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.

Be sure to read *Safety Precautions* on page 22 and *Safety Precautions for All Basic Switches.*

Model Number Structure

Configuration

Basic models	General-purpose		Refer to page 3.
	Drip-proof	Without terminal protective cover	Refer to page 5.
		With terminal protective cover	Refer to page 5.
		Molded terminal	Refer to page 2.
Split-contact models	General-purpose		Refer to page 4.
Maintained-contact models	General-purpose		Refer to page 4.

Basic Models

General-purpose

- A variety of actuators is available for a wide range of application.
- The contact mechanism of models for micro loads is a crossbar type with gold-alloy contacts, which ensures highly reliable operations for micro loads.
- Contact Gap:
  - H2: 0.20 mm (extra-high-sensitivity)
  - H : 0.25 mm (high-sensitivity, micro voltage current load)
  - G : 0.5 mm (standard)
  - E : 1.8 mm (high-capacity)
  - F : 1.0 mm (split-contact models)

Drip-proof

- These Switches use a rubber boot on the actuator and adhesive fill between the case and cover to increase resistance to drips.
- Models with drip-proof terminal protective covers and molded terminals with resin filling are also available.

Split-contact Models

- This type is identical in construction to the general-purpose basic switch except that it has two pairs of simultaneous acting contacts by splitting moving contacts.
- Since the moving contacts are connected to a common terminal, either parallel or series connection is possible.
- Highly reliable micro load switching is ensured if the model is used as a twin-contact switch.

Maintained-contact Models

- The maintained-contact type has a reset button at the bottom of the switch case, in addition to the pushbutton (plunger) located on the opposite side of the reset button. Use these buttons alternately.
- Since the Switch has greater pretravel than overtravel, it is suitable for use in reversible control circuits, manual reset circuits, safety limit circuits, and other circuits which are not preferable for automatic resetting. (For further details, refer to individual datasheets.)

Model Number Legend

Basic Models

Z-□□□□-□
(1)(2)(3)(4) (5)

(1) Ratings

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

(2) Contact Gap

H2 : 0.20 (extra-high-sensitivity)
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 (medium 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 (not include the terminals)
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, *Ordering Information* on page 3 to 6.

Standard Models (Drip-proof Type/Molded Terminals)

Z-□55-M□□ □M
(1) (2)(3) (4)

(1) Drip-proof Type

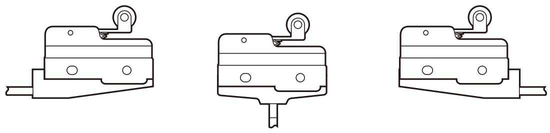
(2) Lead Outlets

None : VSF
19 : VCT

(3) Directions of Lead Outlets (See following diagrams.)

L : Left
R : Right
D : Descending

L Type D Type R Type



(4) Length of Lead Outlets

1 : 1 m
3 : 3 m

Split-contact Models

Z-10F□Y-B
(1)(2)(3)(4) (5)

(1) Ratings

10 : 10 A (split-contact models)

(2) Contact Gap

F : 1 mm (high-capacity)

(3) Actuator

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

(4) Construction

Y : Split-contact models

(5) Terminals

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

Main Unit

Basic Models (General-purpose)

Actuator		Terminal *1	Standard G (0.5 mm) Model	High-sensitivity H (0.25 mm) Model	Extra-high sensitivity H2 (0.20 mm) Model	High-capacity E (1.8 mm) Model	Micro load H (0.25 mm) Model
Pin plunger		Solder	Z-15G	Z-15H	Z-15H2	Z-15E	Z-01H
		Screw	Z-15G-B	Z-15H-B	Z-15H2-B	Z-15E-B	Z-01H-B
Slim spring plunger		Solder	Z-15GS	Z-15HS	---	---	Z-01HS
		Screw	Z-15GS-B	Z-15HS-B			Z-01HS-B
Short spring plunger		Solder	Z-15GD	Z-15HD	---	Z-15ED	Z-01HD
		Screw	Z-15GD-B	Z-15HD-B		Z-15ED-B	Z-01HD-B
Panel mount plunger	Low OP	Solder	Z-15GQ3	---	---	---	---
		Screw	Z-15GQ3-B				
	Medium OP	Solder	Z-15GQ	Z-15HQ		Z-15EQ	Z-01HQ
		Screw	Z-15GQ-B	Z-15HQ-B		Z-15EQ-B	Z-01HQ-B
	High OP	Solder	Z-15GQ8	---		---	---
		Screw	Z-15GQ8-B				
Panel mount roller plunger		Solder	Z-15GQ22	Z-15HQ22	---	Z-15EQ22	---
		Screw	Z-15GQ22-B	Z-15HQ22-B		Z-15EQ22-B	
Panel mount cross roller plunger		Solder	Z-15GQ21	Z-15HQ21	---	Z-15EQ21	---
		Screw	Z-15GQ21-B	Z-15HQ21-B		Z-15EQ21-B	
Leaf spring		Solder	Z-15GL	---	---	---	---
		Screw	Z-15GL-B				
Roller leaf spring		Solder	Z-15GL2	---	---	---	---
		Screw	Z-15GL2-B				
Short hinge lever		Solder	Z-15GW21	---	---	---	---
		Screw	Z-15GW21-B				
Hinge lever	Low OP	Solder	Z-15GW	Z-15HW	---	---	---
		Screw	Z-15GW-B	Z-15HW-B			
	Medium OP	Solder	Z-15GW3	---			
		Screw	Z-15GW3-B				
	High OP	Solder	Z-15GW32				
		Screw	Z-15GW32-B				
Low-force hinge lever		Solder	Z-15GW4	Z-15HW24	---	---	---
		Screw	Z-15GW4-B	Z-15HW24-B			
Low-force wire hinge lever	Low OP	Solder	---	Z-15HW78	---	---	---
		Screw		Z-15HW78-B			
	High OP	Solder		Z-15HW52			
		Screw		Z-15HW52-B			
Short hinge roller lever		Solder	Z-15GW22	Z-15HW22	---	Z-15EW22	Z-01HW22
		Screw	Z-15GW22-B	Z-15HW22-B		Z-15EW22-B	Z-01HW22-B
Short hinge cross roller lever		Solder	Z-15GW49	---	---	---	---
		Screw	Z-15GW49-B				
Hinge roller lever	Standard	Solder	Z-15GW2	Z-15HW2	---	---	---
		Screw	Z-15GW2-B	Z-15HW2-B			
	Large roller	Solder	Z-15GW25	---		---	---
		Screw	Z-15GW25-B				
Hinge cross roller lever		Solder	Z-15GW54	---	---	---	---
		Screw	Z-15GW54-B				
Unidirectional short hinge roller lever	Parallel	Solder	Z-15GW2277	---	---	---	---
		Screw	Z-15GW2277-B				
Reverse hinge lever *2		Solder	Z-15GM	---	---	---	---
		Screw	Z-15GM-B				
Reverse short hinge roller lever *2		Solder	Z-15GM22	---	---	---	---
		Screw	Z-15GM22-B				
Reverse hinge roller lever *2		Solder	Z-15GM2	---	---	---	---
		Screw	Z-15GM2-B				

*1. Solder terminal / Screw terminal

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

Minimum Order Lot

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

Classification / Actuator	Standard	High-sensitivity	Minimum order lot (pcs)
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	Contact gap / Terminal *1	F (1.0 mm) Model
Pin plunger		---
		Z-10FY-B
Slim spring plunger		---
		Z-10FSY-B
Short spring plunger		---
		Z-10FDY-B
Panel mount plunger		---
		Z-10FQY-B
Panel mount roller plunger		---
		Z-10FQ22Y-B
Hinge lever		---
		Z-10FWY-B
Short hinge roller lever		---
		Z-10FW22Y-B
Hinge roller lever		---
		Z-10FW2Y-B
Reverse short hinge roller lever *2		---
		Z-10FM22Y-B

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

Maintained-contact Models

Actuator	Model
Pin plunger	Z-15ER
Slim spring plunger	Z-15ESR
Hinge lever	Z-15EWR

Basic Models (Drip-proof Models Standard, Microload)

Actuator		Terminal *1	Standard G (0.5 mm) Not provided Model	Standard G (0.5 mm) Provided Model	Micro load H (0.25 mm) Not provided Model
Pin plunger			Z-15G55	---	Z-01H55
			Z-15G55-B	Z-15GA55-B5V	Z-01H55-B
Short spring plunger			Z-15GD55	---	Z-01HD55
			Z-15GD55-B		Z-01HD55-B
Spring plunger	Low OP		Z-15GK55	---	---
			Z-15GK55-B		
	High OP		Z-15GK355	---	---
			Z-15GK355-B	Z-15GK3A55-B5V	
Panel mount plunger			Z-15GQ55	---	---
			Z-15GQ55-B	Z-15GQA55-B5V	
Panel mount roller plunger			Z-15GQ2255	---	---
			Z-15GQ2255-B	Z-15GQ22A55-B5V	
Panel mount cross roller plunger			---	---	---
			Z-15GQ2155-B	Z-15GQ21A55-B5V	
Leaf spring			Z-15GL55	---	---
			Z-15GL55-B		
Roller leaf spring			Z-15GL255	---	---
			Z-15GL255-B		
Short hinge lever			Z-15GW2155	---	---
			Z-15GW2155-B		
Long hinge lever			Z-15GW4455	---	---
			Z-15GW4455-B	Z-15GW44A55-B5V	
Hinge lever			Z-15GW55	---	---
			Z-15GW55-B	Z-15GWA55-B5V	
Short hinge roller lever			Z-15GW2255	---	Z-01HW2255
			Z-15GW2255-B	Z-15GW22A55-B5V	Z-01HW2255-B
Hinge roller lever			Z-15GW255	---	---
			Z-15GW255-B	Z-15GW2A55-B5V	
Unidirectional short hinge roller lever			Z-15GW227755	---	---
			Z-15GW227755-B	Z-15GW2277A55-B5V	
Reverse hinge lever *2			Z-15GM55	---	---
			Z-15GM55-B		
Reverse short hinge roller lever *2			Z-15GM2255	---	---
			Z-15GM2255-B		
Reverse hinge roller lever *2			Z-15GM255	---	---
			Z-15GM255-B		
Flexible rod (coil spring) *3			Z-15GNJ55	---	---
			Z-15GNJ55-B		

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

Minimum Order Lot

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

Actuator	Standard G (0.5 mm)	Minimum order lot (pcs)
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	

Basic Models (Drip-proof Models High-sensitivity)

Classification			High-sensitivity
Contact gap			H (0.25 mm)
Drip-proof terminal protective cover			Not provided
Actuator	Terminal *		Model
Flexible rod (steel wire)		Solder terminal	Z-15HNJS55
		Screw terminal	Z-15HNJS55-B

* : Solder terminal : Screw terminal

Minimum Order Lot

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

Actuator	Classification / Contact gap	High-sensitivity H (0.25 mm)	Minimum order lot (pcs)
Flexible rod (steel wire)		Z-15HNJS55-B	10

Specifications

Ratings (Basic, Split-contact and Maintained contact Models)

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

Contact gap	Rated voltage	Non-inductive load (A) Resistive load NC	NO	Lamp load NC	NO	Inductive load (A) Inductive load NC	NO	Motor load NC	NO
G, H, H2, E	125 VAC	15 (10) *		3	1.5	15 (10) *		5	2.5
	250 VAC	15 (10) *		2.5	1.25	15 (10) *		3	1.5
	500 VAC *	10		1.5	0.75	6		1.5	0.75
G	8 VDC	15		3	1.5	15		5	2.5
	14 VDC	15		3	1.5	10		5	2.5
	30 VDC	6		3	1.5	5		5	2.5
	125 VDC	0.5		0.5	0.5	0.05		0.05	0.05
	250 VDC	0.25		0.25	0.25	0.03		0.03	0.03
H, H2	8 VDC	15		3	1.5	15		5	2.5
	14 VDC	15		3	1.5	10		5	2.5
	30 VDC	2		2	1.4	1		1	1
	125 VDC	0.4		0.4	0.4	0.03		0.03	0.03
	250 VDC	0.2		0.2	0.2	0.02		0.02	0.02
E	8 VDC	15		3	1.5	15		5	2.5
	14 VDC	15		3	1.5	15		5	2.5
	30 VDC	15		3	1.5	10		5	2.5
	125 VDC	0.75		0.75	0.75	0.4		0.4	0.4
	250 VDC	0.3		0.3	0.3	0.2		0.2	0.2

* Figures in parentheses are for the Z-15HW52, Z-15HW78(-B) and Z-15H2(-B) models, the AC ratings of these models are 125 and 250 V only.

Z-01H

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

Note: 1. The above current ratings are the values of the steady-state current.
2. Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
3. Lamp load has an inrush current of 10 times the steady-state current.
4. Motor load has an inrush current of 6 times the steady-state current.
5. The normally closed and normally open ratings of reverse hinge lever models are opposite to each other.
6. The AC ratings of molded terminals are 125 and 250 V only.
7. The ratings values apply under the following test conditions:
(1) Ambient temperature: 20±2°C
(2) Ambient humidity: 65±5%RH
(3) Operating frequency: 20 operations/min

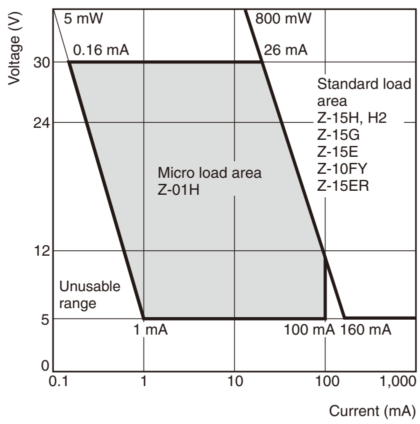
Z-15 (Flexible Rod Models)

Rated voltage	Non-inductive load (A) Resistive load NC	NO	Lamp load NC	NO	Inductive load (A) Inductive load NC	NO	Motor load NC	NO
125 VAC	15		2	1	7		2.5	2
250 VAC	15		1	0.5	5		1.5	1
8 VDC	15		2	1	7		3	1.5
14 VDC	15		2	1	7		3	1.5
30 VDC	2		2	1	1		1	0.5
125 VDC	0.4		0.4	0.4	0.03		0.03	0.03
250 VDC	0.2		0.2	0.2	0.02		0.02	0.02

Z-10F

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

Use the switch within the operating range.



	Z-01H	Z-15□, Z-10FY
Minimum applicable load	5 VDC 1 mA	5 VDC 160 mA

Certified Standard Ratings

Ask your OMRON representative for information on certified models.

