.	34.7 mm	36.7 mm	49.2 mm	51.3 mm	59.2 mm	61.2 mm

■ Contact Form

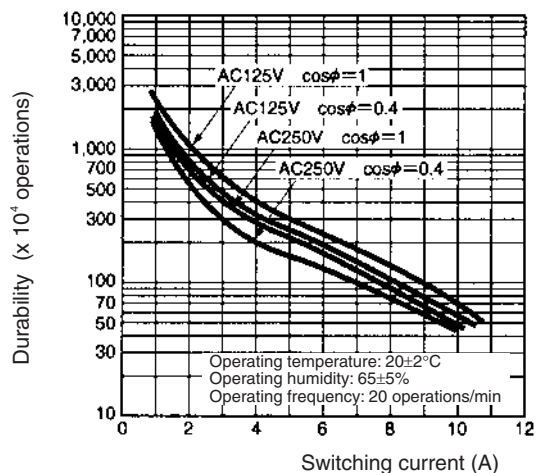


Engineering Data

■ Mechanical Durability (for ZC-Q55)

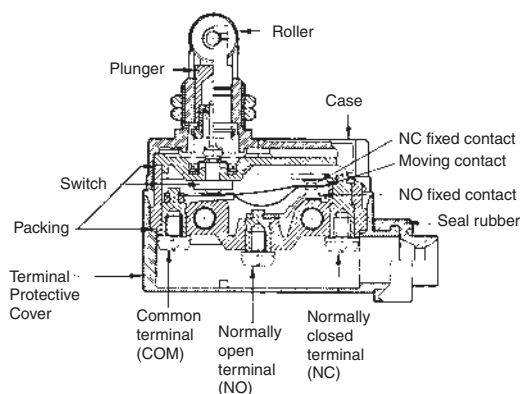


■ Electrical Durability



Nomenclature

Changing the Terminal Protective Cover around allows the cable to be pulled out from either the right or the left.

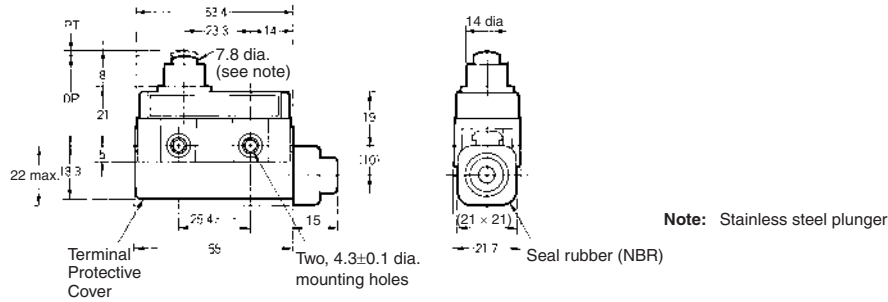


Note: M4 binding head screws (with toothed washers) are used as the terminal screws.

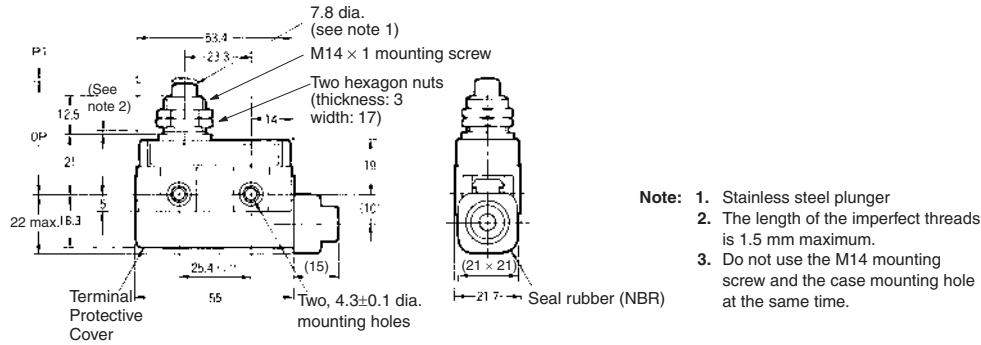
Dimensions

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

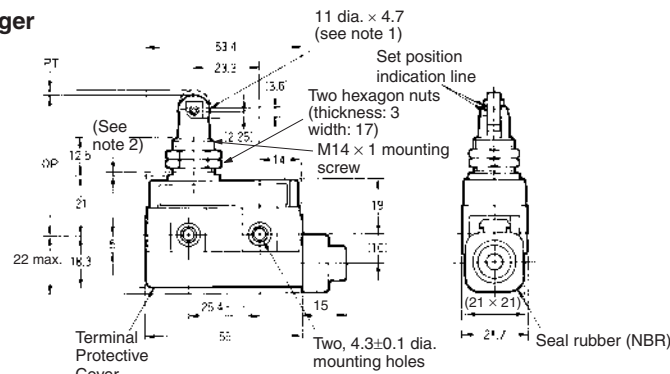
Plunger ZC-D55



Panel Mount Plunger ZC-Q55

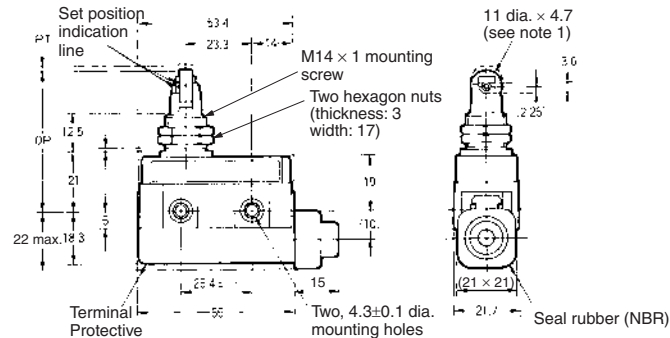


Panel Mount Roller Plunger ZC-Q2255



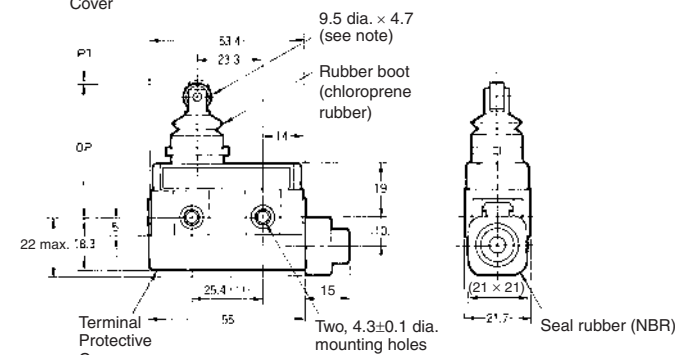
- Note:**
1. Stainless sintered alloy roller
 2. The length of the imperfect threads is 1.5 mm maximum.
 3. Do not use the M14 mounting screw and the case mounting hole at the same time.

Panel Mount Crossroller Plunger
ZC-Q2155



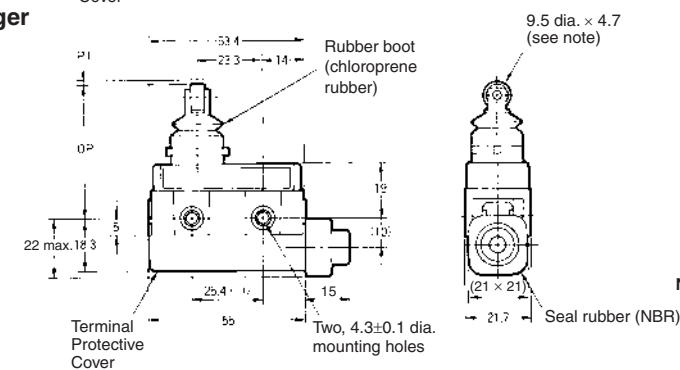
- Note:**
1. Stainless sintered alloy roller
 2. The length of the imperfect threads is 1.5 mm maximum.
 3. Do not use the M14 mounting screw and the case mounting hole at the same time.

Sealed Roller Plunger ZC-N2255



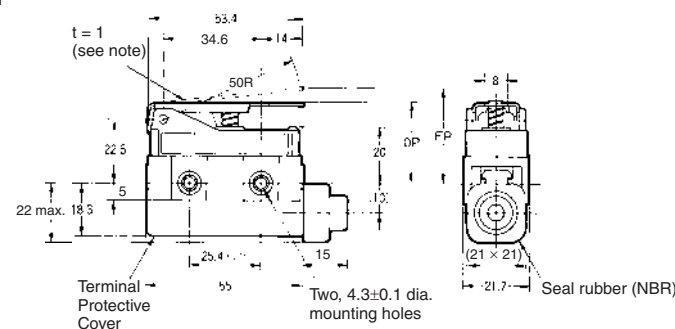
- Note:** Stainless sintered alloy roller

Sealed Crossroller Plunger ZC-N2155



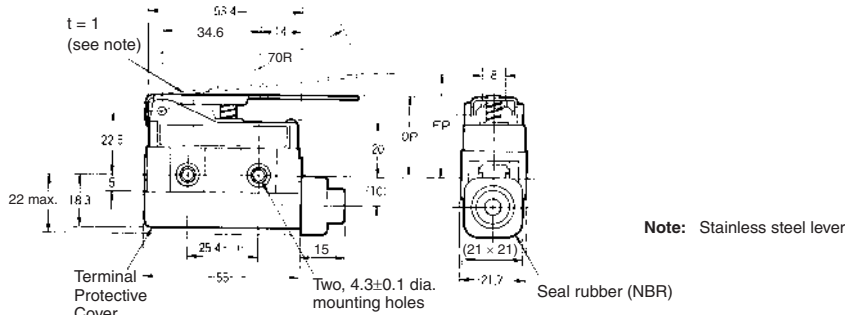
- Note:** Stainless sintered alloy roller

Short Hinge Roller Lever ZC-W55

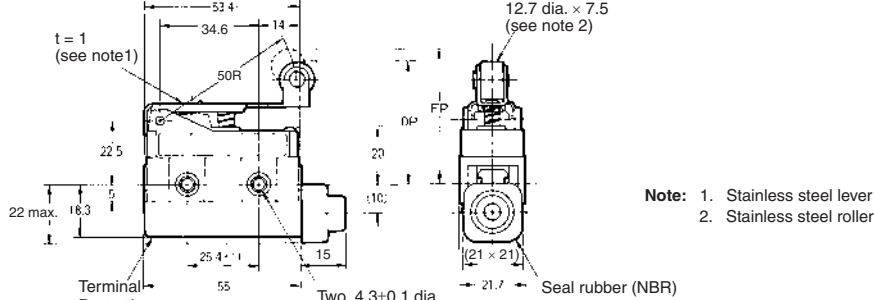


- Note:** Stainless steel lever

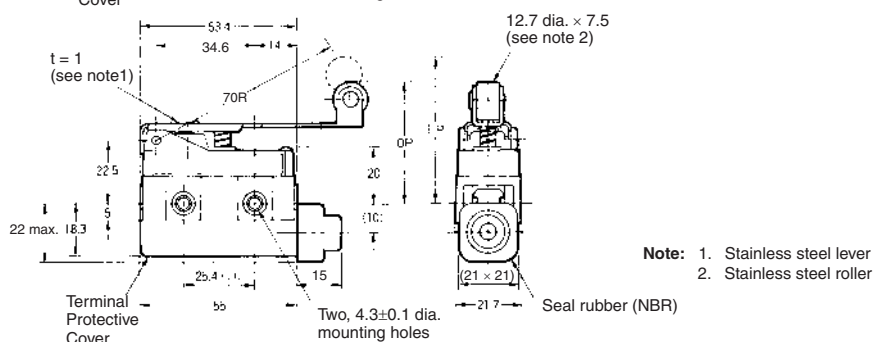
Hinge Lever
ZC-W155



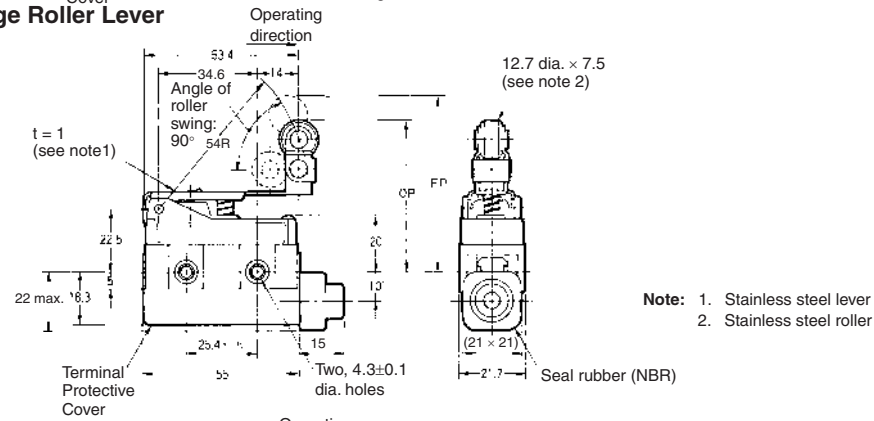
Short Hinge Roller Lever
ZC-W255



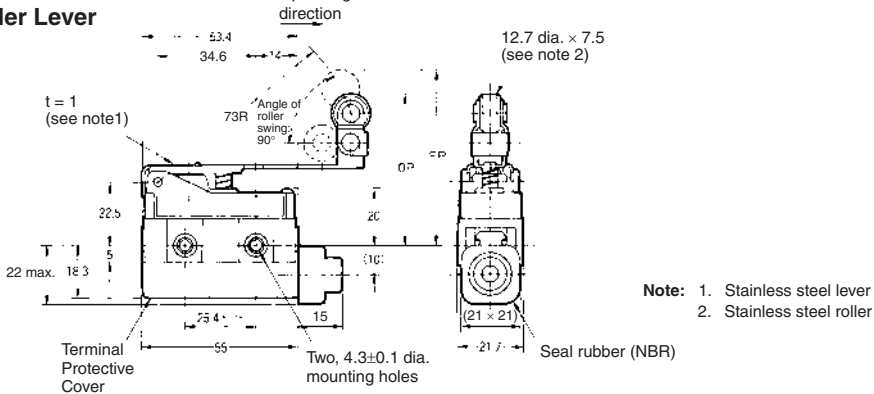
Hinge Roller Lever
ZC-W2155



One-way Action Short Hinge Roller Lever
ZC-W355



One-way Action Hinge Roller Lever
ZC-W3155



Limit
Switches

■ Operation Indicator-equipped Models

All the models can be equipped upon request with an operation indicator to facilitate maintenance and inspection.

Because the indicator is incorporated in the Terminal Protective Cover, the dimensions of the Limit Switch are not affected. In this model, the lead wire is to be connected to the screw terminal. (A connecting washer is provided on the tip of the lead wire).

The lead wire can be connected to either the NC or NO terminal.

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

AC Operation

The operating voltage range is from 90 to 250 VAC.

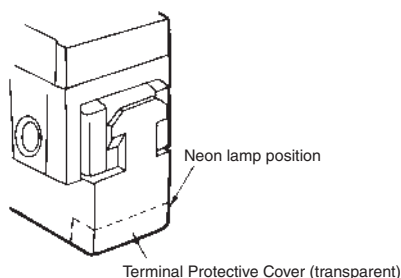
The dimensions are the same as the standard type. The top of the Terminal Protective Cover is transparent to allow checking the operation easily.

When placing your order for the indicator equipped, AC-operated model, add suffix "L" to the end of the model number.

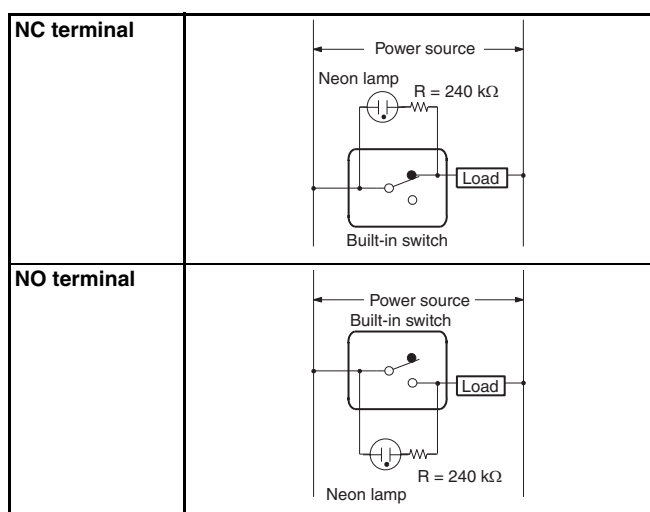
Example:

Standard type: ZC-Q2255

Indicator equipped type: ZC-Q2255-L



Contact Circuit



Note: If the wiring is as shown above, the operation of the respective parts will be as follows:

Contact	Neon lamp	Load	Actuator
NC	ON	Does not operate	Operates
	OFF	Operates	Does not operate
NO	ON	Does not operate	Does not operate
	OFF	Operates	Operates

DC Operation

The DC-operated is provided with an LED indicator.

Since a rectifier stack is incorporated into the unit to permit reversing the polarity, this type can also operate on AC power source. An external 24VDC power supply can be used, eg. OMRON S8VS or S82K.

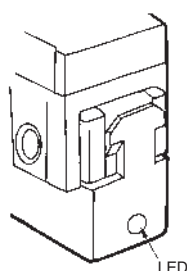
The LED projects from the housing for easy visibility.

When placing your order, add suffix "L2" to "L5" to the model number of the standard type.

Example:

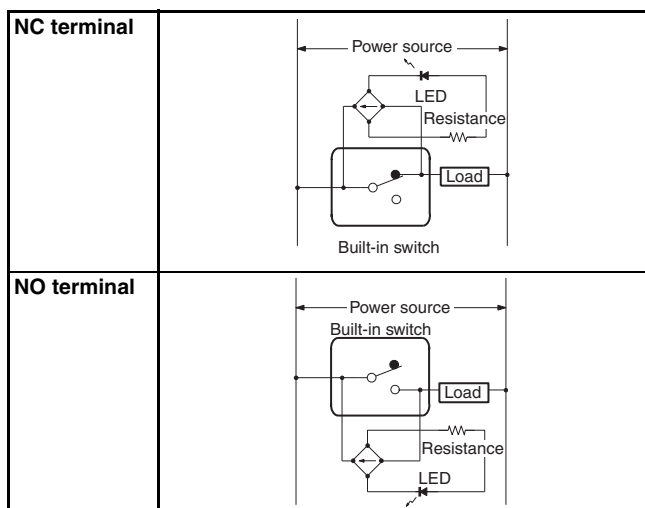
Standard type: ZC-Q2255

Indicator equipped type: ZC-Q2255-L2



Type	Voltage rating	Leakage current	Internal resistance
L2	12 V	Approx. 2.4 mA	4.3 kΩ
L4	24 V	Approx. 1.2 mA	18 kΩ

Contact Circuit



Note: If the wiring is as shown above, the operation of the respective parts will be as follows:

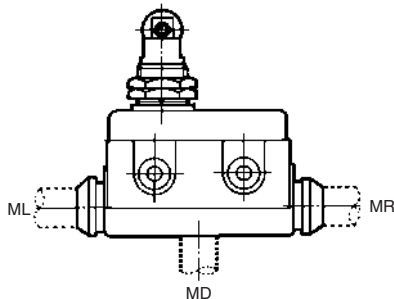
Contact	LED	Load	Actuator
NC	ON	Does not operate	Operates
	OFF	Operates	Does not operate
NO	ON	Does not operate	Does not operate
	OFF	Operates	Operates

Molded Terminal Models

Molded Terminal Model

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.

The molded-terminal model is not approved by UL and CSA.



Note: 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: ZC-Q2155
Location of lead output: Underside
Length of lead: 1 m (V.C.T. lead)
When placing your order for the above Switch, specify the model number as ZC-Q2155-MD VCT 1 m.

Suffix by Location of Lead Outlet

Location of lead output	Model
	COM, NC and NO
Right-hand	ZC-□-MR
Left-hand	ZC-□-ML
Underside	ZC-□-MD

Lead Supplies

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

Precautions

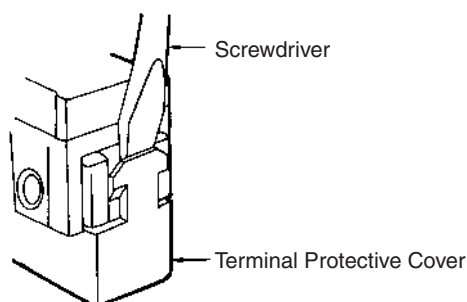
■ Correct Use

Dog Angle

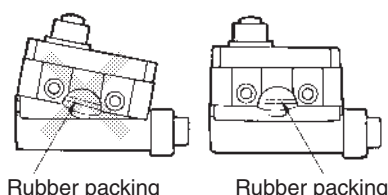
When operating the roller type, be sure to set the dog angle to less than 30° (even when operating at a low speed). Operating the model at a dog angle exceeding 30° will soon cause abrasion or damage. Do not apply a twisting force to the plunger. Set the OT to 70% to 100% of the specified value so that the actuator will not exceed the OT.

Handling

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.

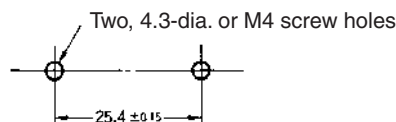


- A 8.5- to 10.5-dia. cable can be applied as seal rubber for the lead wire outlet. (Use two- or three-core cable of VCT1.25 mm².)
- Use weather-proof rubber (chloroprene rubber) as seal rubber for the ZC-N22(21)55.

Mounting

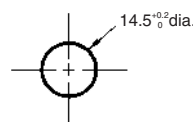
- When mounting the Switch with screws on a side surface, fasten the Switch with M4 screws and use washers, spring washers, etc., to ensure secure mounting.

Mounting Holes



- When mounting the Panel Mount-type Enclosed Switch (ZC-Q55, ZC-Q2255, or ZC-Q2155) with screws on a side surface, remove the hexagonal nuts from the actuator.

Mounting Hole Dimensions



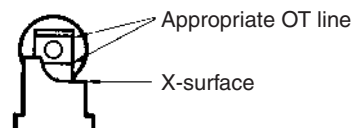
Tightening Torque

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	0.78 to 1.18 N·m
2	Panel mounting screw	4.90 to 7.84 N·m
3	Side mounting screw	1.18 to 1.47 N·m

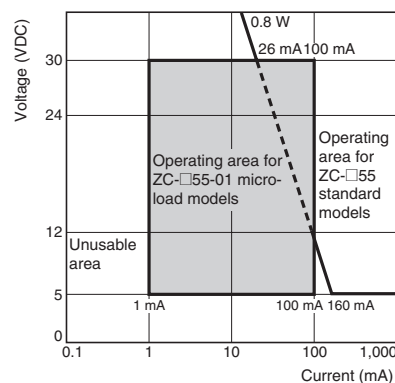
Operation

With the ZC-Q22(21)55, an appropriate OT line is marked on the plunger. Set the OT so that it is between the two X-surface lines.



Micro-load Applicable Ranges

Using a standard load switch for opening and closing a micro-load circuit may cause wear on the contacts. Use the switch within the operating range. (Refer to the diagram below.) Even when using micro-load models within the operating range shown below, if inrush current occurs when the contact is opened or closed, it may cause the contact surface to become rough, and so decrease life expectancy. Therefore, insert a contact protection circuit where necessary. The minimum applicable load is the N-level reference value. This value indicates the malfunction reference level for the reliability level of 60% (λ_{60}). The equation $\lambda_{60} = 0.5 \times 10^{-6}/\text{operations}$ indicates that the estimated malfunction rate is less than 1/2,000,000 operations with a reliability level of 60%.



Model	ZC-Q55-01	ZC-Q55
Minimum applicable load	1 mA at 5 VDC	160 mA at 5 VDC

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 Switches ZE/ZV/XE/XV

Long Service Life and Large Breaking Power

- ZE, ZV, and ZV2 incorporate Model Z Basic Switches with rugged diecast cases.
- Available with various models of built-in switches (including split contact model, maintained operation type, magnetic blowout model) and various actuators.



Model Number Structure

Model Number Legend

□ □ - □ - 2 □
1 2 3 4

1. Built-in Switch

- Z: SPDT (AC)
X: SPDT (DC)

2. Mounting Direction

- E: Side mounting
V: Base mounting
V2: Diagonal side mounting

3. Actuator

- Q: Plunger
Q22: Roller plunger
Q21: Crossroller plunger
QA2: Roller arm lever
QA277: One-way action roller arm lever
N: Sealed plunger
N22: Sealed roller plunger (ZE, ZV, ZV2 only)
N21: Sealed crossroller plunger (ZE, ZV, ZV2 only)
NA2: Sealed roller arm lever
NA277: Sealed one-way action roller arm lever

4. Conduit/Ground Terminal

- None: G 1/2/without ground terminal
G1: G 1/2/with ground terminal
G: Pg13.5/with ground terminal
SG1: 1/2-14NPSM/with ground terminal
YG1: M20/with ground terminal
S: 1/2-14NPSM/without ground terminal
Y: M20/without ground terminal

Ordering Information

■ List of Models

Standard Switches

Contact		Actuator	Side mounting		Diagonal side mounting		Base mounting	
			General purpose	Sealed (Booted)	General purpose	Sealed (Booted)	General purpose	Sealed (Booted)
AC/DC load	SPDT	Plunger	ZE-Q-2	ZE-N-2	ZV2-Q-2	ZV2-N-2	ZV-Q-2	ZV-N-2
		Roller plunger	ZE-Q22-2	ZE-N22-2	ZV2-Q22-2	ZV2-N22-2	ZV-Q22-2	ZV-N22-2
		Crossroller plunger	ZE-Q21-2	ZE-N21-2	ZV2-Q21-2	ZV2-N21-2	ZV-Q21-2	ZV-N21-2
		Roller arm lever	ZE-QA2-2	ZE-NA2-2	ZV2-QA2-2	ZV2-NA2-2	ZV-QA2-2	ZV-NA2-2
		One-way action arm lever	ZE-QA277-2	ZE-NA277-2	ZV2-QA277-2	ZV2-NA277-2	ZV-QA277-2	ZV-NA277-2
DC load	SPDT	Plunger	XE-Q-2	XE-N-2	XV2-Q-2	XV2-N-2	XV-Q-2	XV-N-2
		Roller plunger	XE-Q22-2	---	XV2-Q22-2	---	XV-Q22-2	---
		Crossroller plunger	XE-Q21-2	---	XV2-Q21-2	---	XV-Q21-2	---
		Roller arm lever	XE-QA2-2	XE-NA2-2	XV2-QA2-2	XV2-NA2-2	XV-QA2-2	XV-NA2-2
		One-way action arm lever	XE-QA277-2	XE-NA277-2	---	XV2-NA277-2	XV-QA277-2	XV-NA277-2

- Note:** 1. The diagonal side mounting model feature improved sealing property, improved mounting strength through use of M5 screws, increased stability in seating with large mounting width (31 x 75 mm) and permit coupling of a number of Switch units.
 2. ZE, ZV, and ZV2 series are approved by UL and CSA.

Specifications

■ Approved Standards

Agency	Standard	File No.
UL	UL508	E76675
CSA	CSA C22.2 No. 14	LR45746

Note: Models XE, XV, and XV2 are not approved by UL and CSA.

■ Approved Standard Ratings

UL/CSA

Model	Rated voltage	Current	Horsepower
ZE	125 VAC	15 A	1/8 HP
	250 VAC		1/4 HP
	480 VAC		
	125 VDC	0.5 A	---
	250 VDC	0.25 A	

■ Ratings

Contact	Contact	Rated voltage	Non-inductive load				Inductive load			
			Resistive load		Lamp load		Inductive load		Motor load	
			NC	NO	NC	NO	NC	NO	NC	NO
ZE-□ ZV-□ ZV2-□		125 VAC	15 A		3 A	1.5 A	15 A		5 A	2.5 A
		250 VAC	15 A		2.5 A	1.25 A	15 A		3 A	1.5 A
		480 VAC	10 A		1.5 A	0.75 A	6 A		1.5 A	0.75 A
		125 VDC	0.5 A		0.5 A		0.05 A		0.05 A	
		250 VDC	0.25 A		0.25 A		0.03 A		0.03 A	
XE-□ XV-□ XV2-□		8 VDC	15 A		3 A	3 A	15 A	15 A	10 A	10 A
		14 VDC	15 A		3 A	3 A	15 A	10 A	10 A	10 A
		30 VDC	15 A		3 A	3 A	10 A	10 A	10 A	6 A
		125 VDC	10 A		3 A	1.5 A	7.5 A	6 A	6 A	4 A
		250 VDC	3 A		1.5 A	0.75 A	2 A	1.5 A	2 A	1 A

Note: 1. The above figures are for standard 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.

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

■ Characteristics

Degree of protection	IP65 (see note 2)
Durability (see note 3)	Mechanical: Z□: 10,000,000 operations min. X□: 1,000,000 operations min. Electrical: Z□: 500,000 operations min., for 15 A, 250 VAC resistive load X□: 100,000 operations min., for 10 A, 125 VDC resistive load
Operating speed	Plunger type: 0.01 mm to 0.5 m/s Lever type: 0.02 mm to 0.5 m/s
Operating frequency	Mechanical: 120 operations/min Electrical: 20 operations/min
Rated frequency	50/60 Hz
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	15 mΩ max. (initial value)
Terminal temperature rise	50° max.
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 part and ground, and between each terminal and non-current-carrying metal part (1,500 VAC for Z□ models and X□ models)
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note 4)
Shock resistance (see note 4)	Destruction: 1,000 m/s ² min. Malfunction: 100 m/s ² min. (see note 5), 50 m/s ² min. (see note 6)
Ambient temperature (see note 1)	Operating: -10°C to 80°C (with no icing)
Ambient humidity	Operating: General-purpose type: 85% max. Sealed type: 95% max.
Weight	Approx. 260 to 280 g

Note: 1. The above figures are initial values.

2. IP65 for □E-N models and IP60 for □E-Q models.

3. The 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.

4. At the operation limit positions.

5. Only for plunger, sealed plunger, roller arm lever, and sealed roller arm lever.

6. Only for crossroller plunger, sealed crossroller plunger, roller plunger, and sealed roller plunger.

■ Operating Characteristics

Model	ZE-Q-2	XE-Q-2	ZE-Q22-2	XE-Q22-2	ZE-Q21-2
OF	2.45 to 3.43 N	5.00 N max.	2.45 to 3.43 N	5.00 N max.	2.45 to 3.43 N
RF min.	1.12 N	1.12 N	1.12 N	1.12 N	1.12 N
PT max.	0.4 mm	0.9 mm	0.5 mm	0.9 mm	0.5 mm
OT min.	5.5 mm	5.5 mm	3.6 mm	3.6 mm	3.6 mm
MD max.	0.05 mm	0.47 mm	0.05 mm	0.47 mm	0.05 mm
OP	38.2±0.8 mm		49.7±1 mm		49.7±1 mm

Model	XE-Q21-2	ZE-QA2-2	XE-QA2-2	ZE-QA277-2	XE-QA277-2	ZE-N-2
OF	5.00 N max.	5.59 N max.	6.47N max.	5.59 N	6.47 N	7.85 N
RF min.	1.12 N	1.67 N	1.67 N	1.67 N	1.67 N	2.35 N
PT max.	0.9 mm	4 mm	6 mm	4 mm	6 mm	2 mm
OT min.	3.6 mm	6 mm	5.5 mm	6 mm	5.5 mm	5 mm
MD max.	0.47 mm	0.4 mm	0.72 mm	0.4 mm	0.72 mm	0.1 mm
OP	49.7±1 mm	---				45.8±0.8 mm

Model	XE-N-2	ZE-N22-2	ZE-N21-2	ZE-NA2-2	XE-NA2-2	ZE-NA277-2
OF	10.20 N	4.90 N		6.28 N	7.26 N	6.28 N
RF min.	2.35 N	0.98 N		2.26 N	2.26 N	2.26 N
PT max.	3 mm	1 mm		5 mm	6 mm	5 mm
OT min.	4 mm	3.5 mm		6 mm	5.5 mm	6 mm
MD max.	0.47 mm	0.12 mm		0.4 mm	0.72 mm	0.4 mm
OP	45.8±0.8 mm	49.7±0.8 mm		---		

Model	XE-NA277-2	ZV(2)-Q-2	XV(2)-Q-2	ZV(2)-Q22-2	XV(2)-Q22-2
OF	7.26 N	2.45 to 3.43 N	5.00 N max.	2.45 to 3.43 N	5.00 N max.
RF min.	2.26 N	1.12 N	1.12 N	1.12 N	1.12 N
PT max.	6 mm	0.4 mm	0.9 mm	0.5 mm	0.9 mm
OT min.	5.5 mm	5.5 mm	5.5 mm	3.6 mm	3.6 mm
MD max.	0.72 mm	0.05 mm	0.47 mm	0.05 mm	0.47 mm
OP	---	63.7±0.8 mm (ZV-Q-2, XV-Q-2) (see note 1)		75.2±0.8 mm (ZV-Q-22.2, XV-Q21-2) (see note 2)	

Model	ZV(2)-Q21-2	XV(2)-Q21-2	ZV(2)-QA2-2	XV(2)-QA2-2	ZV(2)-QA277-2
OF	2.45 to 3.43 N	5.00 N max.	5.59 N max.	6.47 N max.	5.59 N
RF min.	1.12 N	1.12 N	1.67 N	1.67 N	1.67 N
PT max.	0.5 mm	0.9 mm	4 mm	6 mm	4 mm
OT min.	3.6 mm	3.6 mm	6 mm	5.5 mm	6 mm
MD max.	0.05 mm	0.47 mm	0.4 mm	0.72 mm	0.4 mm
OP	75.2±0.8 mm (ZV-Q22-2, XV-Q21-2) (see note 3)		---		

- Note:** 1. The OP of ZV2-Q-2/XV2-Q-2 is 24.2±0.8 mm.
 2. The OP of ZV2-Q22-2/XV2-Q22-2 is 35.7±1 mm.
 3. The OP of ZV2-Q21-2/XV2-Q21-2 is 35.7±0.8 mm.

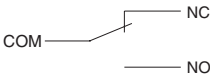
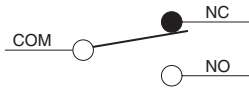
Model	XV(2)-QA277-2	ZV(2)-N-2	XV(2)-N-2	ZV(2)-N22-2	ZV(2)-N21-2	ZV(2)-NA2-2
OF	6.47 N	7.85 N	10.20 N	4.90 N		6.28 N
RF min.	1.67 N	2.35 N	2.35 N	0.98 N		2.26 N
PT max.	6 mm	2 mm	3 mm	1 mm		5 mm
OT min.	5.5 mm	5 mm	4 mm	3.5 mm		6 mm
MD max.	0.72 mm	0.1 mm	0.47 mm	0.12 mm		0.4 mm
OP	---	71.4±0.8 mm (ZV-N-2, XV-N-2) (see note 1)		75.2±0.8 mm (ZV-N22-2, ZV-N21-2) (see note 2)		---

- Note:** 1. The OP of ZV2-N-2/XV2-N-2 is 31.9±0.8 mm.
 2. The OP of ZV2-N22-2/ZV2-N21-2 is 35.7±0.8 mm.

Model	XV(2)-NA2-2	ZV(2)-NA277-2	XV(2)-NA277-2
OF	7.26 N	6.28 N	7.26 N
RF min.	2.26 N	2.26 N	2.26 N
PT max.	6 mm	5 mm	6 mm
OT min.	5.5 mm	6 mm	5.5 mm
MD max.	0.72 mm	0.4 mm	0.72 mm
FP max.	---		
OP	---		

■ Contact Form

ZE-□, ZV-□, ZV2-□
XE-□, XV-□, XV2-□



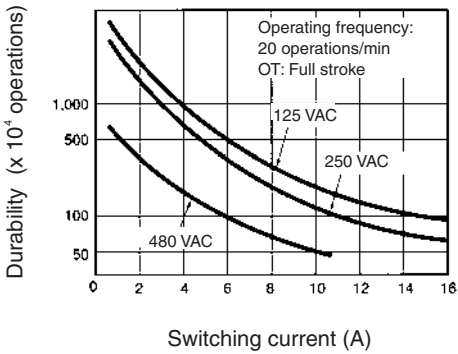
EN60947-5-1

Note: With the XE-□, XV-□, and XV2-□, be sure to connect COM to the + terminal.

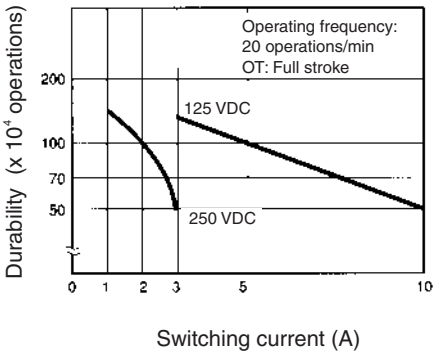
Engineering Data

■ Electrical Durability

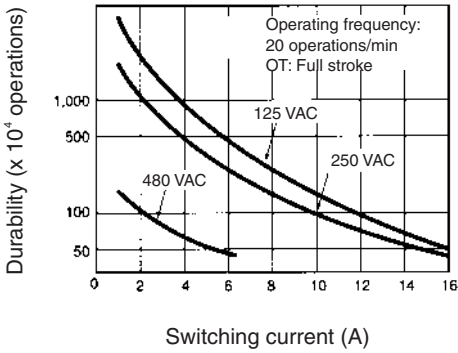
ZE ($\cos\phi = 1$)



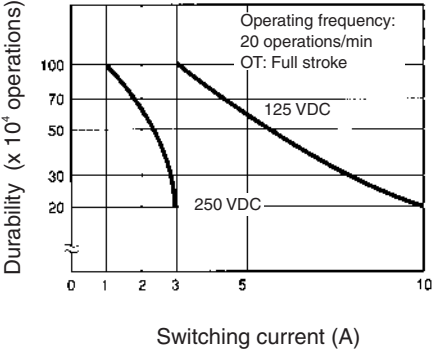
XE ($L/R = 0$)



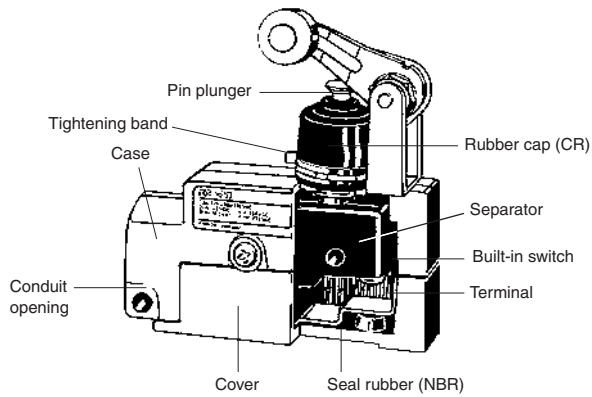
ZE ($\cos\phi = 0.4$)



XE ($L/R = 7 \text{ ms}$)



Nomenclature



Dimensions

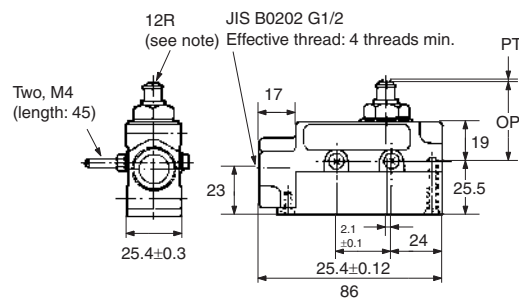
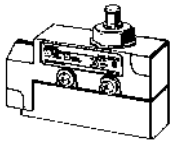
Note: 1. All units are in millimeters unless otherwise indicated.