UL/CSA (General ratings only)

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

TÜV (EN61058-1)

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

Characteristics

Item	Classification	Z-15 (except micro and flexible rod)	Z-01H	Z-15 (flexible rod)	Z-10F	Z-15H2
Operating speed		0.01 mm to 1 m/s *1		1 mm to 1 m/s	0.1 mm to 1 m/s *1	0.01 mm to 1 m/s
Operating frequency	Mechanical	240 operations/min		120 operations/min	240 operations/min	240 operations/min
	Electrical	20 operations/min				
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)	15 mΩ max. (initial value)
Dielectric strength		Between contacts of same polarity 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		Between contacts of same polarity Contact gap G: 1,000 VAC, 50/60 Hz for 1 min Contact gap H: 600 VAC, 50/60 Hz for 1 min	Between contacts of same polarity Contact gap F: 1,500 VAC, 50/60 Hz for 1 min	Between contacts of same polarity 600VAC, 50/60Hz for 1min
		Between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts 2,000 VAC, 50/60 Hz for 1 min				
Vibration resistance	Malfunction	10 to 55 Hz, 1.5-mm double amplitude *5		10 to 20 Hz, 1.5-mm double amplitude *5	10 to 55 Hz, 1.5-mm double amplitude *5	
Shock resistance	Destruction	1,000 m/s² max.				
	Malfunction	300 m/s² max. *2 *5		50 m/s² max. *5	300 m/s² max. *3 *5	100 m/s² max.
Durability	Mechanical	Contact gap G, H: 20,000,000 operations min. Contact gap E: 300,000 operations		1,000,000 operations min.	500,000 operations min. *1	20,000,000 operations min.
	Electrical	Contact gap G, H: 500,000 operations min. Contact gap E: 100,000 operations min.		100,000 operations min.	100,000 operations min.	500,000 operations min.
Degree of protection	General-purpose	IP00				
	Drip-proof	Equivalent to IP62 (except terminals)				
Degree of protection against electric shock		Class I				
Proof tracking index (PTI)		175				
Ambient operating temperature	General-purpose	–25°C to 80°C (with no icing)				
	Drip-proof	–15°C to 80°C (with no icing)				
Ambient operating humidity	General-purpose	35% to 85%RH				
	Drip-proof	35% to 95%RH				
Weight		Approx. 22 to 58 g		Approx. 42 to 48 g	Approx. 34 to 61 g	Approx. 22 g

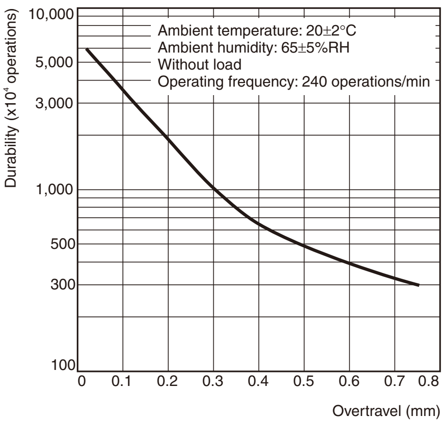
*1. The values are for the plunger models. (For the lever models, the values are at the plunger section.) (Consult your OMRON representative for other models.)
*2. The values are for the Z-15G pin plunger.
*3. The values are for the Z-10FY-B.
*4. The values are for the pin plunger. The durability for models other than the pin plunger is 10,000,000 min.
*5. Malfunction: 1 ms max.

Contacts Specification

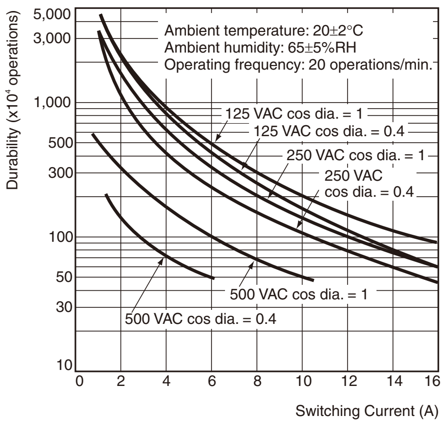
Item	Classification	Z-15	Z-01H	Z-10F
Contacts	Shape	Rivet	Single crossbar	Rivet
	Material	Silver	Gold alloy	Silver
Inrush current	NC	30 A max.	0.1 A max.	40 A max.
	NO	15 A max.	0.1 A max.	20 A max.

Engineering Data

Mechanical Durability (Z-15G)



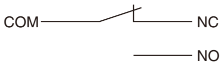
Electrical Durability (Z-15G)



Structure

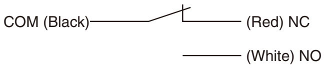
Basic Models

Contact Form (SPDT)



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

Molded Terminals



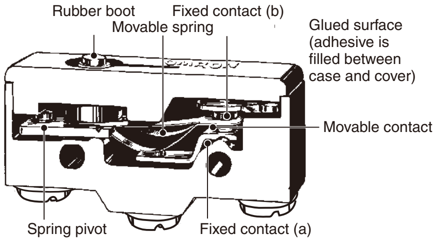
( ) indicates wire color.

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

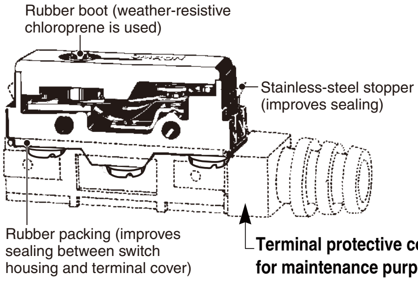
Structure

Drip-proof Construction

- **Without Terminal Protective Cover**



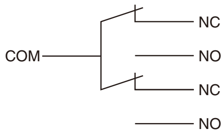
- **With Terminal Protective Cover**



Terminal protective covers are sold separately for maintenance purposes, which can be, however, used with the Z-□-B5V models only. For details, refer to page 24.

Split-contact Models

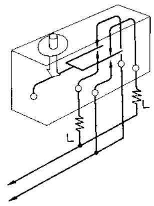
Contact Form



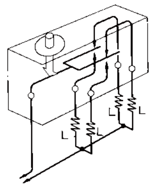
Note: The NO and NC terminal arrangement is reversed for Models with reverse operation (Z-10FM).

Connection Example

Series Connection

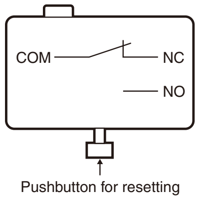


Parallel Connection



Maintained-contact Models

Contact Form

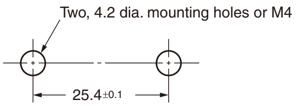


Dimensions

(Unit: mm)

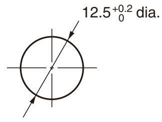
Mounting

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.

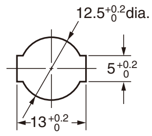


When mounting the Switch to a panel, use a tightening torque of 2.94 to 4.9 N·m for the hexagonal nuts on the actuator.

Panel Mount Plunger



Panel Mount Roller Plunger

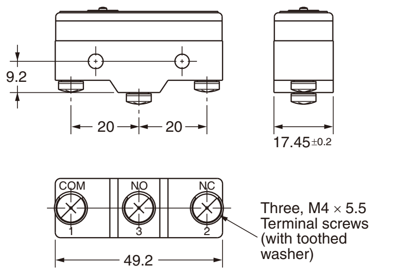


Basic Models General-purpose and Split-contact Models

Terminals

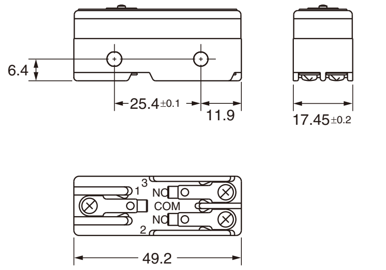
Basic Models

Screw Terminals (-B)



Appropriate terminal screw tightening torque: 0.78 to 1.18 N·m.

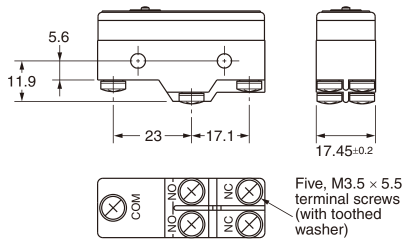
Solder Terminal (-A) ("-A" is not included in the model numbers.)



Note: With reverse action models (Z-15GM), the positions of NO and NC terminals are reversed.

Split-contact Models

Screw Terminals (Y-B)



Appropriate terminal screw tightening torque: 0.49 to 0.78 N·m.

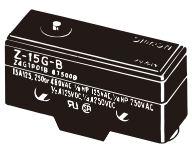
Note: With reverse action models (Z-10FM), the positions of NO and NC terminals are reversed.

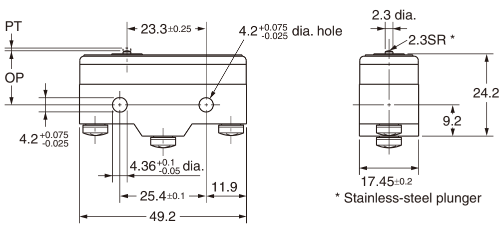
Dimensions and Operating Characteristics

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, see above.

Pin Plunger

Z-15G-B Z-15E-B
Z-15H2-B Z-01H-B
Z-15H-B Z-10FY-B



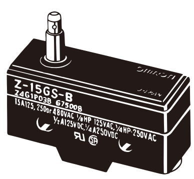


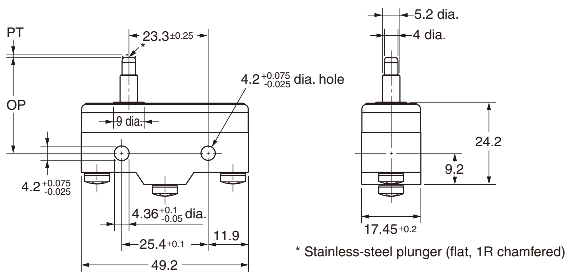
* Stainless-steel plunger

Operating Characteristics	Model	Z-15G-B	Z-15H2-B	Z-15H-B	Z-15E-B	Z-01H-B	Z-10FY-B
Operating force OF		2.45 to 3.43 N	1.96 to 2.5 N	1.96 to 2.75 N	6.12 to 7.85 N	2.45 N max.	4.46 to 7.26 N
Release force RF	min.	1.12 N	1.12 N	1.12 N	1.12 N	0.78 N	1.12 N
Pretravel PT	max.	0.4 mm	0.3 mm	0.3 mm	0.8 mm	0.5 mm	0.8 mm
Overtravel OT	min.	0.13 mm	0.13 mm	0.13 mm	0.13 mm	0.13 mm	0.13 mm
Movement Differential MD	max.	0.05 mm	0.005 to 0.008 mm	0.025 mm	0.13 mm	0.04 mm	0.1 mm
Operating Position OP		15.9±0.4 mm					

Slim Spring Plunger

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





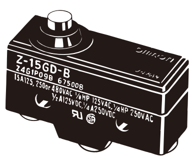
* Stainless-steel plunger (flat, 1R chamfered)

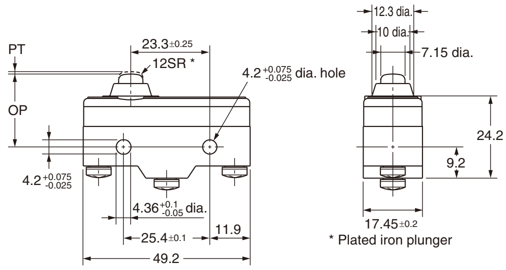
		Z-15GS-B	Z-15HS-B	Z-01HS	Z-10FSY-B
OF		2.45 to 3.43 N	1.96 to 2.79 N	2.45 N max.	4.46 to 7.26 N
RF	min.	1.12 N	1.12 N	0.78 N	1.12 N
PT	max.	0.4 mm	0.3 mm	0.5 mm	0.8 mm
OT	min.	1.6 mm	1.6 mm	1.6 mm	1.6 mm
MD	max.	0.05 mm	0.025 mm	0.05 mm	0.1 mm
OP		28.2±0.5 mm			

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

Short Spring Plunger

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



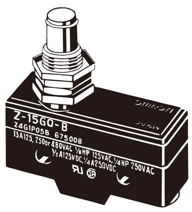


* Plated iron plunger

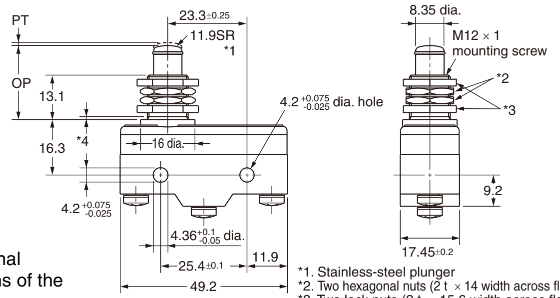
	Z-15GD-B	Z-15HD-B	Z-15ED-B	Z-01HD-B	Z-10FDY-B
OF	2.45 to 3.43 N	1.96 to 2.79 N	6.13 to 7.85 N	2.45 N max.	4.46 to 7.26 N
RF min.	1.12 N	1.12 N	1.12 N	0.78 N	1.12 N
PT max.	0.4 mm	0.3 mm	0.8 mm	0.5 mm	0.8 mm
OT min.	1.6 mm	1.6 mm	1.6 mm	1.6 mm	1.6 mm
MD max.	0.05 mm	0.025 mm	0.13 mm	0.05 mm	0.1 mm
OP	21.5±0.5 mm				

Panel Mount Plunger

Z-15GQ-B Z-01HQ-B
Z-15HQ-B Z-10FQY-B
Z-15EQ-B Z-15GQ3-B *
Z-15GQ8-B *



* The external dimensions of the actuator vary.



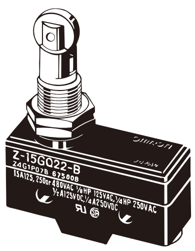
*1. Stainless-steel plunger
*2. Two hexagonal nuts (2 t × 14 width across flats)
*3. Two lock nuts (2 t × 15.6 width across flats)
*4. Incomplete screw part with a maximum length of 1.5 mm.

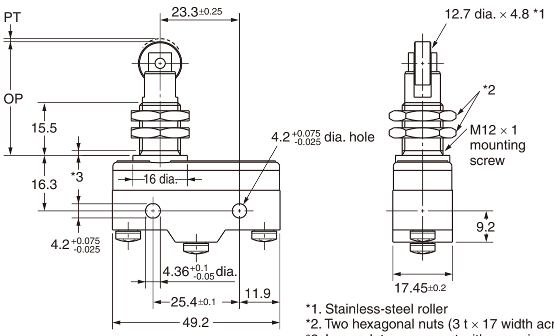
Note: 1. Do not use the M12 mounting screw and the case mounting hole at the same time, or excessive pulling force will be imposed on the switch and the case and cover may be damaged.
2. On the model Z-15GQ3-B, PT can be set to a value larger than that for the Z-15GQ.
3. On the model Z-15GQ8-B, operating position can be adjusted by providing a screw in the plunger section.
4. On the model Z-15GQ8-B, the M3 hole with a depth of 10 mm is a through hole. Take precautions so that no water or screw lock agent penetrates into the hole.

	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	1.96 to 2.79 N	6.13 to 7.85 N	2.45 N max.	4.46 to 7.26 N	2.45 to 3.43 N	2.45 to 3.43 N
RF min.	1.12 N	1.12 N	1.12 N	0.78 N	1.12 N	1.12 N	1.12 N
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

Panel Mount Roller Plunger

Z-15GQ22-B Z-15EQ22-B
Z-15HQ22-B Z-10FQ22Y-B





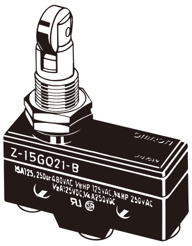
*1. Stainless-steel roller
*2. Two hexagonal nuts (3 t × 17 width across flats)
*3. Incomplete screw part with a maximum length of 1.5 mm.

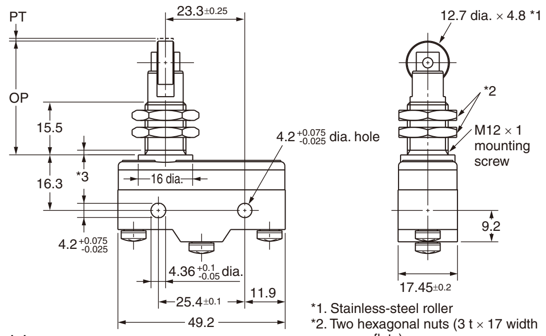
Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

	Z-15GQ22-B	Z-15HQ22-B	Z-15EQ22-B	Z-10FQ22Y-B
OF	2.45 to 3.43 N	1.96 to 2.79 N	6.13 to 7.85 N	4.46 to 7.26 N
RF min.	1.12 N	1.12 N	1.12 N	1.12 N
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: Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

Panel Mount Cross Roller Plunger
Z-15GQ21-B Z-15EQ21-B
Z-15HQ21-B





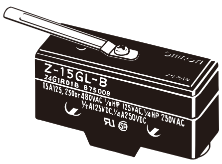
*1. Stainless-steel roller
*2. Two hexagonal nuts (3 t × 17 width across flats)
*3. Incomplete screw part with a maximum length of 1.5 mm.

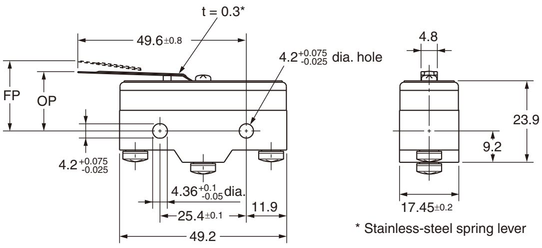
Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

	Z-15GQ21-B	Z-15HQ21-B
OF	2.45 to 3.43 N	1.96 to 2.79 N
RF min.	1.12 N	1.12 N
PT max.	0.4 mm	0.3 mm
OT min.	3.58 mm	3.58 mm
MD max.	0.05 mm	0.025 mm
OP	33.4±1.2 mm	

	Z-15EQ21-B
OF	6.13 to 7.85 N
RF min.	1.12 N
PT max.	0.8 mm
OT min.	3.58 mm
MD max.	0.13 mm
OP	33.4±1.2 mm

Leaf Spring
Z-15GL-B



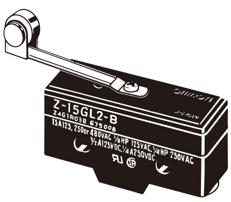


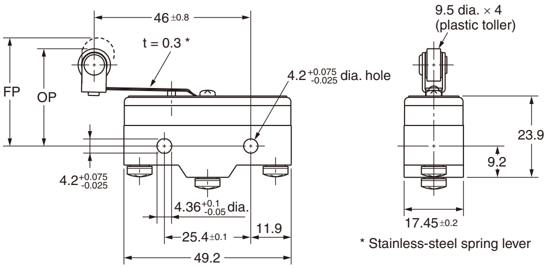
* Stainless-steel spring lever

OF max.	1.38 N
RF min.	0.14 N
OT *min.	1.6 mm
MD max.	1.3 mm
FP max.	20.6 mm
OP	17.4±0.8 mm

* When operating, be sure not to exceed 1.6 mm.

Roller Leaf Spring
Z-15GL2-B



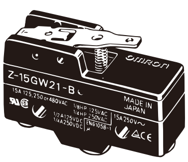


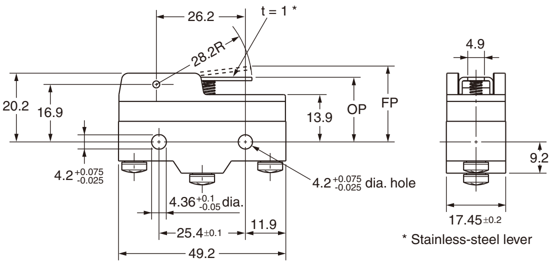
* Stainless-steel spring lever

OF max.	1.38 N
RF min.	0.14 N
OT *min.	1.6 mm
MD max.	1.3 mm
FP max.	31.8 mm
OP	28.6±0.8 mm

* When operating, be sure not to exceed 1.6 mm.

Short Hinge Lever
Z-15GW21-B

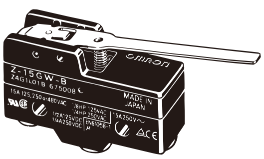




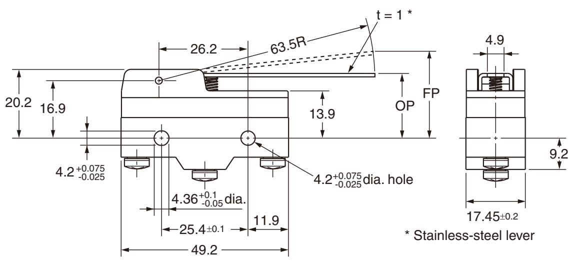
* Stainless-steel lever

OF max.	1.57 N
RF min.	0.27 N
OT min.	2 mm
MD max.	1 mm
FP max.	24.8 mm
OP	19±0.8 mm

Hinge Lever
Z-15GW-B Z-15GW32-B
Z-15HW-B Z-10FWY-B
Z-15GW3-B (Lever Length: 56R)*



* The external dimensions of the actuator vary.



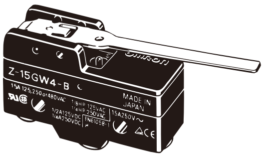
* Stainless-steel lever

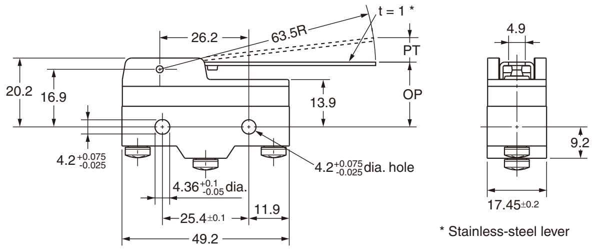
	Z-15GW-B	Z-15HW-B	Z-15GW32-B	Z-10FWY-B	Z-15GW3-B
OF	0.69 N max.	0.66 N max.	1.47 to 1.96 N	0.88 N max.	0.78 N max.
RF min.	0.14 N	0.14 N	0.92 N	0.14 N	0.15 N
OT min.	5.6 mm	5.6 mm	5.6 mm	5.6 mm	4.8 mm
MD max.	1.27 mm	0.63 mm	1.27 mm	2.4 mm	1.12 mm
FP max.	28.2 mm	27.4 mm	28.2 mm	29.8 mm	27.2 mm
OP	19±0.8 mm				

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

Low-force Hinge Lever

Z-15GW4-B

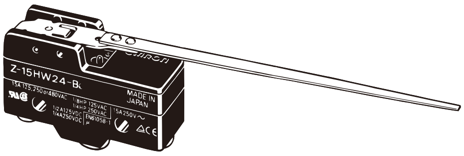


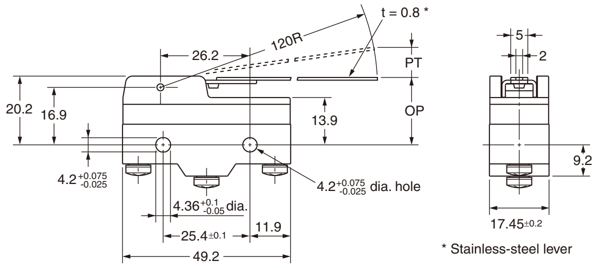


* Stainless-steel lever

OF max.	274 mN
RF min.	34.3 mN
PT max.	10 mm
OT min.	5.6 mm
MD max.	1.27 mm
OP	19±0.8mm

Z-15HW24-B



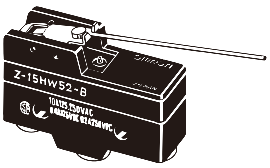


* Stainless-steel lever

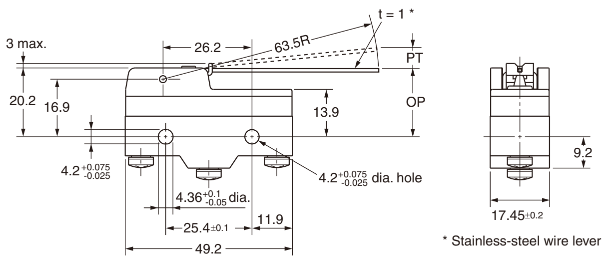
OF max.	58.8 mN
RF min.	4.90 mN
PT max.	19.8 mm
OT min.	10 mm
MD max.	2 mm
OP	19.8±1.6 mm

Low-force Wire Hinge Lever

Z-15HW52-B
Z-15HW78-B (Lever Length: 110R) *



* The external dimensions of the actuator vary.



* Stainless-steel wire lever

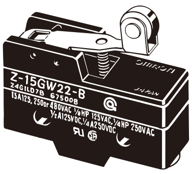
	Z-15HW52-B
OF max.	58.8 mN
RF min.	4.90 mN
PT max.	8.3 mm
OT min.	5.6 mm
MD max.	0.65 mm
OP	19±1 mm

	Z-15HW78-B
OF max.	39.2 mN
RF min.	2.94 mN
PT max.	10 mm
OT min.	6 mm
MD max.	3 mm
OP	20±1 mm

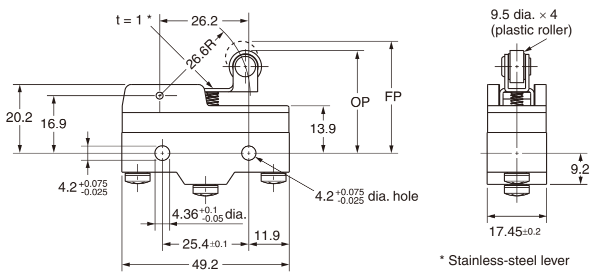
Note: AC electrical ratings: 10 A, 125/250 V.

Short Hinge Roller Lever

Z-15GW22-B Z-01HW22-B
Z-15HW22-B Z-10FW22Y-B
Z-15EW22-B
Z-15GW2-B * Z-15HW2-B *
Z-10FW2Y-B *



* The external dimensions of the actuator vary. (Lever Length: 48.5R)

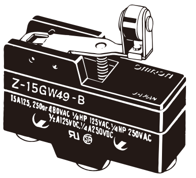


* Stainless-steel lever

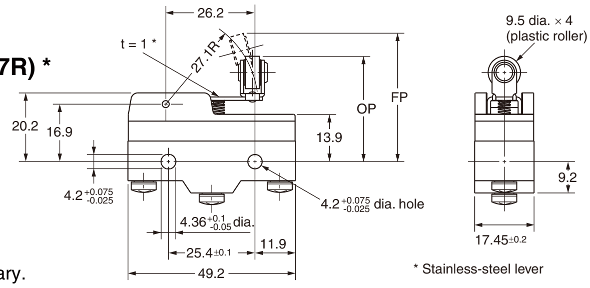
	Z-15GW22-B	Z-15HW22-B	Z-15EW22-B	Z-01HW22-B	Z-10FW22Y-B	Z-15GW2-B	Z-15HW2-B	Z-10FW2Y-B
OF max.	1.57 N	1.47 N	1.94 N	1.57 N	2.45 N	0.98 N	0.84 N	1.27 N
RF min.	0.41 N	0.41 N	0.41 N	0.27 N	0.34 N	0.22 N	0.22 N	0.22 N
OT min.	2.4 mm	2.4 mm	2.4 mm	2.4 mm	2.4 mm	4 mm	4 mm	4 mm
MD max.	0.5 mm	0.45 mm	1.3 mm	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

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

Short Hinge Cross Roller Lever
Z-15GW49-B
Z-15GW54-B (Lever Length: 48.7R) *

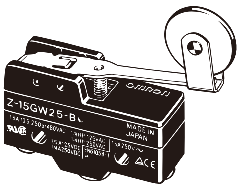


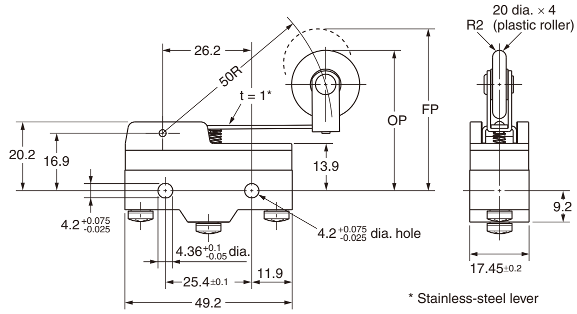
* The external dimensions of the actuator vary.