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

3. In the drawings for the Base Mounting Type Switches (ZV), the mounting surfaces (flanges) are shown by lines of alternate long and two short dashes.

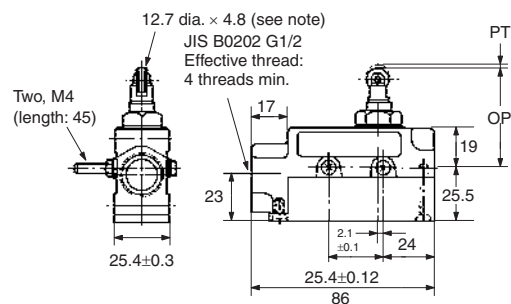
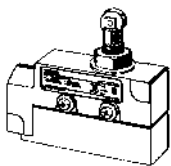
Side Mounting

Plunger ZE-Q-2, XE-Q-2



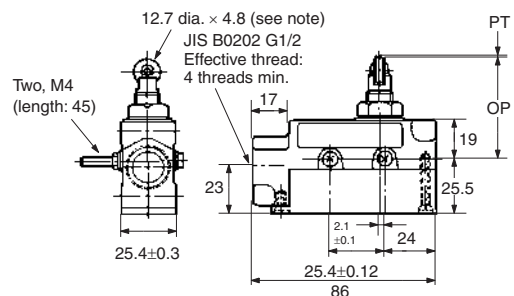
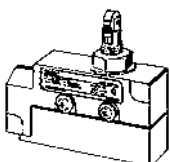
Note: Stainless steel plunger

Roller Plunger ZE-Q22-2, XE-Q22-2



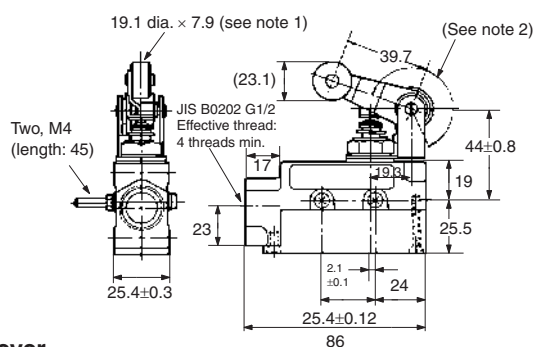
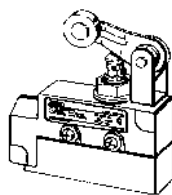
Note: Stainless steel roller

Crossroller Plunger ZE-Q21-2, XE-Q21-2



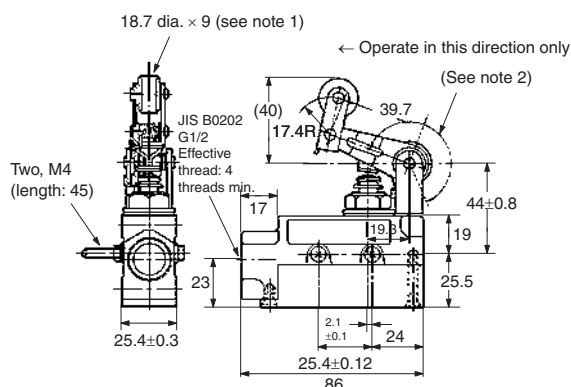
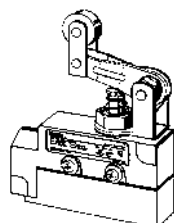
Note: Stainless steel roller

Roller Arm Lever
ZE-QA2-2, XE-QA2-2



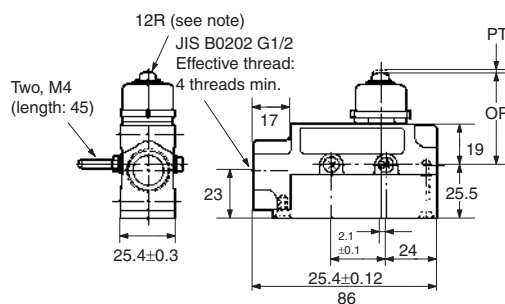
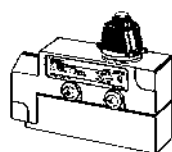
Note: 1. Stainless sintered roller
2. Adjustable between 0° and 225°

One-way Action Roller Arm Lever ZE-QA277-2, XE-QA277-2



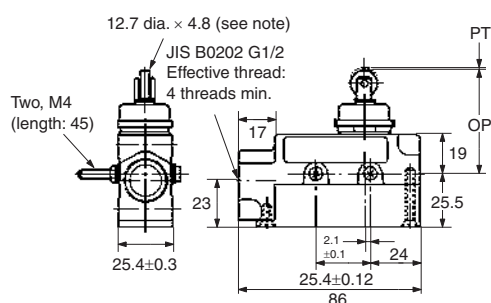
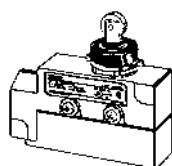
Note: 1. Stainless sintered alloy roller
2. Adjustable between 0° and 225°

Sealed Plunger ZE-N-2, XE-N-2



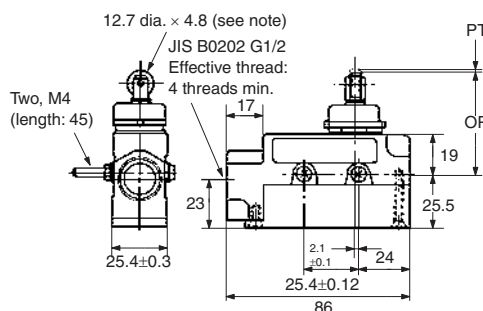
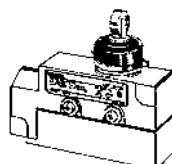
Note: Stainless steel plunger

Sealed Roller Plunger ZE-N22-2



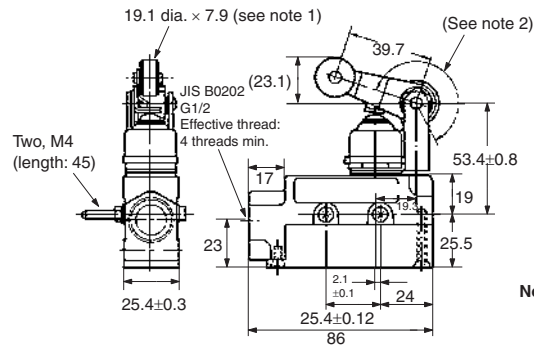
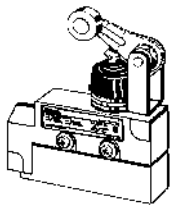
Note: Stainless steel roller

Sealed Crossroller Plunger ZE-N21-2



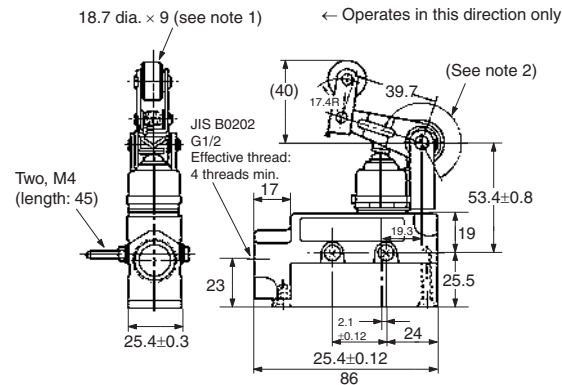
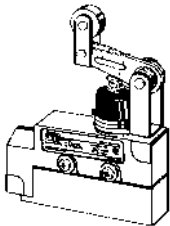
Note: Stainless steel roller

Sealed Roller Arm Lever ZE-NA2-2, XE-NA2-2



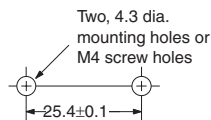
- Note:** 1. Stainless steel roller
2. Adjustable between 0° and 225°

One-way Action Sealed Roller Arm Lever ZE-NA277-2, XE-NA277-2



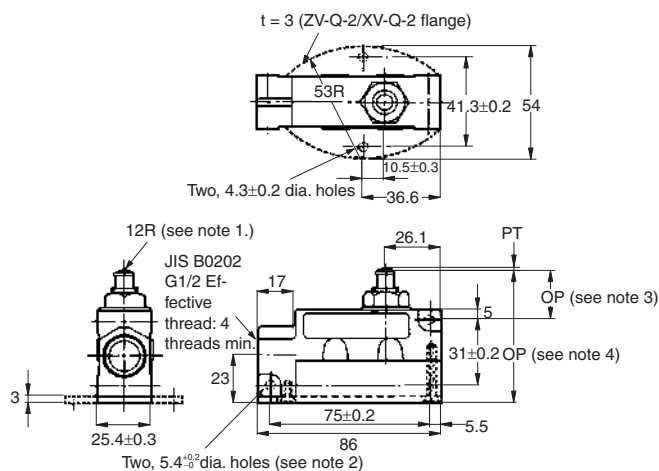
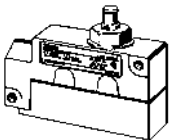
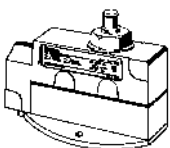
- Note:** 1. Stainless steel roller
2. Adjustable between 0° and 225°

Mounting Hole



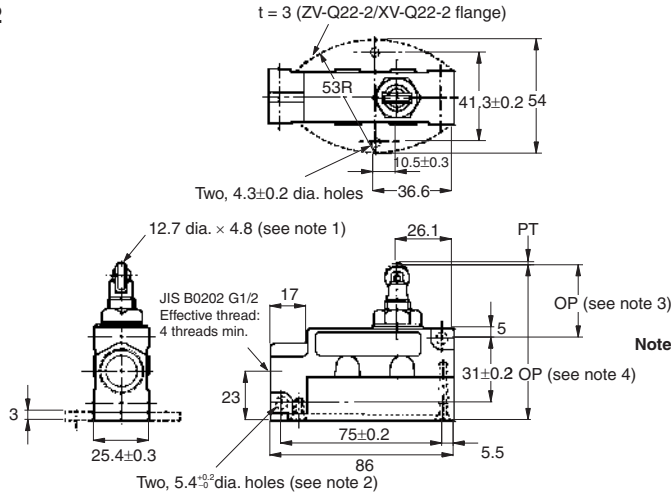
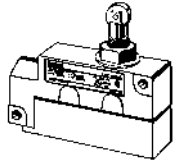
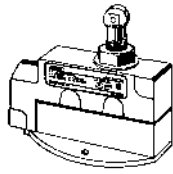
Base Mounting/Diagonal Side Mounting

Plunger ZV(2)-Q-2, XV(2)-Q-2



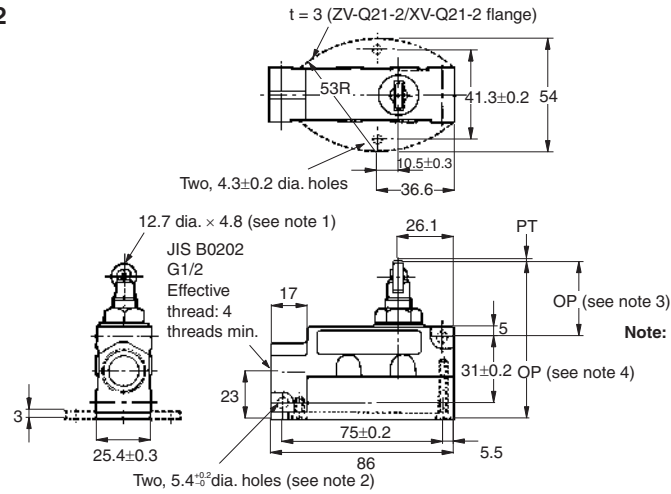
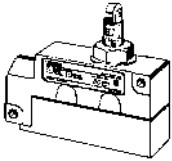
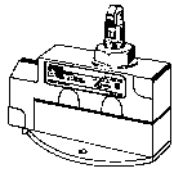
- Note:** 1. Stainless steel plunger
2. Only the ZV2-Q-2 and XV2-Q-2 incorporate mounting holes.
3. OP for ZV2-Q-2 and XV2-Q-2 is 24.2 \pm 0.8 mm.

Roller Plunger
ZV(2)-Q22-2, XV(2)-Q22-2



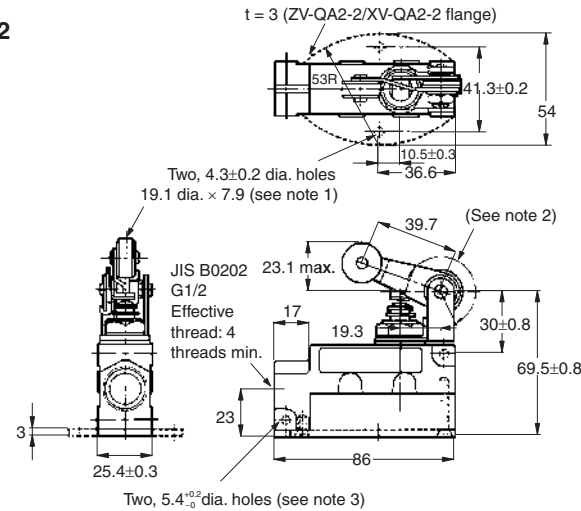
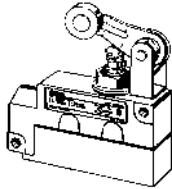
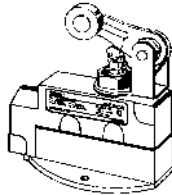
- Note:**
1. Stainless steel roller
 2. Only the ZV2-Q22-2 and XV2-Q22-2 incorporate mounting holes.
 3. OP for ZV2-Q22-2 and XV2-Q22-2 is 35.7 ± 1 mm.

Crossroller Plunger
ZV(2)-Q21-2, XV(2)-Q21-2



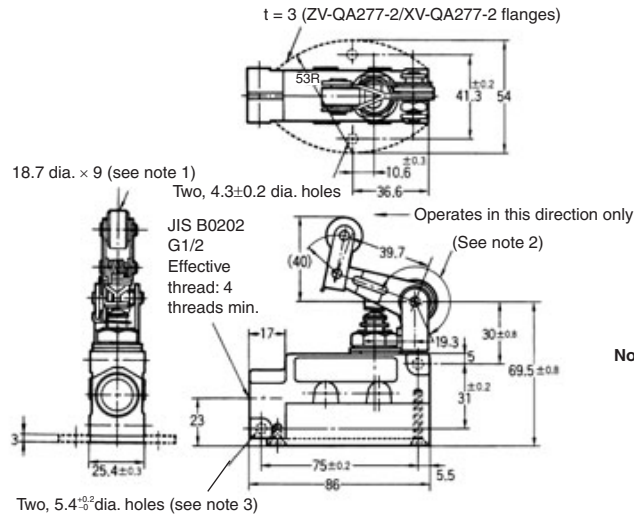
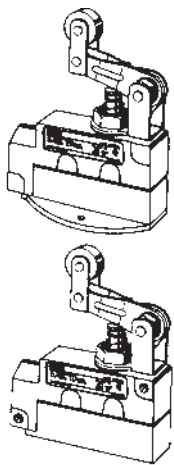
- Note:**
1. Stainless steel roller
 2. Only the ZV2-Q21-2 and XV2-Q21-2 incorporate mounting holes.
 3. OP for ZV2-Q21-2 and XV2-Q21-2 is 35.7 ± 0.8 mm.

Roller Arm Lever
ZV(2)-QA2-2, XV(2)-QA2-2



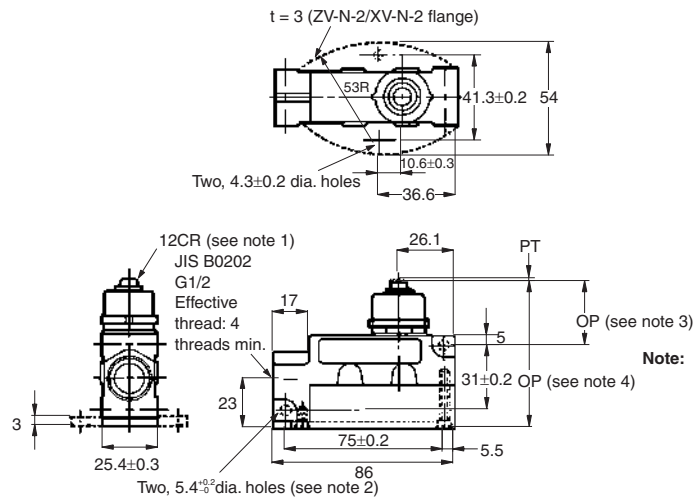
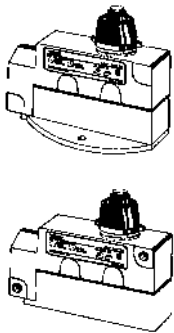
- Note:**
1. Stainless sintered alloy roller
 2. Adjustment between 0° to 225°.
 3. Only the ZV2-QA2-2 and XV2-QA2-2 incorporate mounting holes.

One-way Action Roller Arm Lever ZV(2)-QA277-2, XV(2)-QA277-2



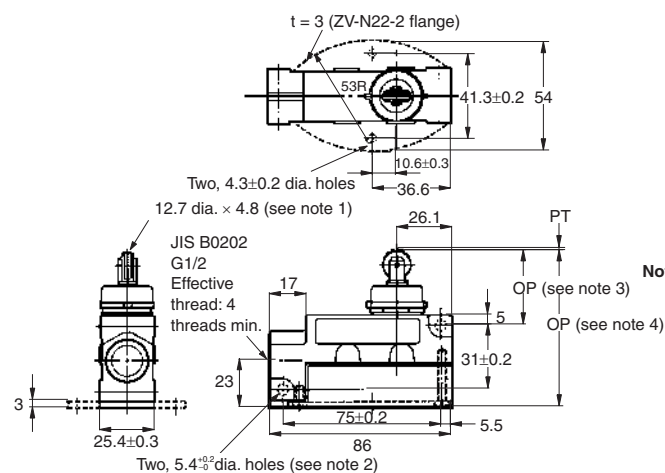
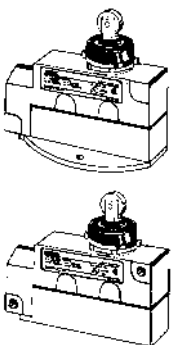
- Note:**
1. Stainless steel roller
 2. Adjustment between 0° to 225°.
 3. Only the ZV2-QA277-2 and XV2-QA277-2 incorporate mounting holes.

Sealed Plunger ZV(2)-N-2, XV(2)-N-2



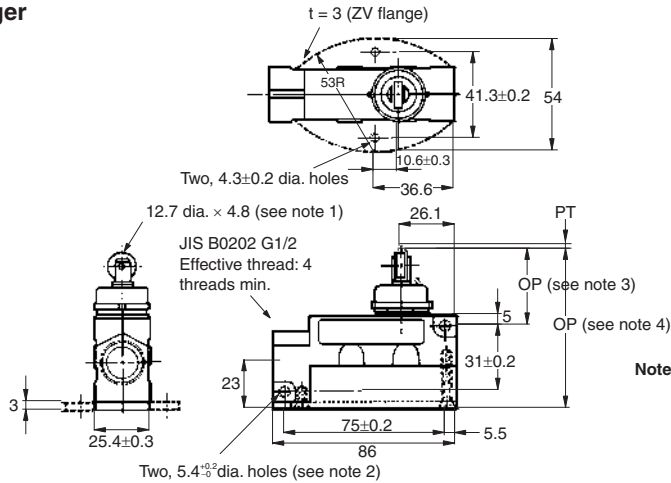
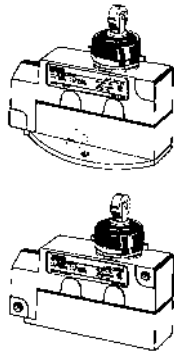
- Note:**
1. Stainless steel plunger
 2. Only the ZV2-N-2 and XV2-N-2 incorporate mounting holes.
 3. OP for ZV2-N-2 and XV2-N-2 is 31.9 \pm 0.8 mm.

Sealed Roller Plunger ZV(2)-N22-2

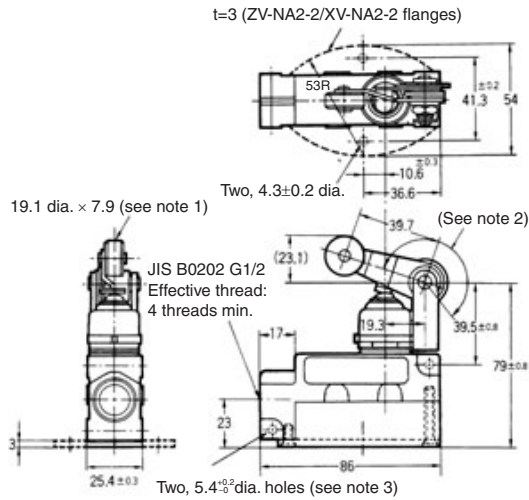
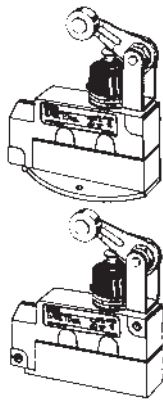


- Note:**
1. Stainless steel roller
 2. Only the ZV2-N22-2 incorporate mounting holes.
 3. OP for ZV2-N22-2 is 35.7 \pm 0.8 mm.

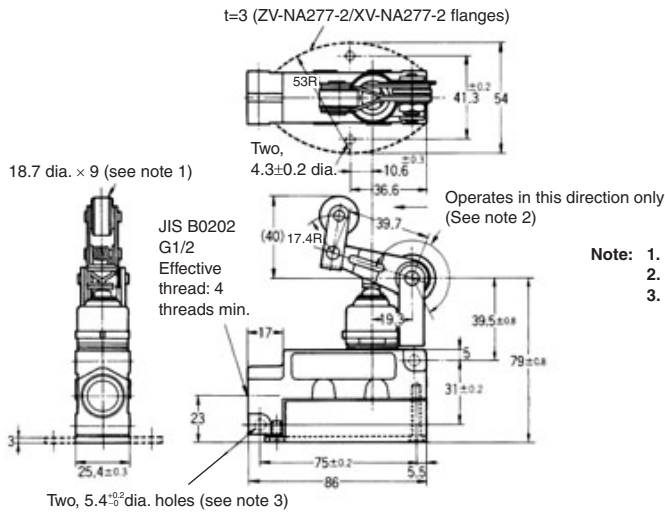
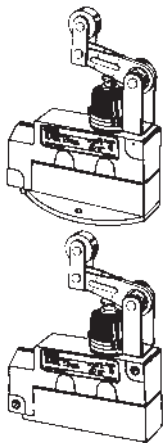
**Sealed Crossroller Plunger
ZV(2)-N21-2**



**Sealed Roller Arm Lever
ZV(2)-NA2-2, XV(2)-NA2-2**



**One-way Action Sealed Roller Arm Lever
ZV(2)-NA277-2, XV(2)-NA277-2**



Precautions

■ Correct Use

Mounting

With the Roller Lever-type Enclosed Switches, the roller arm has been temporarily tightened prior to shipment, so that its position may be adjusted later. When mounting the Switch, be sure to re-tighten the roller arm so as to prevent it from becoming loose during operation.

To adequately maintain the seals at the mounting screw section on the side of the Enclosed Switch, insert each O-ring correctly and secure it with the lock nut.

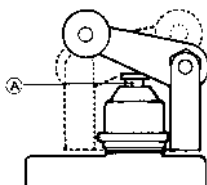
To provide the Switch with improved sealing property, use of the SC Connector is recommended.

When routing wires into the conduit opening, be sure that cuttings and other foreign matter do not enter the Switch.

Environmental Precautions

Sealing materials may deteriorate when used outdoors or when exposed to cutting oil, solvents, or chemicals. Check this on actual equipment and, if deterioration is foreseen, consult your OMRON representative in advance.

Be sure to protect part A with grease in order to maintain the mechanical life and performance of the Limit Switch. The use of molybdenum disulfide grease is recommended.



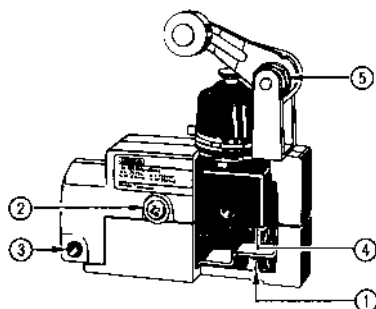
Tightening Torque

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	Cover mounting screw	1.18 to 1.37 N·m
2	Switch mounting screw (see note 1)	1.18 to 1.37 N·m
3	Switch mounting screw (see note 2)	4.90 to 5.88 N·m
4	Switch terminal screw (M4 screws for head)	0.78 to 1.18 N·m
5	Roller arm mounting nut	4.90 to 5.88 N·m

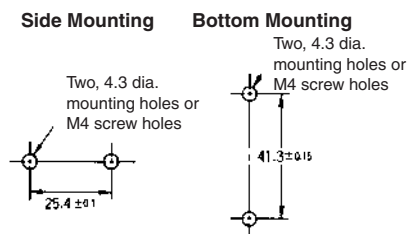
Note: 1. This torque range applies to side mounting or bottom mounting. (M4 screws for head)

2. This torque range applies to side diagonal mounting. (M5 Allen-head bolt)

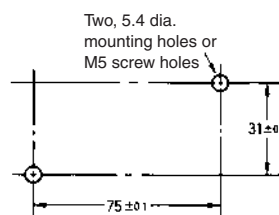


Mounting

Mounting Holes



Side Diagonal Mounting



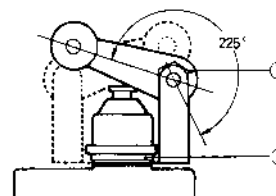
Operation

- Operating method, shape of cam or dog, operating frequency, and the overtravel (OT) have significant effect on the service life and precision of the Limit Switch. Make sure that the shape of the cam is smooth enough.
- Check that OT has a sufficient margin. The actual OT should be rated OT x 0.7 to 1.

Dedicated Wrench

The roller arm can be set freely within a range of 225° after loosening the nut.

The roller arm mounting bracket can be set in any direction after loosening the nut.



A dedicated wrench is provided separately.

Model: SUPANA FOR ZE

Make sure that the nut is free of foreign substances when the nut is loosened.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

General-purpose Basic Switch

A

High-capacity Switch Capable of Handling 20 A Loads with Large Inrush Currents

- Same shape as OMRON Z Basic Switches except in pin plunger position, yet endures inrush currents as large as 75 A.



Model Number Structure










■ Model Number Legend

A-20G□-□
1 2 3 4

- 1. Ratings**
20: 20 A (250 VAC)
- 2. Contact Gap**
G: 0.5 mm
- 3. Actuator**
None: Pin plunger
D: Short spring plunger
Q: Panel mount plunger
Q21: Panel mount cross roller plunger
Q22: Panel mount roller plunger
V: Hinge lever
V2: Hinge roller lever
V21: Short hinge lever
V22: Short hinge roller lever
- 4. Terminals**
None: Solder terminal
B: Screw terminal (with toothed washer)

Ordering Information

List of Models

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

Note: Refer to *Terminals* in Model Z for solder and screw terminals.

Specifications

Approved Standards

Agency	Standard	File No.
UL	UL508	E41515
CSA	CSA C22.2 No. 55	LR21642

Approved Standard Ratings

UL508 (File No. E41515)

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

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

■ 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	20 A		7.5 A		20 A		12.5 A	
250 VAC	20 A		7.5 A		20 A		8.3 A	
500 VAC	15 A		4 A		10 A		2 A	
8 VDC	20 A		3 A	1.5 A	20 A		12.5 A	
14 VDC	20 A		3 A	1.5 A	15 A		12.5 A	
30 VDC	6 A		3 A	1.5 A	5 A		5 A	
125 VDC	0.5 A		0.5 A		0.05 A		0.05 A	
250 VDC	0.25 A		0.25 A		0.03 A		0.03 A	

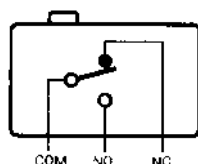
- Note:** 1. The above values are for steady-state current.
 2. Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
 3. Lamp load has an inrush current of 10 times the steady-state current.
 4. Motor load has an inrush current of 6 times the steady-state current.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

■ Characteristics

Operating speed	0.01 mm to 1 m/s (see note 1)
Operating frequency	Mechanical: 240 operations/min Electrical: 20 operations/min (under rated load)
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 the current-carrying metal parts and the ground, and between each terminal and non-current-carrying metal parts
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note 2)
Shock resistance	Destruction: 1,000 m/s ² {approx. 100G} max. Malfunction: 300 m/s ² {approx. 30G} max. (see note 1, 2)
Durability	Mechanical: 1,000,000 operations min. Electrical: 500,000 operations 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)
Ambient humidity	Operating: 35% to 85%
Weight	Approx. 23 to 58 g

- Note:** 1. The value is for the pin plunger. (Contact your OMRON representative for other models.)
 2. Malfunction: 1 ms max.

■ Contact Form (SPDT)

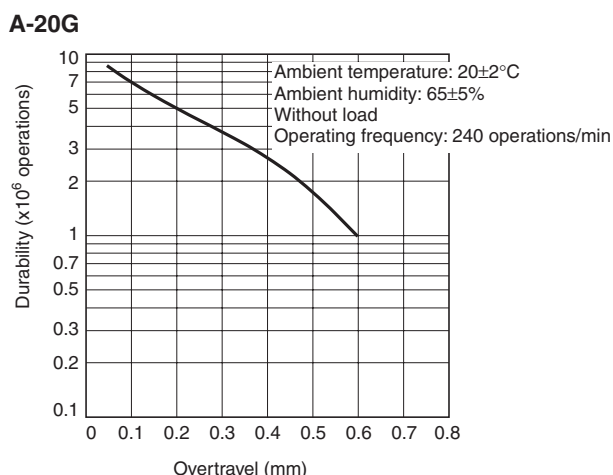


■ Contact Specification

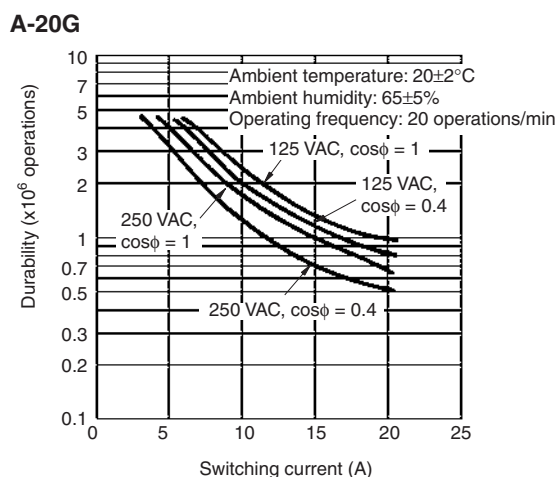
Item		A-20
Contacts	Shape	Rivet
	Material	Silver alloy
	Gap (standard value)	0.5 mm
Inrush current	NC	75 A max.
	NO	75 A max.

Engineering Data

■ Mechanical Durability



■ Electrical Durability



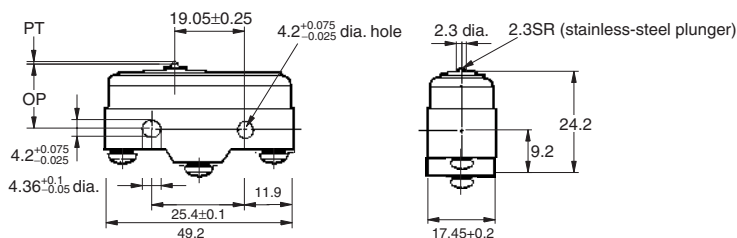
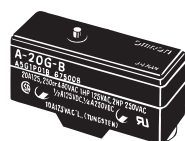
Dimensions

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

■ Dimensions and Operating Characteristics

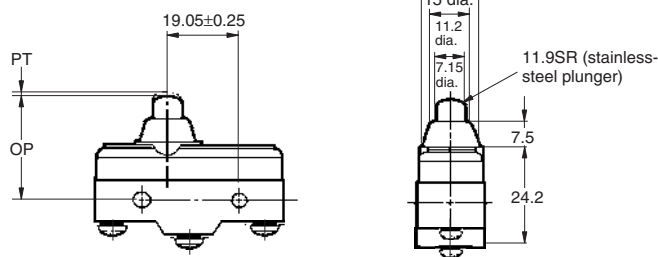
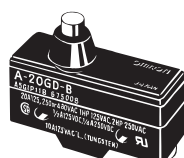
The models, illustrations, and graphics are for screw-terminal models. (The dimensions for models that are omitted here are the same as for pin-plunger models.)

Pin Plunger A-20G-B



OF	3.92 to 6.13 N {400 to 625 gf}
RF min.	2.79 N {285 gf}
PT max.	1.3 mm
OT min.	0.25 mm
MD max.	0.2 mm
OP	16.3±0.4 mm

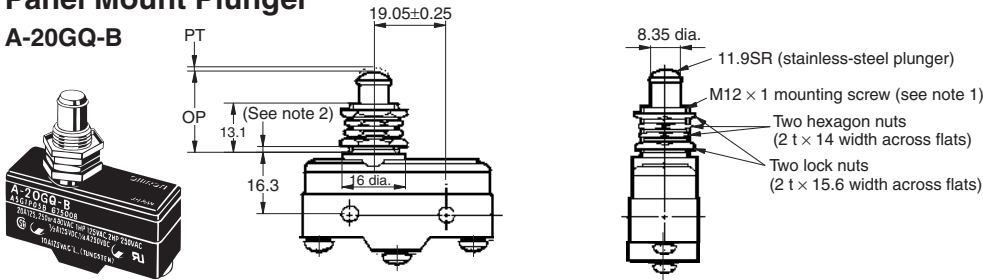
Short Spring Plunger A-20GD-B



OF	3.92 to 6.13 N {400 to 625 gf}
RF min.	2.79 N {285 gf}
PT max.	1.3 mm
OT min.	3 mm
MD max.	0.2 mm
OP	26.2±0.5 mm

Panel Mount Plunger

A-20GQ-B

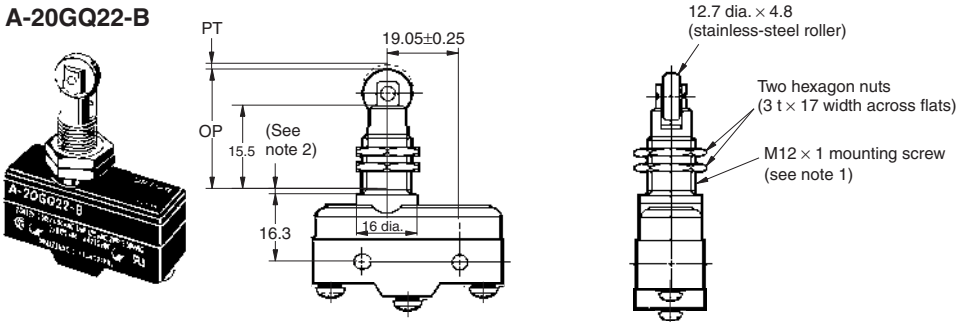


- Note:** 1. Do not use both M12 mounting screw and mounting holes at the same time.
2. Imperfect screw part with a maximum length of 1.5 mm.

OF	3.92 to 6.13 N {400 to 625 gf}
RF min.	2.79 N (285 gf)
PT max.	1.3 mm
OT min.	5.6 mm
MD max.	0.2 mm
OP	21.8±0.8 mm

Panel Mount Roller Plunger

A-20GQ22-B

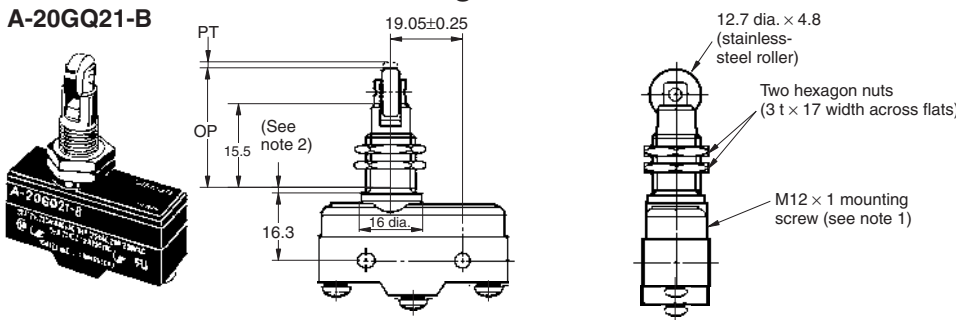


- Note:** 1. Do not use both M12 mounting screw and mounting holes at the same time.
2. Imperfect screw part with a maximum length of 1.5 mm.

OF	6.18 N {630 gf} max.
RF min.	2.75 N {280 gf}
PT max.	1.3 mm
OT min.	3.58 mm
MD max.	0.35 mm
OP	33.4±1.2 mm

Panel Mount Cross Roller Plunger

A-20GQ21-B

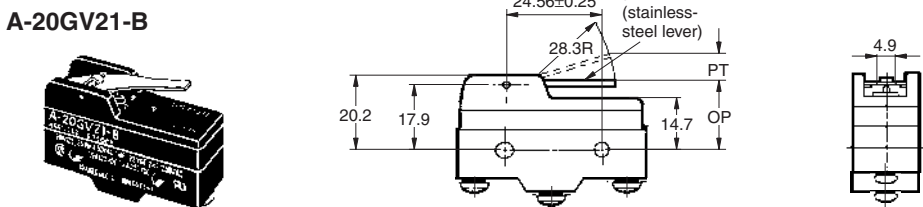


- Note:** 1. Do not use both M12 mounting screw and mounting holes at the same time.
2. Imperfect screw part with a maximum length of 1.5 mm.