	Z-15GW49-B	Z-15GW54-B
OF max.	1.67 N	0.98 N
RF min.	0.41 N	0.22 N
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

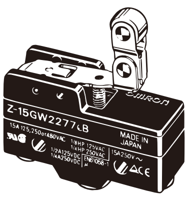
Hinge Roller Lever
Z-15GW25-B

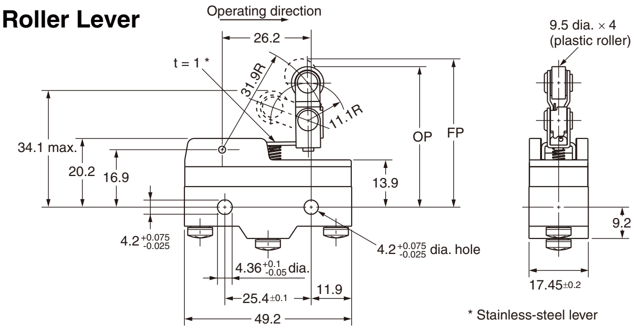




OF max.	0.98 N
RF min.	0.21 N
OT min.	4 mm
MD max.	1.6 mm
FP max.	47.5 mm
OP	41.2±0.8 mm

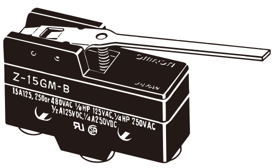
Unidirectional Short Hinge Roller Lever
Z-15GW2277-B

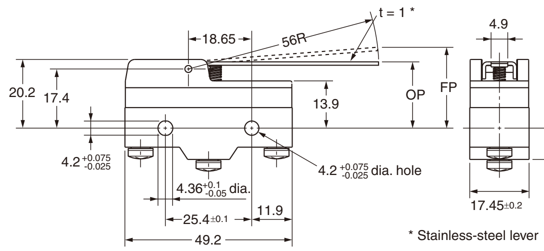




OF max.	1.67 N
RF min.	0.41 N
OT min.	2.4 mm
MD max.	0.51 mm
FP max.	43.6 mm
OP	41.3±0.8 mm

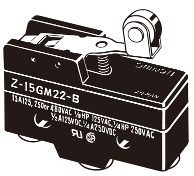
Reverse Hinge Lever **
Z-15GM-B

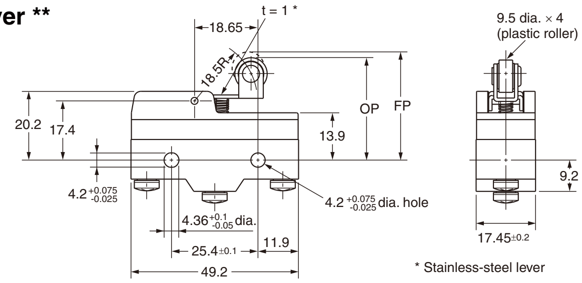




OF max.	1.67 N
RF min.	0.27 N
OT min.	5.6 mm
MD max.	0.89 mm
FP max.	23.8 mm
OP	19±0.8 mm

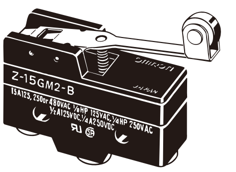
Reverse Short Hinge Roller Lever **
Z-15GM22-B
Z-10FM22Y-B

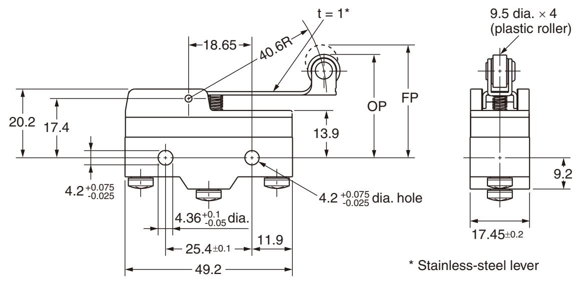




	Z-15GM22-B	Z-10FM22Y-B
OF max.	5.28 N	6.37 N
RF min.	1.67 N	1.67 N
OT min.	2 mm	2 mm
MD max.	0.28 mm	0.56mm
FP max.	31.8 mm	33 mm
OP	29.4±0.4 mm	29.4±0.4 mm

Reverse Hinge Roller Lever **
Z-15GM2-B





OF max.	2.35 N
RF min.	0.55 N
OT min.	4 mm
MD max.	0.64 mm
FP max.	35 mm
OP	30.2±0.8 mm

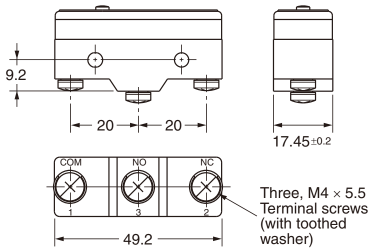
** The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.

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

Basic Models (Drip-proof) without Terminal Protective Cover

Terminals (Molded Terminals : Refer to page 21.)

Without Terminal Protective Cover



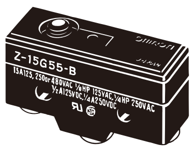
Note: With reverse action models (Z-15GM), the positions of NO and NC terminals are reversed.

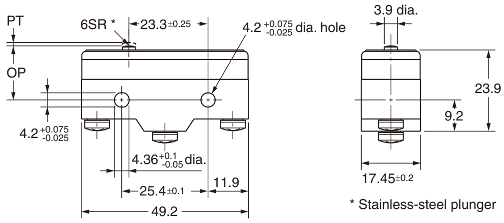
Dimensions and Operating Characteristics

The above illustration is for model without terminal protective cover.

Pin Plunger

Z-15G55-B
Z-01H55-B

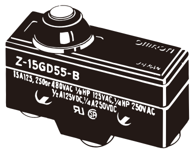


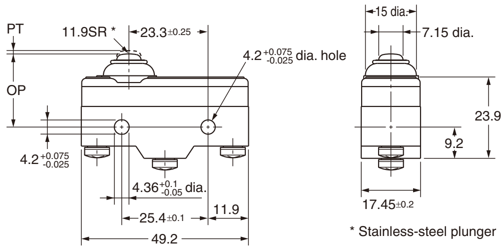


	Z-15G55-B	Z-01H55-B
OF	2.45 to 4.22 N	3.43 N max.
RF min.	1.12 N	0.78 N
PT max.	2.2 mm	2.2 mm
OT min.	0.13 mm	0.13 mm
MD max.	0.06 mm	0.06 mm
OP	15.9±0.4 mm	

Short Spring Plunger

Z-15GD55-B
Z-01HD55-B

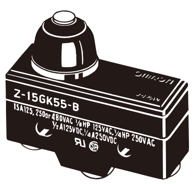


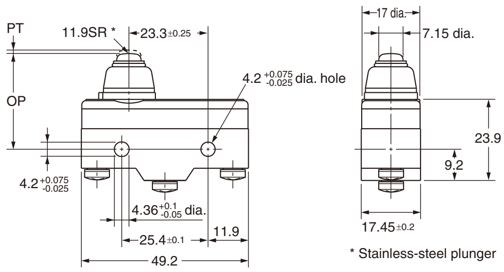


	Z-15GD55-B	Z-01HD55-B
OF max.	5.30 N	3.63 N
RF min.	1.12 N	0.78 N
PT max.	1.8 mm	1.9 mm
OT min.	1.6 mm	1.6 mm
MD max.	0.06 mm	0.06 mm
OP	21.5±0.5 mm	

Spring Plunger

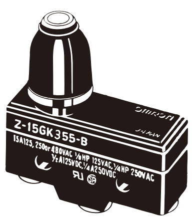
Z-15GK55-B

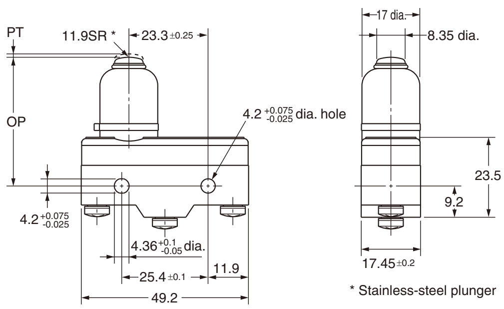




OF max.	5.30 N
RF min.	1.12 N
PT max.	2.3 mm
OT min.	1.6 mm
MD max.	0.06 mm
OP	28.2±0.5 mm

Z-15GK355-B

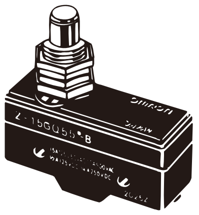


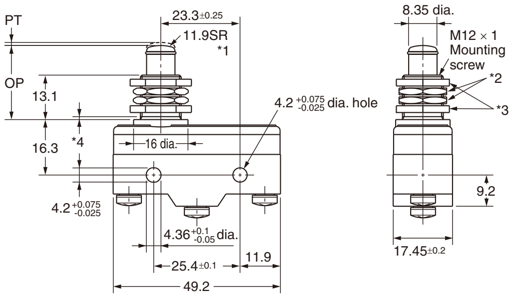


OF max.	5.30 N
RF min.	1.12 N
PT max.	2.4 mm
OT min.	3.5 mm
MD max.	0.06 mm
OP	37.8±1.2 mm

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

Panel Mount Plunger
Z-15GQ55-B



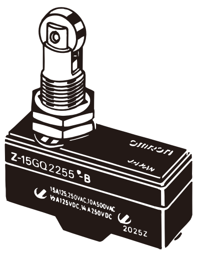


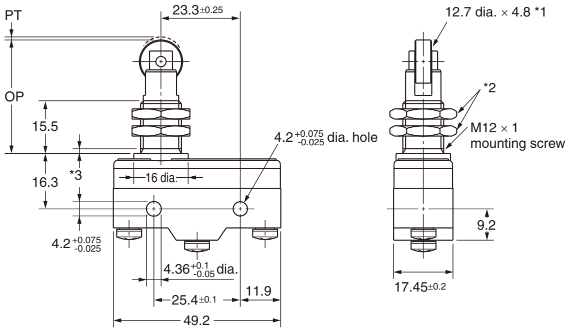
*1. Stainless-steel plunger
*2. Two hexagonal nuts (2 t × 14 width across flats)
*3. Two lock nuts (2 t × 15.6 width across flats)
*4. Incomplete screw part with a maximum length of 1.5 mm.

OF max.	5.30 N
RF min.	1.12 N
PT max.	1.8 mm
OT min.	5.5 mm
MD max.	0.06 mm
OP	21.8±0.8 mm

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Panel Mount Roller Plunger
Z-15GQ2255-B



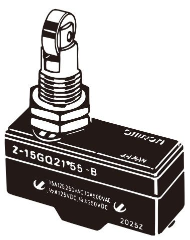


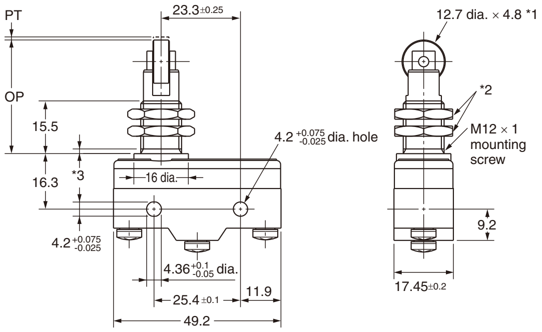
*1. Stainless-steel roller
*2. Two hexagonal nuts (3 t × 17 width across flats)
*3. Incomplete screw part with a maximum length of 1.5 mm.

OF max.	5.30 N
RF min.	1.12 N
PT max.	1.8 mm
OT min.	3.58 mm
MD max.	0.06 mm
OP	33.4±1.2 mm

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Panel Mount Cross Roller Plunger
Z-15GQ2155-B



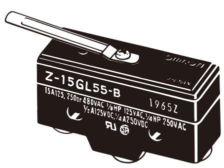


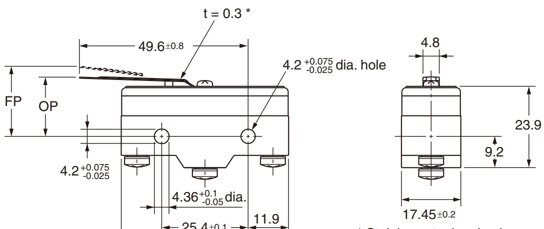
*1. Stainless-steel roller
*2. Two hexagonal nuts (3 t × 17 width across flats)
*3. Incomplete screw part with a maximum length of 1.5 mm.

OF max.	5.30 N
RF min.	1.12 N
PT max.	1.8 mm
OT min.	3.58 mm
MD max.	0.06 mm
OP	33.4±1.2 mm

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Leaf Spring
Z-15GL55-B





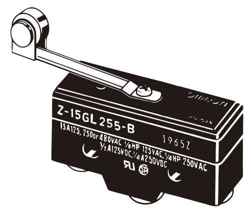
* Stainless-steel spring lever

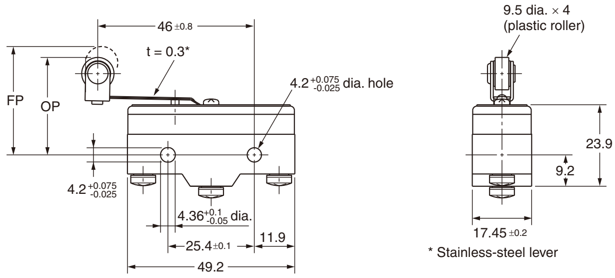
OF max.	1.96 N
RF min.	0.14 N
OT *min.	1.6 mm
MD max.	1.3 mm
FP max.	20.6 mm
OP	17.5±0.8 mm

* When operating, be sure not to exceed 1.6 mm.

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

Roller Leaf Spring
Z-15GL255-B

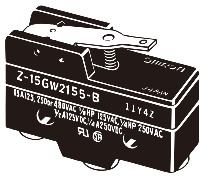


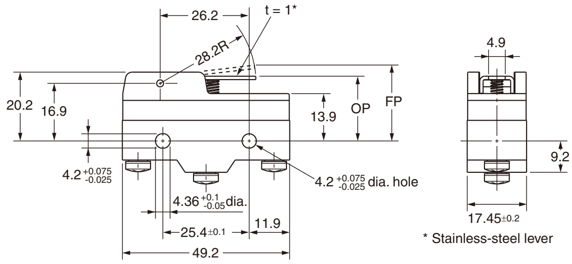


OF max.	1.96 N
RF min.	0.14 N
OT *min.	1.6 mm
MD max.	1.3 mm
FP max.	31.8 mm
OP	28.6±0.8 mm

* When operating, be sure not to exceed 1.6 mm.

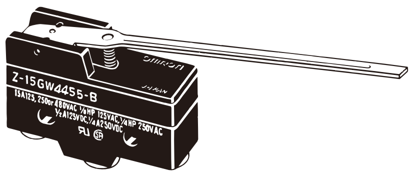
Short Hinge Lever
Z-15GW2155-B

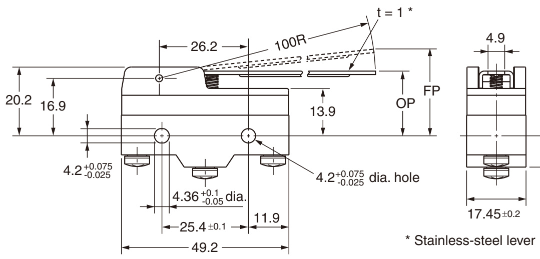




OF max.	1.86 N
RF min.	0.27 N
OT min.	2 mm
MD max.	1 mm
FP max.	25 mm
OP	19±0.8 mm

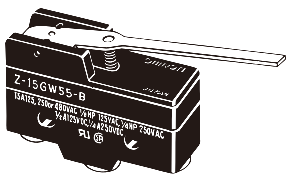
Long Hinge Lever
Z-15GW4455-B

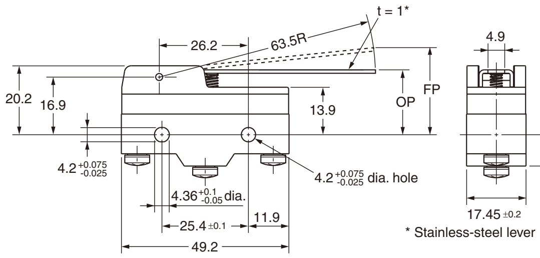




OF max.	0.88 N
RF min.	0.14 N
OT min.	5.6 mm
MD max.	3.5 mm
FP max.	33 mm
OP	19±1.2 mm

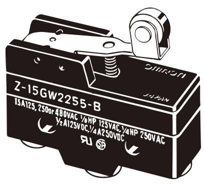
Hinge Lever
Z-15GW55-B

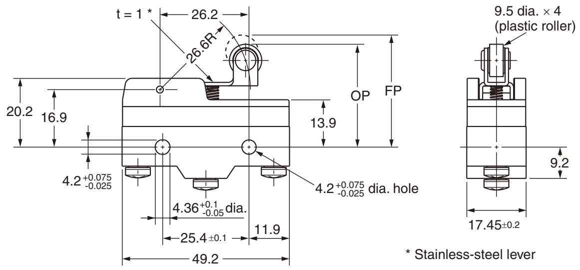




OF max.	0.98 N
RF min.	0.14 N
OT min.	5.6 mm
MD max.	2 mm
FP max.	28.2 mm
OP	19±0.8 mm

Short Hinge Roller Lever
Z-15GW2255-B
Z-01HW2255-B

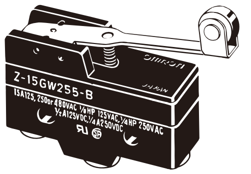


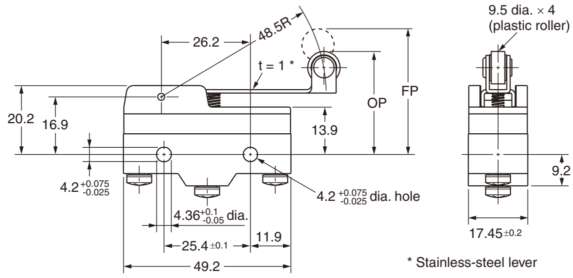


	Z-15GW2255-B	Z-01HW2255-B
OF max.	1.96 N	1.96 N
RF min.	0.41 N	0.27 N
OT min.	2.4 mm	2.4 mm
MD max.	0.8 mm	0.8 mm
FP max.	32.9 mm	
OP	30.2±0.4 mm	

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

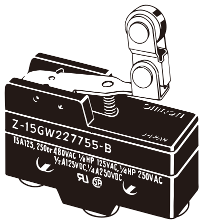
Hinge Roller Lever
Z-15GW255-B

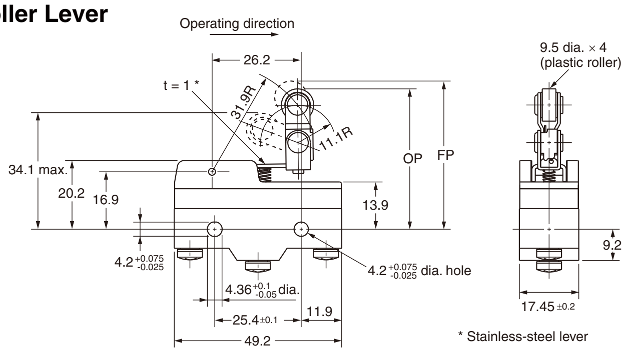




OF max.	1.27 N
RF min.	0.21 N
OT min.	4 mm
MD max.	1.6 mm
FP max.	36.5 mm
OP	30.2±0.8 mm

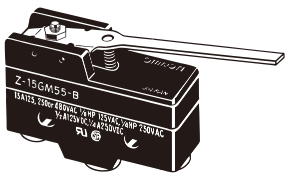
Unidirectional Short Hinge Roller Lever
Z-15GW227755-B

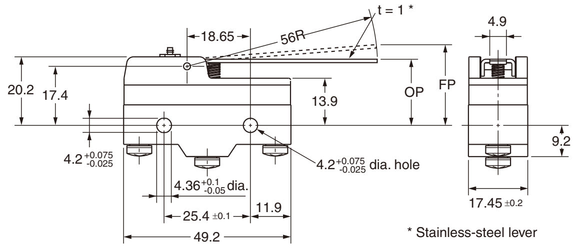




OF max.	1.77 N
RF min.	0.49 N
OT min.	2.4 mm
MD max.	0.8 mm
FP max.	43.6 mm
OP	41.3±0.8 mm

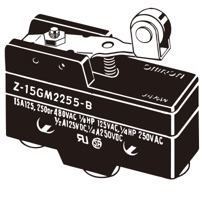
Reverse Hinge Lever *
Z-15GM55-B

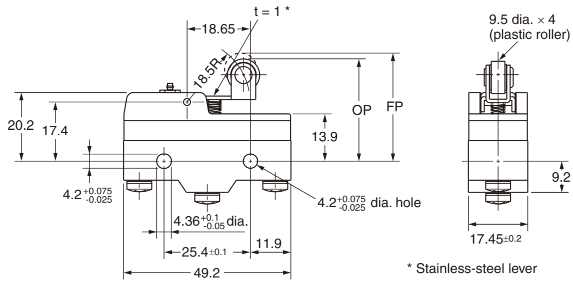




OF max.	1.96 N
RF min.	0.27 N
OT min.	5.6 mm
MD max.	0.89 mm
FP max.	23.8 mm
OP	19±0.8 mm

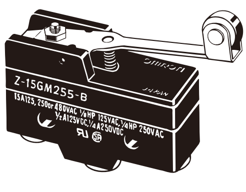
Reverse Short Hinge Roller Lever *
Z-15GM2255-B

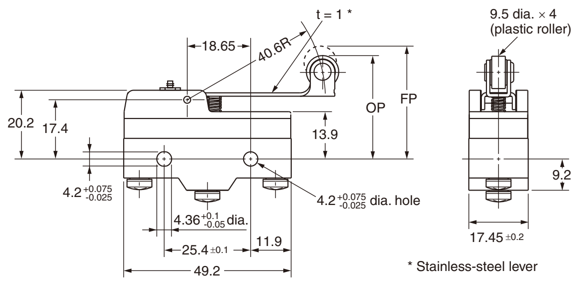




OF max.	5.69 N
RF min.	1.67 N
OT min.	2 mm
MD max.	0.28 mm
FP max.	31.8mm
OP	29.4±0.4mm

Reverse Hinge Roller Lever *
Z-15GM255-B

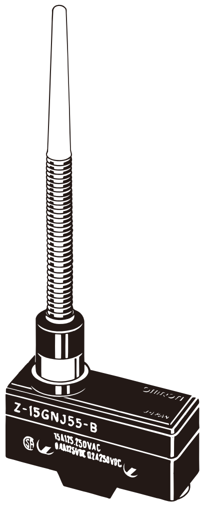


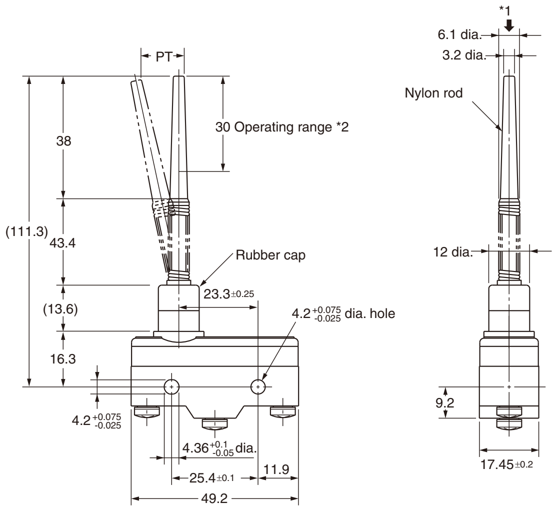


OF max.	2.65 N
RF min.	0.55 N
OT min.	4 mm
MD max.	0.64 mm
FP max.	35 mm
OP	30.2±0.8 mm

* The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers.
Note: Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

Flexible Rod (Coil Spring)
Z-15GNJ55-B

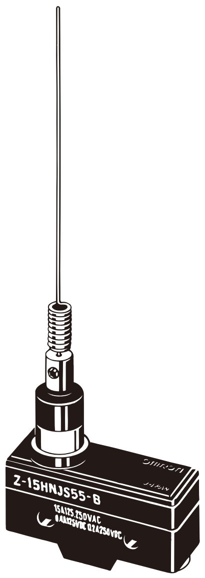


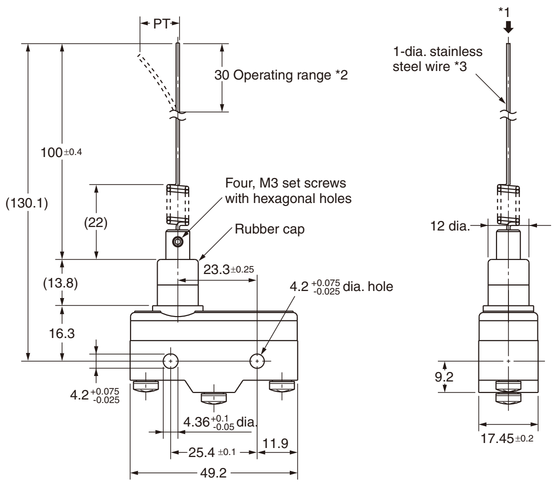


OF max. **PT max.**	0.49 N (20 mm)
TT max.	40 mm

*1. Operation is possible in any direction other than the axial direction (indicated by the arrow ⬇).
*2. Use only the area within the top 30 mm of the rod as the operating part. (Do not use the area that falls within 80 mm from the mounting hole as the operating part. Using this area may cause damage to the nylon rod.

Flexible Rod (Steel Wire)
Z-15HNJS55-B





OF max. **PT max.**	0.15 N (25 mm)

*1. Operation is possible in any direction other than the axial direction (indicated by the arrow ⬇).
*2. Use only the area within the top 30 mm of the rod as the operating part. (Do not use the area that falls within 100 mm from the mounting hole as the operating part. Using this area may cause damage to the steel wire.)
*3. The steel wire can be replaced if damaged. (Model: Lever for HNJS55)

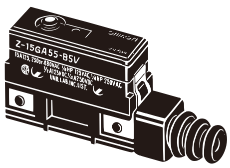
Note: Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

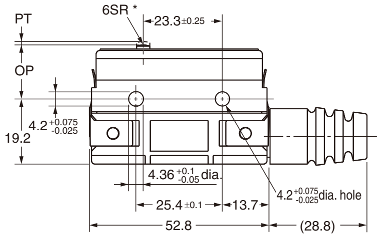
Basic Models (Drip-proof) with Terminal Protective Cover

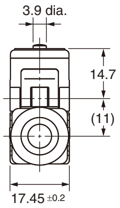
Dimensions and Operating Characteristics

Pin Plunger

Z-15GA55-B5V



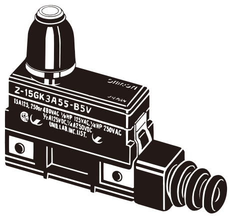


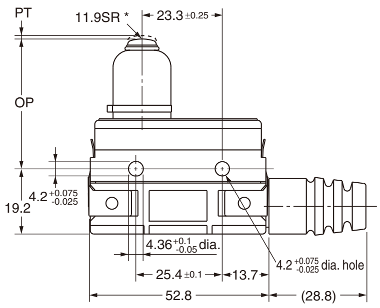


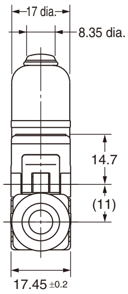
* Stainless-steel plunger

OF max.	2.45 to 4.22 N
RF min.	1.12 N
PT max.	2.2 mm
OT min.	0.13 mm
MD max.	0.06 mm
OP	15.9±0.4 mm

Z-15GK3A55-B5V





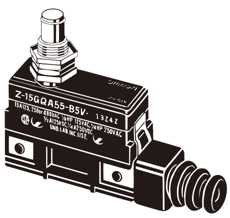


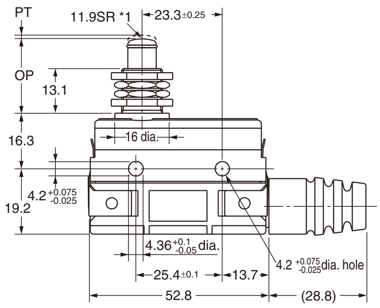
* Stainless-steel plunger

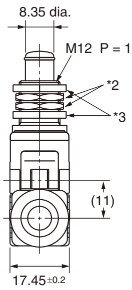
OF max.	5.30 N
RF min.	1.12 N
PT max.	2.4 mm
OT min.	3.5 mm
MD max.	0.06 mm
OP	37.8±1.2 mm

Panel Mount Plunger

Z-15GQA55-B5V







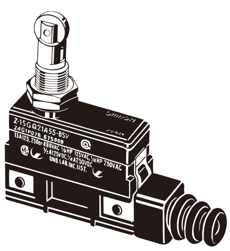
*1. Stainless-steel plunger
*2. Two hexagonal nuts (2 t × 14 width across flat)
*3. Two lock nuts (2 t × 15.6 width across flats)

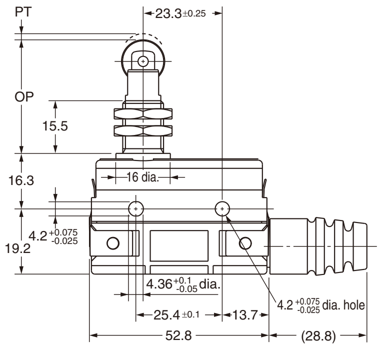
OF max.	5.30 N
RF min.	1.12 N
PT max.	1.8 mm
OT min.	5.5 mm
MD max.	0.06 mm
OP	21.8±0.8 mm

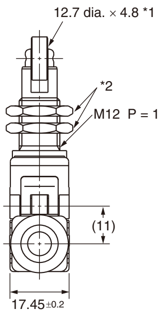
Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Panel Mount Roller Plunger