OF	6.18 N {630 gf} max.
RF min.	2.75 N {280 gf}
PT max.	1.3 mm
OT min.	3.58 mm
MD max.	0.35 mm
OP	33.4±1.2 mm

Short Hinge Lever

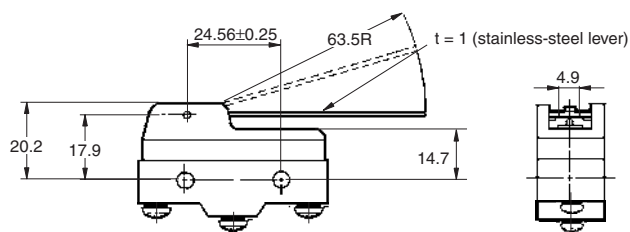
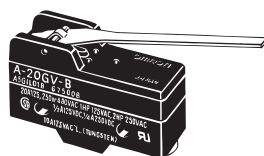
A-20GV21-B



OF	1.57 N {160 gf} max.
RF min.	0.41 N {42 gf}
PT max.	6.5 mm
OT min.	1.2 mm
MD max.	1.2 mm
OP	19±0.8 mm

Hinge Lever

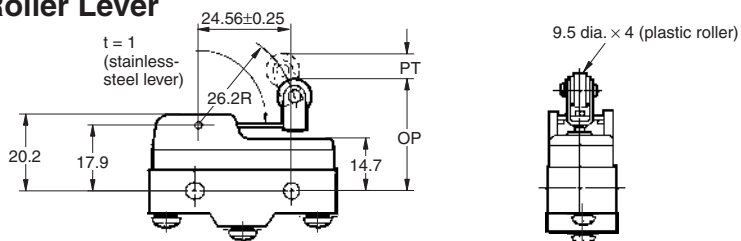
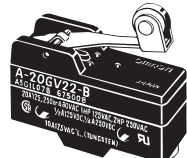
A-20GV-B



OF	0.69 N {70 gf} max.
RF min.	0.14 N {14 gf}
PT max.	15.9 mm
OT min.	4 mm
MD max.	2.4 mm
OP	19±0.8 mm

Short Hinge Roller Lever

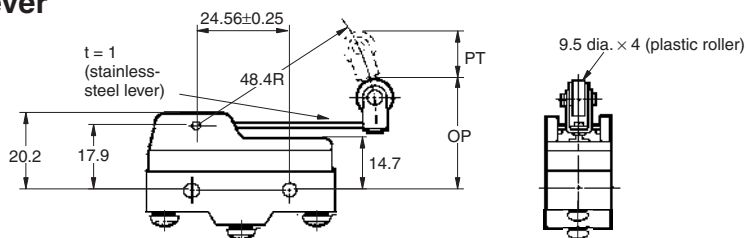
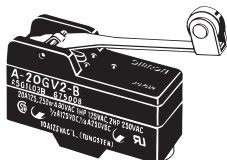
A-20GV22-B



OF	1.57 N {160 gf}
RF min.	0.41 N {42 gf}
PT max.	6.3 mm
OT min.	1.2 mm
MD max.	1.22 mm
OP	29.8±0.8 mm

Hinge Roller Lever

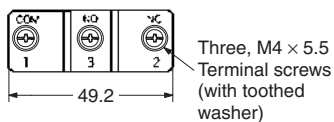
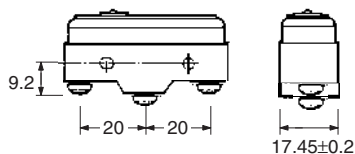
A-20GV2-B



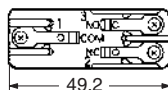
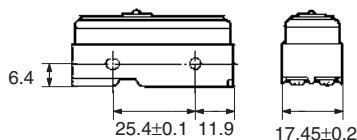
OF	0.88 N {90 gf}
RF min.	0.14 N {14 gf}
PT max.	12 mm
OT min.	2.4 mm
MD max.	2.2 mm
OP	30.2±0.8 mm

■ Terminals

Screw Terminals (-B)



Solder Terminal



Appropriate terminal screw tightening torque:
0.78 to 1.18 N·m {8 to 12 kgf·cm}.

Precautions

Refer to the *Technical Information for Basic Switches* (Cat. No. C122) for common precautions.

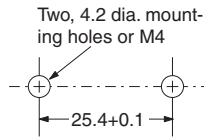
■ Correct Use

Mounting

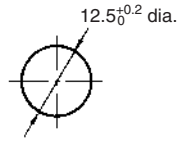
Use M4 mounting screws with plane washers or spring washers to securely mount the Switch. Tighten the screws to a torque of 1.18 to 1.47 N·m {12 to 15 kgf·cm}.

The Switch can be panel mounted, provided that the hexagonal nut of the actuator is tightened to a torque of 2.94 to 4.9 N·m {30 to 50 kgf·cm}.

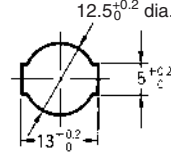
Mounting Holes



Panel Mount Plunger



Panel Mount Roller Plunger



Panel-mounting (A-20GQ□)

If a Switch is side-mounted with screws, remove the hexagonal nut of the actuator.

If a Switch is side-mounted and secured with screws, make sure that the angle or speed of the actuating object is not excessively large or too high, otherwise the Switch may be damaged.

If a Switch is panel-mounted, pay utmost attention to make sure that the actuating speed or OT distance is not excessively high or large. Not doing so may damage the Switch.

■ Accessories (Order Separately)

Refer to *Z/A/X/DZ Common Accessories* for details about Terminal Covers, Separators, and Actuators.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Cat. No. B002-E1-07

In the interest of product improvement, specifications are subject to change without notice.

Special-purpose Basic Switch

DZ

DPDT Basic Switch for Two Independent Circuit Control

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



Model Number Structure

Model Number Legend

DZ-10G□-1□
1 2 3 4 5

1. Ratings

10: 10 A (250 VAC)

2. Contact Gap

G: 0.5 mm

3. Actuator

None: Pin plunger

V: Hinge lever

V22: Short hinge roller lever

V2: Hinge roller lever

W: Hinge lever

W22: Short hinge roller lever

W2: Hinge roller lever

4. Contact Form

1: DPDT

5. Terminals

A: Solder terminal

B: Screw terminal

Ordering Information

List of Models

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

Specifications

■ Approved Standards

Agency	Standard	File No.
UL	UL508	E41515
CSA	CSA C22.2 No. 55	LR21642

■ Approved Standard Ratings

UL508 (File No. E41515)/

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

Rated voltage	DZ-10G
125 VAC	10 A 1/3 HP
250 VAC	10 A 1/4 HP
480 VAC	2 A
125 VDC	0.5 A
250 VDC	0.25 A

■ 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		2 A	1 A	6 A		3 A	1.5 A	30 A max.	15 A max.
250 VAC	10 A		1.5 A	0.7 A	4 A		2 A	1 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	10 A		3 A	1.5 A	4 A		3 A	1.5 A		
125 VAC	0.5 A		0.5 A		0.05 A		0.05 A			
250 VDC	0.25 A		0.25 A		0.03 A		0.03 A			

Note: 1. Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).

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

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

■ Characteristics

Operating speed	0.1 mm to 1 m/s (at pin plunger)
Operating frequency	Mechanical: 240 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 non-continuous terminals 1,500 VAC, 50/60 Hz for 1 min between current-carrying metal parts and non-current-carrying metal part, and between current-carrying metal part and ground and between switches
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s ² {approx. 100G} max. Malfunction: 300 m/s ² {approx. 30G} max. (See notes 1 and 2.)
Durability	Mechanical: 1,000,000 operations min. Electrical: 500,000 operations min.
Ambient temperature	Operating: -25°C to 80°C (with no icing)
Ambient humidity	Operating: 35% to 85% max.
Weight	Approx. 30 to 50 g

Note: 1. The values are for pin plunger models. (Contact your OMRON representative for other models.)

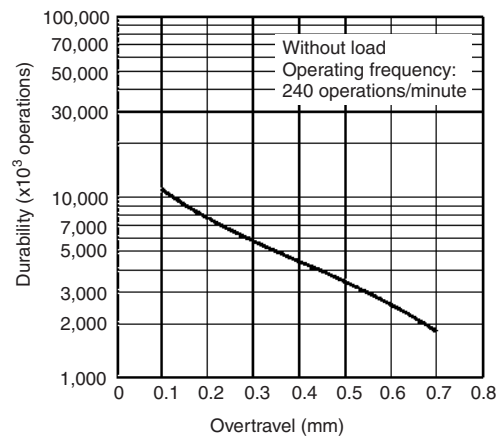
2. Malfunction: 1 ms max.

■ Contact Form (DPDT)

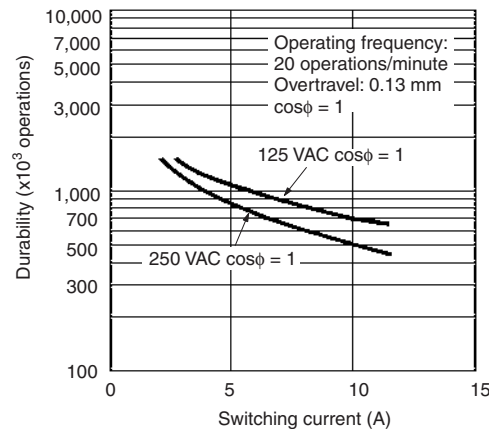


Engineering Data

Mechanical Durability (Pin Plunger)



Electrical Durability (Pin Plunger)

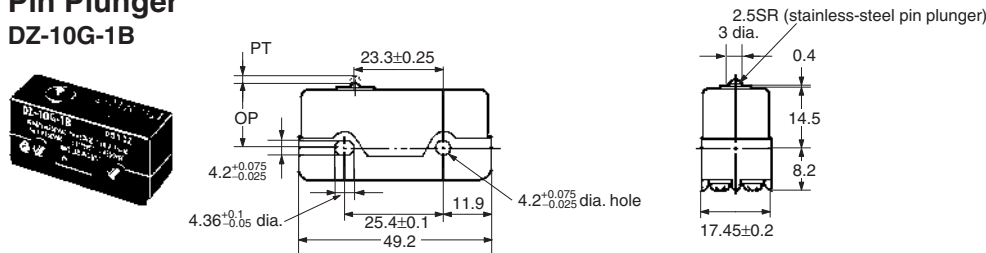


Dimensions

Dimensions and Operating Characteristics

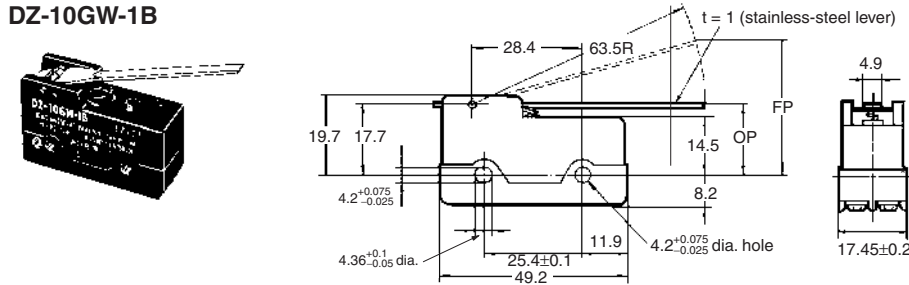
- Note:** 1. All units are in millimeters unless otherwise indicated.
2. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.
3. The solder terminal model has a suffix "-1A" in its model number and its omitted dimensions are the same as the corresponding dimensions of the pin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

Pin Plunger DZ-10G-1B



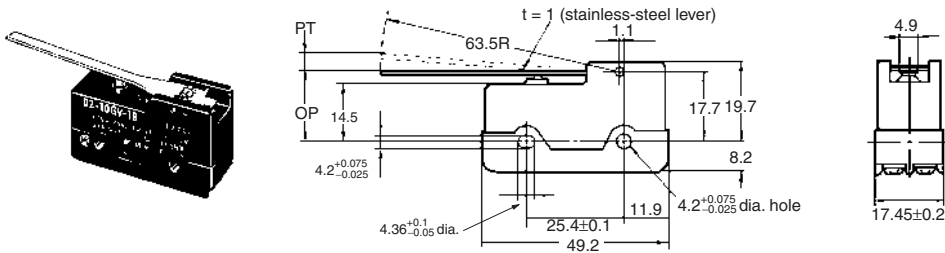
OF max.	5.59 N {570 gf}
RF min.	0.55 N {57 gf}
PT max.	1.7 mm
OT min.	0.13 mm
MD max.	0.4 mm
OP	15.6±0.4 mm

Hinge Lever DZ-10GW-1B



OF max.	1.67 N {170 gf}
RF min.	0.27 N {28 gf}
OT min.	1.6 mm
MD max.	4 mm
FP max.	46.3 mm
OP	21.8±1 mm

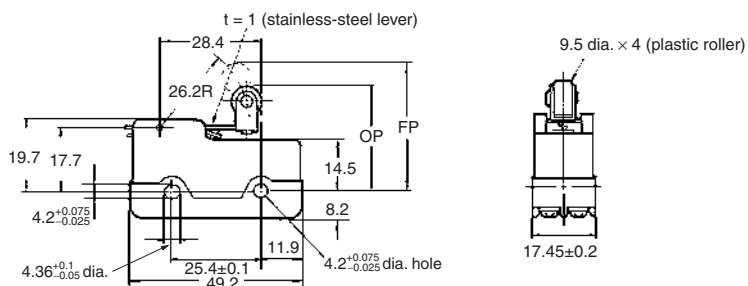
DZ-10GV-1B



OF max.	1.96 N {200 gf}
RF min.	0.13 N {14 gf}
PT max.	6 mm
OT min.	0.4 mm
MD max.	1.7 mm
OP	18.3±1 mm

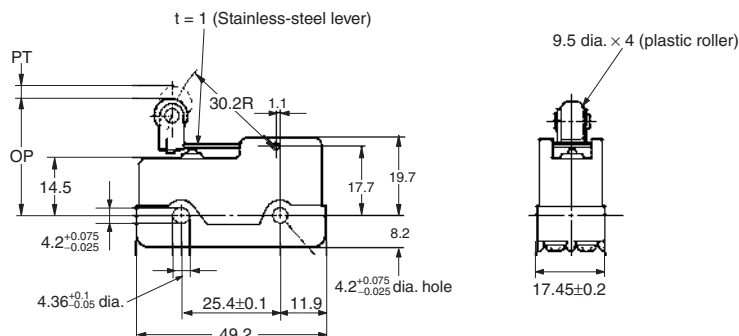
Short Hinge Roller Lever

DZ-10GW22-1B



OF max.	3.92 N {400 gf}
RF min.	0.83 N {85 gf}
OT min.	0.9 mm
MD max.	2.4 mm
FP max.	39.7 mm
OP	30.2±0.8 mm

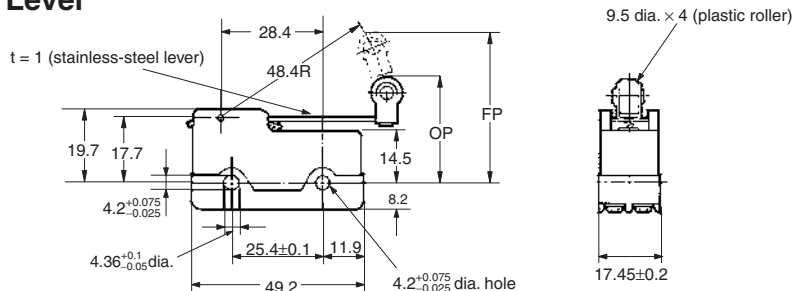
DZ-10GV22-1B



OF max.	4.22 N {430 gf}
RF min.	0.41 N {42 gf}
PT max.	3 mm
OT min.	0.13 mm
MD max.	0.6 mm
OP	29.4±0.8 mm

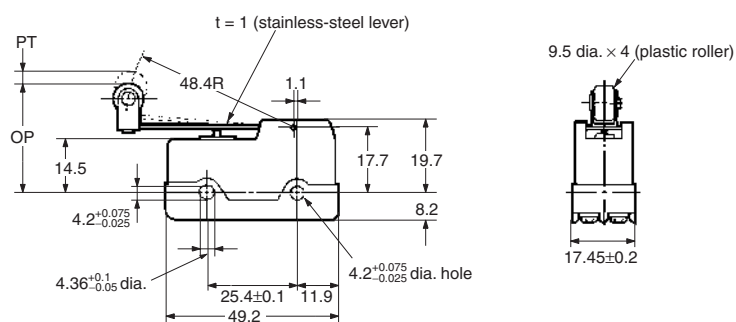
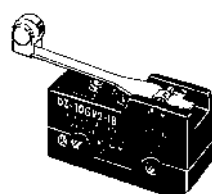
Hinge Roller Lever

DZ-10GW2-1B



OF max.	2.09 N {213 gf}
RF min.	0.41 N {42 gf}
OT min.	1.2 mm
MD max.	3.3 mm
FP max.	47.6 mm
OP	31.8±0.8 mm

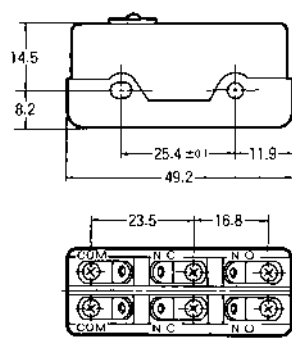
DZ-10GV2-1B



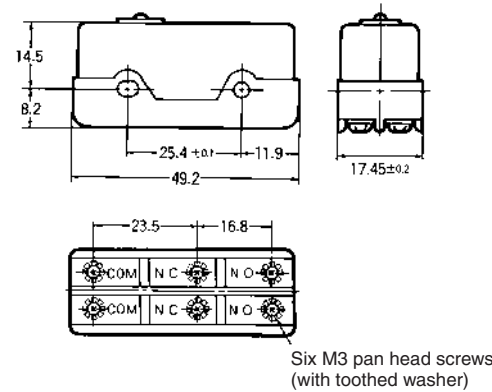
OF max.	2.65 N {270 gf}
RF min.	0.33 N {34 gf}
PT max.	4 mm
OT min.	0.26 mm
MD max.	1.1 mm
OP	29.4±0.8 mm

Terminals

Solder Terminals (-1A)



Screw Terminals (-1B)



Precautions

Refer to the *Technical Information for Basic Switches* (Cat. No. C122) for common precautions.

Cautions

Terminal Connection

When soldering lead wires to the Switch, make sure that the capacity of the soldering iron is 60 W maximum. Do not take more than 5 s to solder any part of the Switch. Improper soldering may cause abnormal heat radiation from the Switch and the Switch may burn.

The characteristics of the Switch will deteriorate if a soldering iron with a capacity of more than 60 W is applied to any part of the Switch for 6 s or more.

Operation

Make sure that the switching frequency or speed is within the specified range.

If the switching speed is extremely slow, the contact may not be switched smoothly, which may result in a contact failure or contact welding.

If the switching speed is extremely fast, switching shock may damage the Switch soon. If the switching frequency is too high, the contact may not catch up with the speed.

The rated permissible switching speed and frequency indicate the switching reliability of the Switch.

The life of a Switch is determined at the specified switching speed. The life varies with the switching speed and frequency even when they are within the permissible ranges. In order to determine the life of a Switch model to be applied to a particular use, it is best to conduct an appropriate durability test on some samples of the model under actual conditions.

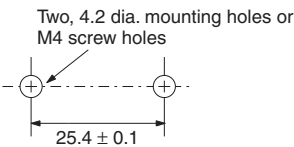
Make sure that the actuator travel does not exceed the permissible OT position. The operating stroke must be set to 70% to 100% of the rated OT.

Correct Use

Mounting

Use M4 mounting screws with plane washers or spring washers to securely mount the Switch. Tighten the screws to a torque of 1.18 to 1.47 N·m {12 to 15 kgf·cm}

Mounting Holes



Accessories (Order separately)

Refer to *Z/A/X/DZ Common Accessories* for details about Terminal Covers, Separators, and Actuators.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Cat. No. B060-E1-07

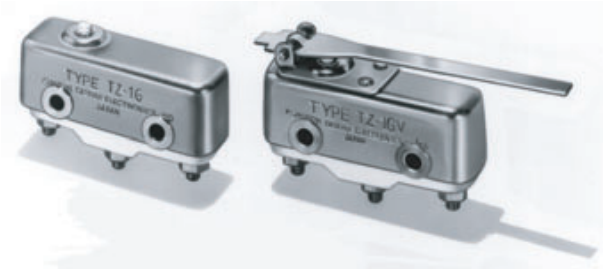
In the interest of product improvement, specifications are subject to change without notice.

High-temperature Basic Switch

TZ

Stable Operation at an Ambient Temperature of 400°C

- Incorporates a ceramic insulator, cobalt-alloy spring, and special-alloy contact, thus ensuring high contact reliability at high ambient temperature.
- Smoothly operates at an ambient temperature of 400°C.



Model Number Structure

Model Number Legend

TZ-1G□
1 2 3

- 1. Rating
1: 1 A, 250 VAC
- 2. Contact Gap
G: 0.5 mm
- 3. Actuator
None: Pin plunger
V: Hinge lever
V2: Hinge roller lever
V22: Short hinge roller lever

Ordering Information

List of Model

Actuator	Model
Pin plunger	TZ-1G
Hinge lever	TZ-1GV
Short hinge roller lever	TZ-1GV22
Hinge roller lever	TZ-1GV2

Specifications

■ Ratings

Rated voltage	Non-inductive load (A)				Inductive load (A)			
	Resistive load		Lamp load		Inductive load		Motor load	
	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	1		0.9	0.45	1		1.5	0.75
250 VAC	1		0.45	0.3	1		0.45	0.3
8 VDC	1		0.9	0.45	1		1.5	1.5
14 VDC	1		0.9	0.45	1		1.5	1.5
30 VDC	1		0.9	0.45	1		1.5	1.5
125 VDC	0.4		0.05	0.05	0.4		0.05	0.05

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

■ Characteristics

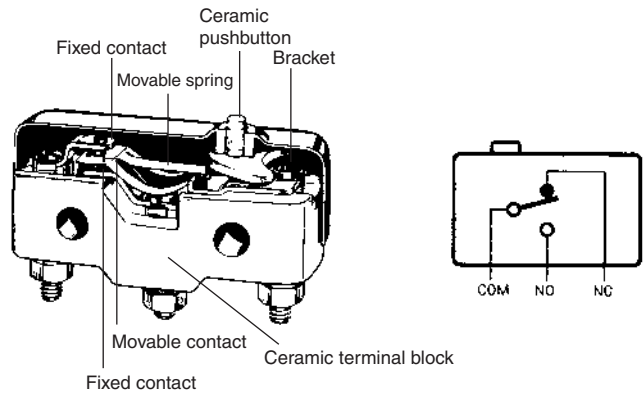
Operating speed	0.05 mm to 1 m/s (see note 1)
Operating frequency	Mechanical: 60 operations/min Electrical: 20 operations/min
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	100 mΩ max. (initial value)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between terminals of same polarity 1,500 VAC, 50/60 Hz for 1 min between current-carrying metal parts and ground and between each terminal and non-current-carrying metal parts
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note 2)
Shock resistance	Destruction: 500 m/s ² {50G} max. Malfunction: 300 m/s ² {30G} max. (see note 2)
Durability	Mechanical: 100,000 operations min. Electrical: 50,000 operations min.
Degree of protection	IP00
Electric shock protection	Class I
Ambient temperature	Operating: -65°C to 400°C (with no icing)
Ambient humidity	Operating: 35% to 85% max.
Weight	Approx. 45 to 54 g

- Note:**
1. This operating speed applies to switches with pin-type pushbuttons.
 2. This refers to a malfunction period of 1 ms max.

■ Contact Specifications

Item		
Contact	Specification	Cross bar
	Material	Platinum alloy
	Gap (standard value)	0.5 mm
Inrush current	NC	9 A max.
	NO	4.5 A max.

Nomenclature



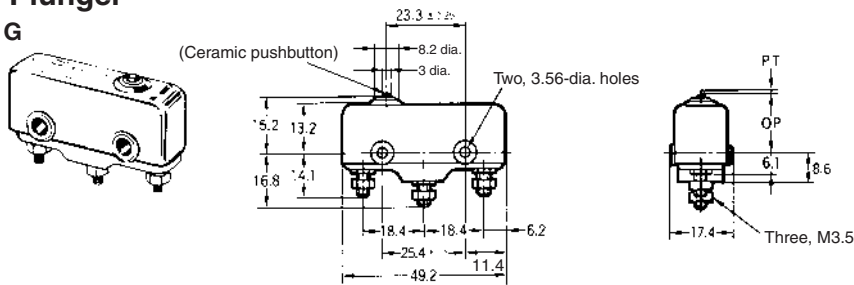
Dimensions

■ Dimensions and Operating Characteristics

Note: 1. All units are in millimeters unless otherwise indicated.
2. Each dimension has a tolerance of ± 0.4 mm unless otherwise specified.

Pin Plunger

TZ-1G

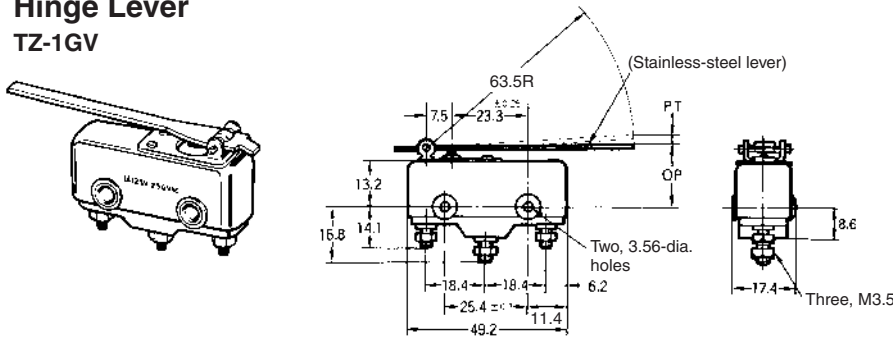


OF max.	4.9 N {500 gf}
RF min.	1.12 N {114 gf}
PT max.	0.4 mm
OT min.	0.13 mm
MD max.	0.15 mm
OP	15.6±0.6 mm

Limit
Switches

Hinge Lever

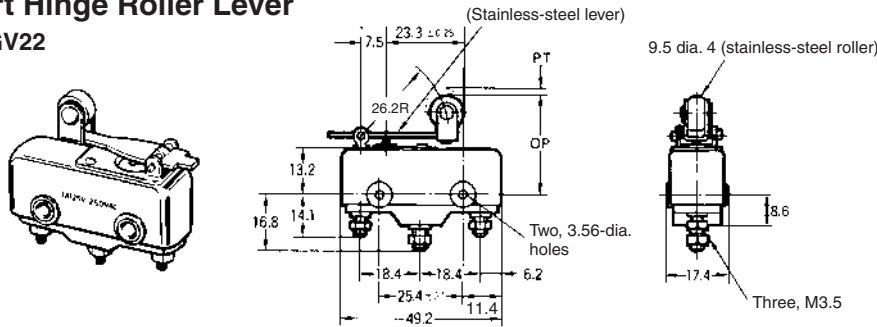
TZ-1GV



OF max.	0.98 N {100 gf}
RF min.	0.14 N {14 gf}
PT max.	3.5 mm
OT min.	4.6 mm
MD max.	1.3 mm
OP	18±1.2 mm

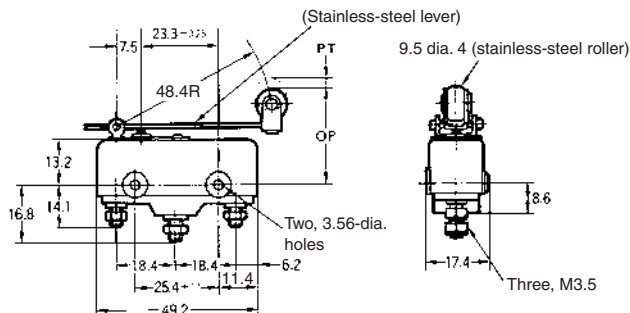
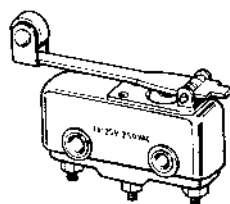
Short Hinge Roller Lever

TZ-1GV22



OF max.	2.35 N {240 gf}
RF min.	0.33 N {34 gf}
PT max.	1.5 mm
OT min.	1.9 mm
MD max.	0.6 mm
OP	28.6±1.2 mm

Hinge Roller Lever TZ-1GV2



OF max.	1.27 N {130 gf}
RF min.	0.2 N {20 gf}
PT max.	2.6 mm
OT min.	3.5 mm
MD max.	1 mm
OP	28.6±1.2 mm

Precautions

Refer to the *Technical Information for Basic Switches* (Cat. No. C122) for common precautions.

■ Correct Use

Handling

The Switch has a ceramic casing. Do not drop the Switch from a height of 30 cm or more. Doing so will break the casing.

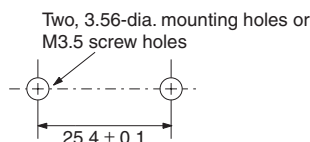
Mounting

Be sure to turn OFF the power supply to the Switch before mounting, dismounting, wiring, or working on the Switch for maintenance. Not doing so may result in an electric shock or the Switch may burn.

Mount the switch with M3.5 stainless-steel screws with plane washer and spring washers securely.

Use M3.5 stainless-steel mounting screws with plane washers or spring washers to securely mount the Switch. Tighten the screws to a torque of 0.69 to 0.98 N·m {7 to 10 kgf·cm}.

Mounting Holes



Connect nickel-plated solderless terminals to the TZ. Each terminal must be secured on the TZ with M3.5 nut.

Make sure that the ceramic case is free of metal powder or other impurities.

Operation

Do not modify the Actuator and change the operating position.

Make sure that the switching speed is not extremely slow or do not use the Switch so that the pushbutton will be set to a position between the FP and OP.

Make sure that the pin-type pushbutton and the switching stroke are on the same vertical line.

Make sure that the switching frequency or speed is within the specified range.

- If the switching speed is extremely slow, the contact may not be switched smoothly, which may result in a contact failure or contact welding.
- If the switching speed is extremely fast, switching shock may damage the Switch soon. If the switching frequency is too high, the contact may not catch up with the speed.

The rated permissible switching speed and frequency indicate the switching reliability of the Switch.

The life of a Switch is determined at the specified switching speed. The life varies with the switching speed and frequency even when they are within the permissible ranges. In order to determine the life of a Switch model to be applied to a particular use, it is best to conduct an appropriate durability test on some samples of the model under actual conditions.

Make sure that the actuator travel does not exceed the permissible OT position. The operating stroke must be set to 70% to 100% of the rated OT.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

General-purpose Basic Switch

X

Direct Current Switch with Built-in Magnetic Blowout

- Incorporates a small permanent magnet in the contact mechanism to deflect the arc to effectively extinguish it.
- Same shape and mounting procedures as the Z Basic Switches.



Model Number Structure

■ Model Number Legend

X-10G

1 2 3 4

1. Ratings

10: 10 A (125 VDC)

2. Contact Gap

G: 0.9 mm

3. Actuator









- None: Pin plunger
- D: Short spring plunger
- S: Slim spring plunger
- Q: Panel mount plunger
- Q21: Panel mount cross roller plunger
- Q22: Panel mount roller plunger
- L: Leaf spring
- W: Hinge lever
- W2: Hinge roller lever
- W21: Short hinge lever
- W22: Short hinge roller lever
- W4: Low-force hinge lever
- M: Reverse hinge lever
- M2: Reverse hinge roller lever
- M22: Reverse short hinge roller lever


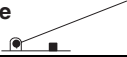





4. Terminals

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

Ordering Information

List of Models

Actuator	Solder	Screw
Pin plunger 	X-10G	X-10G-B
Slim spring plunger 	X-10GS	X-10GS-B
Short spring plunger 	X-10GD	X-10GD-B
Panel mount plunger 	X-10GQ	X-10GQ-B
Panel mount roller plunger 	X-10GQ22	X-10GQ22-B
Panel mount cross roller plunger 	X-10GQ21	X-10GQ21-B
Leaf spring 	X-10GL	X-10GL-B
Short hinge lever 	X-10GW21	X-10GW21-B

Actuator	Solder	Screw
Hinge lever 	X-10GW	X-10GW-B
Low-force hinge lever 	X-10GW4	X-10GW4-B
Short hinge roller lever 	X-10GW22	X-10GW22-B
Hinge roller lever 	X-10GW2	X-10GW2-B
Reverse hinge lever 	X-10GM	X-10GM-B
Reverse short hinge roller lever 	X-10GM22	X-10GM22-B
Reverse hinge roller lever 	X-10GM2	X-10GM2-B

Note: The plungers of reverse-type models are continuously pressed by the compression coil springs and the plungers are freed by operating the levers.

Specifications

Approved Standards

Agency	Standard	File No.
UL	UL508	E41515
CSA	CSA C22.2 No. 55	LR21642

Approved Standard Ratings

UL508 (File No. E41515)

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

Rated voltage	X-10G
125 VDC	10 A
250 VDC	3 A

Ratings

Rated voltage	Non-inductive load			Inductive load			
	Resistive load	Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO
8 VDC	10 A	3 A	1.5 A	10 A	10 A	5 A	2.5 A
14 VDC	10 A	3 A	1.5 A	10 A	10 A	5 A	2.5 A
30 VDC	10 A	3 A	1.5 A	10 A	10 A	5 A	2.5 A
125 VDC	10 A	3 A	1.5 A	7.5 A	6 A	5 A	2.5 A
250 VDC	3 A	1.5 A	0.75 A	2 A	1.5 A	2 A	1.5 A

- Note:** 1. The above values are for the steady-state current.
 2. Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
 3. Lamp load has an inrush current of 10 times the steady-state current.
 4. Motor load has an inrush current of 6 times the steady-state current.
 5. The above electrical ratings also apply to the AC voltage.
 6. With the reverse-type models (X-10GM□), the normally closed circuits and normally open circuits are reversed.
 7. The ratings values apply under the following test conditions:
 Ambient temperature: 20±2°C
 Ambient humidity: 65±5%
 Operating frequency: 20 operations/min

Characteristics

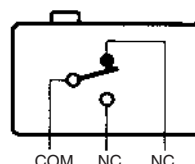
Operating speed	0.1 mm to 1 m/s (see note 1)
Operating frequency	Mechanical: 240 operations/min Electrical: 20 operations/min
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	15 mΩ max. (initial value)
Dielectric strength	1,500 VAC, 50/60 Hz for 1 min between terminals of the same polarity, between current-carrying metal parts and the ground, and between each terminal and non-current-carrying metal parts
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note 2)
Shock resistance	Destruction: 1,000 m/s ² {approx. 100G} max. Malfunction: 300 m/s ² {approx. 30G} max. (see note 1, 2)
Durability	Mechanical: 1,000,000 operations min. Electrical: 100,000 operations 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)
Ambient humidity	Operating: 35% to 85% max.
Weight	Approx. 27 to 63 g

- Note:** 1. The values are for the pin plunger models. (Contact your OMRON representative for other models.)
 2. Malfunction: 1 ms max.

Contact Specification

Item		X-10
Contacts	Material	Silver alloy
	Gap (standard value)	0.9 mm
Inrush current	NC	30 A max.
	NO	15 A max.

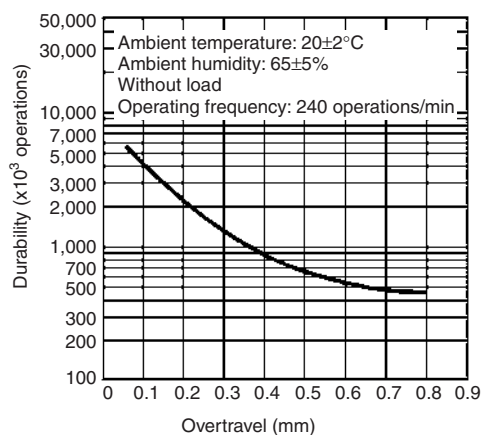
Contact Form (SPDT)



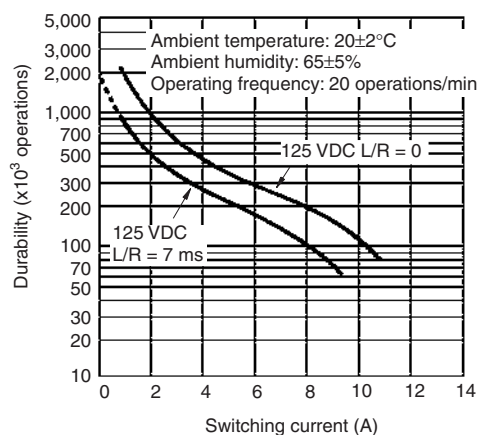
Note: With the reverse-type models (X-10GM□), the NC and NO terminal arrangements are reversed.

Engineering Data

Mechanical Durability (Pin Plunger)



Electrical Durability (Pin Plunger)



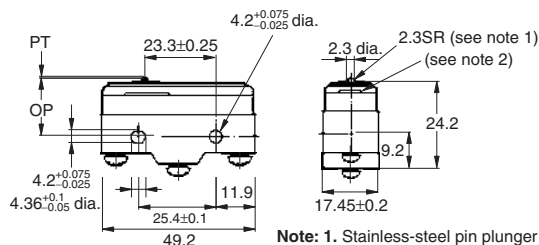
Dimensions

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

Dimensions and Operating Characteristics

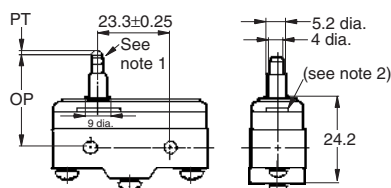
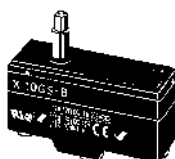
The models, illustrations, and graphics are for screw-terminal models. (The dimensions for models that are omitted here are the same as for pin-plunger models.)

Pin Plunger X-10G-B



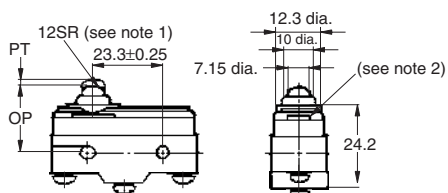
OF max.	5.00 N {510 gf}
RF min.	1.12 N {114 gf}
PT max.	0.9 mm
OT min.	0.13 mm
MD max.	0.18 mm
OP	15.9±0.4 mm

Slim Spring Plunger X-10GS-B



OF max.	5.00 N {510 gf}
RF min.	1.12 N {114 gf}
PT max.	0.9 mm
OT min.	1.6 mm
MD max.	0.18 mm
OP	28.2±0.5 mm

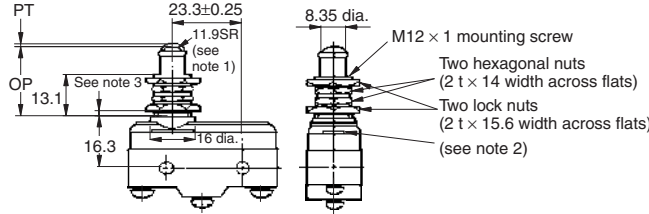
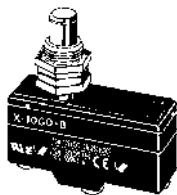
Short Spring Plunger X-10GD-B



OF max.	5.00 N {510 gf}
RF min.	1.12 N {114 gf}
PT max.	0.9 mm
OT min.	1.6 mm
MD max.	0.18 mm
OP	21.2±0.5 mm

Panel Mount Plunger

X-10GQ-B

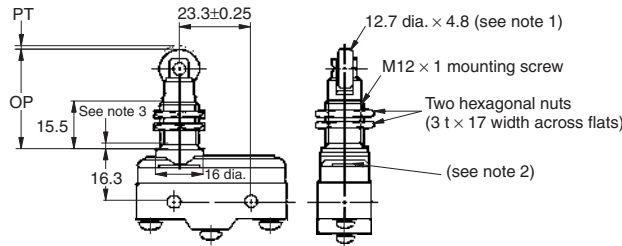
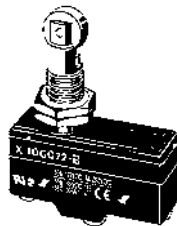


- Note:** 1. Stainless-steel pin plunger
2. Three vent holes
3. Imperfect screw part with a maximum length of 1.5 mm.

OF max.	5.00 N {510 gf}
RF min.	1.12 N {114 gf}
PT max.	0.9 mm
OT min.	5.5 mm
MD max.	0.18 mm
OP	21.8±0.8 mm

Panel Mount Roller Plunger

X-10GQ22-B

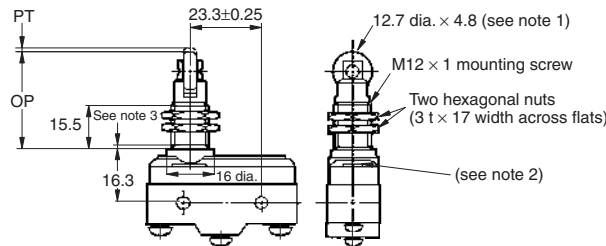
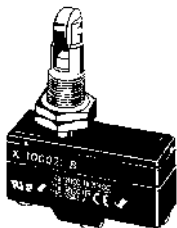


- Note:** 1. Stainless-steel roller
2. Three vent holes
3. Imperfect screw part with a maximum length of 1.5 mm.