Z-15GQ22A55-B5V







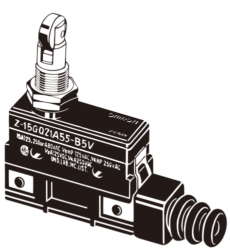
*1. Stainless-steel roller
*2. Two hexagonal nuts (3 t × 17 width across flats)

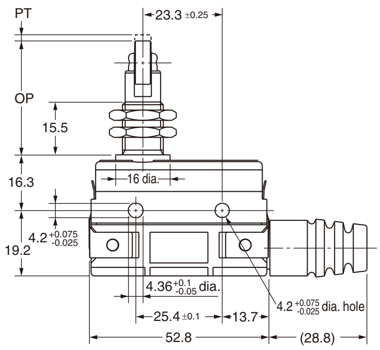
OF max.	5.30 N
RF min.	1.12 N
PT max.	1.8 mm
OT min.	3.58 mm
MD max.	0.06 mm
OP	33.4±1.2 mm

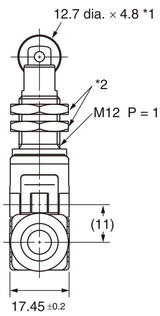
Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

Panel Mount Cross-roller Plunger

Z-15GQ21A55-B5V







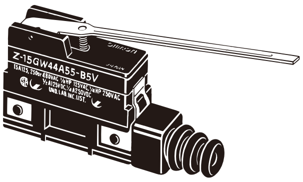
*1. Stainless-steel roller
*2. Two hexagonal nuts (3 t × 17 width across flats)

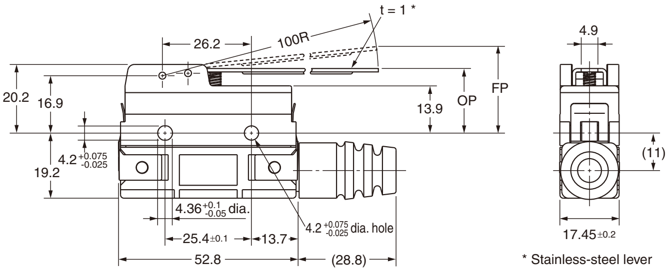
OF max.	5.30 N
RF min.	1.12 N
PT max.	1.8 mm
OT min.	3.58mm
MD max.	0.06 mm
OP	33.4±1.2 mm

Note: Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

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

Long Hinge Lever
Z-15GW44A55-B5V

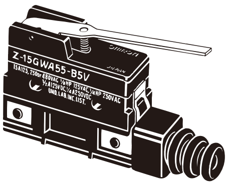


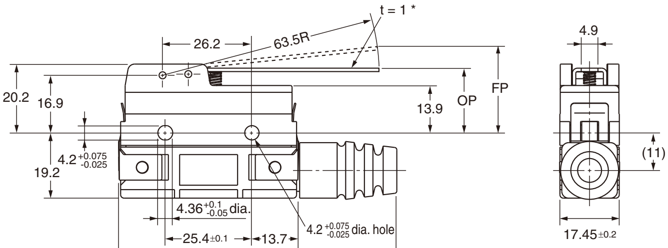


* Stainless-steel lever

OF max.	0.88 N
RF min.	0.14 N
OT min.	5.6 mm
MD max.	3.5 mm
FP max.	33 mm
OP	19±1.2 mm

Hinge Lever
Z-15GWA55-B5V

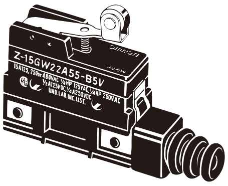


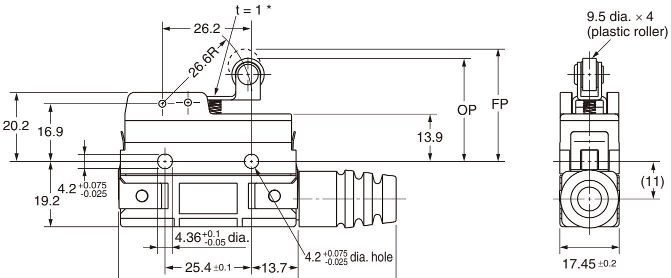


* Stainless-steel lever

OF max.	0.98 N
RF min.	0.14 N
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

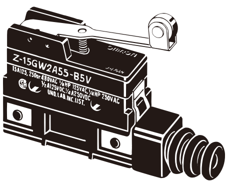


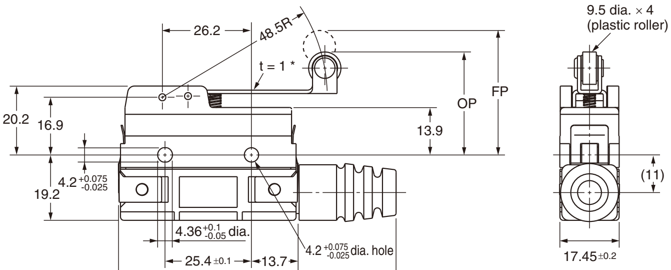


* Stainless-steel lever

OF max.	1.96 N
RF min.	0.41 N
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

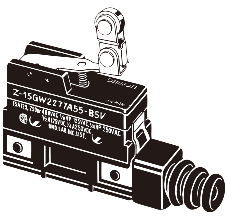


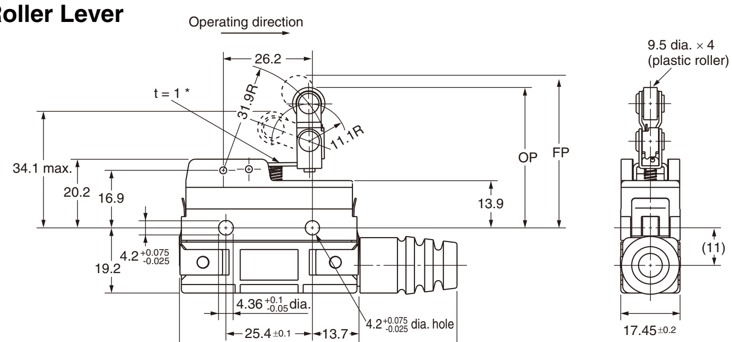


* Stainless-steel lever

OF max.	1.27 N
RF min.	0.21 N
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-15GW2277A55-B5V





* Stainless-steel lever

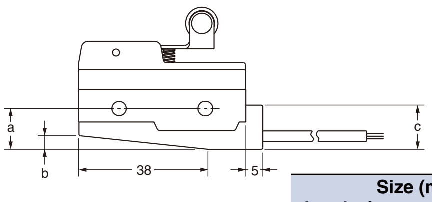
OF max.	1.77 N
RF min.	0.49 N
OT min.	2.4 mm
MD max.	0.8 mm
FP max.	43.6 mm
OP	41.3±0.8 mm

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

Basic Models (Drop-proof) with Modeled terminals

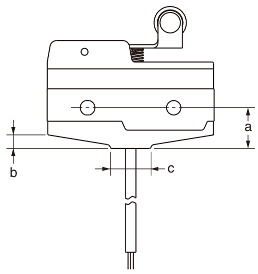
Molded Terminals

L/R Type (The following illustration is the R type.)



Size (mm) / Lead wire	a	b	c
VSF	12	4	13
VCT	19	11	20

D Type



Size (mm) / Lead wire	a	b	c
VSF	12	4	12
VCT	19	11	16

Lead Wire Specifications

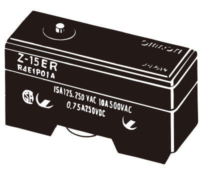
Specifications / Lead wire	Nominal cross sectional area (mm2)	Finished outer diameter (mm)	Connection to terminal	Length (m)
VSF (single-core, vinyl cord)	1.25	Approx. 3.1 dia.	Black :COM White :NO Red :NC	1, 3
VCT (vinyl-insulated cable)		Three-core: approx. 10.5 dia.		

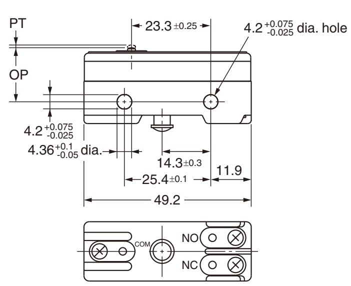
Note: 1. No models with molded terminals are approved by UL, CSA, or EN.
2. Molded terminals are not available on all models. Contact your OMRON representative for applicable products.

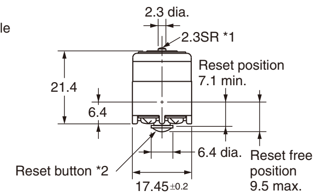
Maintained-contact Models

Dimensions and Operating Characteristics

Pin Plunger
Z-15ER







*1. Stainless steel plunger
*2. Plastic plunger

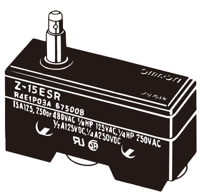
Plunger

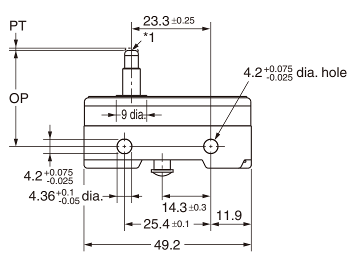
OF	max.	1.96 to 2.50 N
PT	max.	0.4 mm
OT	min.	0.13 mm
OP		15.9±0.4 mm

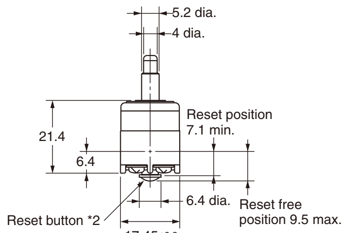
Reset Button

OF	max.	0.55 to 2.79 N
OT	min.	0.4 mm

Slim Spring Plunger
Z-15ESR







*1. Stainless steel plunger (tip only, flat, R1 bevel).
*2. Plastic plunger

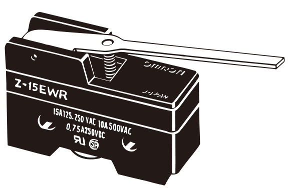
Plunger

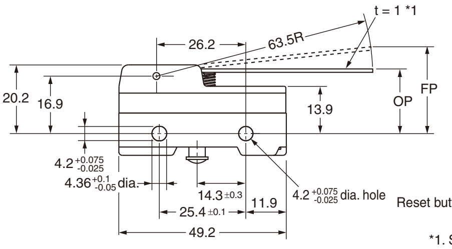
OF	max.	2.65 N
PT	max.	0.4 mm
OT	min.	1.6 mm
OP		28.2±0.5 mm

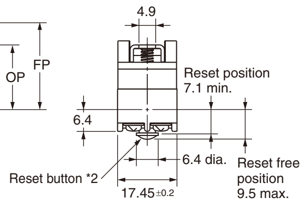
Reset Button

OF	max.	2.79 N
OT	min.	0.4 mm

Hinge Lever
Z-15EWR







*1. Stainless steel lever
*2. Plastic plunger

Lever Tip

OF	max.	0.54 N
OT	min.	5.6 mm
FP	max.	28.2 mm
OP		19±0.8 mm

Reset Button

OF	max.	2.94 N
OT	min.	0.4 mm

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

Safety Precautions

For details, be sure to read *Safety Precautions for All Basic Switches*.

Precautions for Safe Use

Terminal Connection

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

Operation

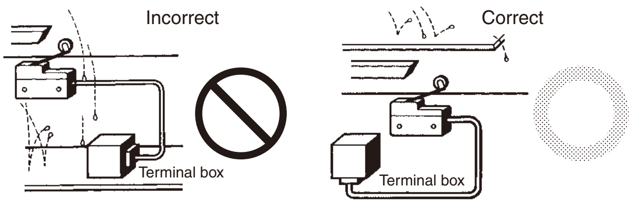
- Make sure that the switching frequency or speed is within the specified range.
  1. If the switching speed is extremely slow, the contact may not be switched smoothly, which may result in a contact failure or contact welding.
  2. If the switching speed is extremely fast, switching shock may damage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

  The rated permissible switching speed and frequency indicate the switching reliability of the Switch.
  The life of a Switch is determined at the specified switching speed. The life varies with the switching speed and frequency even when they are within the permissible ranges. In order to determine the life of a Switch model to be applied to a particular use, it is best to conduct an appropriate durability test on some samples of the model under actual conditions.
- Make sure that the actuator travel does not exceed the permissible OT position. The operating stroke must be set to 70% to 100% of the rated OT.

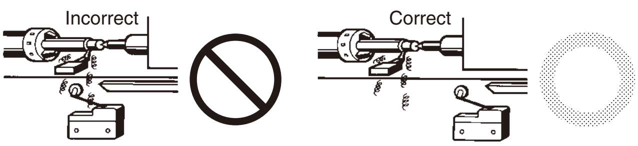
Precautions for Correct Use

Mounting Location

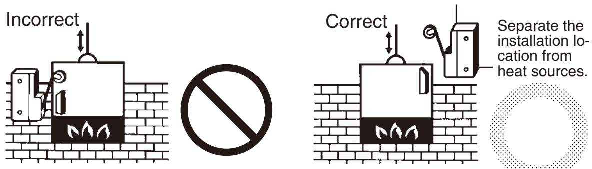
- Do not use the switch alone in atmospheres such as flammable or explosive gases. Arcing and heat generation associated with switching may cause fires or explosions.
- Switches are generally not constructed with resistance against water. Use a protective cover to prevent direct spraying if the switch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



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



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



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

- Subjecting the switch to continuous vibration or shock may result in contact failure or faulty operation due to abrasion powder and in reduced durability. Excessive vibration or shock will cause the contacts to operate malfunction or become damaged. Mount the switch in a location that is not subject to vibration or shock and in a direction that does not subject the switch to resonance.
- If silver contacts are used with relatively low frequency for a long time or are used with microloads, the sulfide coating produced on the contact surface will not be broken down and contact faults will result. Use a microload switch that uses gold contacts.
- Do not use the switch in atmospheres with high humidity or heat or in harmful gases, such as sulfide gas (H_2S, SO_2), ammonia gas (NH_3), nitric acid gas (HNO_3), or chlorine gas (Cl_2). Doing so may impair functionality, such as with damage due to contacting faults or corrosion.
- The switch includes contacts. If the switch is used in an atmosphere with silicon gas, arc energy may cause silicon oxide (SiO_2) to accumulate on the contacts and result in contact failure. If there is silicon oil, silicon filling, silicon wiring, or other silicon products in the vicinity of the switch, use a contact protection circuit to limit arcing and remove the source of the silicon gas.

Mounting

Always make sure that the power is turned OFF before mounting, removing, or wiring the Switch, or performing maintenance.
Electric shock or burning may occur.

Selecting Models

We recommend using Drip-proof Models (protection equivalent to IP62) in locations subject to floating dirt and dust. Other models do not have a protective structure.

Wiring

For wiring, use a wire size that is appropriate for the applied voltage and the supplied current. When soldering the Switch, make sure that the capacity of the soldering iron is 60 W maximum. Do not take more than 5 s to solder any part of the Switch. Using the Switch with incomplete soldering may result in errors and heat, which may cause burning. The characteristics of the Switch will deteriorate if a soldering iron with a capacity of more than 60 W is used or if any part of the Switch is soldered for 6 s or longer.

Tightening

The suitable tightening torque for screw terminals is given below.
Screw terminals except for those on Split-contact Models (Z-10FY-B)
: 0.78 to 1.18 N·m
Screw terminals on Split-contact Models (Z-10FY-B)
: 0.49 to 1.18 N·m

Operation

- Make sure that the switching speed and frequency are is within the specified ranges.

1. If the switching speed is extremely slow, the contacts may not be switched smoothly, which may result in a contact failure or contact welding.
2. If the switching speed is extremely fast, switching shock may damage the Switch prematurely. If the switching frequency is too high, the contacts may not be able to keep up with the speed.

The rated permissible switching speed and frequency indicate the switching reliability of the Switch.
The life of a Switch is determined at the specified switching speed. The life varies with the switching speed and frequency even when they are within the permissible ranges. Always conduct appropriate durability tests under actual conditions before using a Switch.

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

Panel Mount Switch (Z-15□Q□, Z-01□Q□)

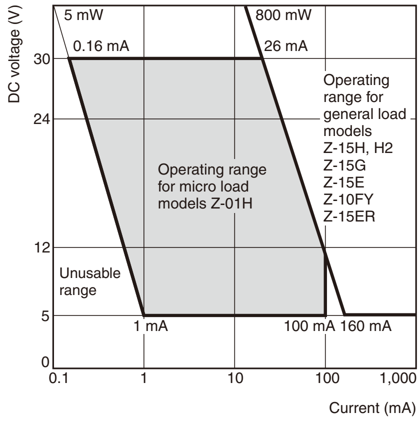
- When mounting the panel mount plunger model with screws on a side surface, be careful of the dog angle and operation speed. Excessive dog angle or operation speed may damage the Switch.
- When using the panel mount plunger model mounted with screws on a side surface, be careful not to apply a large shock. Applying a shock exceeding 1,000 m/s² may damage the Switch.
- When using the panel mount plunger model mounted with screws on a side surface, remove the hexagonal nuts from the actuator.

High-sensitivity Switch (Z-15H)/
Extra-high-sensitivity Switch (Z-15H2)

- When using the Switch in a DC circuit, be sure to provide an arc suppressor as well because the small contact gap of the Switch may result in contact troubles.
- In an application where a high repeat accuracy is required, limit the current that flows through the Switch to within 0.1 A. Also, use a relay to control a high-capacity load if the Switch is connected to such a load. (In this case, the exciting current of the relay coil is the load of the Switch.)
- Do not apply a force of 19.6 N or higher to the pin plunger.
- Exercise care that the environment conditions such as temperature and humidity do not change abruptly.

Micro Load Applicable Range

Using a model for ordinary loads to open or close the contact of a micro load circuit may result in faulty contact. Use models that operate in the following range. However, even when using micro load models within the operating range shown here, if inrush current occurs when the contact is opened or closed, it may increase contact wear and so decrease durability. Therefore, insert a contact protection circuit where necessary.
The minimum applicable load is the N-level reference value. This value indicates the malfunction reference level for the reliability level of 60% (λ 60). The equation, $\lambda\ 60 = 0.5\times10^{-6}$/operations indicates that the estimated malfunction rate is less than 1/2,000,000 operations with a reliability level of 60%.

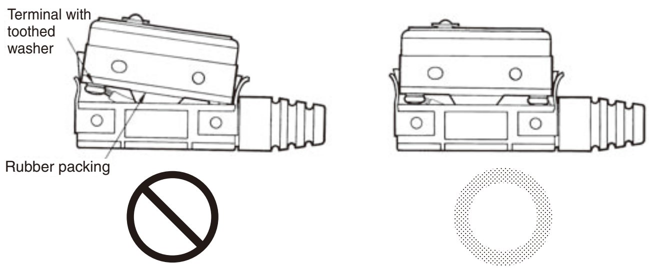


	Z-01H	Z-15□, Z-10FY
Minimum applicable load	1 mA at 5 VDC	160 mA at 5 VDC

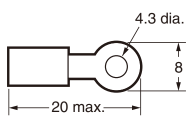
Models with Drip-proof Terminal Cover (Z-□A55-B5V)

Wiring

- To attach the Protective Cover to the case, hold the cover in almost parallel to the case and then push it to the case. If the cover is pushed diagonally, the rubber packing may slip off, degrading the sealability of the Switch.



- Use round solderless terminals having the following dimensions to connect leads to the terminals. Tighten the screws of terminals to a torque of 0.78 to 1.18 N·m. Use the terminal shown below.



- A cable 8.5 to 10.5 mm in diameter can be applicable to the sealing rubber of the lead outlet of the Switch. A two-core or three-core VCT cable having a cross-sectional area of 1.25 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.
- Rubber boots and rubber caps will tend to harden at lower ambient temperatures. If an Actuator is used in a pressed state for an extended period of time at low temperatures, it may return slowly or it may not return at all. OMRON can provide special Actuators for use at low temperature with rubber boots or rubber caps made of silicon rubber, which has superior resistance to cold. Ask your OMRON representative for details.

Split-contact Switch (Z-10F□Y)

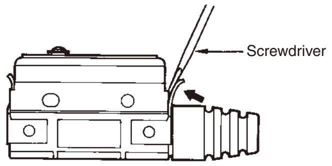
The applicable current varies depending on how the contacts are used. If the Switch is connected in series, the Switch can endure a current 1.5 to 2 times higher than the current that can be applied in parallel connection.

Flexible Rod Switch (Z-15□NJ□55, Drip-proof)

- When the rod is fully swung, the Switch may operate when the lever returns, causing chattering. Use a circuit that compensates for chattering wherever possible.
- Do not switch the rod to the fullest extent when the Switch is to break a power circuit because such a practice may cause metal deposition to occur between the mating contacts of the Switch.

Other Precautions

- Do not apply excessive force with a screwdriver or other tool when attaching or removing the Protective Cover. Doing so may deform the Switch.



- The Drip-proof Terminal Protective Cover can be sued only with Switches with model numbers ending in "-B5V."
- Only the Terminal Protective Cover is available for maintenance.

Accessories (Order Separately)

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

Drip-proof Terminal Cover (Order Separately)

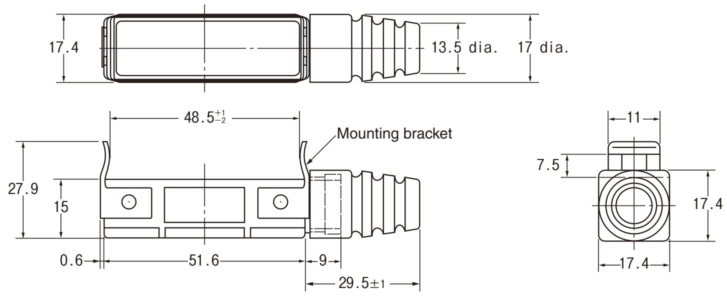
The Drip-proof Terminal Protective Cover is provided for maintenance for Z-□A55-B5V Switches.

Ordering Information

Name	Model
Drip-proof Terminal Protective Cover	AP-DV

Dimensions

(Unit: mm)



Safety Precautions for All Basic Switches

For the individual precautions for a Switch, refer to the precautions in the section for that Switch.

Precautions for Safe Use

Always observe the following cautions to ensure safety.

Mounting

Before mounting, dismounting, wiring, or inspecting a 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

- Do not perform wiring when power is being supplied to a switch. Also, do not touch any of the charged terminals when power is being supplied. Otherwise, electric shock may be received.
- Follow the instructions provided in *Correct Use* for all wiring and soldering work. Using a switch with improper wiring or soldering may result in abnormal heating when power is supplied, possibly resulting in burning.

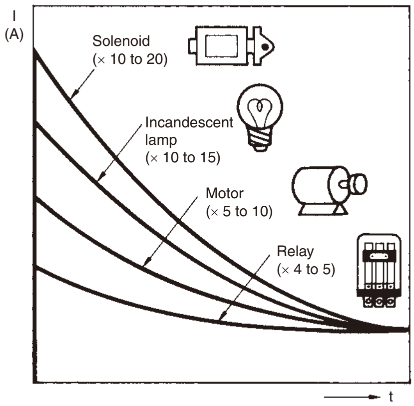
Contact Load

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

Load Types

Some types of load have a large difference between steady-state current and inrush current, as shown in the following diagram. Select a switch with ratings suitable for the type of load. The higher the inrush current in the closed circuit is, the more the contact abrasion or shift there will be. Consequently, contact welding or shifting may occur, possibly resulting in short-circuits or burning.

Types of Load vs. Inrush Current



Operating Atmosphere

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

Shock on Individual Switches

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

Durability

The durability of a switch greatly varies with switching conditions. Before using a switch, be sure to test the switch under actual conditions in the actual application and to use the switch within the switching operations causing no problem. If a deteriorated switch is used continuously, insulation failures, contact welding, contact failures, switch damage, or switch burnout may result.

Precautions for Correct Use

For details, refer to the *Precautions for Correct Use* in the *Basic Switches Technical Guide*.

Precautions for Correct Use of Basic Switches

Using Switches

- When switches are actually used, unforeseen accidents may occur. Before using a switch, perform all possible testing in advance.
- Unless otherwise specified, ratings and performances given in this catalog are for standard test conditions (i.e., 15 to 35°C, 25% to 75% humidity, and 86 to 106 kPa atmospheric pressure). When performing testing in the actual application, always use the same conditions as will be used in actual usage conditions for both the load and the operating environment.
- Reference data provided in this catalog represents actual measurements from production samples in graph form. All reference data values are nominal.
- All ratings and performance values provided in this catalog are the results of a single test each rating and performance value therefore may not be met for composite conditions.

Selecting Correct Switch

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

- Use the Selection Guide to select a suitable switch for the rated current, operating load, actuator type, and operating environment.
- It is not recommended to use a switch for a large current to switch a micro current, in terms of contact reliability. Select a switch that is suitable for the current actually being switched.
- Consider using a sealed switch in environments subject to water droplets.

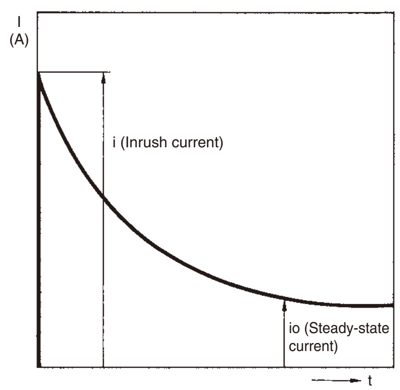
Electrical Conditions

1. Operating Load

- The switching capacity of a 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 a switch. The control capacity will drop drastically if it is a DC load. This is because a DC load, unlike an AC load, has no current zero cross point. Therefore, if an arc is generated, it may continue for a comparatively long time. Furthermore, the current direction is always the same, which results in contact relocation phenomena, and the contacts hold each other with ease and will not separate if the surfaces of the contacts are uneven.
- If the load is inductive, counter-electromotive voltage will be generated. The higher the voltage is, the higher the generated energy is, which increase the abrasion of the contacts and contact relocation phenomena. Make sure to use a switch within the rated conditions.
- If a switch is used for switching both micro and high-capacity loads, be sure to connect relays suitable to the loads.
- The rated loads of a switch are according to the following conditions:
  - 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.

Inrush Current



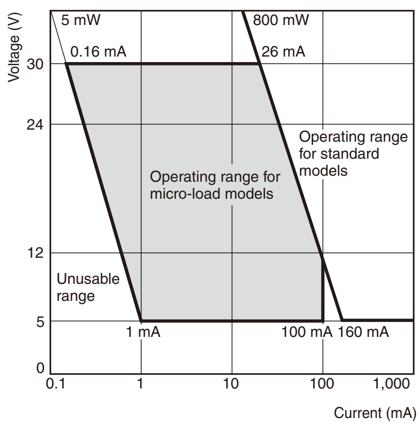
2. Using Switches with Electronic Circuits

- 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.
- Use microload switches that use gold contacts particularly if high contact reliability is required.
- In order to protect the Switch from damage due to short-circuits, be sure to connect a quick-response fuse with a breaking current 1.5 to 2 times larger than the rated current to the Switch in series. When complying with EN approved ratings, use a 10-A IEC 60269-compliant gI or gG fuse.

3. Using Switches for Micro Loads

Contact faults may occur if a Switch for a general-load is used to switch a micro load circuit. Use switches in the ranges shown in the diagram on the right. However, even when using micro load models within the operating range shown here, if inrush current occurs when the contact is opened or closed, it may increase contact wear and so decrease durability. Therefore, insert a contact protection circuit where necessary. The minimum applicable load is the N-level reference value. This value indicates the malfunction reference level for the reliability level of 60% (λ_{60}).

The equation, $\lambda_{60} = 0.5 \times 10^{-6}$/operations indicates that the estimated malfunction rate is less than 1/2,000,000 operations with a reliability level of 60%.

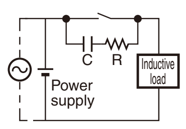
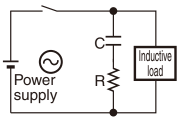
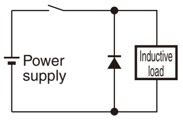
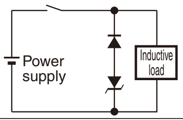
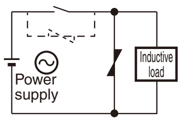


4. Contact Protective Circuit

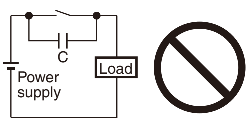
Apply a contact protective circuit (e.g., surge protector) to increase the contact durability, prevent noise, and suppress the generation of carbide or nitric acid. Be sure to apply the contact protective circuit correctly. Otherwise, an adverse effect may occur.
The following provides typical examples of contact protective circuits. If the 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 NOx, which will change into HNO_3 if it reacts with moisture. Consequently, the internal metal parts may corrode and the Switch may fail. Be sure to select the ideal contact preventive circuit from the following. Also, load operating times may be delayed somewhat if a contact protective circuit (a surge killer) is used.