OF max.	5.00 N {510 gf}
RF min.	1.12 N {114 gf}
PT max.	0.9 mm
OT min.	3.6 mm
MD max.	0.18 mm
OP	33.4±1.2 mm

Panel Mount Cross Roller Plunger

X-10GQ21-B

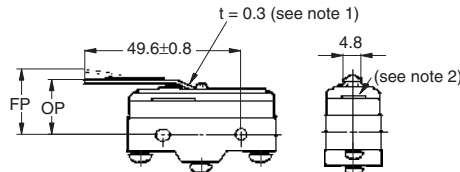


- Note:** 1. Stainless-steel roller
2. Three vent holes
3. Imperfect screw part with a maximum length of 1.5 mm.

OF max.	5.00 N {510 gf}
RF min.	1.12 N {114 gf}
PT max.	0.9 mm
OT min.	3.6 mm
MD max.	0.18 mm
OP	33.4±1.2 mm

Leaf Spring

X-10GL-B

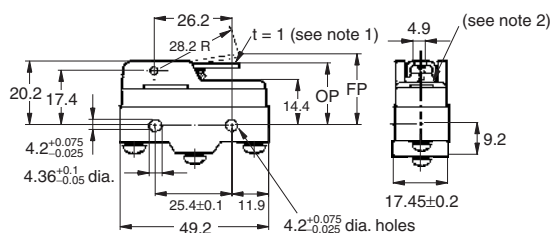


- Note:** 1. Stainless-steel spring lever
2. Three vent holes

OF max.	1.96 N {200 gf}
RF min.	0.14 N {14 gf}
OT min.	1.6 mm (see note)
MD max.	2.3 mm
FP max.	22.1 mm
OP	17.4±0.8 mm

- Note:** 1. Reference value
2. Be sure to use the switch at the rated OT value of 1.6 mm.

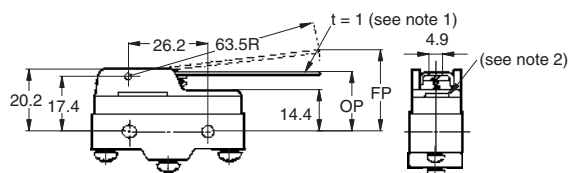
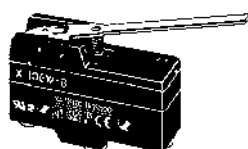
Short Hinge Lever X-10GW21-B



Note: 1. Stainless-steel lever
2. Three vent holes

OF max.	2.45 N {250 gf}
RF min.	0.31 N {32 gf}
OT min.	2.1 mm
MD max.	1.7 mm
FP max.	25.5 mm
OP	20.7 ± 0.8 mm

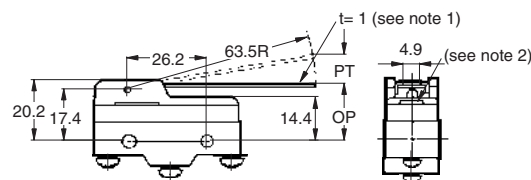
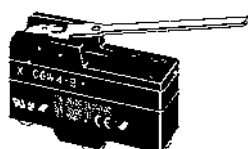
Hinge Lever X-10GW-B



Note: 1. Stainless-steel lever
2. Three vent holes

OF max.	1.08 N {110 gf}
RF min.	0.14 N {14 gf}
OT min.	4.8 mm
MD max.	3.9 mm
FP max.	34.6 mm
OP	21.1 ± 0.8 mm

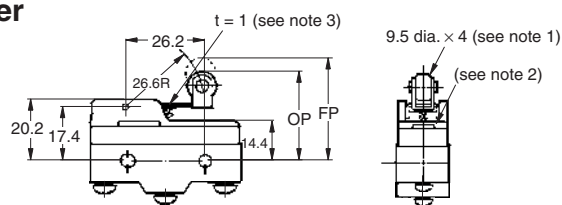
Low-force Hinge Lever X-10GW4-B



Note: 1. Stainless-steel lever
2. Three vent holes

OF max.	0.25 N {25 gf}
RF min.	0.05 N {5 gf}
PT max.	14.3 mm
OT min.	4.8 mm
MD max.	3.9 mm
OP	21.1 ± 0.8 mm

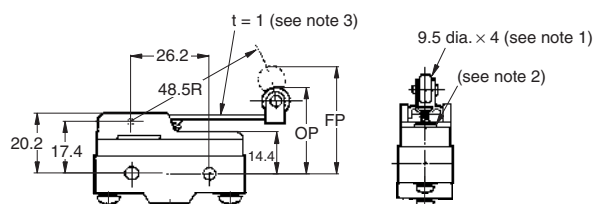
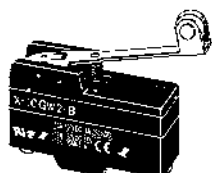
Short Hinge Roller Lever X-10GW22-B



Note: 1. Plastic roller
2. Three vent holes
3. Stainless-steel spring lever

OF max.	2.16 N {220 gf}
RF min.	0.34 N {35 gf}
OT min.	2.4 mm
MD max.	1.7 mm
FP max.	37.1 mm
OP	32.2 ± 0.8 mm

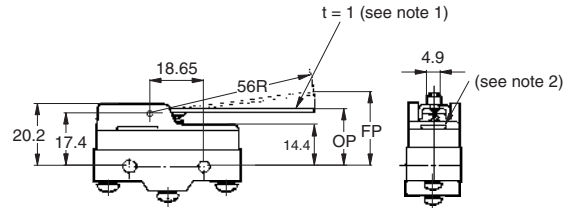
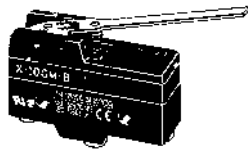
Hinge Roller Lever X-10GW2-B



Note: 1. Plastic roller
2. Three vent holes
3. Stainless-steel spring lever

OF max.	1.42 N {145 gf}
RF min.	0.21 N {21 gf}
OT min.	4 mm
MD max.	3 mm
FP max.	40.5 mm
OP	32.2 ± 0.8 mm

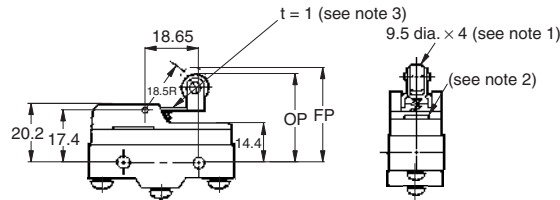
Reverse Hinge Lever X-10GM-B



Note: 1. Stainless-steel lever
2. Three vent holes

OF max.	2.16 N {220 gf}
RF min.	0.25 N {25 gf}
OT min.	5.5 mm
MD max.	2.1 mm
FP max.	26.8 mm
OP	21.1±0.8 mm

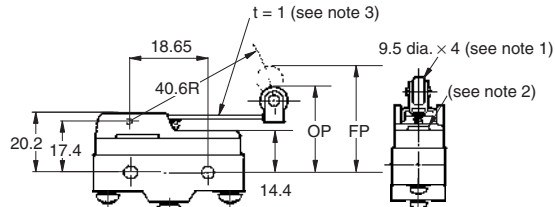
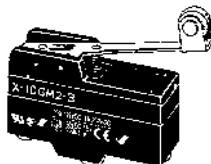
Reverse Short Hinge Lever X-10GM22-B



Note: 1. Plastic roller
2. Three vent holes
3. Stainless-steel spring lever

OF max.	6.86 N {700 gf}
RF min.	1.52 N {155 gf}
OT min.	2 mm
MD max.	0.75 mm
FP max.	36.1 mm
OP	32.2±0.8 mm

Reverse Hinge Roller Lever X-10GM2-B



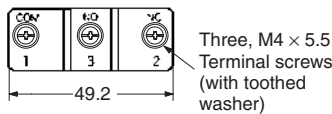
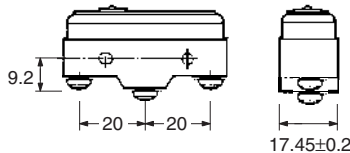
Note: 1. Plastic roller
2. Three vent holes
3. Stainless-steel spring lever

OF max.	3.14 N {320 gf}
RF min.	0.49 N {50 gf}
OT min.	4 mm
MD max.	1.5 mm
FP max.	37.4 mm
OP	32.2±0.8 mm

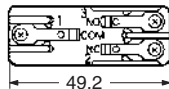
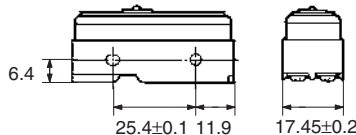
Limit
Switches

Terminals

Screw Terminals (-B)



Solder Terminal



Appropriate terminal screw tightening torque:
0.78 to 1.18 N·m {8 to 12 kgf·cm}.

Note: 1. Tighten the terminal screws to a torque of 0.78 to 1.18 N·m {8 to 12 kgf·cm}.
2. In case of DC voltage, set the COM to the positive terminal.

Precautions

Refer to the *Technical Information for Basic Switches* (Cat. No. C122) for common precautions.

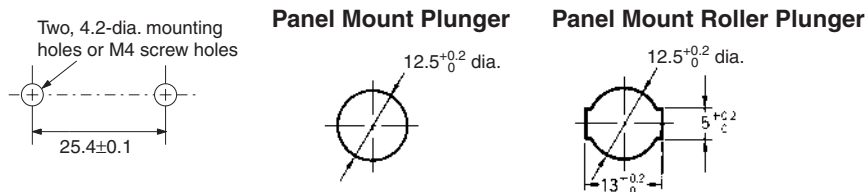
■ Correct Use

Mounting

Use M4 mounting screws with plane washers or spring washers to securely mount the Switch. Tighten the screws to a torque of 1.18 to 1.47 N·m {12 to 15 kgf·cm}

The Switch can be panel mounted, provided that the hexagonal nut of the actuator is tightened to a torque of 2.94 to 4.9 N·m {30 to 50 kgf·cm}.

Mounting Holes



Handling

Set the common (COM) terminal to the positive terminal. If it is set to the negative terminal, the Switch will not turn OFF.

When using the Switch under an inductive load, the arc suppression capability varies depending on current. If the current becomes 0.6 to 1.2 A or of the time constant L/R exceeds 7 ms, be sure to provide an arc suppressor.

Since the Switch incorporates a permanent magnet, attention must be paid to the following points:

- Avoid mounting the Switch directly onto a magnetic substance.
- Do not subject the Switch to severe shocks.
- Avoid placing the Switch in a strong magnetic field.
- Be sure to prevent iron dust or iron chips from adhering to the built-in magnet or the magnetic blowout function of the Switch will be adversely affected.
- Do not apply thermal shock to the Switch, or the magnetic flux will be diminished.

Since a ventilation hole is provided to avoid abnormal corrosion due to operating conditions, provide a dustproofing device in locations where the Switch is exposed to dust.

Do not change operating positions for the actuator. Changing the position may cause malfunction.

Panel-mounted Model (X-10GQ□)

To side-mount the panel-mount Switch to the panel with screws, remove the hexagonal nut from the actuator.

Too large a dog angle and too fast operating speed may damage the Switch when the Switch is side-mounted on the panel.

Too fast operating speed and too long overtravel of the roller plunger Switch may result in damage to the Switch.

■ Accessories (Order separately)

Refer to *Z/A/X/DZ Common Accessories* for details about Terminal Covers, Separators, and Actuators.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

General-purpose Basic Switch

Z

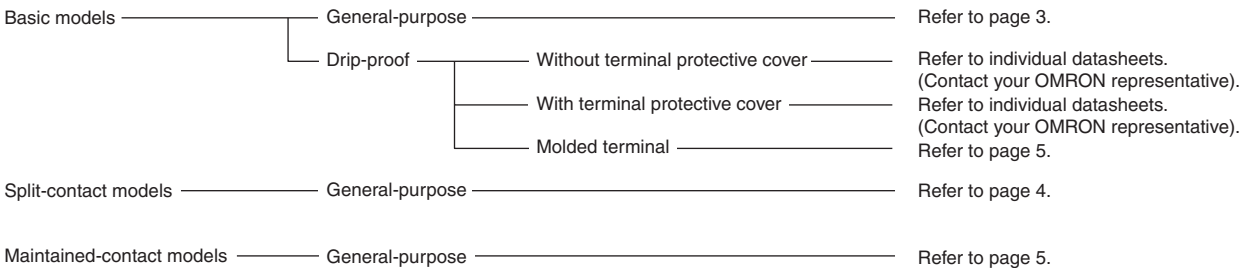
Best-selling Basic Switch Boasting High Precision and Wide Variety

- A large switching capacity of 15 A with high repeat accuracy.
- A wide range of variations in contact form for your selection: basic, split-contact, maintained-contact, and adjustable contact gap types.
- A series of standard models for micro loads is available.
- A series of molded terminal-type models incorporating safety terminal protective cover is available.



Model Number Structure

■ Configuration



Basic Models

General-purpose

A variety of actuators is available for a wide range of application.

The contact mechanism of models for micro loads is a crossbar type with gold-alloy contacts, which ensures highly reliable operations for micro loads.

Contact Gap:
H: 0.25 mm (high-sensitivity, micro voltage current load)
G: 0.5 mm (standard)
E: 1.8 mm (high-capacity)
F: 1.0 mm (split-contact models)

Split-contact Models

This type is identical in construction to the general-purpose basic switch except that it has two pairs of simultaneous acting contacts by splitting moving contacts.

Since the moving contacts are connected to a common terminal, either parallel or series connection is possible.

Highly reliable micro load switching is ensured if the model is used as a twin-contact switch.

Maintained-contact Models

The maintained-contact type has a reset button at the bottom of the switch case, in addition to the pushbutton (plunger) located on the opposite side of the reset button. Use these buttons alternately.

Since the Switch has greater pretravel than overtravel, it is suitable for use in reversible control circuits, manual reset circuits, safety limit circuits, and other circuits which are not preferable for automatic resetting. (For further details, refer to individual datasheets.)

■ Model Number Legend

Basic Models

Z-□□□□-□
1 2 3 4 5

1. Ratings

01: 0.1 A (for micro load)
15: 15 A

2. Contact Gap

H: 0.25 mm (high-sensitivity, micro load)
G: 0.5 mm (standard)
E: 1.8 mm (high-capacity)

3. Actuator

None: Pin plunger
S: Slim spring plunger
D: Short spring plunger
K: Spring plunger (medium OP)
K3: Spring plunger (high OP)
Q3: Panel mount plunger (low OP)
Q: Panel mount plunger (medium OP)
Q8: Panel mount plunger (high OP)
Q22: Panel mount roller plunger
Q21: Panel mount cross roller plunger
L: Leaf spring (high OF)
L2: Roller leaf spring
W21: Short hinge lever
W: Hinge lever (low OF)
W3: Hinge lever (medium OF)
W32: Hinge lever (high OF)
W4: Low-force hinge lever
W44: Long hinge lever
W78: Low-force wire hinge lever (low OF)
W52: Low-force wire hinge lever (high OF)
W22: Short hinge roller lever
W2: Hinge roller lever
W25: Hinge roller lever (large roller)
W49: Short hinge cross roller lever
W54: Hinge cross roller lever
W2277: Unidirectional short hinge roller lever (Low OF)
M: Reverse hinge lever
M22: Reverse short hinge roller lever
M2: Reverse hinge roller lever
NJ: Flexible rod (high OF)
NJS: Flexible rod (low OF)

4. Degree of Protection

None: General-purpose
55: Drip-proof
A55: Drip-proof (including the terminals)

5. Terminals

None: Solder terminal
B: Screw terminal (with toothed washer)
B5V: Screw terminal with terminal cover (for Z-15G□A55 only)

Note: For combinations of models, refer to the following pages.

Split-contact Models

Z-10F□Y-B
1 2 3 4 5

1. Ratings

10: 10 A

2. Contact Gap

F: 1 mm (high-capacity)

3. Actuator

None: Pin plunger
S: Slim spring plunger
D: Short spring plunger
Q: Panel mount plunger
Q22: Panel mount roller plunger
W: Hinge lever
W22: Short hinge roller lever
W2: Hinge roller lever
M22: Reverse short hinge roller lever

4. Construction

Y: Split-contact models

5. Terminals

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

Maintained-contact Models

Z-15-E□R
1 2 3 4

1. Ratings

15: 15 A

2. Contact Gap

E: 1.8 mm (High capacity)

3. Actuator

None: Pin plunger
S: Slim spring plunger
W: Hinge lever











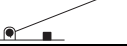




4. Structure


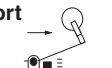
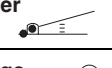
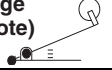

R: Maintained-contact models

Ordering Information

List of Models

Basic Models (General-purpose)

Actuator			Standard	High-sensitivity	High-capacity	Micro load
			G (0.5 mm)	H (0.25 mm)	E (1.8 mm)	H (0.25 mm)
Pin plunger 		Solder terminal	Z-15G	Z-15H	Z-15E	Z-01H
		Screw terminal	Z-15G-B	Z-15H-B	Z-15E-B	Z-01H-B
Slim spring plunger 		Solder terminal	Z-15GS	Z-15HS	---	Z-01HS
		Screw terminal	Z-15GS-B	Z-15HS-B	---	Z-01HS-B
Short spring plunger 		Solder terminal	Z-15GD	Z-15HD	Z-15ED	Z-01HD
		Screw terminal	Z-15GD-B	Z-15HD-B	Z-15ED-B	Z-01HD-B
Panel mount plunger 	Low OP	Solder terminal	Z-15GQ3	---	---	---
		Screw terminal	Z-15GQ3-B			
	Medium OP	Solder terminal	Z-15GQ	Z-15HQ	Z-15EQ	Z-01HQ
		Screw terminal	Z-15GQ-B	Z-15HQ-B	Z-15EQ-B	Z-01HQ-B
	High OP	Solder terminal	Z-15GQ8	---	---	---
		Screw terminal	Z-15GQ8-B			
Panel mount roller plunger 		Solder terminal	Z-15GQ22	Z-15HQ22	Z-15EQ22	---
		Screw terminal	Z-15GQ22-B	Z-15HQ22-B	Z-15EQ22-B	---
Panel mount cross roller plunger 		Solder terminal	Z-15GQ21	Z-15HQ21	Z-15EQ21	---
		Screw terminal	Z-15GQ21-B	Z-15HQ21-B	Z-15EQ21-B	---
Leaf spring 		Solder terminal	Z-15GL	---	---	---
		Screw terminal	Z-15GL-B			
Roller leaf spring 		Solder terminal	Z-15GL2	---	---	---
		Screw terminal	Z-15GL2-B			
Short hinge lever 		Solder terminal	Z-15GW21	---	---	---
		Screw terminal	Z-15GW21-B			
Hinge lever 	Low OF	Solder terminal	Z-15GW	Z-15HW	---	---
		Screw terminal	Z-15GW-B	Z-15HW-B	---	---
	Medium OF	Solder terminal	Z-15GW3	---	---	---
		Screw terminal	Z-15GW3-B			
	High OF	Solder terminal	Z-15GW32	---	---	---
		Screw terminal	Z-15GW32-B			
Low-force hinge lever 		Solder terminal	Z-15GW4	Z-15HW24	---	---
		Screw terminal	Z-15GW4-B	Z-15HW24-B	---	
Low-force wire hinge lever 	Low OF	Solder terminal	---	Z-15HW78	---	---
		Screw terminal	---	Z-15HW78-B	---	
	High OF	Solder terminal	---	Z-15HW52	---	---
		Screw terminal	---	Z-15HW52-B	---	
Short hinge roller lever 		Solder terminal	Z-15GW22	Z-15HW22	Z-15EW22	Z-01HW22
		Screw terminal	Z-15GW22-B	Z-15HW22-B	Z-15EW22-B	Z-01HW22-B
Short hinge cross roller lever 		Solder terminal	Z-15GW49	---	---	---
		Screw terminal	Z-15GW49-B			
Hinge roller lever 	Parallel	Solder terminal	Z-15GW2	Z-15HW2	---	---
		Screw terminal	Z-15GW2-B	Z-15HW2-B	---	---
	Large roller	Solder terminal	Z-15GW25	---	---	---
		Screw terminal	Z-15GW25-B			

Actuator		Standard	High-sensitivity	High-capacity	Micro load
		G (0.5 mm)	H (0.25 mm)	E (1.8 mm)	H (0.25 mm)
Hinge cross roller lever 	Solder terminal	Z-15GW54	---	---	---
	Screw terminal	Z-15GW54-B	---	---	---
Unidirectional short hinge roller lever 	Solder terminal	Z-15GW2277	---	---	---
	Screw terminal	Z-15GW2277-B	---	---	---
Reverse hinge lever (see note) 	Solder terminal	Z-15GM	---	---	---
	Screw terminal	Z-15GM-B	---	---	---
Reverse short hinge roller lever (see note) 	Solder terminal	Z-15GM22	---	---	---
	Screw terminal	Z-15GM22-B	---	---	---
Reverse hinge roller lever (see note) 	Solder terminal	Z-15GM2	---	---	---
	Screw terminal	Z-15GM2-B	---	---	---





Note: The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.






Minimum Order Lot

The following models are available at the minimum order lot specified below. Orders must be placed per lot.

Actuator	Standard	High-sensitivity	Minimum order lot (pcs)
	G (0.5 mm)	H (0.25 mm)	
Short spring plunger	Z-15GD-B	---	10
Panel mount plunger	Z-15GQ	---	
	Z-15GQ-B	---	
	Z-15GQ8-B	---	
Panel mount roller plunger	Z-15GQ22	---	
	Z-15GQ22-B	---	
Panel mount cross roller plunger	Z-15GQ21-B	---	
Short hinge lever	Z-15GW21-B	---	
Hinge lever	Z-15GW	---	
	Z-15GW-B	---	
Low-force hinge lever	Z-15GW4-B	Z-15HW24-B	
Low-force hinge wire lever	---	Z-15HW78-B	
Short hinge roller lever	Z-15GW22	---	
	Z-15GW22-B	---	
Hinge roller lever	Z-15GW2	---	
	Z-15GW2-B	---	
Reverse short hinge roller lever	Z-15GM22-B	---	
Reverse hinge roller lever	Z-15GM2-B	---	




Split-contact Models

Actuator		F (1.0 mm)	
Pin plunger 	Solder terminal	---	
	Screw terminal	Z-10FY-B	
Slim spring plunger 	Solder terminal	---	
	Screw terminal	Z-10FSY-B	
Short spring plunger 	Solder terminal	---	
	Screw terminal	Z-10FDY-B	
Panel mount plunger 	Medium OP	Solder terminal	---
		Screw terminal	Z-10FQY-B













Actuator		F (1.0 mm)	
Panel mount roller plunger 		Solder terminal	---
		Screw terminal	Z-10FQ22Y-B
Hinge lever 	Low OP	Solder terminal	---
		Screw terminal	Z-10FWY-B
Short hinge roller lever 		Solder terminal	---
		Screw terminal	Z-10FW22Y-B
Hinge roller lever 	Parallel	Solder terminal	---
		Screw terminal	Z-10FW2Y-B
Reverse short hinge roller lever 		Solder terminal	---
		Screw terminal	Z-10FM22Y-B







Note: The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.

Maintained-contact Models

Actuator	Maintained-contact model
Pin plunger 	Z-15ER
Slim spring plunger 	Z-15ESR
Hinge lever 	Z-15EWR

Basic Models (Drip-proof Models)

Actuator		Basic model (drip-proof)		
		Standard		Micro load
		G (0.5 mm)		H (0.25 mm)
		Without drip-proof terminal protective cover	With drip-proof terminal protective cover	Without drip-proof terminal protective cover
Pin plunger 		Solder terminal	Z-15G55	---
		Screw terminal	Z-15G55-B	Z-15GA55-B5V
Short spring plunger 		Solder terminal	Z-15GD55	---
		Screw terminal	Z-15GD55-B	Z-01HD55
Spring plunger 	Medium OP	Solder terminal	Z-15GK55	---
		Screw terminal	Z-15GK55-B	---
	High OP	Solder terminal	Z-15GK355	---
		Screw terminal	Z-15GK355-B	Z-15GK3A55-B5V
Panel mount plunger 	Medium OP	Solder terminal	Z-15GQ55	---
		Screw terminal	Z-15GQ55-B	Z-15GQA55-B5V
Panel mount roller plunger 		Solder terminal	Z-15GQ2255	---
		Screw terminal	Z-15GQ2255-B	Z-15GQ22A55-B5V
Panel mount cross roller plunger 		Solder terminal	---	---
		Screw terminal	Z-15GQ2155-B	Z-15GQ21A55-B5V
Leaf spring 		Solder terminal	Z-15GL55	---
		Screw terminal	Z-15GL55-B	---
Roller leaf spring 		Solder terminal	Z-15GL255	---
		Screw terminal	Z-15GL255-B	---
Short hinge lever 		Solder terminal	Z-15GW2155	---
		Screw terminal	Z-15GW2155-B	---
Long hinge lever 		Solder terminal	Z-15GW4455	---
		Screw terminal	Z-15GW4455-B	Z-15GW44A55-B5V
Hinge lever 		Solder terminal	Z-15GW55	---
		Screw terminal	Z-15GW55-B	Z-15GWA55-B5V
Short hinge roller lever 		Solder terminal	Z-15GW2255	Z-01HW2255
		Screw terminal	Z-15GW2255-B	Z-01HW2255-B

Actuator			Basic model (drip-proof)		
			Standard		Micro load
			G (0.5 mm)		H (0.25 mm)
			Without drip-proof terminal protective cover	With drip-proof terminal protective cover	Without drip-proof terminal protective cover
Hinge roller lever 	Parallel	Solder terminal	Z-15GW255	---	---
		Screw terminal	Z-15GW255-B	Z-15GW2A55-B5V	
Unidirectional short hinge roller lever 		Solder terminal	Z-15GW227755	---	---
		Screw terminal	Z-15GW227755-B	Z-15GW2277A55-B5V	
Reverse hinge lever (see note 1) 		Solder terminal	Z-15GM55	---	---
		Screw terminal	Z-15GM55-B		
Reverse short hinge roller lever (see note 1) 		Solder terminal	Z-15GM2255	---	---
		Screw terminal	Z-15GM2255-B		
Reverse hinge roller lever (see note 1) 		Solder terminal	Z-15GM255	---	---
		Screw terminal	Z-15GM255-B		
Flexible rod (coil spring) (see note 2) 		Solder terminal	Z-15GNJ55	---	---
		Screw terminal	Z-15GNJ55-B		


Note: 1. The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers.
2. The tip is made of resin.

Minimum Order Lot

The following models are available at the minimum order lot specified below. Orders must be placed per lot.

Actuator	Standard		High-sensitivity	Minimum order lot
	G (0.5 mm)		H (0.25 mm)	
Short spring plunger	Z-15GD55-B	---	---	10
Spring plunger	Z-15GK55-B	---	---	
Hinge lever	Z-15GW4455-B Z-15GW55 Z-15GW55-B	---	---	
Short hinge roller lever	Z-15GW2255 Z-15GW2255-B	---	---	
Hinge roller lever	Z-15GW255-B	---	---	
Flexible rod (coil spring)	Z-15GNJ55-B	---	---	
Flexible rod (steel wire)	---	---	Z-15HNJS55-B	

Basic Models (Drip-proof High-sensitivity Models)

Actuator		High-sensitivity	
		H (0.25 mm)	
Flexible rod (steel wire) 	Solder terminal	Z-15HNJS55	
	Screw terminal	Z-15HNJS55-B	

Specifications

■ Approved Standards

Agency	Standard	File No.
UL	UL508	E41515
CSA	CSA C22.2 No. 55	LR21642
TÜV Rheinland	EN61058-1	R9451585

■ Approved Standard Ratings

UL508 (File No. E41515)

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

Rated voltage	Z-15	Z-10F	Z-01H
125 VAC	15 A 1/8 HP	6 A 1/10 HP	0.1 A
250 VAC	15 A 1/4 HP	6 A 1/8 HP	---
480 VAC	15 A	6 A	---
30 VDC	---	---	0.1 A
125 VDC	0.5 A	0.6 A	---
250 VDC	0.25 A	0.3 A	---

EN (EN61058-1)

Rated voltage	Z-15H□-B	Z-15G□-B	Z-01H□-B
250 VAC	15 A	15 A	---
125 VAC	---	---	0.1 A
30 VDC	---	---	0.1 A

Note: Consult with OMRON about approved part numbers by standards.

■ Ratings

Z-15 (Except Micro Load and Flexible Rod Models)

Item Model	Rated voltage	Non-inductive load				Inductive load			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
G, H, E	125 VAC 250 VAC 500 VAC	15 (10) A (see note) 15 (10) A (see note) 10 A		3 A 2.5 A 1.5 A	1.5 A 1.25 A 0.75 A	15 (10) A (see note) 15 (10) A (see note) 6 A		5 A 3 A 1.5 A	2.5 A 1.5 A 0.75 A
G	8 VDC 14 VDC 30 VDC 125 VDC 250 VDC	15 A 15 A 6 A 0.5 A 0.25 A		3 A 3 A 3 A 0.5 A 0.25 A	1.5 A 1.5 A 1.5 A 0.5 A 0.25 A	15 A 10 A 5 A 0.05 A 0.03 A		5 A 5 A 5 A 0.05 A 0.03 A	2.5 A 2.5 A 2.5 A 0.05 A 0.03 A
H	8 VDC 14 VDC 30 VDC 125 VDC 250 VDC	15 A 15 A 2 A 0.4 A 0.2 A		3 A 3 A 2 A 0.4 A 0.2 A	1.5 A 1.5 A 1.4 A 0.4 A 0.2 A	15 A 10 A 1 A 0.03 A 0.02 A		5 A 5 A 1 A 0.03 A 0.02 A	2.5 A 2.5 A 1 A 0.03 A 0.02 A
E	8 VDC 14 VDC 30 VDC 125 VDC 250 VDC	15 A 15 A 15 A 0.75 A 0.3 A		3 A 3 A 3 A 0.75 A 0.3 A	1.5 A 1.5 A 1.5 A 0.75 A 0.3 A	15 A 15 A 10 A 0.4 A 0.2 A		5 A 5 A 5 A 0.4 A 0.2 A	2.5 A 2.5 A 2.5 A 0.4 A 0.2 A

Note: Figures in parentheses are for the Z-15HW52 and Z-15HW78(-B) models, the AC ratings of these models are 125 and 250 V only.

Z-15 (Flexible Rod Models)

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 250 VAC	15 A		2 A 1 A	1 A 0.5 A	7 A 5 A		2.5 A 1.5 A	2 A 1 A
8 VDC 14 VDC 30 VDC 125 VDC 250 VDC	15 A 15 A 2 A 0.4 A 0.2 A		2 A 2 A 2 A 0.4 A 0.2 A	1 A 1 A 1 A 0.4 A 0.2 A	7 A 7 A 1 A 0.03 A 0.02 A		3 A 3 A 1 A 0.03 A 0.02 A	1.5 A 1.5 A 0.5 A 0.03 A 0.02 A

Z-01H

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

Z-10F

Model	Rated voltage	Non-inductive load				Inductive load			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
Series connection	125 VAC	10 A		4 A	2 A	6 A		5 A	2.5 A
	250 VAC	10 A		2.5 A	1.5 A			3 A	1.5 A
	30 VDC	10 A		4 A	2 A	6 A		6 A	3 A
	125 VDC	1 A		1 A	1 A	0.1 A		0.1 A	0.1 A
Parallel connection	250 VDC	0.6 A		0.6 A	0.6 A	0.05 A		0.05 A	0.05 A
	125 VAC	6 A		3 A	1.5 A	4 A		4 A	2 A
	250 VAC	6 A		2.5 A	1.25 A	4 A		2 A	1 A
	30 VDC	6 A		4 A	2 A	4 A		6 A	3 A
	125 VDC	0.6 A		0.6 A	0.6 A	0.1 A		0.1 A	0.1 A
	250 VDC	0.3 A		0.3 A	0.3 A	0.05 A		0.05 A	0.05 A

- Note:**
- The above current ratings are the values of the steady-state current.
 - Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
 - Lamp load has an inrush current of 10 times the steady-state current.
 - Motor load has an inrush current of 6 times the steady-state current.
 - The normally closed and normally open ratings of reverse hinge lever models are opposite to each other.
 - The AC ratings of molded terminals are 125 and 250 V only.
 - The ratings values apply under the following test conditions:
 Ambient temperature: 20±2°C
 Ambient humidity: 65±5%
 Operating frequency: 20 operations/min

■ Characteristics

Item	Basic (except micro load and flexible rod)/ maintained contact Z-15	Basic (micro load) Z-01H	Basic (flexible rod) Z-15	Split-contact Z-10F
Operating speed (see note)	0.01 mm to 1 m/s (see note 1)		1 mm to 1 m/s	0.1 mm to 1 m/s (see note 1)
Operating frequency	Mechanical: 240 operations/min Electrical: 20 operations/min		Mechanical: 120 operations/min Electrical: 20 operations/min	Mechanical: 240 operations/min Electrical: 20 operations/min
Insulation resistance	100 MΩ min. (at 500 VDC)			
Contact resistance	15 mΩ max. (initial value)	50 mΩ max. (initial value)	15 mΩ max. (initial value)	25 mΩ max. (initial value)
Dielectric strength	<u>Between contacts of same polarity</u> Contact gap G: 1,000 VAC, 50/60 Hz for 1 min Contact gap H: 600 VAC, 50/60 Hz for 1 min Contact gap E: 1,500 VAC, 50/60 Hz for 1 min <u>Between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts</u> 2,000 VAC, 50/60 Hz for 1 min		<u>Between contacts of same polarity</u> Contact gap G: 1,000 VAC, 50/60 Hz for 1 min Contact gap H: 600 VAC, 50/60 Hz for 1 min <u>Between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts</u> 2,000 VAC, 50/60 Hz for 1 min	<u>Between contacts of same polarity</u> Contact gap F: 1,500 VAC, 50/60 Hz for 1 min <u>Between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts</u> 2,000 VAC, 50/60 Hz for 1 min
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note 5)		Malfunction: 10 to 20 Hz, 1.5-mm double amplitude (see note 5)	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note 5)
Shock resistance	<u>Destruction:</u> 1,000 m/s ² {approx. 100G} max. <u>Malfunction:</u> 300 m/s ² {approx. 30G} max. (see note 2, 5)		<u>Destruction:</u> 1,000 m/s ² {approx. 100G} max. <u>Malfunction:</u> 50 m/s ² {approx. 5G} max. (see note 5)	<u>Destruction:</u> 1,000 m/s ² {approx. 100G} max. <u>Malfunction:</u> 300 m/s ² {approx. 30G} max. (see note 3, 5)
Durability	<u>Mechanical:</u> Contact gap G, H: 20,000,000 operations min. (see note 4) Contact gap E: 300,000 operations <u>Electrical:</u> Contact gap G, H: 500,000 operations min. Contact gap E: 100,000 operations min.		<u>Mechanical:</u> 1,000,000 operations min. <u>Electrical:</u> 100,000 operations min.	<u>Mechanical:</u> 500,000 operations min. (see note 1) <u>Electrical:</u> 100,000 operations min.
Degree of protection	General-purpose: IP00 Drip-proof: IP62			
Degree of protection against electric shock	Class I			
Proof tracking index (PTI)	175			
Switch category	D (IEC335-1)			
Ambient temperature	Operating: General-purpose: -25°C to 80°C (with no icing) Drip-proof: -15°C to 80°C (with no icing)			
Ambient humidity	Operating: General-purpose: 35% to 85% Drip-proof: 35% to 95%			
Weight	Approx. 22 to 58 g		Approx. 42 to 48 g	Approx. 34 to 61 g

Note: 1. The values are for the plunger models. (For the lever models, the values are at the plunger section.) (Contract your OMRON representative for other models.)

2. The values are for the Z-15G pin plunger.

3. The values are for the Z-10FY-B.

4. The values are for the pin plunger. The durability for models other than the pin plunger is 10,000,000 min.

5. Malfunction: 1 ms max.

■ Contacts Specification

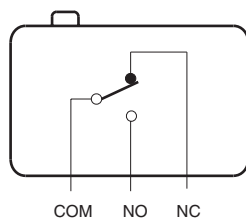
Item		Z-15	Z-01H	Z-10F
Contacts	Shape	Rivet	Single crossbar	Rivet
	Material	Silver alloy	Gold alloy	Silver alloy
Inrush current	NC	30 A max.	0.1 A max.	40 A max.
	NO	15 A max.	0.1 A max.	20 A max.

■ Contact Form

Basic Models

General-purpose

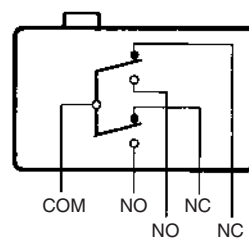
Contact Form (SPDT)



Note: The Z-15GM is a reversible model and the NO and NC positions are reversed.