Typical Examples of Contact Protective Circuits (Surge Killers)

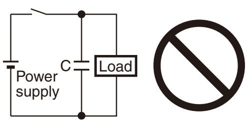
O: Applicable ×: Not applicable Δ: Conditional

Circuit example		Applicable current		Feature	Element selection
		AC	DC		
CR circuit		Δ *	O	* When AC is switched, the load impedance must be lower than the C and R impedance.	C: 0.5 to 1 µF 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. If, however, the ability to control arcs between contacts is a problem for high DC voltage, it may be more effective to connect a capacitor and resistor between the contacts across the load. Check the results by testing in the actual application.
		O	O	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		×	O	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		×	O	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		O	O	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.	Select the varistor so that the following condition is met for the cut voltage Vc. For AC currents, the value must be multiplied by $\sqrt{2}$. Vc > (Current Voltage × 1.5) If Vc is set too high, however, the voltage cut for high voltages will no longer be effective, diminishing the effect.

Do not apply contact protective circuit as shown below.



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.

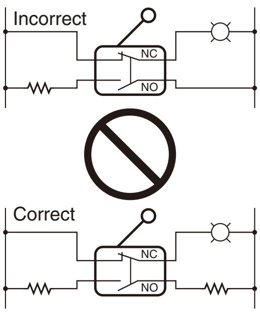


This circuit effectively suppresses arcs when the contacts are OFF. When the contacts are ON again, however, charge current flows to the capacitor, which may result in contact weld.

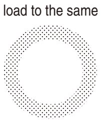
Connections

- With contact form Za, do not connect a power supply of different polarity or different types to one switch.

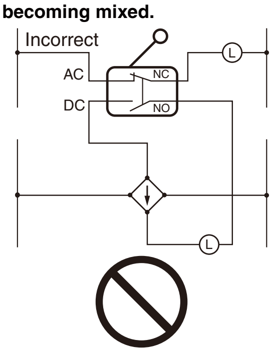
Example of Power Supply Connection (Connection with Different Polarity)



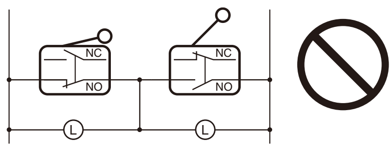
Connect the load to the same polarity side.



Example of Incorrect Power Supply Connection (Connection with Different Type of Power Supply) There is a danger of AC and DC becoming mixed.



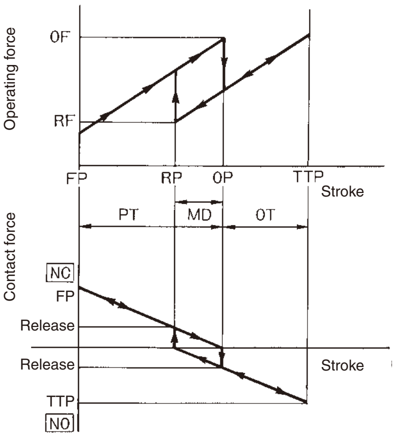
- Do not use a short-circuited circuit if a fault occurs. (Doing so may cause the current-carrying parts to fuse.)



Mechanical Conditions

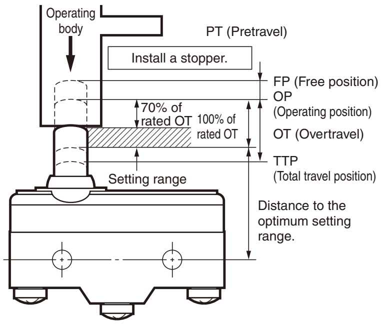
1. Operating Stroke Setting

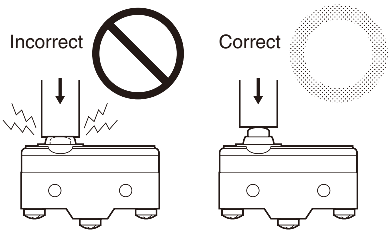
The setting of stroke is very important for a switch to operate with high reliability.
The chart below shows the relationship among operating force, stroke, and contact force. To obtain high reliability from a switch, a switch actuator must be manipulated within an appropriate range of operating force.



Be sure to pay the utmost attention when mounting a switch.

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





- If stroke is set in the vicinity of the operating position (OP) or the releasing position (RP), contact force may become unstable. As a result, the switch cannot ensure high reliability. Furthermore, the switch may malfunction due to vibration or shock.
- If stroke is set exceeding the total travel position (TTP), the moment of inertia of the operating body may damage the actuator or the switch itself, and the stress applied to the moving spring inside the switch will increase and then, the durability of the switch may be deteriorated.

2. 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 contact failures or contact welding.
- 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 indicate the operational reliability of the switch.
The durability of a switch is based on operation under specific conditions regarding the switching speed and switching frequency. The durability of a switch may not meet the durability due to conditions 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 durability.

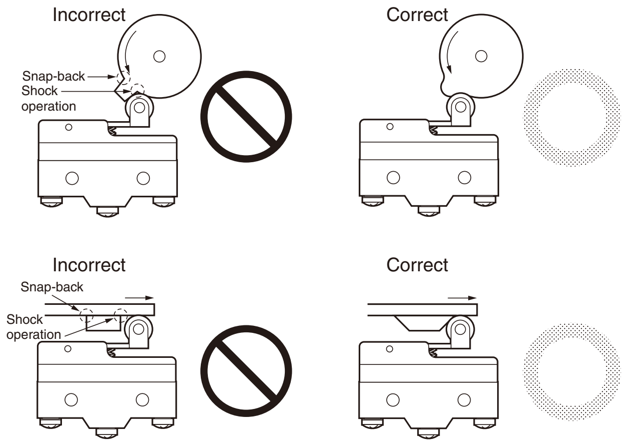
3. Operating Condition

Do not leave a switch with the actuator depressed for a long time, otherwise the parts of the switch may soon deteriorate and the changes of its characteristics operating may result.

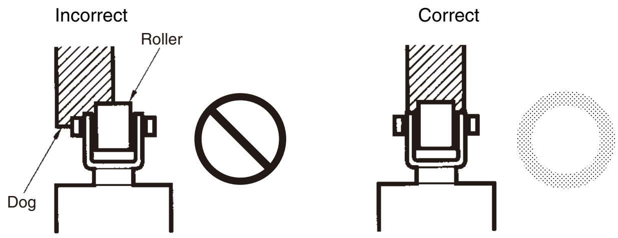
4. Operating Method

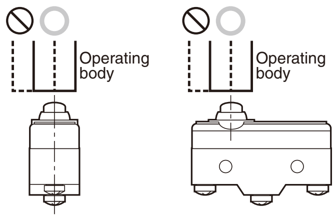
The operating method has a great influence on the performance of a switch. Consider the following before operating a switch.

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

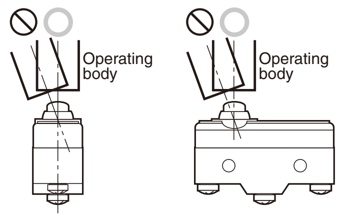


- Make sure that no improper force is applied to the actuator, otherwise the actuator may incur local abrasion. As a result, the actuator may become damaged or its durability may be deteriorated.

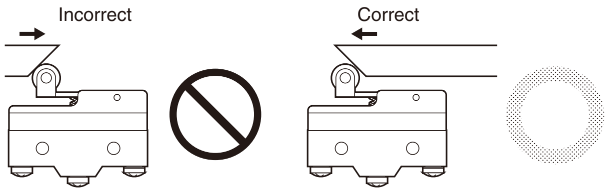




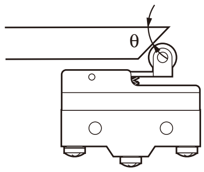
- Make sure that the operating body moves in a direction where the actuator moves. If the actuator is a pin plunger type, make sure that the operating body presses the pin plunger vertically.



- Operate the actuator of a hinge roller lever or simulated hinge lever type in the direction shown below.



- Set the angle of the cam or dog (θ) for roller levers and similar actuators to the range between 30° and 45°. If the angle is too large, an abnormally large horizontal stress will be applied to the lever.

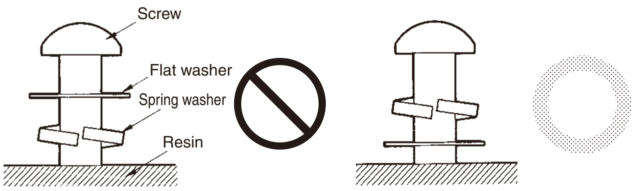


- Do not modify the actuator. If the actuator is modified, excessive external force may be applied to the internal switch mechanism, characteristics may change, and the switch may stop functioning.
- If an external actuator is used as an operating object, check the material and thickness of the lever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

Mounting

1. Securing

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



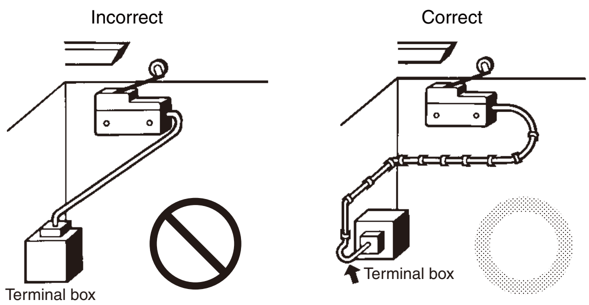
- Do not modify the switch in any way, for example, by widening the mounting holes.

Locking Agent

If glue or locking agent is applied, make sure that it does not stick to the moving parts or intrude into the inside of the switch, otherwise the switch may have operating failure or 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 glue or locking agent.

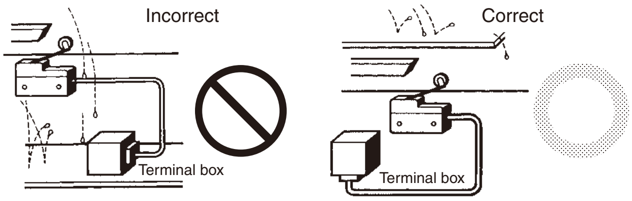
Wiring

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

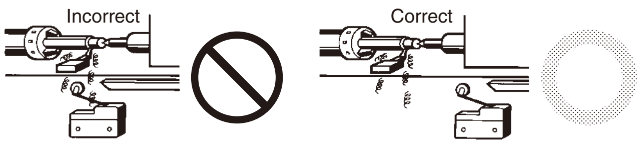


Mounting Location

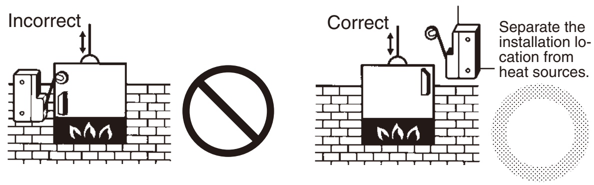
- Do not use the switch alone in atmospheres such as flammable or explosive gases. Arcing and heat generation associated with switching may cause fires or explosions.
- Switches are generally not constructed with resistance against water. Use a protective cover to prevent direct spraying if the switch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



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



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



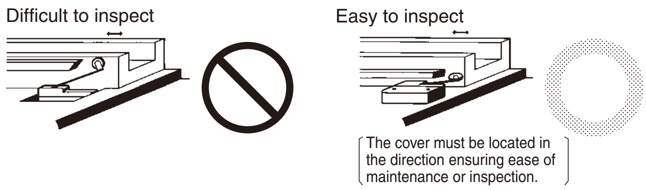
- Mount a cover if the switch is to be installed in a location where worker inattention could result in incorrect operation or accidents.

- Subjecting the switch to continuous vibration or shock may result in contact failure or faulty operation due to abrasion powder and in reduced durability. Excessive vibration or shock will cause the contacts to operate malfunction or become damaged. Mount the switch in a location that is not subject to vibration or shock and in a direction that does not subject the switch to resonance.
- If silver contacts are used with relatively low frequency for a long time or are used with microloads, the sulfide coating produced on the contact surface will not be broken down and contact faults will result. Use a microload switch that uses gold contacts.
- Do not use the switch in atmospheres with high humidity or heat or in harmful gases, such as sulfide gas (H_2S, SO_2), ammonia gas (NH_3), nitric acid gas (HNO_3), or chlorine gas (Cl_2). Doing so may impair functionality, such as with damage due to contacting faults or corrosion.

- The switch includes contacts. If the switch is used in an atmosphere with silicon gas, arc energy may cause silicon oxide (SiO_2) to accumulate on the contacts and result in contact failure. If there is silicon oil, silicon filling, silicon wiring, or other silicon products in the vicinity of the switch, use a contact protection circuit to limit arcing and remove the source of the silicon gas.

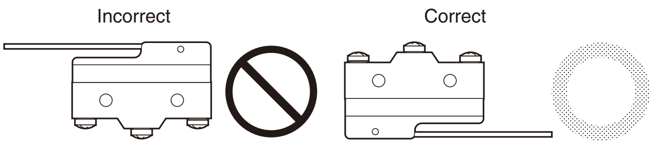
Maintenance and Inspection

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



Mounting Direction

When using a switch with a low operating force mounted with a long lever, make sure that the switch is mounted in the direction where the weight of the lever is not applied to the pushbutton directly, otherwise the switch may have releasing failures.



2. Terminal Connections

Solder Terminals

- When soldering lead wires to a switch, make sure that the temperature of the iron tip is 380°C maximum. Improper soldering may cause abnormal heat radiation from the switch and the switch may burn.
- Complete soldering within 5 seconds at 350°C or within 3 seconds at 380°C. If heat is applied for longer period of time, switch characteristics will be deteriorated, e.g., the case will melt and lead wire insulation will scorch.

Quick-Connect Terminals

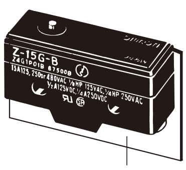
Use the specified receptacles to connect to quick-connect terminals. Do not apply excessive force horizontally or vertically to the terminals, otherwise the terminal may be deformed or the housing may be damaged.

Wiring Work

- When wiring a switch, check the insulation distance between the switch and the mounting plate. If the insulation distance is insufficient, use an insulation guard or separator. Be particularly careful when mounting a switch to metal.
- Use wire sizes suitable for the applied voltage and carrying current.
- Do not wire a switch while power is being supplied.

Using Separators

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



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Operation and Storage Environment

1. Handling

Do not apply oil, grease, or other lubricants to the sliding parts of a switch. The intrusion of oil, grease, or other lubricants into the internal part may cause operating failure or contact failure.

2. Storage Environment

When storing a switch, consider countermeasures (e.g., storing in a plastic bag) to prevent discoloration resulting from sulphurisation of terminals (silver-plated).

Make sure that the location is free of harmful gas and does not have high temperature or humidity. It is recommended that a switch be inspected before use if it is stored for three months or more after the production, depending on the location.

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