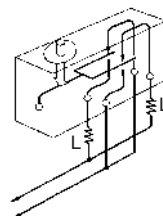
Split-contact Models

Contact Form (Split-contact)

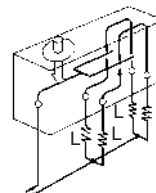


Connection Example

Series Connection

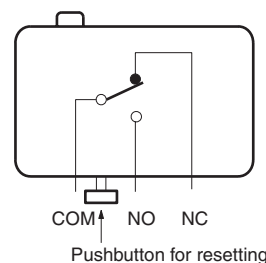


Parallel Connection



Maintained-contact Models

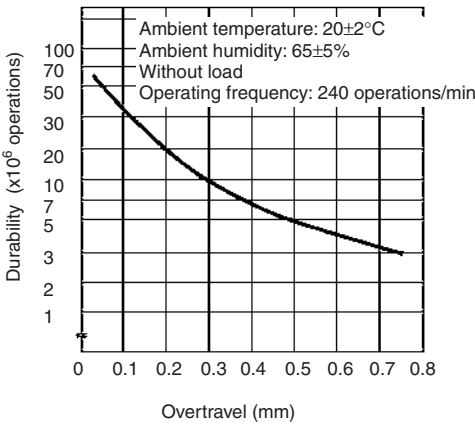
Contact Form (Maintained-contact)



Engineering Data

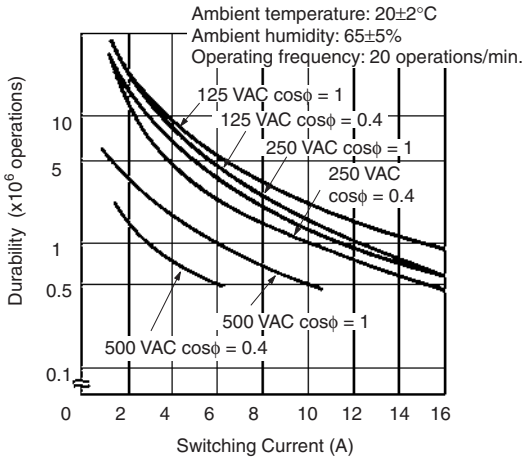
Mechanical Durability

Z-15G



Electrical Durability

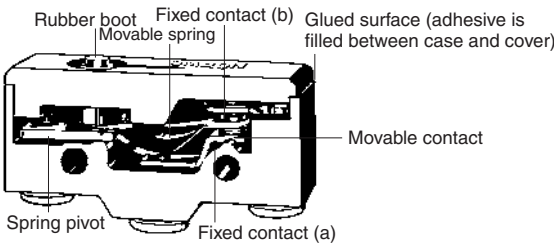
Z-15G



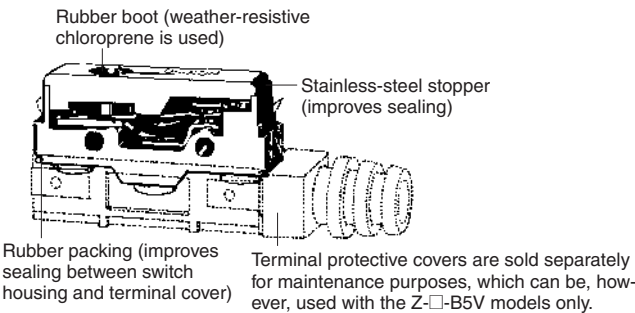
Nomenclature

Drip-proof Construction

Without Terminal Protective Cover



With Terminal Protective Cover



Dimensions

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

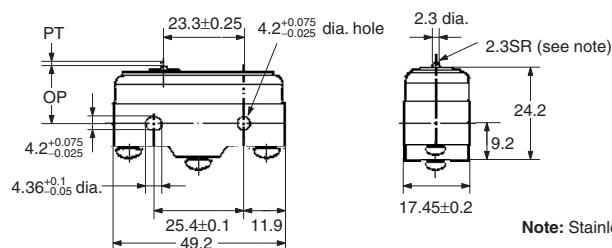
■ Dimensions and Operating Characteristics

Basic Models (General-purpose) & Split-contact Models

The models, illustrations, and graphics are for screw-terminal models (-B). The "-A" at the end of the model number for solder terminal models has been omitted. For details of the terminals, refer to *Terminals* above.

Pin Plunger

Z-15G-B, Z-15E-B
Z-15H-B, Z-01H-B
Z-10FY-B

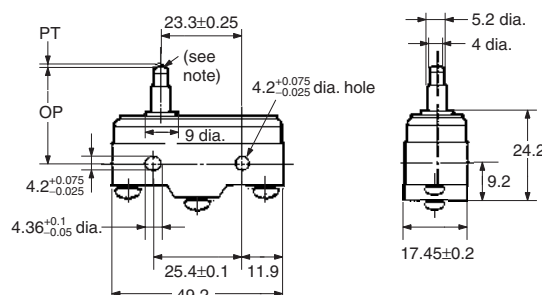
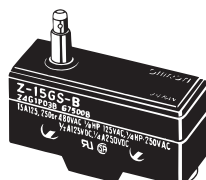


Note: Stainless-steel plunger

	Z-15G-B	Z-15H-B	Z-15E-B	Z-01H-B	Z-10FY-B
OF	2.45 to 3.43 N {250 to 350 gf}	1.96 to 2.75 N {200 to 280 gf}	6.12 to 7.85 N {625 to 800 gf}	2.45 N {250 gf} max.	4.46 to 7.26 N {455 to 740 gf}
RF min.	1.12 N {114 gf}	1.12 N {114 gf}	1.12 N {114 gf}	0.78 N {80 gf}	1.12 N {114 gf}
PT max.	0.4 mm	0.3 mm	0.8 mm	0.5 mm	0.8 mm
OT min.	0.13 mm	0.13 mm	0.13 mm	0.13 mm	0.13 mm
MD max.	0.05 mm	0.025 mm	0.13 mm	0.04 mm	0.1 mm
OP	15.9±0.4 mm				

Slim Spring Plunger

Z-15GS-B, Z-15HS-B,
Z-01HS-B, Z-10FSY-B

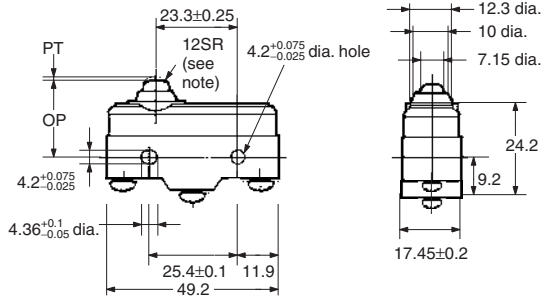
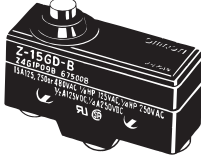


Note: Stainless-steel plunger
(flat, 1R chamfered)

	Z-15GS-B	Z-15HS-B	Z-01HS	Z-10FSY-B
OF	2.45 to 3.43 N {250 to 350 gf}	1.96 to 2.79 N {200 to 285 gf}	2.45 N {250 gf} max.	4.46 to 7.26 N {455 to 740 gf}
RF min.	1.12 N {114 gf}	1.12 N {114 gf}	0.78 N {80 gf}	1.12 N {114 gf}
PT max.	0.4 mm	0.3 mm	0.5 mm	0.8 mm
OT min.	1.6 mm	1.6 mm	1.6 mm	1.6 mm
MD max.	0.05 mm	0.025 mm	0.05 mm	0.1 mm
OP	28.2±0.5 mm			

Short Spring Plunger

Z-15GD-B, Z-01HD-B
Z-15HD-B, Z-10FDY-B
Z-15ED-B

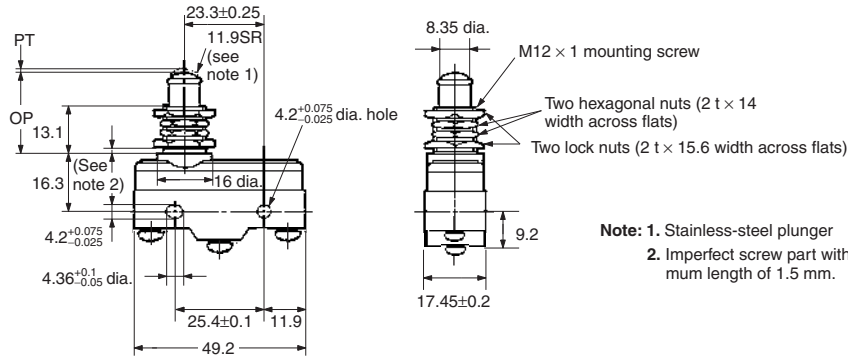
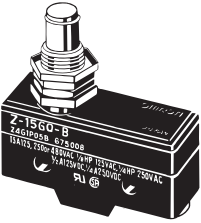


Note: Plated iron plunger

	Z-15GD-B	Z-15HD-B	Z-15ED-B	Z-01HD-B	Z-10FDY-B
OF	2.45 to 3.43 N {250 to 350 gf}	1.96 to 2.79 N {200 to 285 gf}	6.13 to 7.85 N {625 to 800 gf}	2.45 N {250 gf} max.	4.46 to 7.26 N {455 to 740 gf}
RF min.	1.12 N {114 gf}	1.12 N {114 gf}	1.12 N {114 gf}	0.78 N {80 gf}	1.12 N {114 gf}
PT max.	0.4 mm	0.3 mm	0.8 mm	0.5 mm	0.8 mm
OT min.	1.6 mm	1.6 mm	1.6 mm	1.6 mm	1.6 mm
MD max.	0.05 mm	0.025 mm	0.13 mm	0.05 mm	0.1 mm
OP	21.5±0.5 mm				

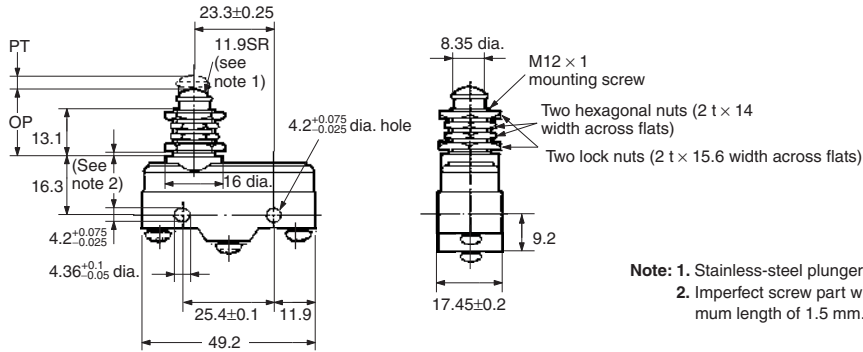
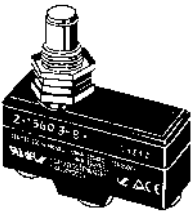
Panel Mount Plunger

Z-15GQ-B, Z-01HQ-B
Z-15HQ-B, Z-10FQY-B
Z-15EQ-B



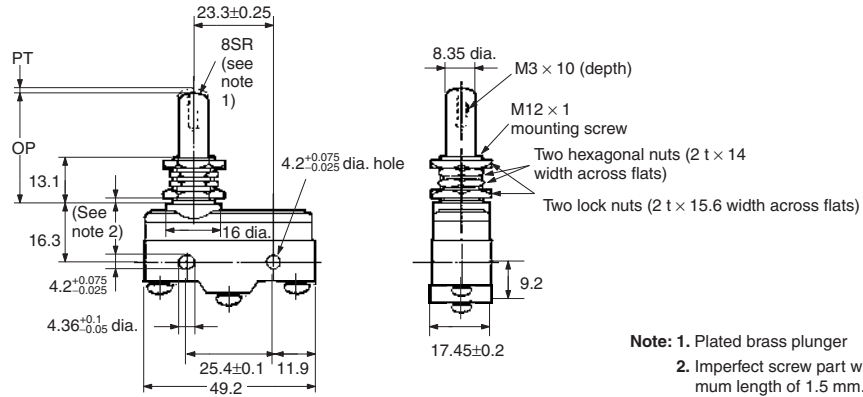
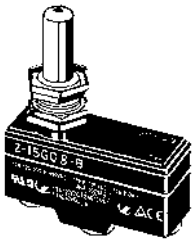
Note: 1. Stainless-steel plunger
2. Imperfect screw part with a maximum length of 1.5 mm.

Z-15GQ3-B



Note: 1. Stainless-steel plunger
2. Imperfect screw part with a maximum length of 1.5 mm.

Z-15GQ8-B



Note: 1. Plated brass plunger
2. Imperfect screw part with a maximum length of 1.5 mm.

	Z-15GQ-B	Z-15HQ-B	Z-15EQ-B	Z-01HQ-B	Z-10FQY-B	Z-15GQ3-B	Z-15GQ8-B
OF	2.45 to 3.43 N {250 to 350 gf}	1.96 to 2.79 N {200 to 285 gf}	6.13 to 7.85 N {625 to 800 gf}	2.45 N {250 gf} max.	4.46 to 7.26 N {455 to 740 gf}	2.45 to 3.43 N {250 to 350 gf}	2.45 to 3.43 N {250 to 350 gf}
RF min.	1.12 N {114 gf}	1.12 N {114 gf}	1.12 N {114 gf}	0.78 N {80 gf}	1.12 N {114 gf}	1.12 N {114 gf}	1.12 N {114 gf}
PT max.	0.4 mm	0.3 mm	0.8 mm	0.5 mm	0.8 mm	4.2 mm	0.5 mm
OT min.	5.5 mm	5.5 mm	5.5 mm	5.5 mm	5.5 mm	2.5 mm	5.5 mm
MD max.	0.05 mm	0.025 mm	0.13 mm	0.05 mm	0.1 mm	2.2 mm	0.05 mm
OP	21.8±0.8 mm					18.8±0.8 mm	32.5±1 mm

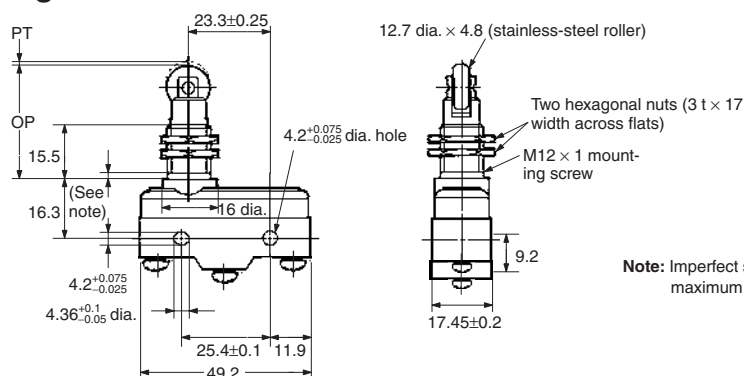
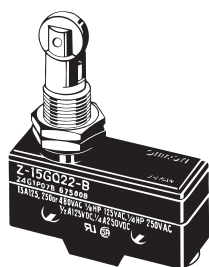
Note: 1. Do not use the M12 mounting screw and the case mounting hole at the same time, or excessive pulling force will be imposed on the Switch and the case and cover may be damaged.

2. On the model Z-15GQ3-B, PT can be set to a value larger than that for the Z-15GQ.

3. On the model Z-15GQ8-B, operating position can be adjusted by providing a screw in the plunger section.
The M3 hole with a depth of 10 mm is a through hole. Take precautions so that no water or screw lock agent penetrates into the hole.

Panel Mount Roller Plunger

Z-15GQ22-B, Z-15EQ22-B
Z-15HQ22-B, Z-10FQ22Y-B



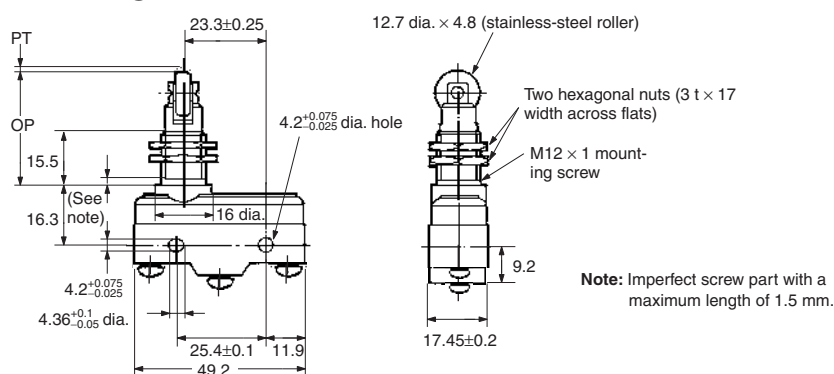
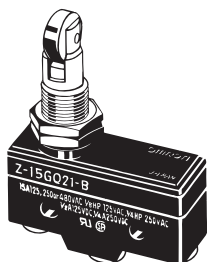
Note: Imperfect screw part with a maximum length of 1.5 mm.

	Z-15GQ22-B	Z-15HQ22-B	Z-15EQ22-B	Z-10FQ22Y-B
OF	2.45 to 3.43 N {250 to 350 gf}	1.96 to 2.79 N {200 to 285 gf}	6.13 to 7.85 N {625 to 800 gf}	4.46 to 7.26 N {455 to 740 gf}
RF min.	1.12 N {114 gf}	1.12 N {114 gf}	1.12 N {114 gf}	1.12 N {114 gf}
PT max.	0.4 mm	0.3 mm	0.8 mm	1 mm
OT min.	3.58 mm	3.58 mm	3.58 mm	3.55 mm
MD max.	0.05 mm	0.025 mm	0.13 mm	0.1 mm
OP	33.4±1.2 mm			

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Panel Mount Cross Roller Plunger

Z-15GQ21-B, Z-15HQ21-B,
Z-15EQ21-B



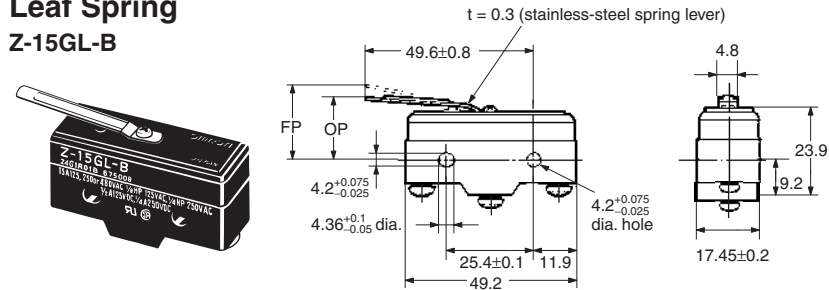
Note: Imperfect screw part with a maximum length of 1.5 mm.

	Z-15GQ21-B	Z-15HQ21-B	Z-15EQ21-B
OF	2.45 to 3.43 N {250 to 350 gf}	1.96 to 2.79 N {200 to 285 gf}	6.13 to 7.85 N {625 to 800 gf}
RF min.	1.12 N {114 gf}	1.12 N {114 gf}	1.12 N {114 gf}
PT max.	0.4 mm	0.3 mm	0.8 mm
OT min.	3.58 mm	3.58 mm	3.58 mm
MD max.	0.05 mm	0.025 mm	0.13 mm
OP	33.4±1.2 mm		

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Leaf Spring

Z-15GL-B

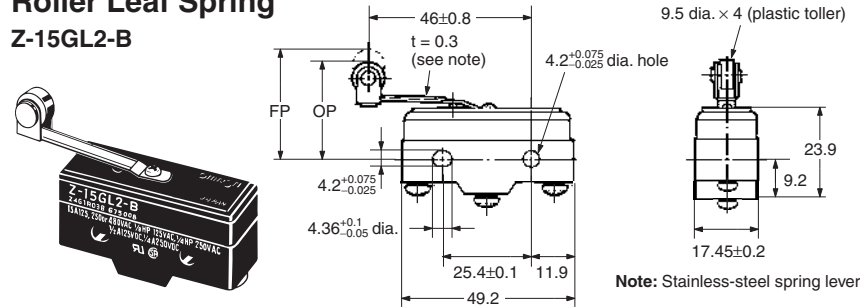


OF max.	1.38 N {141 gf}
RF min.	0.14 N {14 gf}
OT min.	1.6 mm (see note)
MD max.	1.3 mm
FP max.	20.6 mm
OP	17.4±0.8 mm

Note: When operating, be sure not to exceed 1.6 mm.

Roller Leaf Spring

Z-15GL2-B

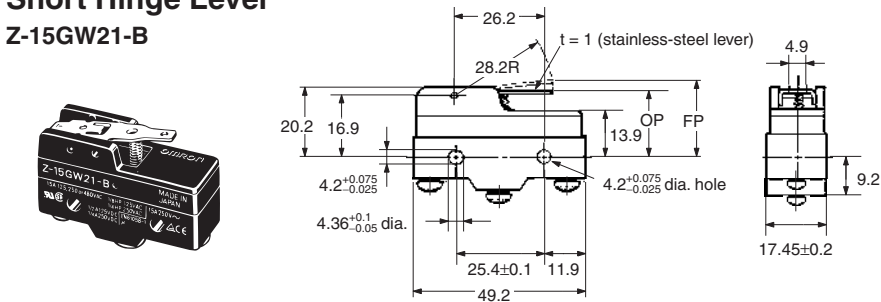


OF max.	1.38 N {141 gf}
RF min.	0.14 M {14 gf}
OT min.	1.6 mm (see note)
MD max.	1.3 mm
FP max.	31.8 mm
OP	28.6±0.8 mm

Note: When operating, be sure not to exceed 1.6 mm.

Short Hinge Lever

Z-15GW21-B



OF max.	1.57 N {160 gf}
RF min.	0.27 N {28 gf}
OT min.	2 mm
MD max.	1 mm
FP max.	24.8 mm
OP	19±0.8 mm

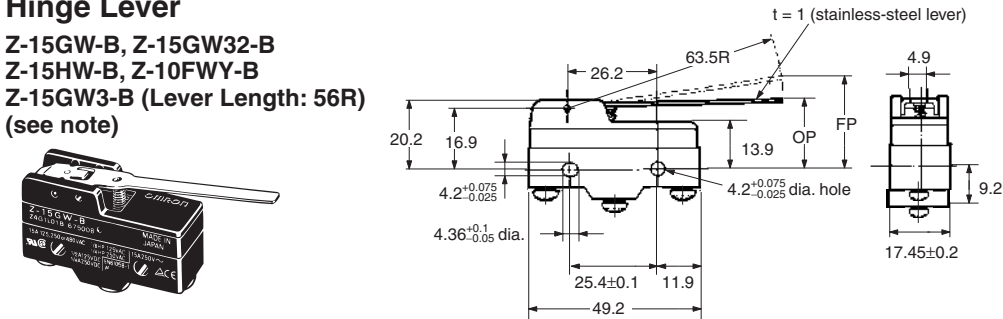
Hinge Lever

Z-15GW-B, Z-15GW32-B

Z-15HW-B, Z-10FWY-B

Z-15GW3-B (Lever Length: 56R)

(see note)

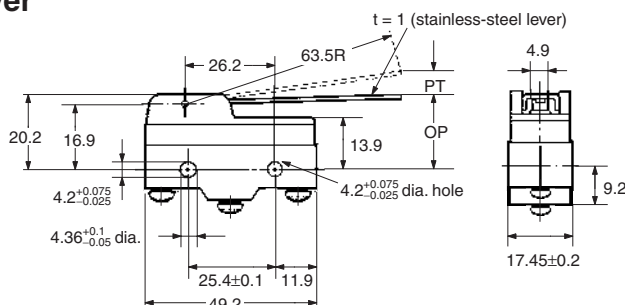
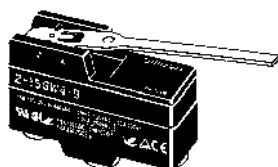


Note: The external dimensions of the actuator vary.

	Z-15GW-B	Z-15HW-B	Z-15GW32-B	Z-10FWY-B	Z-15GW3-B
OF max.	0.69 N {70 gf}	0.66 N {67 gf}	1.47 to 1.96 N {150 to 200 gf}	0.88 N {90 gf}	0.78 N {80 gf}
RF min.	0.14 N {14 gf}	0.14 N {14 gf}	0.92 N {94 gf}	0.14 N {14 gf}	0.15 N {15.5 gf}
OT min.	5.6 mm	5.6 mm	5.6 mm	5.6 mm	4.8 mm
MD max.	1.27 mm	0.63 mm	1.27 mm	2.4 mm	1.12 mm
FP max.	28.2 mm	27.4 mm	28.2 mm	29.8 mm	27.2 mm
OP	19±0.8 mm				

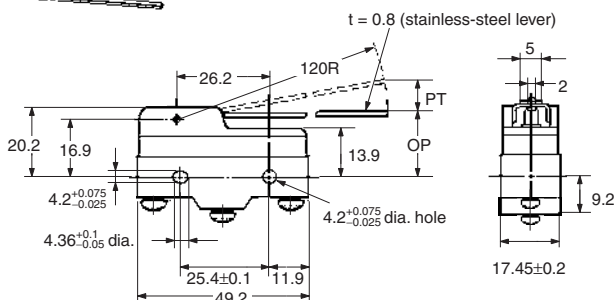
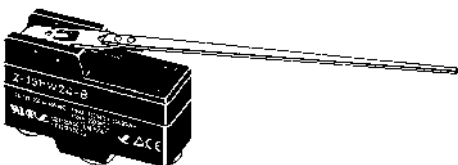
Low-force Hinge Lever

Z-15GW4-B



OF max.	274 mN {28 gf}
RF min.	34.3 mN {3.5 gf}
PT max.	10 mm
OT min.	5.6 mm
MD max.	1.27 mm
OP	19±0.8 mm

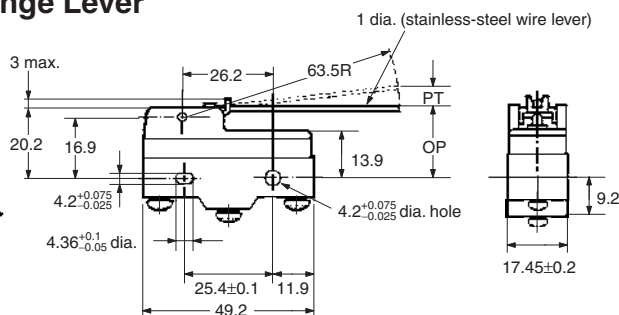
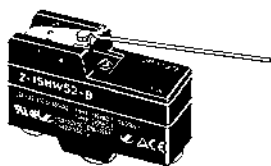
Z-15HW24-B



OF max.	58.8 mN {6 gf}
RF min.	4.90 mN {0.5 gf}
PT max.	19.8 mm
OT min.	10 mm
MD max.	2 mm
OP	19.8±1.6 mm

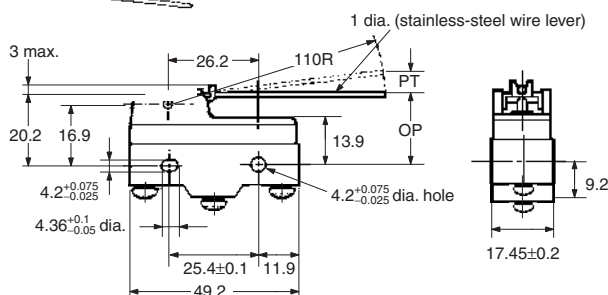
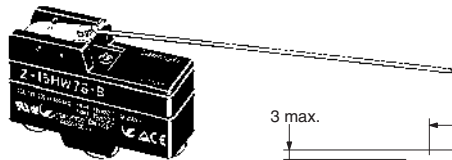
Low-force Wire Hinge Lever

Z-15HW52-B



OF max.	58.8 mN {6 gf}
RF min.	4.90 mN {0.5 gf}
PT max.	8.3 mm
OT min.	5.6 mm
MD max.	0.65 mm
OP	19±1 mm

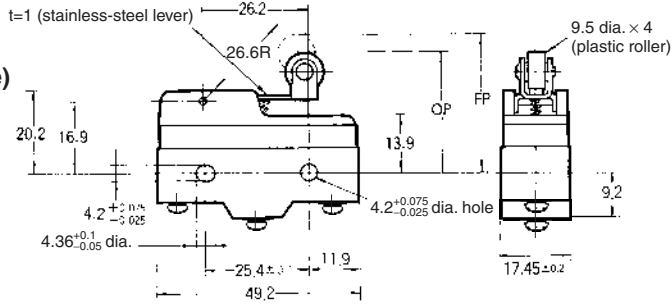
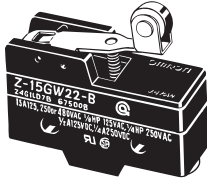
Z-15HW78-B



OF max.	39.2 mN {4 gf}
RF min.	2.94 mN {0.3 gf}
PT max.	10 mm
OT min.	6 mm
MD max.	3 mm
OP	20±1 mm

Short Hinge Roller Lever

Z-15GW22-B, Z-01HW22-B
Z-15HW22-B, Z-10FW22Y-B (see note)
Z-15EW22-B, Z-15GW2-B
Z-15HW2-B (see note), Z-10FW2Y-B (see note)
(Lever Length: 48.5R) (see note)

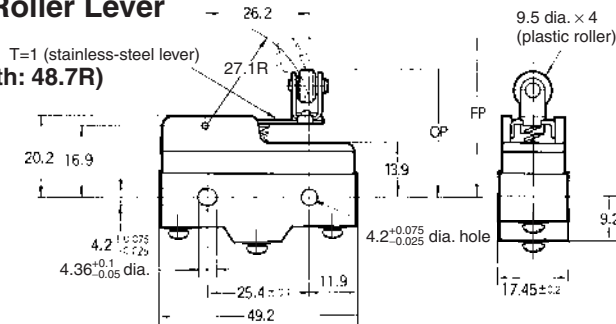
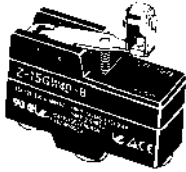


Note: The external dimensions of the actuator vary.

	Z-15GW22-B	Z-15HW22-B	Z-15EW22-B	Z-01HW22-B	Z-10FW22Y-B	Z-15GW2-B	Z-15HW2-B	Z-10FW2Y-B
OF max.	1.57 N {160 gf}	1.47 N {150 gf}	1.94 N {198 gf}	1.57 N {160 gf}	2.45 N {250 gf}	0.98 N {100 gf}	0.84 N {86 gf}	1.27 N {130 gf}
RF min.	0.41 N {42 gf}	0.41 N {42 gf}	0.41 N {42 gf}	0.27 N {28 gf}	0.34 N {35 gf}	0.22 N {22 gf}	0.22 N {22 gf}	0.22 N {22 gf}
OT min.	2.4 mm	2.4 mm	2.4 mm	2.4 mm	2.4 mm	4 mm	4 mm	4 mm
MD max.	0.5 mm	0.45 mm	1.3 mm	0.5 mm	1 mm	1.02 mm	0.6 mm	2 mm
FP max.	32.5 mm		35.1 mm	32.5 mm	34.8 mm	36.5 mm		37.4 mm
OP	30.2±0.4 mm		30.2±0.4 mm	30.2±0.4 mm	30.2±0.4 mm	30.2±0.8 mm		30.2±0.8 mm

Short Hinge Cross Roller Lever

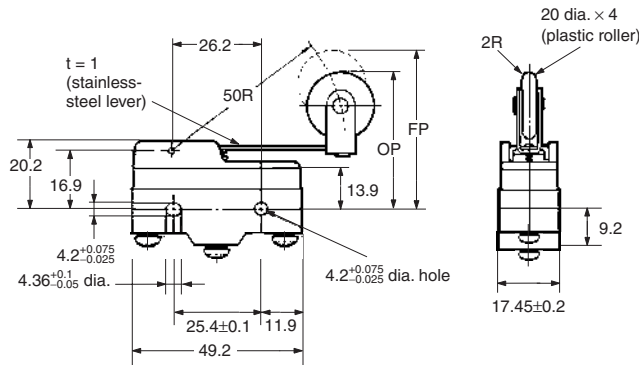
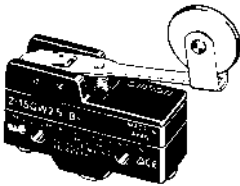
Z-15GW49-B
Z-15GW54-B (Lever Length: 48.7R)
(see note)



Model	Z-15GW49-B	Z-15GW54-B
OF max.	1.67 N {170 gf}	0.98 N {100 gf}
RF min.	0.41 N {42 gf}	0.22 N {22 gf}
OT min.	2.4 mm	4 mm
MD max.	0.51 mm	1 mm
FP max.	33.3 mm	37.3 mm
OP	31±0.4 mm	31±0.8 mm

Note: The external dimensions of the actuator vary.

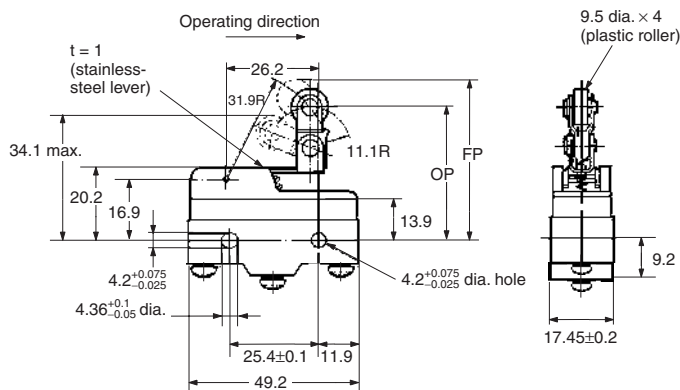
Z-15GW25-B



OF max.	0.98 N {100 gf}
RF min.	0.21 N {21 gf}
OT min.	4 mm
MD max.	1.6 mm
FP max.	47.5 mm
OP	41.2±0.8 mm

Unidirectional Short Hinge Roller Lever

Z-15GW2277-B

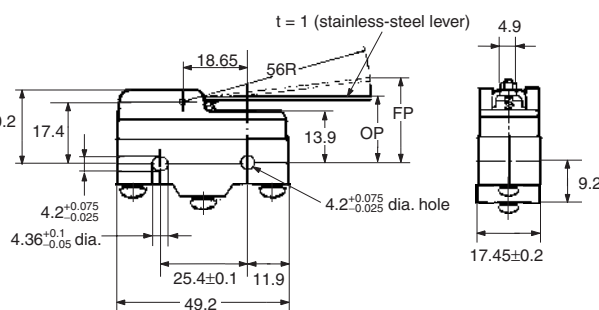
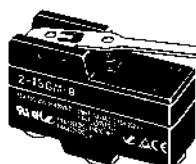


OF max.	1.67 N {170 gf}
RF min.	0.41 N {42 gf}
OT min.	2.4 mm
MD max.	0.51 mm
FP max.	43.6 mm
OP	41.3±0.8 mm

Reverse Hinge Lever

Note: The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistant because the pin plungers are normally pressed.

Z-15GM-B

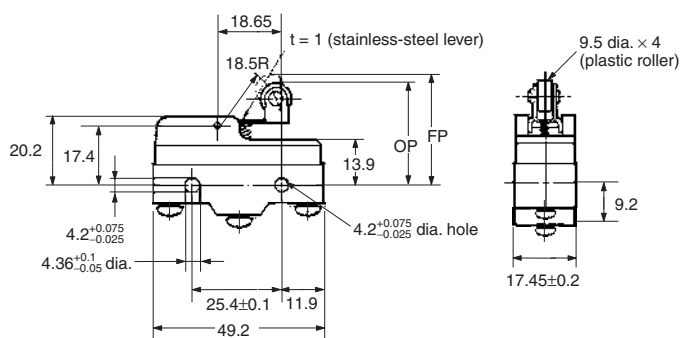


OF max.	1.67 N {170 gf}
RF min.	0.27 N {28 gf}
OT min.	5.6 mm
MD max.	0.89 mm
FP max.	23.8 mm
OP	19±0.8 mm

Reverse Short Hinge Roller Lever

Note: The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistant because the pin plungers are normally pressed.

Z-15GM22-B,
Z-10FM22Y-B

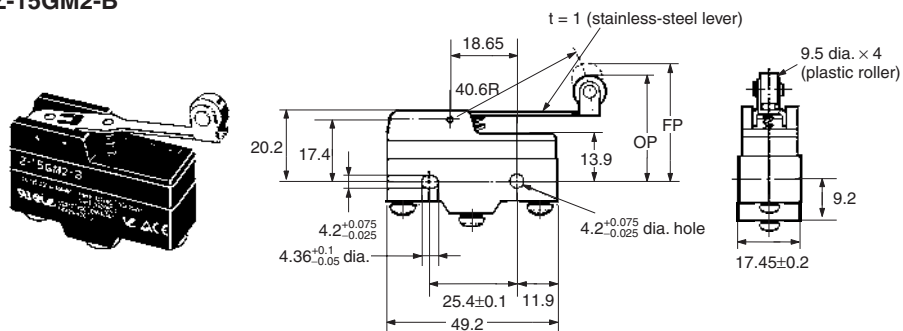


Model	Z-15GM22-B	Z-10FM22Y-B
OF max.	5.28 N {538 gf}	6.37 N {650 gf}
RF min.	1.67 N {170 gf}	1.67 N {170 gf}
OT min.	2 mm	2 mm
MD max.	0.28 mm	0.56 mm
FP max.	31.8 mm	33 mm
OP	29.4±0.4 mm	29.4±0.4 mm

Reverse Hinge Roller Lever

Note: The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.

Z-15GM2-B

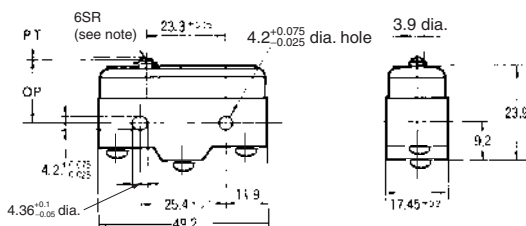


OF max.	2.35 N {240 gf}
RF min.	0.55 N {56 gf}
OT min.	4 mm
MD max.	0.64 mm
FP max.	35 mm
OP	30.2±0.8 mm

Basic Models (Drip-proof) without Terminal Protective Cover

Pin Plunger

Z-15G55-B
Z-01H55-B

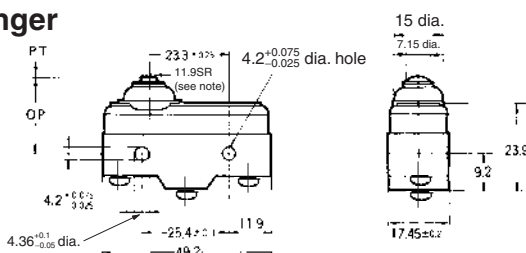


Note: Stainless-steel plunger

Model	Z-15G55-B	Z-01H55-B
OF	2.45 to 4.22 N {250 to 431 gf}	3.43 N {350 gf} max.
RF min.	1.12 N {114 gf}	0.78 N {80 gf}
PT max.	2.2 mm	2.2 mm
OT min.	0.13 mm	0.13 mm
MD max.	0.06 mm	0.06 mm
OP	15.9±0.4 mm	

Short Spring Plunger

Z-15GD55-B
Z-01HD55-B

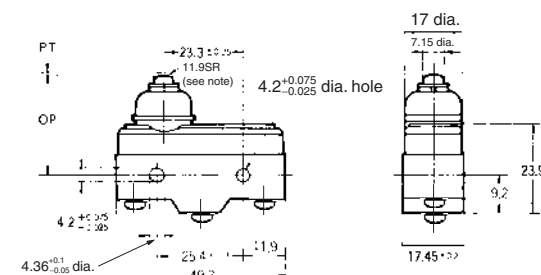
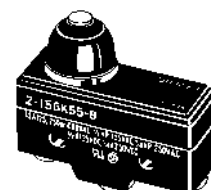


Note: Stainless-steel plunger

Model	Z-15GD55-B	Z-01HD55-B
OF max.	5.30 N {541 gf}	3.63 N {370 gf}
RF min.	1.12 N {114 gf}	0.78 N {80 gf}
PT max.	1.8 mm	1.9 mm
OT min.	1.6 mm	1.6 mm
MD max.	0.06 mm	0.06 mm
OP	21.5±0.5 mm	

Spring Plunger

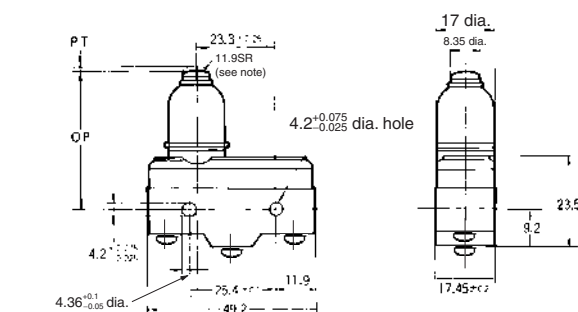
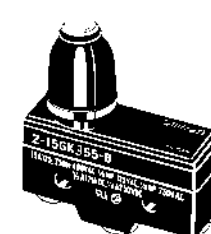
Z-15GK55-B



Note: Stainless-steel plunger

OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	2.3 mm
OT min.	1.6 mm
MD max.	0.06 mm
OP	28.2±0.5 mm

Z-15GK355-B

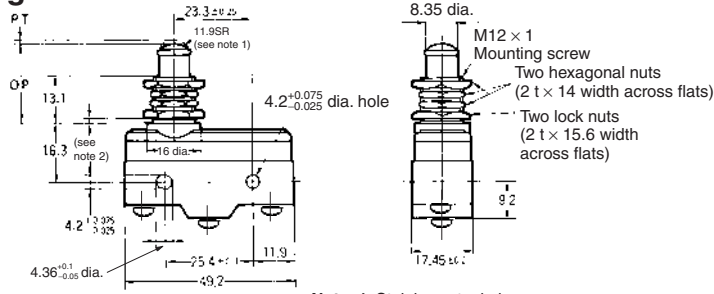
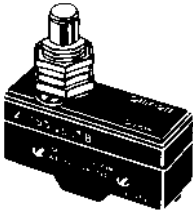


Note: Stainless-steel plunger

OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	2.4 mm
OT min.	3.5 mm
MD max.	0.06 mm
OP	37.8±1.2 mm

Panel Mount Plunger

Z-15GQ55-B



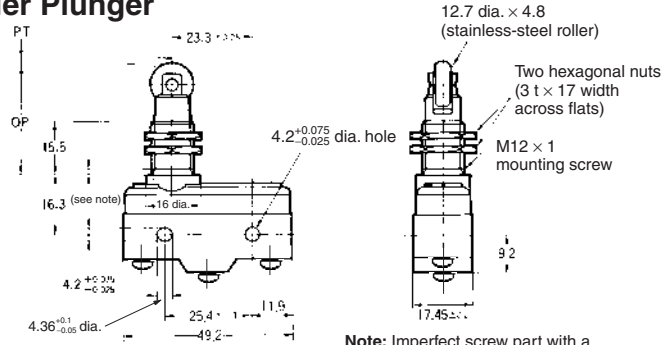
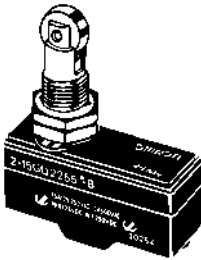
Note: 1. Stainless-steel plunger
2. Imperfect screw part with a maximum length of 1.5 mm.

OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	1.8 mm
OT min.	5.5 mm
MD max.	0.06 mm
OP	21.8±0.8 mm

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Panel Mount Roller Plunger

Z-15GQ2255-B



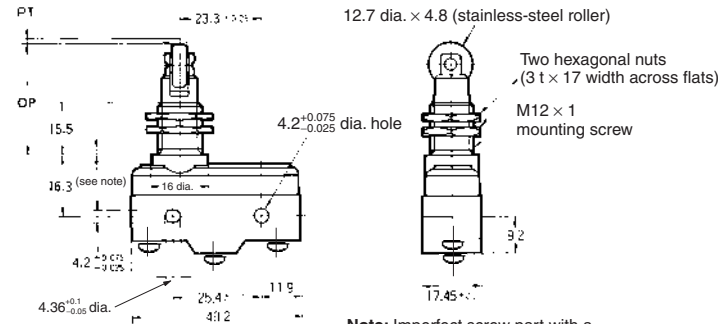
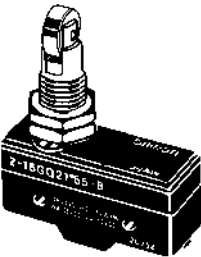
Note: Imperfect screw part with a maximum length of 1.5 mm.

OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	1.8 mm
OT min.	3.58 mm
MD max.	0.06 mm
OP	33.4±1.2 mm

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Panel Mount Cross Roller Plunger

Z-15GQ2155-B

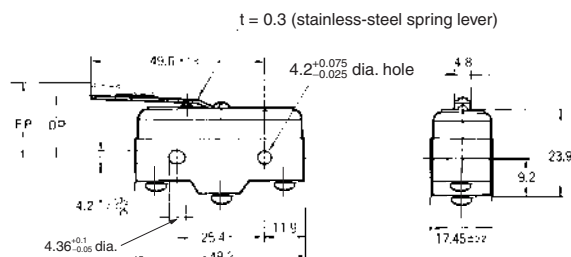
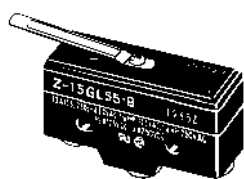


Note: Imperfect screw part with a maximum length of 1.5 mm.

OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	1.8 mm
OT min.	3.58 mm
MD max.	0.06 mm
OP	33.4±1.2 mm

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

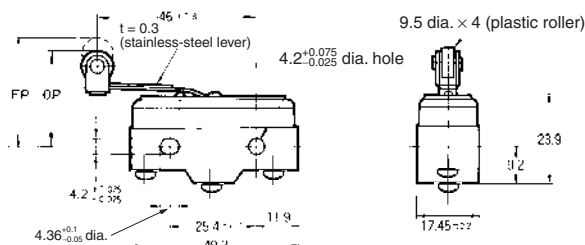
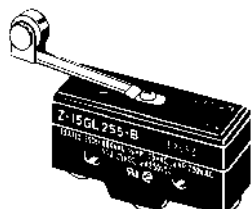
Leaf Spring Z-15GL55-B



OF max.	1.96 N {200 gf}
RF min.	0.14 N {14 gf}
OT min.	1.6 mm
MD max.	1.3 mm
FP max.	20.6 mm
OP	17.5±0.8 mm

Note: When operating, be sure not to exceed 1.6 mm.

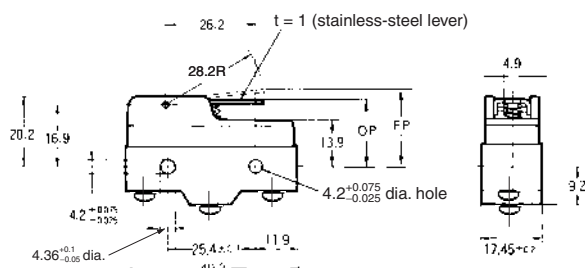
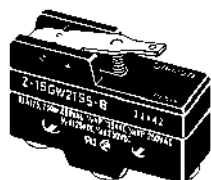
Roller Leaf Spring Z-15GL255-B



OF max.	1.96 N {200 gf}
RF min.	0.14 N {14 gf}
OT min.	1.6 mm
MD max.	1.3 mm
FP max.	31.8 mm
OP	28.6±0.8 mm

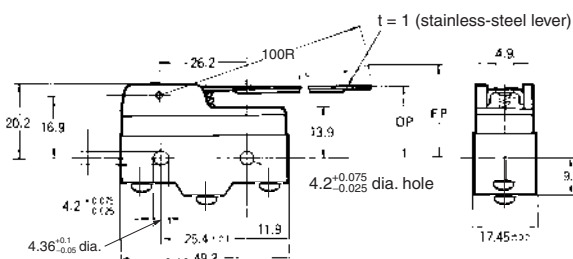
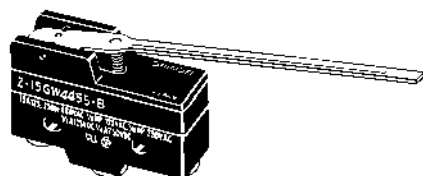
Note: When operating, be sure not to exceed 1.6 mm.

Short Hinge Lever Z-15GW2155-B



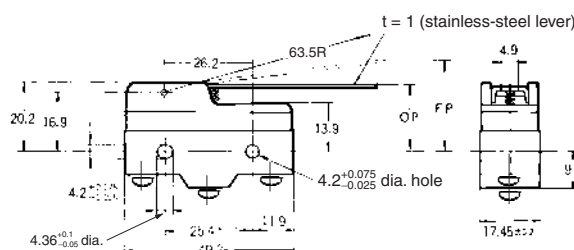
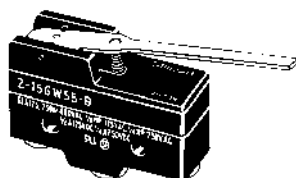
OF max.	1.86 N {190 gf}
RF min.	0.27 N {28 gf}
OT min.	2 mm
MD max.	1 mm
FP max.	25 mm
OP	19±0.8 mm

Long Hinge Lever Z-15GW4455-B



OF max.	0.88 N {90 gf}
RF min.	0.14 N {14 gf}
OT min.	5.6 mm
MD max.	3.5 mm
FP max.	33 mm
OP	19±1.2 mm

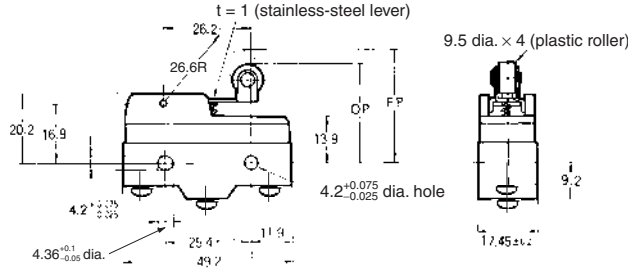
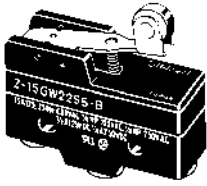
Hinge Lever Z-15GW55-B



OF max.	0.98 N {100 gf}
RF min.	0.14 N {14 gf}
OT min.	5.6 mm
MD max.	2 mm
FP max.	28.2 mm
OP	19±0.8 mm

Short Hinge Roller Lever

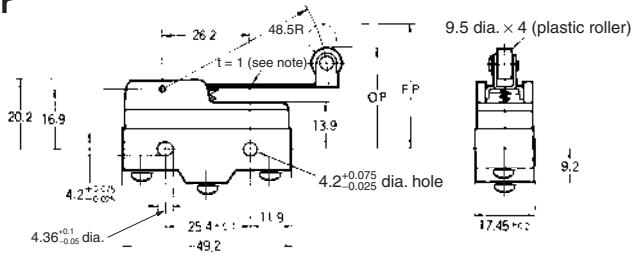
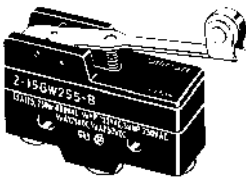
Z-15GW2255-B
Z-01HW2255-B



Model	Z-15GW2255-B	Z-01HW2255-B
OF max.	1.96 N {200 gf}	1.96 N {200 gf}
RF min.	0.41 N {42 gf}	0.27 N {28 gf}
OT min.	2.4 mm	2.4 mm
MD max.	0.8 mm	0.8 mm
FP max.	32.9 mm	
OP	30.2±0.4 mm	

Hinge Roller Lever

Z-15GW255-B

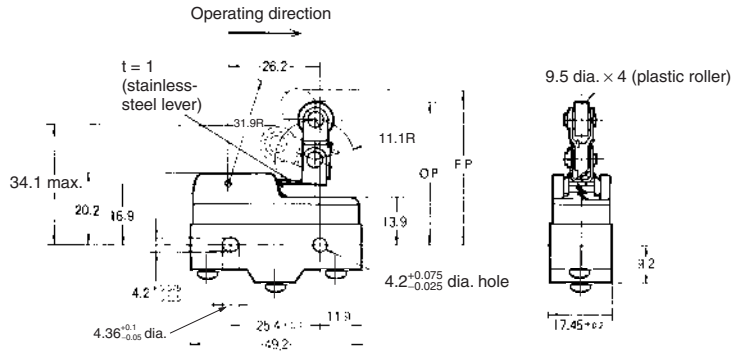
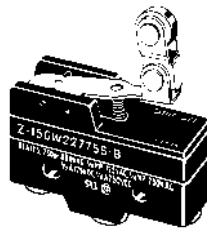


Note: Stainless-steel lever

OF max.	1.27 N {130 gf}
RF min.	0.21 N {21 gf}
OT min.	4 mm
MD max.	1.6 mm
FP max.	36.5 mm
OP	30.2±0.8 mm

Unidirectional Short Hinge Roller Lever

Z-15GW227755-B

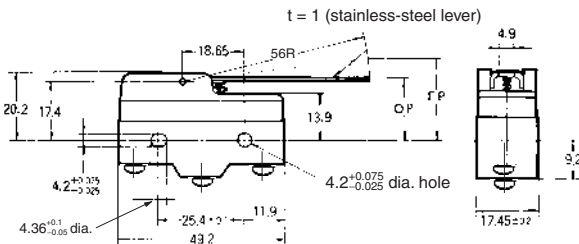
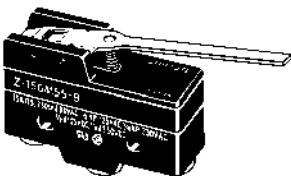


OF max.	1.77 N {181 gf}
RF min.	0.49 N {50 gf}
OT min.	2.4 mm
MD max.	0.8 mm
FP max.	43.6 mm
OP	41.3±0.8 mm

Reverse Hinge Lever

Note: The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.

Z-15GM55-B

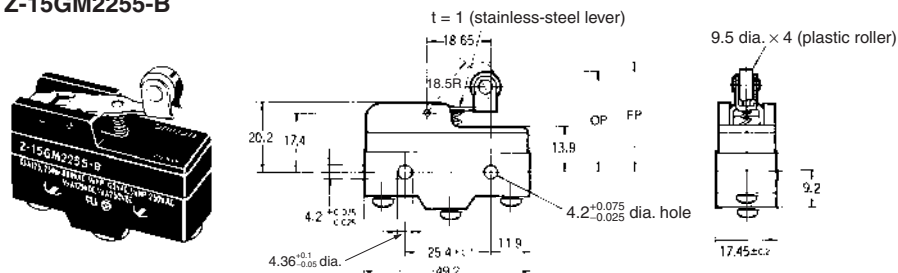


OF max.	1.96 N {200 gf}
RF min.	0.27 N {28 gf}
OT min.	5.6 mm
MD max.	0.89 mm
FP max.	23.8 mm
OP	19±0.8 mm

Reverse Short Hinge Roller Lever

Note: The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.

Z-15GM2255-B

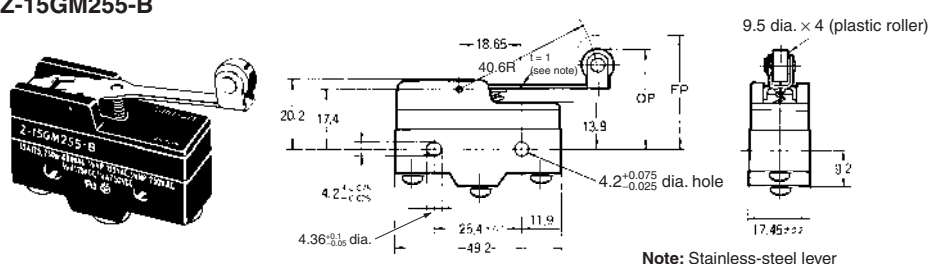


OF max.	5.69 N {581 gf}
RF min.	1.67 N {170 gf}
OT min.	2 mm
MD max.	0.28 mm
FP max.	31.8 mm
OP	29.4±0.4 mm

Reverse Hinge Roller Lever

Note: The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.

Z-15GM255-B



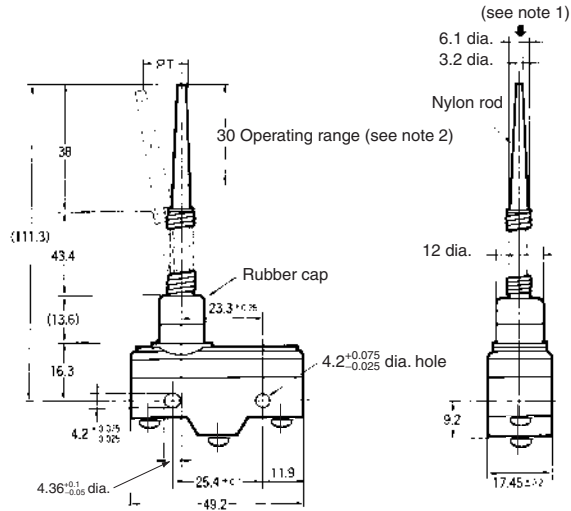
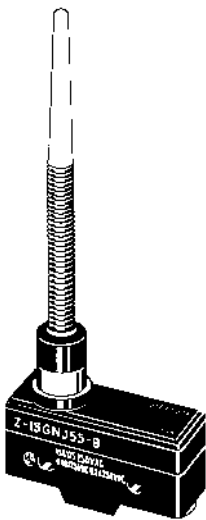
Note: Stainless-steel lever

OF max.	2.65 N {270 gf}
RF min.	0.55 N {56 gf}
OT min.	4 mm
MD max.	0.64 mm
FP max.	35 mm
OP	30.2±0.8 mm

Flexible Rod (Coil Spring)

Z-15GNJ55-B

OF max.	0.49 N {50 gf}
PT max.	(20 mm)
OT	42 to 60 mm

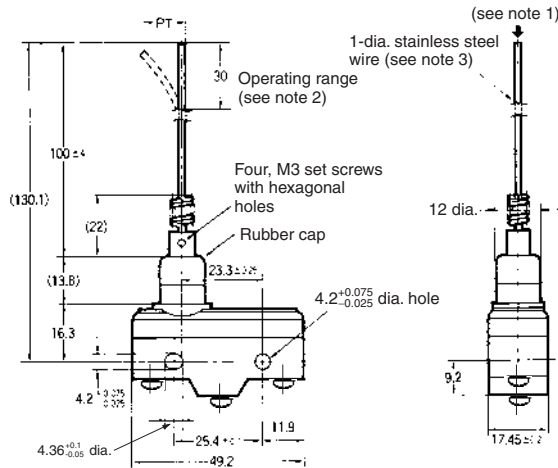
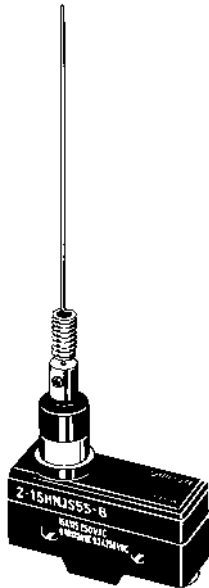


- Note:** 1. Operation is possible in any direction other than the axial direction (indicated by the arrow ↓).
 2. Use only the area within the top 30 mm of the rod as the operating part. (Do not use the area that falls within 80 mm from the mounting hole as the operating part. Using this area may cause damage to the nylon rod.)

Flexible Rod (Steel Wire)

Z-15HNJS55-B

OF max.	0.15 N {15 gf}
PT max.	(25 mm)

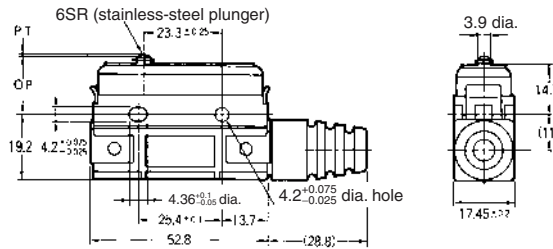
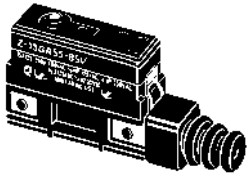


- Note:** 1. Operation is possible in any direction other than the axial direction (indicated by the arrow ↓).
 2. Use only the area within the top 30 mm of the rod as the operating part. (Do not use the area that falls within 100 mm from the mounting hole as the operating part. Using this area may cause damage to the steel wire.)
 3. The steel wire can be replaced if damaged. (Model: Lever for HNJS55)

Basic Models (Drip-proof) with Terminal Protective Cover

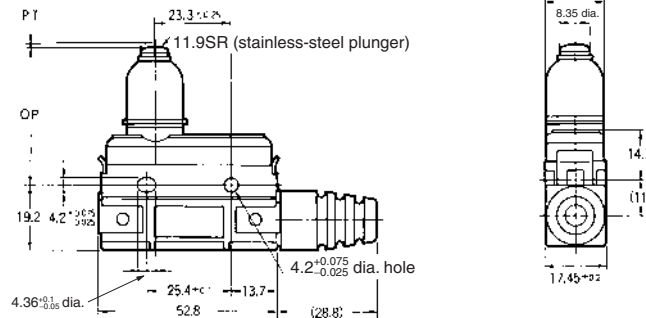
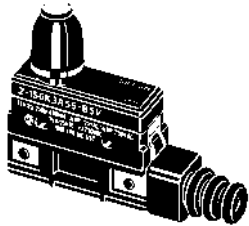
Pin Plunger

Z-15GA55-B5V



OF max.	2.45 to 4.22 N {250 to 431 gf}
RF min.	1.12 N {114 gf}
PT max.	2.2 mm
OT min.	0.13 mm
MD max.	0.06 mm
OP	15.9±0.4 mm

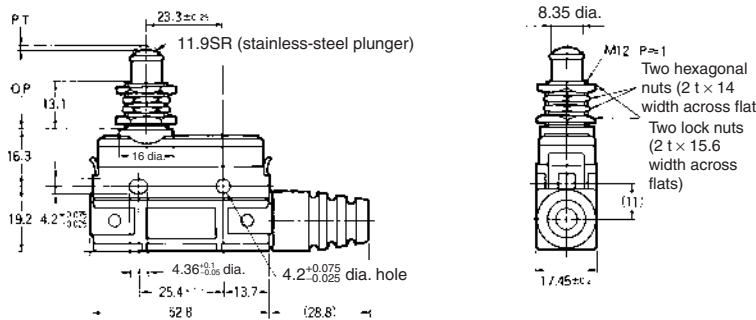
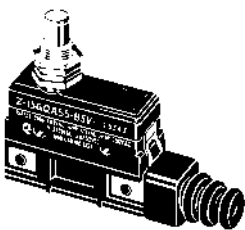
Z-15GK3A55-B5V



OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	2.4 mm
OT min.	3.5 mm
MD max.	0.06 mm
OP	37.8±1.2 mm

Panel Mount Plunger

Z-15GQA55-B5V

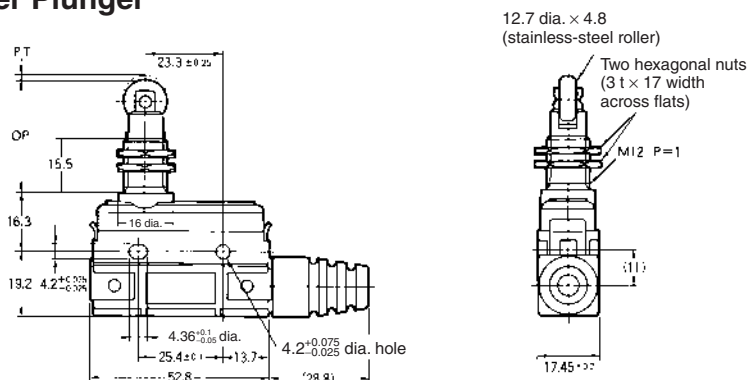
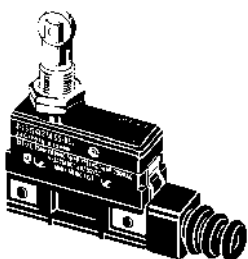


OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	1.8 mm
OT min.	5.5 mm
MD max.	0.06 mm
OP	21.8±0.8 mm

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Panel Mount Roller Plunger

Z-15GQ22A55-B5V

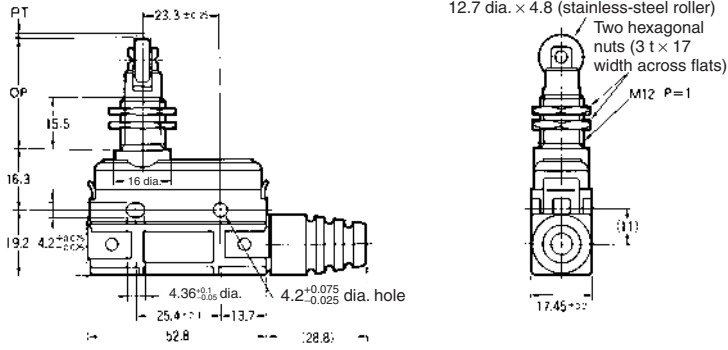
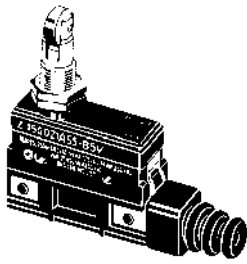


OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	1.8 mm
OT min.	3.58 mm
MD max.	0.06 mm
OP	33.4±1.2 mm

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Panel Mount Cross-roller Plunger

Z-15GQ21A55-B5V

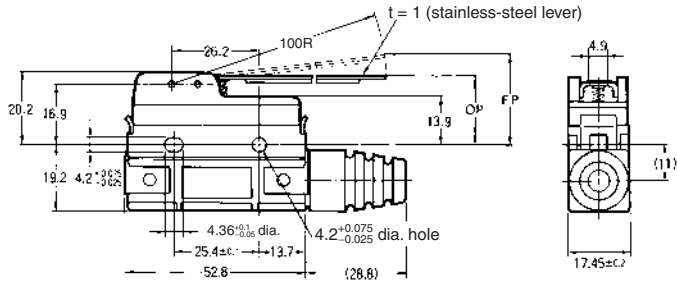
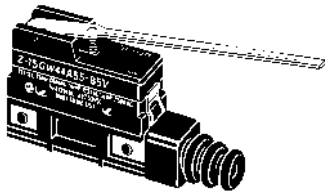


OF max.	5.30 N {541 gf}
RF min.	1.12 N {114 gf}
PT max.	1.8 mm
OT min.	3.58 mm
MD max.	0.06 mm
OP	33.4±1.2 mm

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Long Hinge Lever

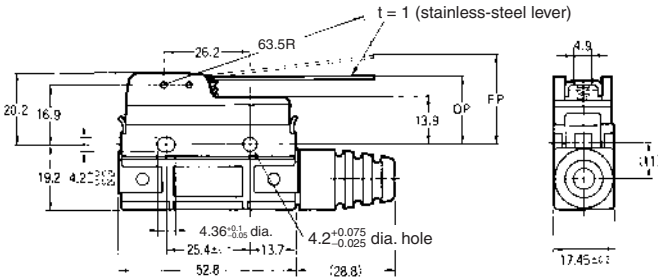
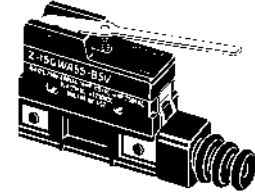
Z-15GW44A55-B5V



OF max.	0.88 N {90 gf}
RF min.	1.14 N {116 gf}
OT min.	5.6 mm
MD max.	3.5 mm
FP max.	33 mm
OP	19±1.2 mm

Hinge Lever

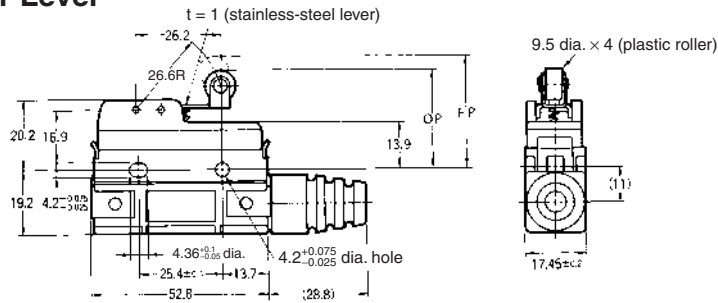
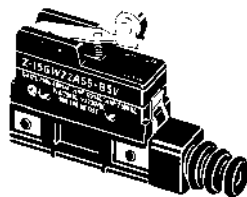
Z-15GWA55-B5V



OF max.	0.98 N {100 gf}
RF min.	0.14 N {14 gf}
OT min.	5.6 mm
MD max.	2 mm
FP max.	28.2 mm
OP	19±0.8 mm

Short Hinge Roller Lever

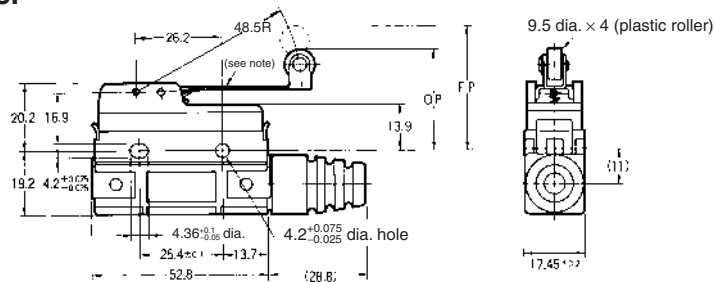
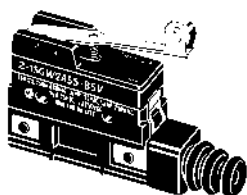
Z-15GW22A55-B5V



OF max.	1.96 N {200 gf}
RF min.	0.41 N {42 gf}
OT min.	2.4 mm
MD max.	0.8 mm
FP max.	32.9 mm
OP	30.2±0.4 mm

Hinge Roller Lever

Z-15GW2A55-B5V

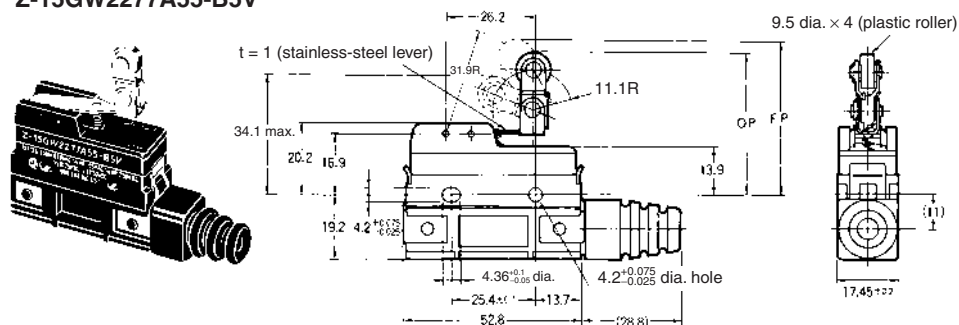


OF max.	1.27 N {130 gf}
RF min.	0.21 N {21 gf}
OT min.	4 mm
MD max.	1.6 mm
FP max.	36.5 mm
OP	30.2±0.8 mm

Note: t = 1 (stainless-steel lever)

Unidirectional Short Hinge Roller Lever

Z-15GW2277A55-B5V

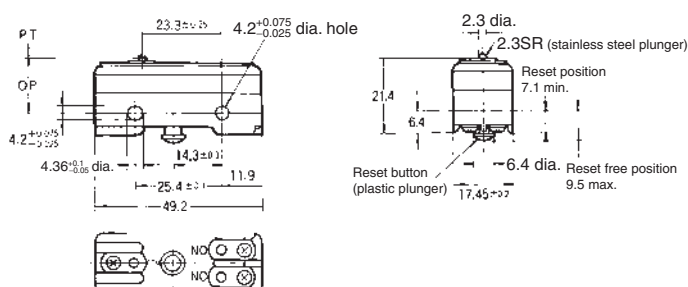


OF max.	1.77 N {181 gf}
RF min.	0.49 N {50 gf}
OT min.	2.4 mm
MD max.	0.8 mm
FP max.	43.6 mm
OP	41.3±0.8 mm

Maintained-contact Models

Pin Plunger

Z-15ER



Plunger

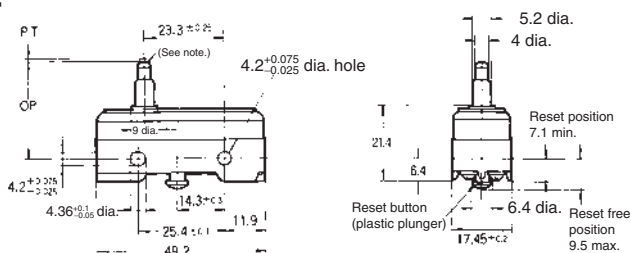
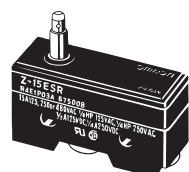
OF max.	1.96 to 2.50 N {200 to 255 gf}
PT max.	0.4 mm
OT min.	0.13 mm
OP	15.9±0.4 mm

Reset Button

OF max.	0.55 to 2.79 N {56 to 285 gf}
OT min.	0.4 mm

Slim Spring Plunger

Z-15ESR



Note: Stainless steel plunger (tip only, flat, R1 bevel).

Plunger

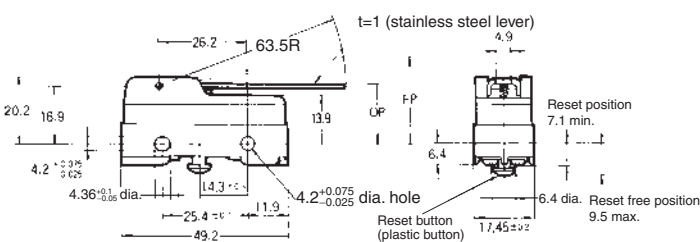
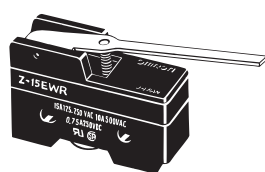
OF max.	2.65 N {270 gf}
PT max.	0.4 mm
OT min.	1.6 mm
OP	28.2±0.5 mm

Reset Button

OF max.	2.79 N {285 gf}
OT min.	0.4 mm

Hinge Lever

Z-15EWR



Lever Tip

OF max.	0.54 N {55 gf}
OT min.	5.6 mm
FP max.	28.2 mm
OP	19±0.8 mm

Reset Button

OF max.	2.94 N {0.3 gf}
OT min.	0.4 mm

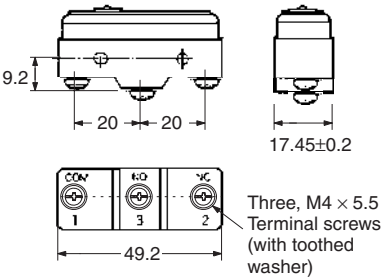
■ Terminals

Basic Models (General-purpose) & Split-contact Models

Basic (General-purpose) Models		Split-contact Models
<p>Screw Terminals (-B)</p> <p>Three, M4 × 5.5 Terminal screws (with toothed washer)</p> <p>Appropriate terminal screw tightening torque: 0.78 to 1.18 N·m {8 to 12 kgf·cm}.</p> <p>Note: With reverse action models (Z-15GM), the positions of NO and NC terminals are reversed.</p>	<p>Solder Terminal</p> <p>Appropriate terminal screw tightening torque: 0.49 to 0.78 N·m {5 to 8 kgf·cm}.</p> <p>Note: With reverse action models (Z-10FM), the positions of NO and NC terminals are reversed.</p>	<p>Screw Terminals (Y-B)</p> <p>Five, M3.5 × 5.5 terminal screws (with toothed washer)</p> <p>Appropriate terminal screw tightening torque: 0.49 to 0.78 N·m {5 to 8 kgf·cm}.</p> <p>Note: With reverse action models (Z-10FM), the positions of NO and NC terminals are reversed.</p>

Basic Models (Drip-proof) without Terminal Protective Cover

Without Terminal Protective Cover



Note: With reverse action models (Z-15GM), the positions of NO and NC terminals are reversed.

Molded Terminals (Drip-proof Type/Molded Terminal)

Model Number Legend

Z-□55-M□□□M

1 2 3 4

1. Drip-proof Type

2. Lead Outlets

None: VSF

19: VCT

3. Directions of Lead Outlets

Refer to the following diagrams.

4. Length of Lead Outlets

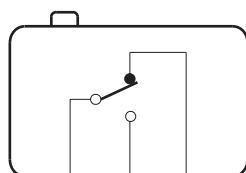
0.5: 0.5 m

1: 1 m

2: 2 m

3: 3 m

Contact Form



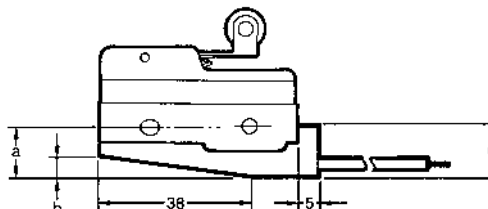
COM NO NC
(Black) (White) (Red)

Note: With the reverse action model (Z-15GM), the positions of NO and NC terminals are reversed.

Dimensions

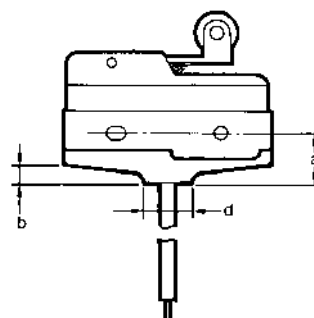
L/R Type

(The following illustration is the R type.)



Lead wire	a	b	d
VSF	12	4	13
VCT	19	11	20

D Type



Lead wire	a	b	d
VSF	12	4	12
VCT	19	11	16

Lead Wire Specifications

Lead wire	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 dia.	Black: COM	0.5, 1, 2, 3
VCT (vinyl-insulated cable)		Three-core: approx. 10.5 dia.	White: NO Red: NC	

Note: No models with molded terminals are approved by UL, CSA, or TÜV.

Precautions

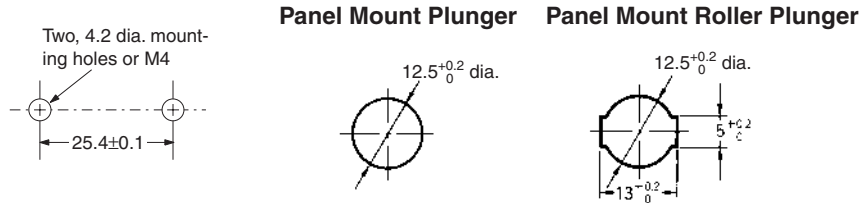
Refer to the *Technical Information for Basic Switches* (Cat. No. C122) for common precautions.

Correct Use

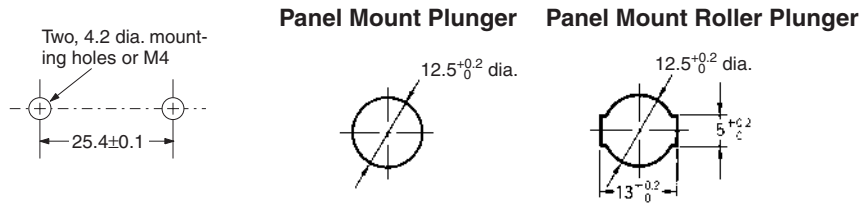
Mounting

Use M4 screws with plane washers and spring washers to mount the Switch. Tighten each mounting screw securely to a torque of 1.18 to 1.47 N·m {12 to 15 kgf·cm}.

Basic Models (General-purpose) & Split-contact Models



Basic Models (Drip-proof) without Terminal Protective Cover



Panel Mount Switch (Z-15□Q□, Z-01□Q□)

When mounting the panel mount plunger model with screws on a side surface, be careful of the dog angle and operation speed. Excessive dog angle or operation speed may damage the Switch.

The Switch can be panel mounted, provided that the hexagonal nut of the actuator is tightened to a torque of 2.94 to 4.9 N·m {30 to 50 kgf·cm}.

When using the panel mount plunger model mounted with screws on a side surface, be careful not to apply a large shock. Applying a shock exceeding 100G may damage the Switch.

When using the panel mount plunger model mounted with screws on a side surface, remove the hexagonal nuts from the actuator.

High-sensitivity Switch (Z-15H)

When using the Switch in a DC circuit, be sure to provide an arc suppressor as well because the small contact gap of the Switch may result in contact troubles.

In an application where a high repeat accuracy is required, limit the current that flows through the Switch to within 0.1 A. Also, use a relay to control a high-capacity load if the Switch is connected to such a load. (In this case, the exciting current of the relay coil is the load of the Switch.)

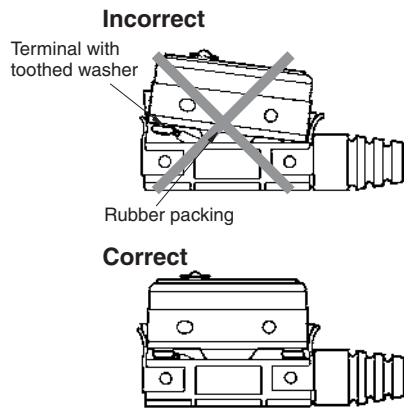
Do not apply a force of 19.6 N {2 kgf} or higher to the pin plunger.

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

Models with Drip-proof Terminal Cover (Z-□A55-B5V)

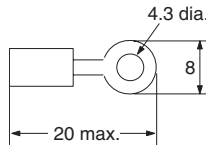
Wiring

To attach the Protective Cover to the case, hold the cover in almost parallel to the case and then push it to the case. If the cover is pushed diagonally, the rubber packing may slip off, degrading the sealability of the Switch.



Use round solderless terminals having the following dimensions to connect leads to the terminals. Tighten the screws of terminals to a torque of 0.78 to 1.18 N·m {8 to 12 kgf·cm}.

Use the terminal shown below.



A cable 8.5 to 10.5 mm in diameter can be applicable to the sealing rubber of the lead outlet of the Switch. A two-core or three-core VCT cable having a cross-sectional area of 1.25 mm² is especially suitable for this.

Use M4 small screws with spring toothed washer are used as the terminal screws.

Drip-proof Switch (Z□55)

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

The rubber boots are made from weather-resistive chloroprene rubber.

Do not use Basic Switches in places with radical changes in temperature.

Split-contact Switch (Z-10F□Y)

The applicable current varies depending on how the contacts are used. If the Switch is connected in series, the Switch can endure a current 1.5 to 2 times higher than the current that can be applied in parallel connection.

Flexible Rod Switch (Z-15□NJ□55, Drip-proof)

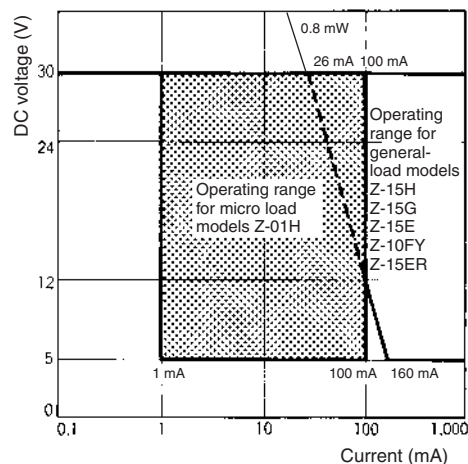
When the rod is fully swung, the Switch may operate when the lever returns, causing chattering. Use a circuit that compensates for chattering wherever possible.

Do not switch the rod to the fullest extent when the Switch is to break a power circuit because such a practice may cause metal deposition to occur between the mating contacts of the Switch.

Micro Load Applicable Range

Using a model for ordinary loads to open or close the contact of a micro load circuit may result in faulty contact. Use models that operate in the following range. However, even when using micro load models within the operating range shown here, if inrush current occurs when the contact is opened or closed, it may increase contact wear and so decrease life expectancy. Therefore, insert a contact protection circuit where necessary.

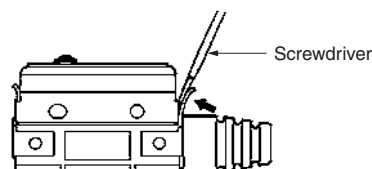
The minimum applicable load is the N-level reference value. This value indicates the malfunction reference level for the reliability level of 60% (λ 60). The equation, λ 60 = 0.5×10^{-6} /operations indicates that the estimated malfunction rate is less than 1/2,000,000 operations with a reliability level of 60%.



Item	Z-01H	Z-15□, Z-10FY
Minimum applicable load	1 mA at 5 VDC	160 mA at 5 VDC

Others

Do not apply an excessive force to the mounting bracket with a screwdriver or a similar object when attaching or detaching the protective cover; otherwise, the cover will be deformed.



This terminal protective cover cannot be used with models whose model number does not have the prefix “-B5V.”

Terminal protective covers can be ordered separately for maintenance use.

Accessories (Order Separately)

Refer to *Z/A/X/DZ Common Accessories* for details about Terminal Covers, Separators, and Actuators.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Z/A/X/DZ Common Accessories

Z/A/X/DZ

Ordering Information

List of Models

Terminal Covers (Sold Separately)

Common to Z, A, X, and DZ Models

The Terminal Cover is secured with mounting screws and protects the casing and terminal wires from dust, vibration, or fingers, thus preventing terminal short-circuiting, ground faults, wire disconnection or improper connection, and electric shock accidents.

Terminal Covers made of phenol resin have five or six thin wall sections. These sections can be torn open for providing holes for lead cables at desired points.

Application		Soldering terminal use	Screw terminal use	Remarks
Material	Mounting direction	Model		
Phenol resin	Side mounting	AP-A	AP-B	---
Metal press mold	Side mounting	AP1-A	AP1-B	Used for AP-A and AP-B
Vinyl chloride	Side mounting	AP-Z		---

Note: Use the screw-terminal use Terminal Cover for DZ-series soldering-terminal models.

Separator (Sold Separately)


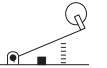


Common to Z, A, X, and DZ Models

Model: Separator for Z

Actuators (Sold Separately)

Common to Z and X Models

A Switch can be actuated by a cam or an appropriate object, in which case, use one of the following Actuators according to the application.

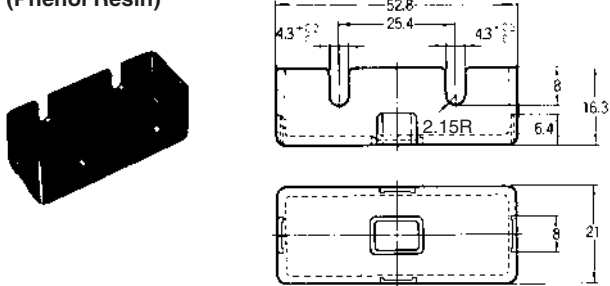
Actuator		Common to Z and X models	
Hinge lever 		XAA-1	
Hinge roller lever 		ZAA-2	
Panel mount plunger 	Short	ZAQ-3	
	Medium	ZAQ-2	
	Long	ZAQ-1	
Panel mount roller plunger 		ZAQ-22	

Dimensions

■ Dimensions and Operating Characteristics

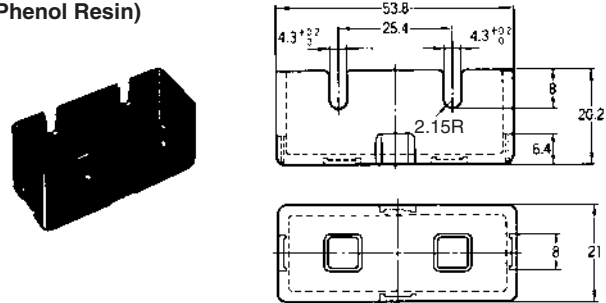
Terminal Covers

AP-A
Soldering Terminal Use
(Phenol Resin)



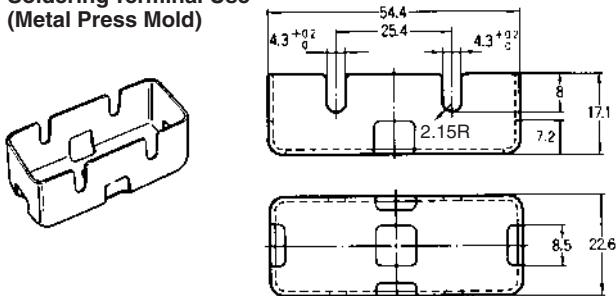
Note: The Cover has five thin, easy-to-separate portions for easy lead wire connections.

AP-B
Screw Terminal Use
(Phenol Resin)



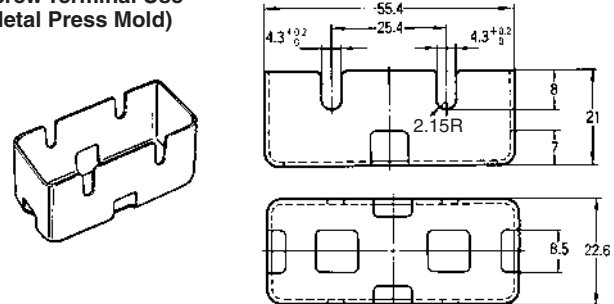
Note: The Cover has six thin, easy-to-separate portions for easy lead wire connections.

AP1-A
Soldering Terminal Use
(Metal Press Mold)



Note: 1. The Cover has five holes for easy lead wire connections.
2. AP1-A should be used with AP-A.

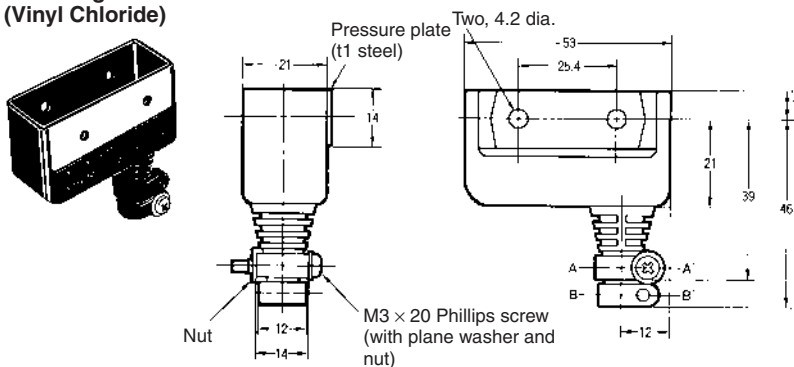
AP1-B
Screw Terminal Use
(Metal Press Mold)



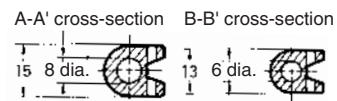
Note: 1. The Cover has six holes for easy lead wire connections.
2. AP1-B should be used with AP-B.

AP-Z

**Soldering or Screw Terminal Use
(Vinyl Chloride)**



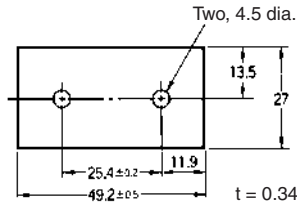
Cable Pull-out Dimension



Note: A 6-dia. or 8-dia. cable can be used by cutting the cable pull-out hole to the size of the cable to be used.

Note: Each dimension has a tolerance of ± 0.4 mm unless otherwise specified. (± 0.8 mm for the AP-Z)

Separator

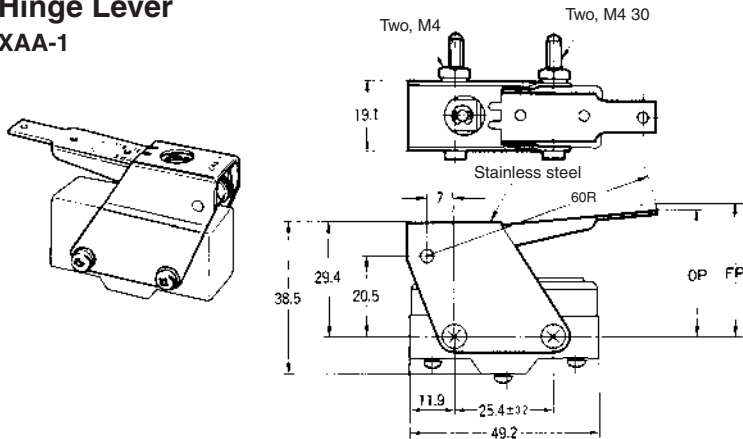


- Note:** 1. Each dimension has a tolerance of +0.4 mm unless otherwise specified.
2. The material is EAVTC (Epoxy Alkyd Varnished Tetron Cloth) and its heat-resisting temperature is 130°C.

Actuators

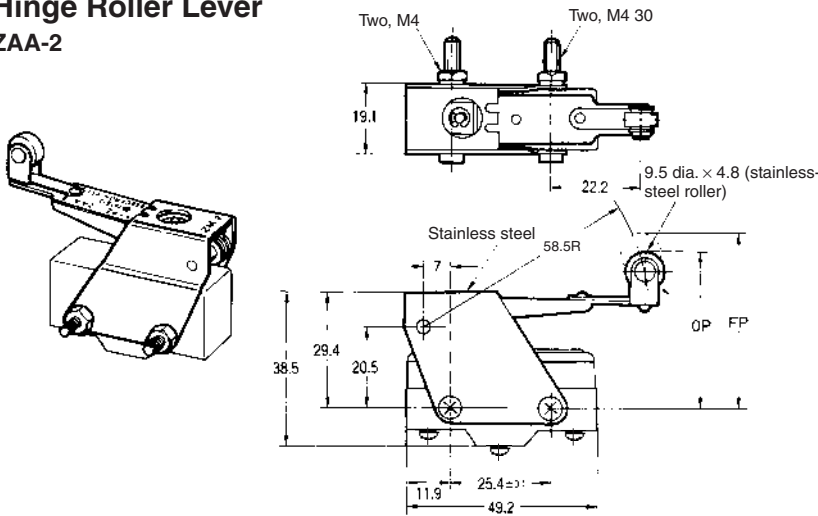
Note: These Actuators are not provided with Switches.

Hinge Lever
XAA-1



Model	Z-15G-B	X-10G-B
OF max.	4.90 n {500 gf}	4.90 n {500 gf}
RF min.	1.67 N {170 gf}	1.67 N {170 gf}
PT max.	6 mm	6 mm
OT min.	12.7 mm	12.7 mm
MD max.	2.2 mm	3.3 mm
FP max.	32.9±1.6 mm	

Hinge Roller Lever
ZAA-2

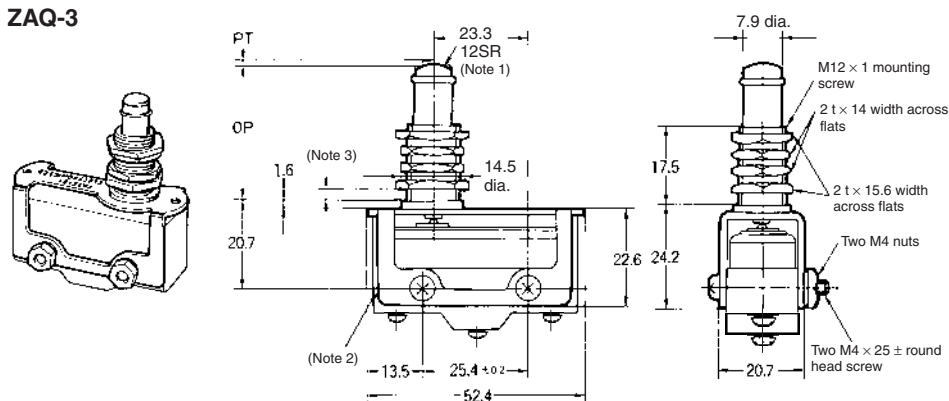


Model	Z-15G-B	X-10G-B
OF max.	4.90 n {500 gf}	4.90 n {500 gf}
RF min.	1.67 N {170 gf}	1.67 N {170 gf}
PT max.	6 mm	6 mm
OT min.	12.7 mm	12.7 mm
MD max.	2.2 mm	3.3 mm
FP max.	44.5±1.6 mm	

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

Short Panel Mount Plunger

ZAQ-3



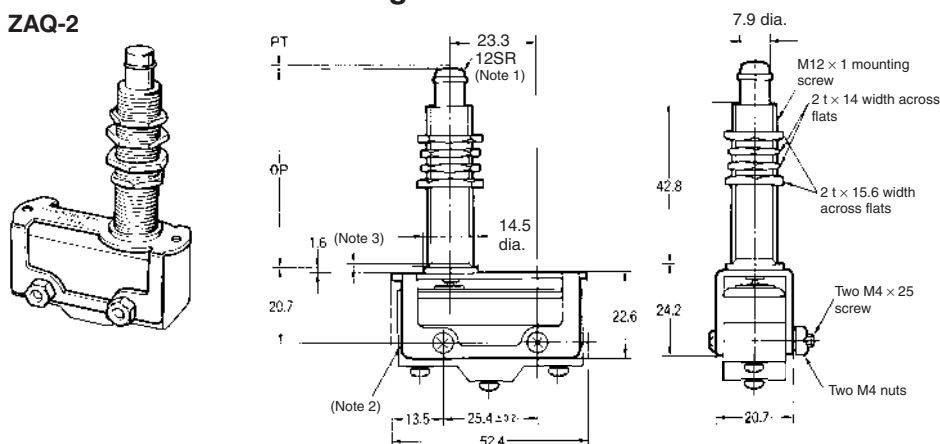
Model	ZAQ-3	
	Z-15E-B	X-10G-B
OF max.	8.34 N {850 gf}	5.39 N {550 gf}
RF min.	1.12 N {114 gf}	1.12 N {114 gf}
PT max.	0.8 mm	1 mm
OT min.	4.8 mm	4.5 mm
MD max.	0.15 mm	0.2 mm
OP	27.8±1.5 mm	

- Note:** 1. Stainless-steel pin plunger
2. Bronze frame
3. Incomplete screw section part with a maximum of 1.5 mm

Note: This Actuator (pin plunger) can be used with Standard Pin Plungers (Z-15G(-B), Z-15E(-B), X-10G(-B), DZ-10G-1A(-1B)) for the Z, X, and DZ models.

Medium Panel Mount Plunger

ZAQ-2



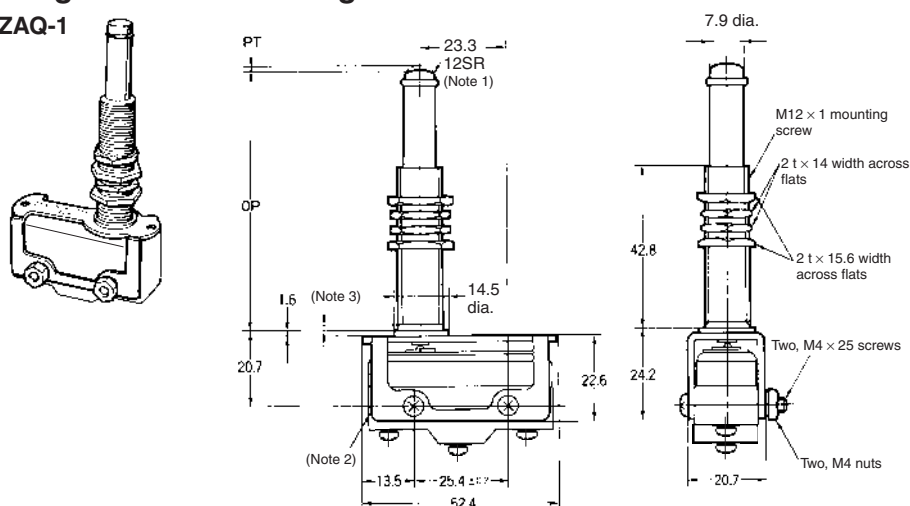
Model	ZAQ-2	
	Z-15E-B	X-10G-B
OF max.	8.34 N {850 gf}	5.39 N {550 gf}
RF min.	1.12 N {114 gf}	1.12 N {114 gf}
PT max.	0.8 mm	1 mm
OT min.	4.8 mm	4.5 mm
MD max.	0.15 mm	0.2 mm
OP	53.2±1.5 mm	

- Note:** 1. Stainless-steel pin plunger
2. Bronze frame
3. Incomplete screw section part with a maximum of 1.5 mm

Note: This Actuator (pin plunger) can be used with Standard Pin Plungers (Z-15G(-B), Z-15E(-B), X-10G(-B), DZ-10G-1A(-1B)) for the Z, X, and DZ models.

Long Panel Mount Plunger

ZAQ-1

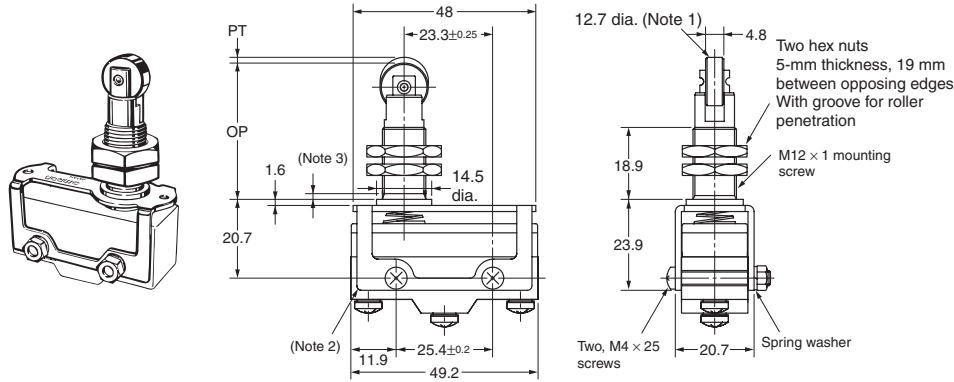


Model	ZAQ-1	
	Z-15E-B	X-10G-B
OF max.	8.34 N {850 gf}	5.39 N {550 gf}
RF min.	1.12 N {114 gf}	1.12 N {114 gf}
PT max.	0.8 mm	1 mm
OT min.	20.6 mm	20.4 mm
MD max.	0.15 mm	0.2 mm
OP	69.1±1.5 mm	

- Note:** 1. Stainless-steel pin plunger
2. Bronze frame
3. Incomplete screw section part with a maximum of 1.5 mm

Note: This Actuator (pin plunger) can be used with Standard Pin Plungers (Z-15G(-B), Z-15E(-B), X-10G(-B), DZ-10G-1A(-1B)) for the Z, X, and DZ models.

Panel Mount Roller Plunger
ZAQ-22



Note: 1. Stainless-steel pin plunger
2. Bronze frame
3. Incomplete screw section part with a maximum of 1.5 mm.

Model	ZAQ-22	
	Z-15E-B	X-10G-B
OF max.	8.34 N {850 gf}	5.39 N {550 gf}
RF min.	1.12 N {114 gf}	1.12 N {114 gf}
PT max.	0.8 mm	1 mm
OT min.	20.6 mm	20.4 mm
MD max.	0.15 mm	0.2 mm
OP	37±0.8 mm	

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Cat. No. B106-E1-01

In the interest of product improvement, specifications are subject to change without notice.

Limit Switches

Technical Information

■ Safety Precautions

For the individual precautions for each Switch, refer to the *Precautions* section of each Switch.

⚠ WARNING

Do not touch the charged switch terminals while the Limit Switch has carry current. Doing so may result in electric shock.

⚠ WARNING

Do not assemble the Limit Switch or touch the interior of the Limit Switch while power is being supplied to the Limit Switch. Doing so may result in electric shock.

If the Limit Switch incorporates a ground terminal, be sure to ground it through an appropriate wire, otherwise an electric shock may be received.

Be sure to connect a fuse with a breaking current 1.5 to 2 times the rated current to the Limit Switch in parallel in order to protect the Limit Switch from damage due to short-circuiting.

Maintain an appropriate insulation distance between wires connected to the Limit Switch.

If the Limit Switch has no ground terminal, ground the mounting panel to which the Limit Switch is mounted unless the Limit Switch is of double insulation construction falling under class II. Such models (e.g., the D4D-N, D4D-R, D4DS, SHL, D4E-N, ZC, or D4MC) ensure good insulation characteristics. Therefore, no ground terminals are incorporated.

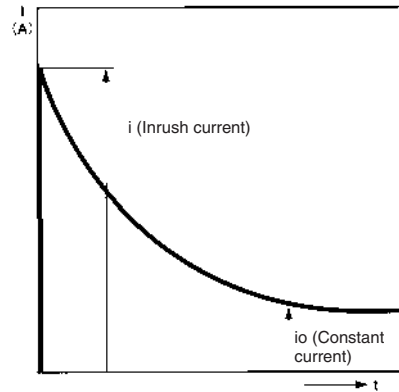
Do not use the Limit Switch in places with flammable or explosive gas without taking any countermeasures against explosion or fires. Otherwise switching arcs or heat radiation may cause a fire or explosion.

Be sure to protect the Limit Switch with appropriate explosion-proof barriers or use a Limit Switch of explosion-proof construction. The Explosion-proof Limit Switch is not available for use in all types of gas or locations. Refer to the *Explosion-proof Device General Catalog* for details.

The life of the Limit Switch greatly varies with switching conditions. Before using the Limit Switch, be sure to test the Limit Switch under actual conditions. Make sure that the number of switching operations is within the permissible range.

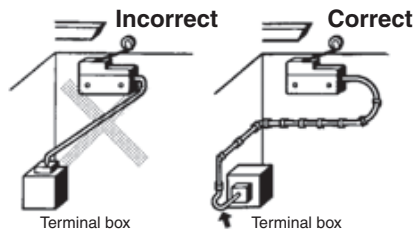
If a deteriorated Switch is used continuously, insulation failures, contact weld, contact separation failures, switch damage, or switch burnout may result.

Some types of load have a great difference between normal current and inrush current. Make sure that the inrush current is within the permissible value. The greater the inrush current in the closed circuit is, the greater the contact abrasion or shift will be. Consequently, contact weld, contact separation failures, or insulation failures may result. Furthermore, the Limit Switch may become broken or damaged.



Wiring

If the wiring method is incorrect, the wires may get caught by some object or the lead wires may be pulled excessively. Make sure that the lead wires are connected without extraordinary force and that the wires are supported securely.



Pay the utmost attention so that each terminal is wired correctly. If the terminal is wired incorrectly, the Limit Switch will not function. Furthermore, not only will the Limit Switch have a bad influence on the external circuit, the Limit Switch itself may become damaged or burnt.

Mounting

Do not modify the actuator, otherwise the operating characteristics and performance of the actuator will change.

Do not enlarge the mounting holes of the Limit Switch or modify the Limit Switch, otherwise insulation failures or housing damage may result. If the Limit Switch has a force separation mechanism, a modification of the Limit Switch may cause injury.

Do not apply oil, grease, or other lubricants to the moving parts of the actuator, otherwise the actuator may not operate correctly. Furthermore, intrusion of oil, grease, or other lubricants inside the Limit Switch may cause failures in the Limit Switch.

When mounting the Limit Switch to the mounting panel, maintain a minimum insulation distance of 1 mm between the mounting panel and the Limit Switch. If the insulation distance is insufficient, add an appropriate insulation guard or separator, otherwise a fire or current leakage may occur or an electric shock may be received.

Mount the Limit Switch and secure it with the specified screws tightened to the specified torque along with flat washers and springs. The actuator of the Limit Switch mounted to a panel with excessive tightening torque may not operate correctly if the Limit Switch is a push-button model.

Be sure to wire the Limit Switch so that the conduit opening is free of metal powder or any other impurities.

If glue or bonding agent is applied, make sure that it does not adhere to the movable parts or intrude inside the Limit Switch, otherwise the Limit Switch may not work correctly or cause contact failure. Some types of glue or bonding agent may generate a gas that may have a bad influence on the Limit Switch. Pay the utmost attention when selecting the glue or locking agent.

Do not drop or disassemble the Limit Switch, otherwise the Limit Switch will not be capable of full performance. Furthermore, the Limit Switch may become broken or burnt.

If the contacts are not turned ON or OFF over a long time, the contacts may become oxidized. Consequently, the reliability of the contacts may decrease, which may result in accidents.

Actuation of the Limit Switch over a long time may deteriorate parts of the Limit Switch and a releasing failure may result. Be sure to check the condition of the Limit Switch regularly.

Some models allow changes in head directions. When changing the head of such a model, make sure that the head is free of any foreign substance. Tighten each screw of the head to the rated torque.

Be sure to take measures so that no foreign material, oil, or water will penetrate into the Limit Switch through the conduit opening. Be sure to attach a connector suited to the cable thickness and tighten the connector securely to the rated torque.

Apply Limit Switch models incorporating a force-separation function, such as the D4BS or D4BL, for safety doors or emergency stop circuits.

Do not impose shock or vibration on the actuator while it is fully pressed. Otherwise, the actuator will partially abrade and an actuation failure may result.

■ Correct Use

Limit Switch Operation

The Limit Switch in actual operation may cause accidents that cannot be foreseen from the design stage. Therefore, the Limit Switch must be practically tested before actual use.

When testing the Limit Switch, be sure to apply the actual load condition together with the actual operating environment.

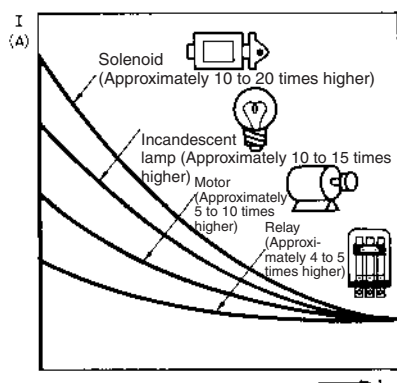
All the performance ratings in this catalog are provided under the following conditions unless otherwise specified.

- Inductive load: A minimum power factor of 0.4 (AC) or a maximum time constant of 7 ms (DC)
- Lamp load: An inrush current 10 times higher than the normal current
- Motor load: An inrush current 8 times higher than the normal current

The rated values are obtained from tests conducted in accordance with JIS C4508.

1. Ambient temperature: +5°C to 35°C
2. Ambient humidity: 40% to 70%.

Note: An inductive load causes a problem especially in DC circuitry. Therefore, it is essential to know the time constants (L/R) of the load.



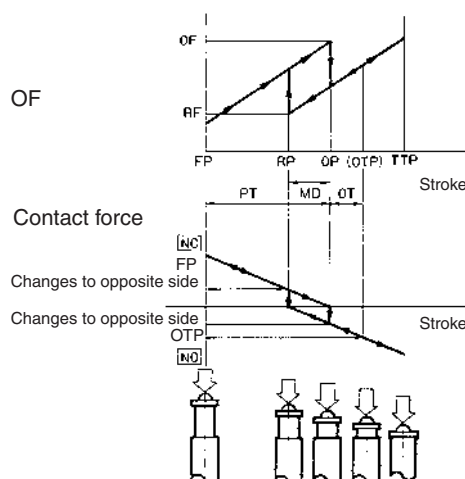
Mechanical Characteristics

Operating Force, Stroke, and Contact Characteristics

The following graph indicates the relationship between operating force and stroke or stroke and contact force. In order to operate the Limit Switch with high reliability, it is necessary to use the Limit Switch within an appropriate contact force range. If the Limit Switch is used in the normally closed condition, the dog must be installed so that the actuator will return to the FP when the actuator is actuated by the object. If the Limit Switch is used in the normally open condition, the actuator must be pressed to 70% to 100% of the OT (i.e., 60% to 80% of the TT) and any slight fluctuation must be absorbed by the actuator.

If the full stroke is set close to the OP or RP, contact instability may result. If the full stroke is set to the TTP, the actuator or switch may become damaged due to the inertia of the dog. In that case, adjust the stroke with the mounting panel or the dog. Refer to page 200, *Dog Design*, page 201, *Stroke Settings vs. Dog Movement Distance*, and page 202, *Dog Surface* for details.

The following graph shows an example of changes in contact force according to the stroke. The contact force near the OP or RP is unstable, and the Limit Switch cannot maintain high reliability. Furthermore, the Limit Switch cannot withstand strong vibration or shock.



Mechanical Conditions

The actuator must be selected according to the operating method.

Check the operating speed and switching frequency.

1. If the operating speed is extremely low, the switching of the movable contact will become unstable, thus resulting in incorrect contact or contact weld. If the operating speed is extremely low or the pushbutton needs to be set between the FP and OP, consult your OMRON representative in advance.
2. If the operating speed is extremely high, the Limit Switch may break due to shock. If the switching frequency is high, the switching of the contacts cannot catch up with the switching frequency. Make sure that the switching frequency is within the rated switching frequency. If a higher switching frequency is required, use of a proximity sensor is recommended.

Do not impose excessive force on the actuator, otherwise the actuator may become damaged or not operate correctly.

Make sure that the stroke is set within the suitable range specified for the model, or otherwise the Limit Switch may break.

Make sure that the operating direction of the actuator is parallel to the axis of the actuator if the actuator is a pushbutton type. If they are not in parallel, partial abrasion may result and the actuator may soon become damaged. Refer to page 199, *Operation* for details.

Electrical Characteristics

Electrical Conditions

The switching load capacity of the Limit Switch greatly varies between AC and DC. Always be sure to apply the rated load. The control capacity will drastically drop if it is a DC load. This is because a DC load has no current zero-cross point, unlike an AC load. Therefore, if an arc is generated, it may continue comparatively for a long time. Furthermore, the current direction is always the same, which results in a contact relocation phenomena whereby the contacts easily stick to each other and do not separate when the surfaces of the contacts are uneven.

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

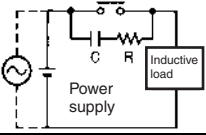
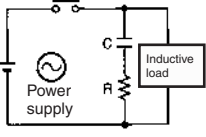
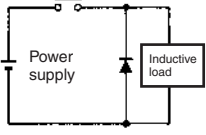
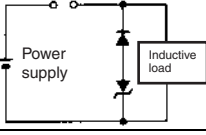
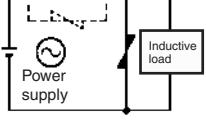
If the load is a minute voltage or current load, use a dedicated Limit Switch for minute loads. The reliability of silver-plated contacts, which are used by standard Limit Switches, will be insufficient if the load is a minute voltage or current load.

Contact Protective Circuit

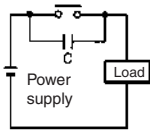
Apply a contact protective circuit to extend the contact life, prevent noise, and suppress the generation of carbide or nitric acid. Be sure to apply the contact protective circuit correctly, otherwise an adverse effect may occur.

The following provides typical examples of contact protective circuits. If the Limit Switch is used in an excessively humid location for switching a load that easily generates arcs, such as an inductive load, the arcs may generate NO_x, which will change into HNO₃ if it reacts with moisture. Consequently, the internal metal parts may corrode and the Limit Switch may fail. Be sure to select the ideal contact preventive circuit from the following.

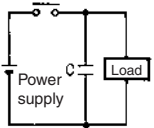
Typical Examples of Contact Protective Circuits

Circuit example	Applicable current		Feature	Element selection
	AC	DC		
CR circuit		*	Yes	*When AC is switched, the load impedance must be lower than the CR impedance. C: 1 to 0.5 μF x switching current (A) R: 0.5 to 1 Ω x switching voltage (V) The values may change according to the characteristics of the load. The capacitor suppresses the spark discharge of current when the contacts are open. The resistor limits the inrush current when the contacts are closed again. Consider the roles of the capacitor and resistor and determine ideal capacitance and resistance values through testing. Use a capacitor that has a low dielectric strength. When AC is switched, make sure that the capacitor has no polarity.
		Yes	Yes	
Diode method		No	Yes	Energy stored in the coil is changed into current by the diode connected in parallel to the load. Then the current flowing to the coil is consumed and Joule heat is generated by the resistance of the inductive load. The reset time delay with this method is longer than that in the CR method.
Diode and Zener diode method		No	Yes	This method will be effective if the reset time delay caused by the diode method is too long.
Varistor method		Yes	Yes	This method makes use of constant-voltage characteristic of the varistor so that no high-voltage is imposed on the contacts. This method causes a reset time delay. Connecting a varistor in parallel to the load is effective when the supply voltage is 24 to 48 V and in parallel to the contacts when the supply voltage is 100 to 200 V.

Do not apply contact protective circuits as shown below.



This circuit effectively suppresses arcs when the contacts are OFF. The capacitor will be charged, however, when the contacts are OFF. Consequently, when the contacts are ON again, short-circuited current from the capacitance may cause contact weld.

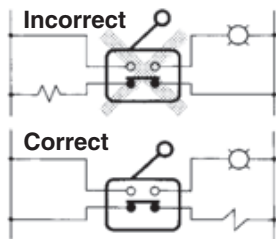


This circuit effectively suppresses arcs when the contacts are OFF. When the contacts are ON again, however, charge current will flow to the capacitor, which may result in contact weld.

Switching a DC inductive load is usually more difficult than switching a resistive load. By using an appropriate contact protective circuit, however, switching a DC inductive load will be as easy as switching a resistive load.

Do not connect a single Limit Switch to two power supplies that are different in polarity or type.

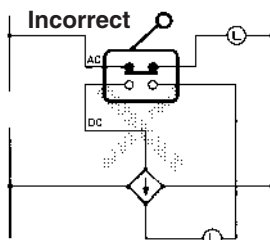
Power Connection Examples
(Connection of Different Polarities)



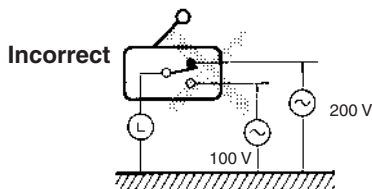
Connect the load to the same polarities.

Incorrect Power Connection Example

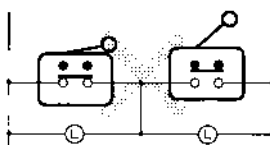
(Connection of Different Power Supplies)
There is a risk of AC and DC mixing.



Do not design a circuit where voltage is imposed between contacts, otherwise contact weld may result.



Do not use a circuit that will short-circuit if an error occurs, otherwise the charged part may melt and break off.



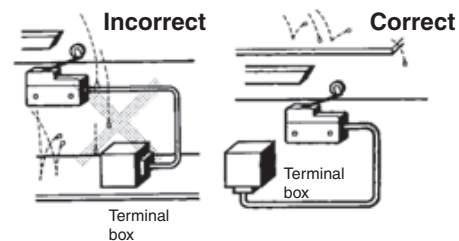
Application of Limit Switch to a Low-voltage, Low-current Electronic Circuit

1. If bouncing or chattering of the contacts results and causes problems, take the following countermeasures.
 - (a) Insert an integral circuit.
 - (b) Suppress the generation of pulse from the contact bouncing or chattering of the contacts so that it is less than the noise margin of the load.
2. Conventional silver-plated contacts are not suited to this application. Use gold-plated contacts, which are ideal for handling minute voltage or current loads.
3. The contacts of the Limit Switch used for an emergency stop must be normally open.

In order to protect the Limit Switch from damage due to circuit short-circuiting, be sure to connect a quick-response fuse with a breaking current 1.5 to 2 times larger than the rated current to the Limit Switch in parallel. Some models (e.g., the D4B-N and D4BS) specify the types of fuses. In that case, be sure to use the specified fuses.

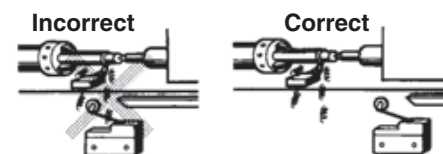
Operating Environment

If the Limit Switch used in locations with oil or water spray or excessive dust is not a water-resistant model or of sealed construction, be sure to protect the Limit Switch with a protective cover so that the Limit Switch will not be directly exposed to them.



The materials of Limit Switch may change in quality or deteriorate, if the Limit Switch is used outdoors or any other location where the Limit Switch is exposed to special machining oil. Consult your OMRON representative before selecting the model.

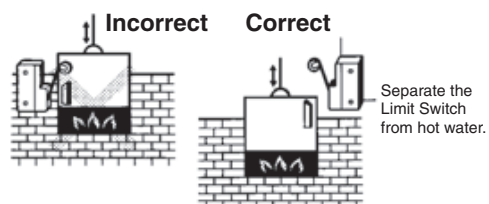
Be sure to install the Limit Switch so that the Limit Switch is free from dust or metal powder. The actuator and the switch casing must be protected from the accumulation of dust or metal powder.



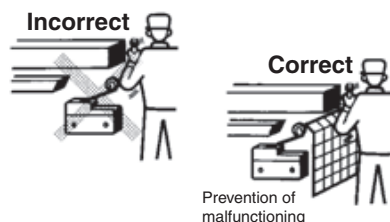
Do not use the Limit Switch in locations where the Limit Switch is exposed to hot water at a temperature greater than 60°C or steam.

Do not use the Limit Switch under temperatures or other environmental conditions not within the specified ranges. The rated permissible ambient temperature range varies with the model. Refer to the specifications in this catalog.

If the Limit Switch is exposed to radical temperature changes, the thermal shock may deform the Limit Switch and the Limit Switch may malfunction.



Be sure to protect the Limit Switch with a cover if the Limit Switch is in a location where the Limit Switch may be actuated by mistake or where the Limit Switch is likely to cause an accident.



Make sure to install the Limit Switch in locations free of vibration, shock, or resonance. If vibration or shock is continuously imposed on the Limit Switch, contact failure, malfunction, or decrease in service life may be caused by abrasive powder generated from the internal parts. If excessive vibration or shock is imposed on the Limit Switch, the contacts may malfunction or become damaged.

Do not use the Limit Switch with silver-plated contacts for long periods if the switching frequency of the Limit Switch is comparatively low or the load is minute. Otherwise, sulfuric film will be generated on the contacts and contact failures may result. Use the Limit Switch with gold-plated contacts or use a dedicated Limit Switch for minute loads instead.

Do not use the Limit Switch in locations with corrosive gas, such as sulfuric gas (H_2S or SO_2), ammonium gas (NH_3), nitric gas (HNO_3), or chlorine gas (Cl_2), or high temperature and humidity. Otherwise, contact failure or corrosion damage may result.

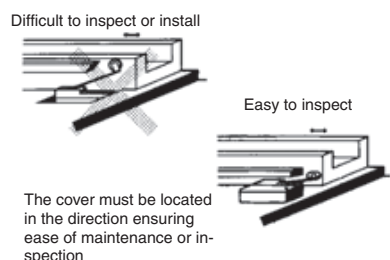
If the Limit Switch is used in locations with silicone gas, arc energy may create silicon dioxide (SiO_2) on the contacts and a contact failure may result. If there is silicone oil, silicone sealant, or wire covered with silicone close to the Limit Switch, attach a contact protective circuit to suppress the arcing of the Limit Switch or eliminate the source of silicone gas generation.

Regular Inspection and Replacement

If the Limit Switch is normally closed with low switching frequency (e.g., once or less than once a day), a reset failure may result due to the deterioration of the parts of the Limit Switch. Regularly inspect the Limit Switch and make sure that the Limit Switch is in good working order.

In addition to the mechanical life or electrical life of the Limit Switch described previously, the life of the Limit Switch may decrease due to the deterioration of each part, especially rubber, resin, and metal. Regularly inspect the Limit Switch and replace any part that has deteriorated in order to prevent accidents from occurring.

Be sure to mount the Limit Switch securely in a clean location to ensure ease of inspection and replacement. The Limit Switch with operation indicator is available, which is ideal if the location is dark or does not allow easy inspection or replacement.



Storage of Limit Switch

When storing the Limit Switch, make sure that the location is free of corrosive gas, such as H_2S , SO_2 , NH_3 , HNO_3 , or Cl_2 , or dust and does not have a high temperature or humidity.

Be sure to inspect the Limit Switch before use if it has been stored for three months or more.

Outdoor Use

When using the Limit Switch outdoors, make sure that the Limit Switch is a sealed model. The Limit Switch with IP67 sealing construction does not necessarily mean that the mechanical parts are also of IP67 construction.

The rubber material exposed to ozone may deteriorate. Check that the rubber parts are environment-resistant, such as chloroprene, silicone, or fluorine rubber. The following models are recommended.

WL□-P1 or D4C-□P

If the Limit Switch is used in places with sludge or dust powder sprays, make sure that the mechanical parts are sealed with a rubber cap.

Due to capillary attraction, rainwater may enter the Limit Switch through the lead wires or sheath. Be sure to cover the wire connections in a terminal box so that they are not directly exposed to rainwater.

If the Limit Switch is used outdoors, the steel parts of the Limit Switch (such as the screws and plunger parts) may corrode. Consider the use of outdoor models, such as WL□-P1 or D4C-□P, or proximity sensors in such cases.

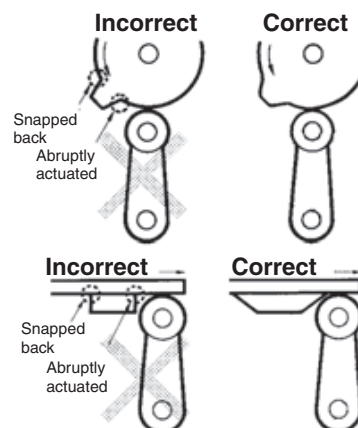
The expression "Limit Switch is used outdoors" refers to an environment where the Limit Switch is exposed directly to rainwater or sunlight (e.g., multi-story parking lots) excluding locations with corrosive gas or salty breezes.

The Limit Switch used outdoors may not release due to icing and may not satisfy standards for indoor use.

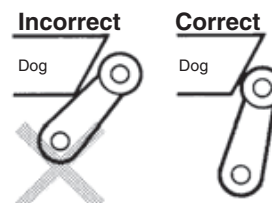
Operation

Carefully determine the position and shape of the cam so that the actuator will not abruptly snap back, thus causing shock. In order to operate the Limit Switch at a comparatively high speed, use an object or cam that keeps the Limit Switch turned ON for a sufficient time so that the relay or valve will be sufficiently energized.

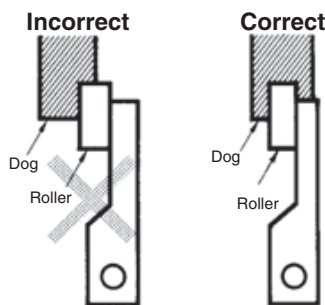
The shape of the object or cam has a large influence on the life and operating accuracy of the Limit Switch. The cam must be smooth in shape.



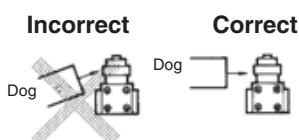
Appropriate force must be imposed on the actuator by the cam or another object in both rotary operation and linear operation. If the object touches the lever as shown below, the operating position will not be stable.



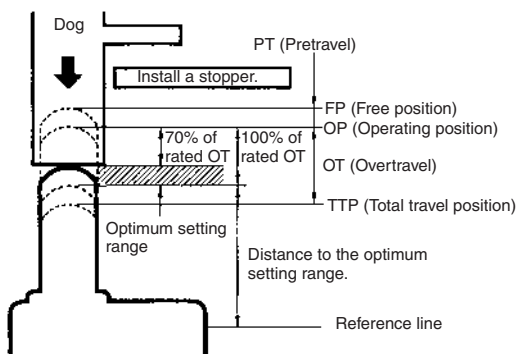
Unbalanced force must not be imposed on the actuator. Otherwise, wear and tear on the actuator may result.



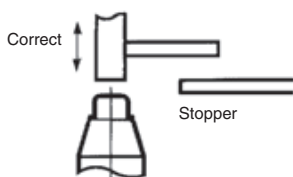
In the case of a roller-type actuator, the object must touch the actuator at a right angle. Otherwise, the actuator or shaft may deform or break.



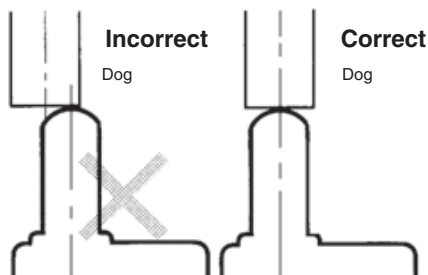
Make sure that the actuator does not exceed the OT (overtravel) range, otherwise the Limit Switch may malfunction. When mounting the Limit Switch, be sure to adjust the Limit Switch carefully while considering the whole movement of the actuator.



The Limit Switch may soon malfunction if the OT is excessive. Therefore, adjustments and careful consideration of the position of the Limit Switch and the expected OT of the actuator are necessary when mounting the Limit Switch.



When using a pin-plunger-type actuator, make sure that the stroke of the actuator and the movement of the object are located along a single straight line.



Be sure to use the Limit Switch according to the characteristics of the actuator. If a roller arm lever actuator is used, do not attempt to actuate the Limit Switch in the direction shown below.

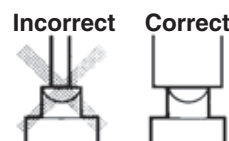


Do not modify the actuator to change the OP.

In the case of a long actuator of an adjustable roller lever type, the following countermeasures against lever shaking are recommended.

1. Make the rear edge of the object smooth with an angle of 15° to 30° or make it in the shape of a quadratic curve.
2. Design the circuit so that no error signal will be generated.
3. Use or set a switch that is actuated in one direction only.

In the case of a bevel plunger-type actuator, make sure that the width of the object is wider than that of the plunger.



Dog Design

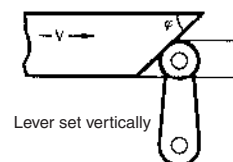
Operating Speed, Dog Angle, and Relationship with Actuator

Before designing a dog, carefully consider the operating speed and angle of the dog and their relationship with the shape of the actuator. The optimum operating speed of a standard dog at an angle of 30° to 45° is 0.5 m/s maximum.

Roller Lever Models

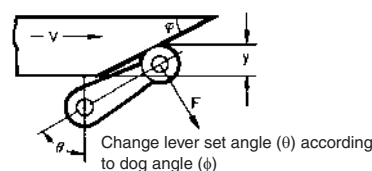
1. Non-overtravel Dog

Dog speed: 0.5 m/s max. (standard speed)



ϕ	V max. (m/s)	y
30°	0.4	0.8 (TT)
45°	0.25	80% of total travel
60°	0.1	
60° to 90°	0.05 (low speed)	

Dog speed: $0.5 \text{ m/s} \leq V \leq 2 \text{ m/s}$

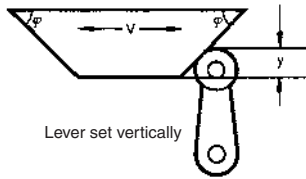


θ	ϕ	V max. (m/s)	y
45°	45°	0.5	0.5 to 0.8 (TT)
50°	40°	0.6	0.5 to 0.8 (TT)
60° to 55°	30° to 35°	1.3	0.5 to 0.7 (TT)
75° to 65°	15° to 25°	2	0.5 to 0.7 (TT)

Note: The above y values indicate the ratio ranges based on TT (total travel). Therefore, the optimum pressing distance of the dog is between 50% and 80% (or 50% and 70%).

2. Overtravel Dog

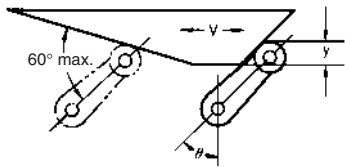
Dog speed: 0.5 m/s max.



ϕ	V max. (m/s)	y
30°	0.4	0.8 (TT)
45°	0.25	80% of total travel
60°	0.1	
60° to 90°	0.05 (low speed)	

Dog speed: 0.5 m/s min.

If the speed of the overtravel dog is comparatively high, make the rear edge of the object smooth at an angle of 15° to 30° or make it in the shape of a quadratic curve. Then lever shaking will be reduced.



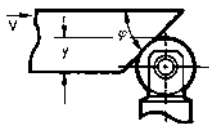
θ	ϕ	V max. (m/s)	y
45°	45°	0.5	0.5 to 0.8 (TT)
50°	40°	0.6	0.5 to 0.8 (TT)
60° to 55°	30° to 35°	1.3	0.5 to 0.7 (TT)
75° to 65°	15° to 25°	2	0.5 to 0.7 (TT)

Note: The above y values indicate the ratio ranges based on TT (total travel). Therefore, the optimum pressing distance of the dog is between 50% and 80% (or 50% and 70%).

Plunger Models

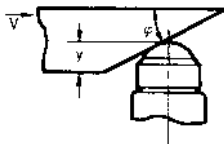
If the dog overrides the actuator, the front and rear of the dog may be the same in shape, provided that the dog is not designed to be separated from the actuator abruptly.

Roller Plunger



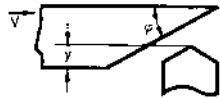
ϕ	V max. (m/s)	y
30°	0.25	0.6 to 0.8 (TT)
20°	0.5	0.5 to 0.7 (TT)

Ball Plunger



ϕ	V max. (m/s)	y
30°	0.25	0.6 to 0.8 (TT)
20°	0.5	0.5 to 0.7 (TT)

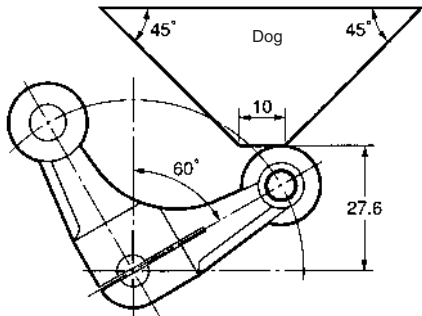
Bevel Plunger



ϕ	V max. (m/s)	y
30°	0.25	0.6 to 0.8 (TT)
20°	0.5	0.5 to 0.7 (TT)

Note: The above y values indicate the ratio ranges based on TT (total travel). Therefore, the optimum pressing distance of the dog is between 60% and 80% (or 50% and 70%).

Fork Lever Lock Models

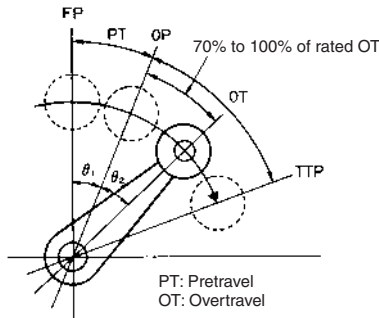


Note: Design the shape of the dog so that it does not come in contact with the other roller lever when the actuator is inverted.

Stroke Settings vs. Dog Movement Distance

The following provides information on stroke settings based on the movement distance of the dog instead of the actuator angle. The following is the optimum stroke of the Limit Switch

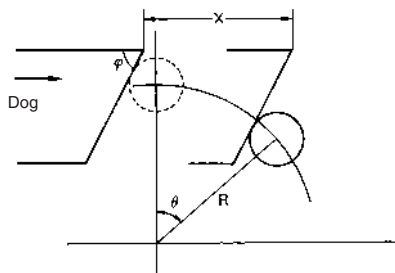
Optimum stroke: PT + (Rated OT x 0.7 to 1.0)
The angle converted from the above: $\theta_1 + \theta_2$



The movement distance of the dog based on the optimum stroke is expressed by the following formula.

Movement distance of dog

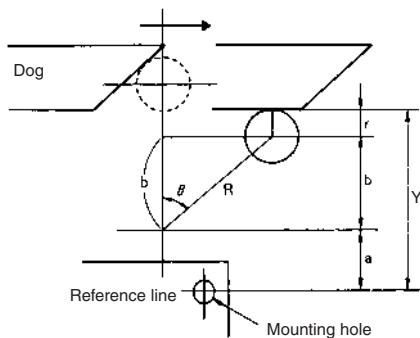
$$X = R \sin \theta + \frac{R(1 - \cos \theta)}{\tan \varphi} \text{ (mm)}$$



φ: Dog angle
θ: Optimum stroke angle
R: Actuator length
X: Dog movement distance

The distance between the reference line and the bottom of the dog based on the optimum stroke is expressed by the following formula.

$$Y = a + b + r \text{ (mm)}$$



a: Distance between reference line and actuator fulcrum
b: $R \cos \theta$
r: Roller radius
Y: Distance between reference line and bottom of dog

Dog Surface

The surface of dog touching the actuator should be 6.3 S in quality and hardened at approximately H450V.

For smooth operation of the actuator, apply molybdenum disulfide grease to the actuator and the dog touching the actuator. This is ideal for Limit Switches of drip-proof construction and Multiple Limit Switch models.

Maintenance and Repairs

The user must not maintain or repair the system. Consult the manufacturer of the system for maintenance or repairs.

Others

The Limit Switch has contacts that must be free of silicone gas, otherwise a contact failure may result. Therefore, do not apply cable covered with silicone, silicone sealant, or silicone grease to the Limit Switch.

The sealing of the standard Limit Switch uses nitrile butadiene rubber (NBR), which is highly oil resistive. The NBR exposed to different types of oil or chemical may, however, deteriorate, swell, or shrink. Contact your OMRON representative for details.

The WLNJ, D4C-□□32, and ZE-N□ incorporate exposed seal caps, which may be deteriorated by ozone. Consult your OMRON representatives before using the above models outdoors, near large bodies of water, or in locations where ozone is generated.

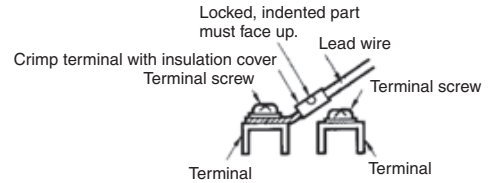
OMRON shall not guarantee the performance and characteristics of any actuator, plunger, or lever modified by the user.

When using the Limit Switch with a long lever or long rod lever, make sure that the lever is in the downward direction.

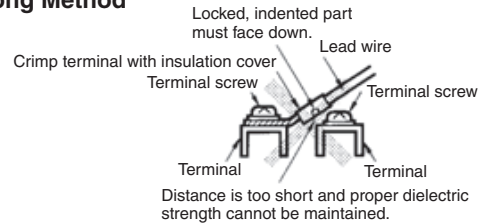
In order to ensure high contact reliability, the correct Limit Switch must be selected according to the load. For details, refer to the precautions for minute load models in this catalog.

The leads must be wired as shown below.

Correct Method



Wrong Method



Switch Trouble and Remedial Action

Problem	Probable cause	Remedy
Mechanical failure	1. The actuator does not operate.	The shape of the cam is incorrect.
	2. The actuator does not return to the free position (FP).	The contacting surface of the dog is rough.
	3. The actuator has been deformed.	The actuator in use is not suitable.
	4. The actuator is worn.	The operating direction of the actuator is not correct.
	5. The actuator has been damaged.	The operation speed is excessively high.
		Excessive stroke.
		The rubber or grease hardened due to low temperature.
		The accumulation of sludge, dust, or cuttings.
		Dissolution, expansion, or swelling damage to the rubber parts of the driving mechanism.
		Attach a decelerating device or change the mounting position of the Limit Switch.
		Change the stroke.
		Use a cold-resistive switch.
		Use a drip-proof model or one with high degree of protection.
Failures related to chemical or physical characteristics	There is a large deviation in operating position (with malfunctioning involved).	Damage to and wear and tear of the internal movable spring.
		Wear and tear of the internal mechanism.
		The loosening of the mounting screws.
	The terminal part wobbles. (The mold part has been deformed.)	Regularly inspect the Limit Switch.
		Use a better quality switch.
		Tighten the mounting screws securely. Use a mounting board.
		Solder the Limit Switch quickly.
		Change the lead wire according to the carry current and ratings.
		Use a temperature-resistive switch or change mounting positions.
	Contact chattering	Vibration or shock is beyond the rated value.
		Shock has been generated from a device other than the Limit Switch.
		Too-slow operating speed.
	Oil or water penetration	Attach an anti-vibration mechanism.
Failures related to electric characteristics		Attach a rubber circuit to the solenoid.
		Increase the operating speed (with an accelerating mechanism).
		Use a drip-proof or waterproof switch.
		Use the correct connector and cable. (Use a sealed connector for sealed switches.)
		Use a switch with terminals sealed with resin.
		The sealing part has not been tightened sufficiently.
		The wrong connector has been selected and does not conform to the cable.
		The wrong switch has been selected.
		The terminal part is not molded.
		The Limit Switch has been burnt or carbonated due to the penetration of dust or oil.
	Deterioration of the rubber part	Use an oil-resistant rubber or Teflon bellows.
		Use a weather-resistant rubber or protective cover.
		Use a switch with a protective cover or a metal bellows.
Failures related to electric characteristics	Corrosion (cracks)	The expansion and dissolution of the rubber caused by solvent or lubricating oil.
		Cracks due to direct sunlight or ozone.
		Damage to the rubber caused by scattered or heated cuttings.
		Use an anti-corrosive switch.
		Change the lubricating oil.
		Change mounting positions.
		Use a crack-resistant material.
		The Limit Switch has been operated in a corrosive environment, near the sea, or on board a ship.
		The electrical deterioration of metal parts of the Limit Switch resulted due to the ionization of cooling water or lubricating oil.
		The cracking of alloyed copper due to rapid changes in temperature.
	No actuation or no current breakage caused by contact weld.	Inductive interference in the DC circuit.
		Add an erasing circuit.
		Carbon generated on the surface of the contacts due to switching operations.
		Use a switch with a special alloy contact or use a sealed switch.
		A short-circuit or contact weld due to the deformation and relocation of the contacts.
		Reduce the switching frequency or use a switch with a large switching capacity.
		Change the circuit design.
		Contact weld due to an incorrectly connected power source.
		Use a protective box.
		Foreign materials or oil penetrated into the contact area.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Cat. No. C121-E1-01

In the interest of product improvement, specifications are subject to change without notice.

Basic Switches

Technical Information

■ Safety Precautions

For the individual precautions for each Switch, refer to the *Precautions* section of each Switch.



WARNING

Do not wire the Switch or touch any terminal of the Switch while power is being supplied to the Switch. Doing so may result in electric shock.

Electrical Conditions

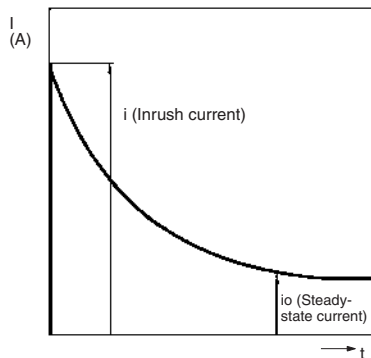
Load

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

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

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

Inrush Current

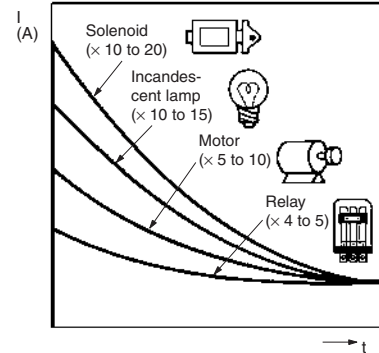


The switching capacity of each Switch appearing on a datasheet is the rated capacity. When applying the Switch to a circuit with a special load with unusual inrush and switching current and voltage waveforms, be sure to test the Switch under the actual conditions before use.

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

If the Switch is used for switching both micro and high-capacity loads, be sure to connect relays suitable to the loads.

Types of Load vs. Inrush Current



The rated loads of the Switch are as follows:

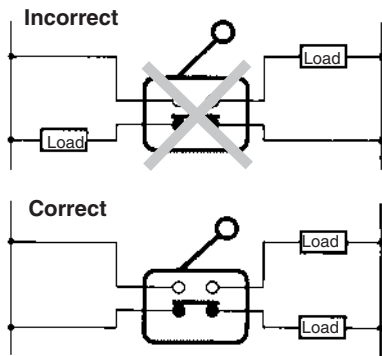
- Inductive Load:** A load having a minimum power factor of 0.4 (AC) or a maximum time constant of 7 ms (DC).
- Lamp Load:** A load having an inrush current ten times the steady-state current.
- Motor Load:** A load having an inrush current six times the steady-state current.

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

Load Connections

Example of Power Source Connection (Different Polarity)

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

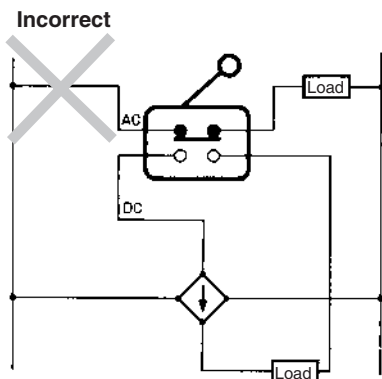


Connect the same polarities to the load.

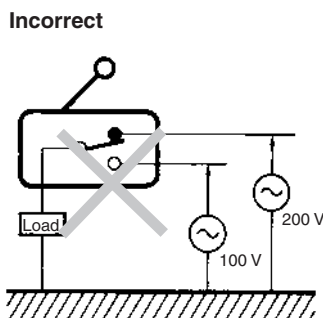
Even in a "correct" circuit, note that the insulation performance of the switch may deteriorate and the switch life may be shortened because one load is connected to one contact.

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

The DC and AC power may be mixed.



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



Contact Protective Circuit

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

Life Expectancy

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

Mounting

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

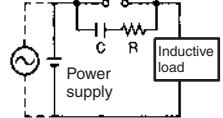
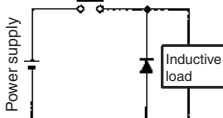
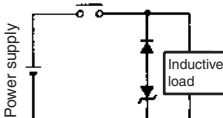
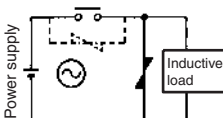
Wiring

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

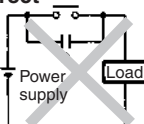
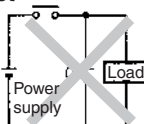
The Basic Switch does not incorporate a ground terminal. Do not mount the Basic Switch while power is being supplied.

The following provides typical examples of contact protective circuits. If the Switch is used in an excessively humid place for switching a load that generates arcs with ease, such as an inductive load, the arcs may generate NOx, which will change into HNO₃ (nitric acid) if it reacts with moisture. Consequently, the internal metal part may be corroded and result in an operating failure of the Switch. Be sure to select the best contact preventive circuit from the following in order to prevent this.

Typical Examples of Contact Protective Circuit

Circuit example	Applicable current		Feature	Element selection
	AC	DC		
CR circuit 	See note.	Yes	Note: When AC is switched, the load impedance must be lower than the CR impedance.	C: 0.5 to 1 μ F per switching current (1 A) R: 0.5 to 1 Ω per switching voltage (1 V) The values may change according to the characteristics of the load. The capacitor suppresses the spark discharge of current when the contacts are open. The resistor limits the inrush current when the contacts are closed again. Consider these roles of the capacitor and resistor and determine the ideal capacitance and resistance values from experimentation. Use a capacitor with a dielectric strength between 200 and 300 V. When AC is switched, make sure that the capacitor has no polarity.
	Yes	Yes	The operating time will increase if the load is a relay or solenoid. It is effective to connect the CR circuit in parallel to the load when the power supply voltage is 24 or 48 V and in parallel to the contacts when the power supply voltage is 100 to 200 V.	
Diode method 	No	Yes	Energy stored in the coil is changed into current by the diode connected in parallel to the load. Then the current flowing to the coil is consumed and Joule heat is generated by the resistance of the inductive load. The reset time delay in this method is longer than that of the CR method.	The diode must withstand a peak inverse voltage 10 times higher than the circuit voltage and a forward current as high as or higher than the load current.
Diode and Zener diode method 	No	Yes	This method will be effective if the reset time delay caused by the diode method is too long.	Zener voltage for a Zener diode must be about 1.2 times higher than the power source since the load may not work under some circumstances.
Varistor method 	Yes	Yes	This method makes use of constant-voltage characteristic of the varistor so that no high-voltage is imposed on the contacts. This method causes a reset time delay more or less. It is effective to connect varistor in parallel to the load when the supply voltage is 24 to 48 V and in parallel to the contacts when the supply voltage is 100 to 200 V.	---

Do not apply contact protective circuits as shown below.

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

Terminal Connections

Be sure to connect appropriate wires to the Switch by considering the voltage and current applied to the Switch.

Solder Terminals

When soldering lead wires to the Switch, make sure that the capacity of the soldering iron is 60 W maximum and that the temperature of the iron tip is 300°C maximum unless otherwise specified in the datasheet of the Switch. Improper soldering may cause abnormal heat radiation from the Switch and the Switch may burn.

The characteristics of the Switch will deteriorate if a soldering iron with a capacity of more than 60 W is applied to any part of the Switch for 6 s or more. For Switches with special soldering specifications,

however (provided in *Terminal Connections* under *Cautions* where appropriate), be sure to perform soldering according to the specifications.

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

Quick-connect Terminals

Wire the quick-connect terminals with the specified receptacles and insert the terminals straight into the receptacles. Do not impose excessive external force on the terminals in the horizontal or vertical directions, otherwise the terminals may deform or the housing may become damaged.

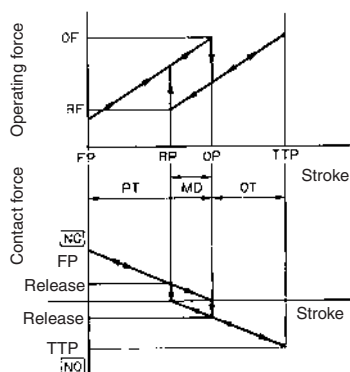
Mechanical Conditions

Operating Stroke Setting

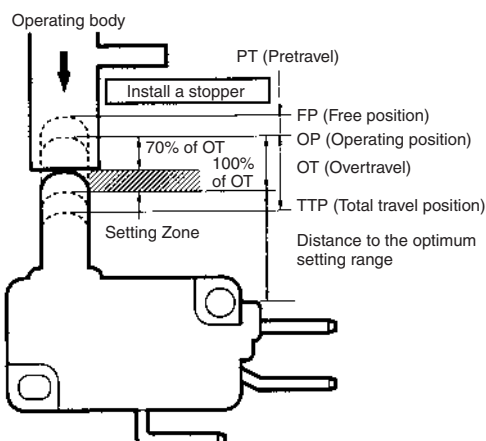
The setting of the stroke is very important for the Switch to operate with high reliability.

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

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

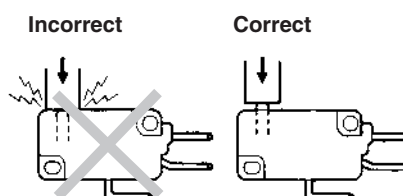


Make sure that the operating body returns the actuator to the free position when the operating body has moved if the Switch is used to form a normally closed (NC) circuit. If the Switch is used to form a normally open (NO) circuit, the operating body must move the Switch actuator to a distance of 70% to 100% of the rated overtravel (OT) of the Switch, ensuring that the operating body pushes the actuator a sufficient distance without touching the Switch itself. For details, refer to *Precautions* for the relevant product.



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

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



Switching Speed and Frequency

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

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

The permissible switching speed and switching frequency of a Switch indicates the operational reliability of the Switch. The life expectancy of the Switch is based on operation under specific conditions regarding the switching speed and switching frequency. The life of the Switch, however, may vary even if the Switch is operated within the permissible switching speed and frequency ranges. Test a Switch sample under the actual conditions to ascertain its life expectancy.

Operating Condition

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

■ Correct Use

Electrical Conditions

Application of Switch to Electronic Circuits

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

- Design the circuits so that they include appropriate CR circuits to absorb noise or pulse signals.
- Use Switches incorporating gold-plated contacts for micro loads, which are more resistive to environmental conditions than standard Switches. (Ensure, however, that the load capacity is sufficient.)

Switches for Micro Loads

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

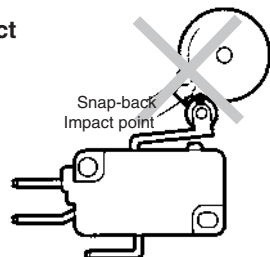
Mechanical Conditions

Switching Method

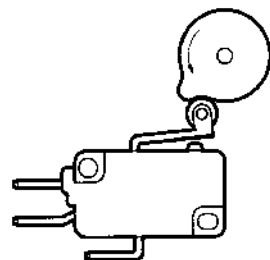
The switching method has a great influence on the performance of the Switch. Consider the following before operating the Switch.

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

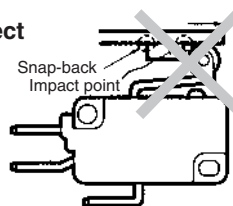
Incorrect



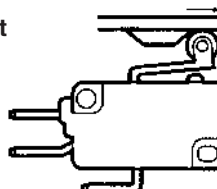
Correct



Incorrect

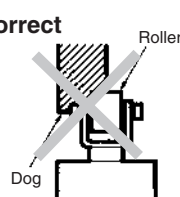


Correct

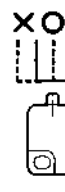
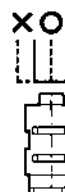
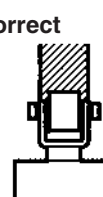


- Make sure that no improper load is imposed on the actuator, otherwise the actuator may incur local abrasion. As a result, the actuator may become damaged or its life expectancy shortened.

Incorrect

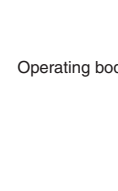


Correct



○ : Correct
× : Incorrect

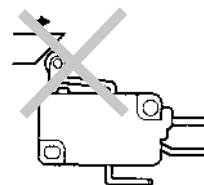
- Make sure that the operating body moves in a direction where the actuator moves. If the actuator is a pin plunger type, make sure that the operating body presses the pin plunger vertically.



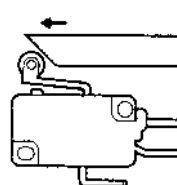
○ : Correct
× : Incorrect

Operate the actuator of a hinge roller lever or simulated hinge lever type in the direction shown below. Operating the actuator in the opposite direction may result in deformation of the lever.

Incorrect



Correct



- Do not modify the actuator to change the operating position (OP).
- If an external actuator is used as an operating object, check the material and thickness of the lever and make sure that the force imposed on the lever is within the permissible range.

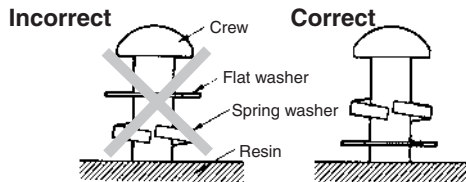
Mounting

When mounting the Switch, pay attention to the following.

Securing

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

If the Switch housing is made of thermoplastic, the Switch housing may incur crack damage if it comes into contact with the spring washers directly. In that case make sure that the flat washers come into contact with the Switch housing as shown below.



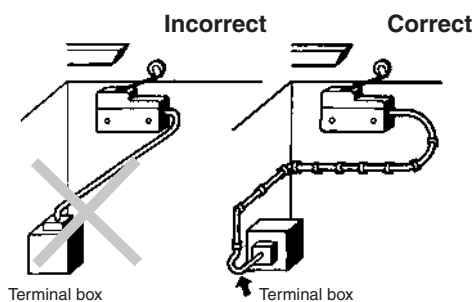
- Do not modify the Switch in any way, for example, by widening the mounting holes.
- Do not subject the Switch to excessive shock or high-frequency vibrations when mounting as this may have an adverse effect on Switch performance.

Locking Agent

If glue or locking agent is applied, make sure that it does not stick to the movable parts or intrude into the interior of the Switch, otherwise the Switch may work improperly or cause contact failure. Some types of glue or locking agent may generate gas that has a bad influence on the Switch. Pay the utmost attention when selecting the glue or locking agent. Particular care is required with unsealed Switches. Glue or locking agent may intrude into the interior of the switch via the pushbutton or the terminals and cause faulty operation. Select the glue or locking agent carefully and be sure to apply it in appropriate places.

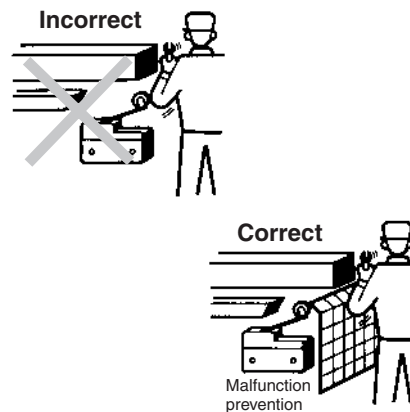
Wiring

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



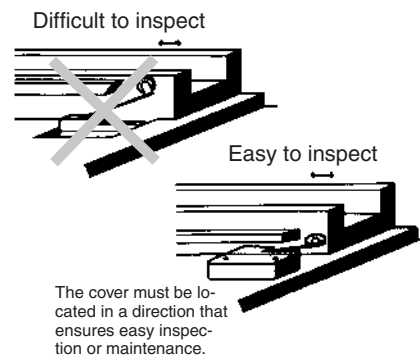
Mounting Location

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



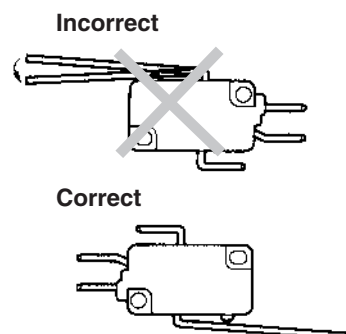
Maintenance and Inspection

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



Mounting Direction

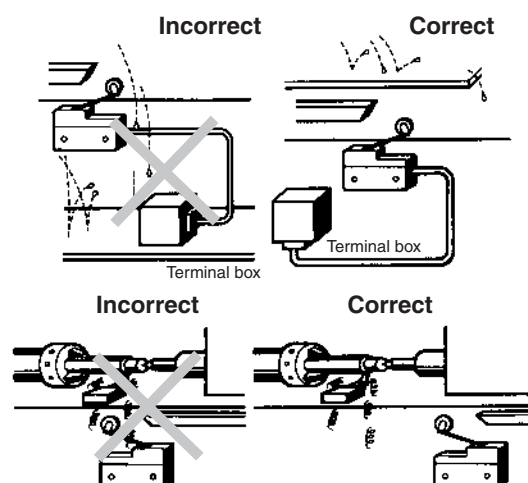
When using a Switch of low operating force attached with a long lever, make sure that the lever is in the downward direction as shown below, otherwise the Switch may not reset properly.



Operation and Storage Environment

Oil and Water Resistance

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



Handling

Do not drop the Switch, otherwise the Switch may break or deform.

Do not apply oil, grease, or other lubricants to the sliding parts of the Switch, otherwise the actuator may not operate smoothly. The intrusion of oil, grease, or other lubricants into the internal part may cause faulty operation or contact failure.

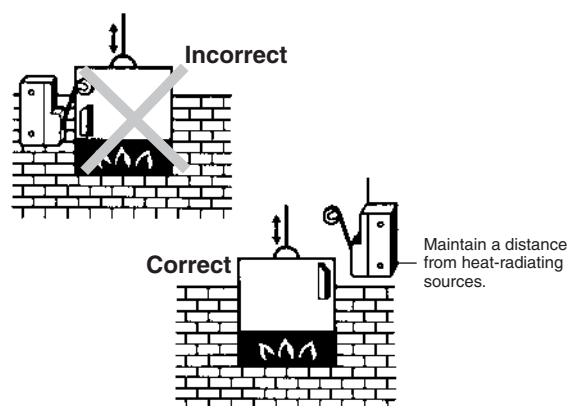
Operating Environment

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

Do not use the Switch in locations with corrosive gas, such as sulfuric gas (H_2S or SO_2), ammonium gas (NH_3), nitric gas (HNO_3), or chlorine gas (Cl_2), or in locations with high temperature and humidity. Otherwise, contact failure or corrosion damage may result.

If the Switch is used in places with silicone gas, arc energy may attract silicon dioxide (SiO_2) to the contacts and a contact failure may result. If there is silicone oil, silicone sealant, a wire covered with silicone, or any other silicone-based product near the Switch, attach a contact protective circuit to suppress the arcing of the Switch or eliminate the source of silicone gas generation.

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



Storage Environment

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

■ Switch Trouble and Remedial Action

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

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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